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# **Dilemmas of Educational Innovation**

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## Abstract

Education is reported to be in crisis. The needs and demands of learners are continuously evolving due to rapid changes in the socio-cultural and technological landscape, whereas pedagogy is slow to change. Institutions have been admonished that they need to encourage creativity and innovation in educational practices. Yet prior research shows that realising innovative pedagogical solutions is not easy for teachers because it involves complex dilemmas. This research investigated the experiences of tertiary level pedagogical innovators to identify dilemmas they encountered during the innovation process and the strategies they used to resolve them.

Interviews were conducted, either face-to-face or via Skype, with 30 research participants. The participants were all tertiary-level teachers who had led a team-based pedagogical innovation project and who had published about the innovation in peer-reviewed academic journals. In order to explore experiences of innovators, each interview was used to generate a cognitive map, and then the individual maps were combined into an aggregate map using *Decision Explorer*. The aggregate map was then explored and analysed to identify the dilemmas of innovators and the strategies used to resolve them. These findings were then reviewed, interpreted and discussed in the light of relevant literature.

Overall, the findings of this study reaffirm that pedagogical innovators encounter a range of dilemmas while realizing their innovations and the effective management of these dilemmas enables them to progress toward their intended pedagogical goals. Effective management usually involved the “through—through” thinking advocated by Trompenaars. The main contributions of this research are: the application of cognitive mapping to identification of dilemmas; the identification of thirteen distinct dilemmas that can be managed by educational institutions and innovative educators; and articulation of alternative ways of reconciling dilemmas. The findings may assist educators with choosing an appropriate course of action when facing a dilemma during their innovations.

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## **Dedication**

This thesis is dedicated to my parents, Farid Khan and Rabia Farid, to whom I owe everything.

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# **Chapter 1. Introduction to the Thesis**

Every year, hundreds of thousands of students around the world enrol for tertiary education, seeing it as a critical step to achieve their goals in life. For this education to be effective, educators need to design and adapt educational interventions that correspond to the changing needs of these students. The present thesis is an attempt to understand the experience of those tertiary level teachers who successfully introduce innovative teaching and learning practices.

The purpose of this chapter is to introduce the research. The chapter begins with an explanation of the motivation for the research. It then provides readers with a rationale for studying innovative tertiary teaching and discusses the importance of the study. The chapter also outlines the research question and research objectives. The scope and methodology of the research are introduced, and an overview of the structure of the thesis is provided.

## **1.1 Motivation for the Study**

I studied Training and Development as a compulsory course during my MBA (HRD) program at the Institute of Management Sciences (IMSciences), Peshawar, Pakistan. This course ingrained in me a belief that training was the best development and retention tool available for all kinds of organisations. Immediately after finishing the Masters Degree, in March 2005, I joined the National Database and Registration Authority (NADRA) Pakistan as an Assistant Manager in the Human Resource and Administration department. During the course of my work at NADRA, I observed that neither the organisation in general nor the individual employees in particular gave due importance to training, as a really useful tool. Instead of viewing training as a valuable solution to their performance and retention problems, NADRA considered training to be a direct cost, and therefore was not interested in investing adequately to improve the quality of their training programs through innovative practice. Likewise the employees viewed training not as a tool for personal development, but as days off from their jobs and a means of earning the transport and daily allowance (TADA allowance). This contrast between my beliefs about training and my observation of organisational reality created a dilemma for me. It seemed that one way to resolve this dilemma was to evaluate the effectiveness of training programs, to determine whether they

actually assist organisations in achieving their intended goals. I thought that evaluation could act as a force to improve the quality of HRD and to change some attitudes towards training.

To this end, I developed a training evaluation model from the literature and then applied it to a training program (Khan & Ramsey, 2013). The findings of that study convinced me that the way training is designed and delivered can greatly influence its effectiveness. This shifted my focus from training evaluation to instruction design and delivery. Both training and education involve the design and delivery of instruction and are considered crucial for economic, social and cultural development of a society. However, especially in Pakistan, education is considered by many to be more important than training because of its lifelong nature. Furthermore, education receives much broader attention in the literature due to its more comprehensive role in developing skills and knowledge (Wößmann & Schuetz, 2006). Yet, I reasoned that the processes of learning apply to both education and training, and some of the distinctions between education and training are arbitrary in nature (Ramsey, Khan & Weston, 2017).

When the opportunity arose to undertake research in the higher education context, I saw it as a way to contribute to both education and training, and to organisations both within academia and outside of it. Wherever I looked, it seemed that there were organisations and instructional programs that were in need of better approaches to learning, and I wanted to contribute. Thus, I eventually shifted my focus to higher or university education. However, I bring to the work a perspective based on my background in training and HRD.

This perspective influences my approach to research. In the case of this research, I find the use of dilemmas attractive because Dilemma Theory provides a sound methodology for the study, and because it is teachable. It appeals to me that outcomes from the study should readily inform training and HRD.

## **1.2 The rationale and importance of the study**

In order to be effective, educational systems need to respond to rapidly evolving demands of the labour market, new technological, economic and ecological challenges and to changing norms, values and practices of societies (Vieluf, Kaplan, Klieme & Bayer, 2012). Educational literature suggests that pedagogical learning theories are continuously evolving (Ertmer & Newby, 1993; Ertmer & Newby, 2013; Meriam,

2008); however, some suggest that pedagogy has not been changing accordingly (Evans & Mathew, 2012; Gray, 2011). Perhaps the way forward is to move away from traditional monolithic pedagogy (Bell, 2011; Jorgenson, 2006; Mazzocchi, 2008) toward more contextualised, personalised, collaborative and, if needed, technology-mediated learning programs (Christensen, Horn & Johnson, 2008; Ertmer & Newby, 2013; Paterson, 2009).

Kuhn (1962) argues that there is a state of crisis for a discipline when the prevailing paradigm does not meet the demands of a new situation, and a new paradigm is not yet established. Using this understanding of a paradigm shift as a backdrop, Robinson (2011) has described educational systems as being in crisis. To overcome this crisis, it is crucial to encourage educational innovation because successful innovations can generate the increased effectiveness stakeholders are demanding (OECD, 2009; Christensen, Horn, & Johnson, 2008). To put it differently, the existence of crisis and confusion around theory and practice should encourage experimentation and innovation (Garcia, 2012). Educational literature, however, indicates that instead of initiating and supporting innovation, reform and change activities, the reaction of many teachers is to resist them (Beck, Czerniak, & Lumpe, 2000; Clair, 2008; Fullan, 2001; Hunzicker, 2004; Lucas, Claxton & Spenser, 2013).

What stops teachers from engaging in innovative teaching practices? As we will discuss in Chapter 3, research into this question has identified myriad factors that act as barriers or facilitators to teachers' adoption of innovation (Akomolafe, 2011, Banaji, Cranmer & Perrotta, 2013; Beck, Czerniak, & Lumpe, 2000; Clair, 2008; Fullan, 2001; Girvan, Greenberg & Baron, 2000; Conneely & Tangney, 2016; McLaughlin & Talbert, 2001; Nisbet & Collins, 1978; Lucas, Claxton & Spenser, 2013; White, 2007; Wong & Cheung, 2009). Further, factors often involve dilemmas, where efforts to address one important factor make it more difficult to address another equally important factor.

Managing all the factors mentioned in the literature seems beyond any teacher's ability because of the dilemmas or trade-offs involved. For instance, time given to developing one's own capabilities is time that cannot be spent on shaping the nature of the innovation. Clearly, innovative teachers will also face dilemmas because of gaps between what ought to be and what is (Walker, 2004; Windschitl, 2002; Yin, 2015). The nature of dilemmas like this is that they are difficult to deal with (Cabaroglu &

Tillema, 2011; Wegner, Anders & Nückles, 2010), however, if reconciled properly, they can assist the teacher innovator in achieving their goals related to developing, implementing or sustaining innovations (Pareja-Roblin & Margalef, 2013). So, while dilemmas initially appear negative and problematic, they can produce positive outcomes for an innovation.

Dilemmas are important because of the role they can play in shaping how people think about and respond to challenges. As will be discussed in Chapter 3, patterns of dilemma resolution can shape the thinking of decision makers in ways that are not recognised, but which have a major impact. Consequently, they have been investigated and discussed in the literature in the context of teachers' work (Ben-Peretz and Kremer-Hayon, 1990; Berlak and Berlak, 1975; Buzzelli & Johnson, 2001; Cabaroglu, 2014; Cabaroglu & Tillema, 2011; Enyedy et al., 2006, Lampert, 1985; Olson, 1981; Pareja-Roblin & Margalef, 2013; Qoyyimah, 2015; Shapira-Lishchinsky, 2010; Tillema, 2004; Tillema, & Kremer-Hayon, 2002; Tirri, 1999; Tirri, 2009; Titti & Hussu, 2002;). There are also some studies available in the literature on the dilemmas experienced by teachers during change, reform and innovation (Olson, 1981; Enyedy, Goldberg & Welsh; 2006; Chee, Mehroratra & Ong, 2015; Briant & Doherty, 2012; Qoyyimah, 2015). This literature will be discussed in depth in Chapter 3.

Despite the attention already given to teaching dilemmas there are gaps in the literature which ought to be addressed. Much less attention has been paid in the literature to dilemmas experienced by university teachers working on innovative projects and still less to how they respond to these dilemmas. Moreover, in preparing for this research no study was located which investigated the dilemmas experienced by innovative teachers working in groups on teaching innovation. Lastly, the methods and approaches used in most studies to elicit and represent dilemmas have been criticised as not sufficiently rigorous (Briant & Doherty, 2012; Chee et al., 2015).

The present study aims to contribute to the gaps in the research literature mentioned above. The study uses the experiences and understandings of 'successful innovators' to identify and understand dilemmas that are experienced by university teachers during innovative teaching projects. The findings of the study will contribute to a better understanding of the dynamic relationships between different factors in teaching environments. Knowing which dilemmas they may face during their innovations and

which coping strategies can help them to reconcile these dilemmas may assist teachers in better managing their innovations. The findings of this study will be beneficial to educators, administrators, policymakers, researchers and all those who are interested in understanding the complex process of pedagogical change.

### **1.3 Research Question and Objectives**

The study aims to answer the following question:

*What are the dilemmas experienced by innovative university educators during the process of innovation, and how do they respond to these dilemmas?*

The phrase 'the process of innovation' here means a series of phases an innovator must go through before successfully completing innovation. Given the needs for new approaches to tertiary education, the study is focused on how the process of innovation has been applied to university instruction, with the aim of producing better learning outcomes for students. The process of innovation will be discussed in detail in Chapter 2.

The term 'dilemma' as used in the Research Question, refers to a choice between two positive outcomes, where choosing one appears to mean sacrificing the other. Dilemmas that people encounter and the strategies they use to resolve can provide valuable insights. Understanding the dilemmas that are relevant to educational innovation may produce a better understanding of the thinking patterns that characterise innovators, and may be able to guide efforts to support and encourage their efforts. The dynamics of how people respond to dilemmas is the subject of Dilemma Theory, which will be outlined in Chapter 3.

The term 'innovative university educators' is used to indicate university teachers who stand out from the majority of teachers, in the way they not only embrace pedagogical change but initiate it. Assuming that the rate of innovation in education needs to increase, as suggested by the commentators' mentioned earlier, it is important to understand the thinking of those who are personally motivated to initiate innovation. Selection of innovative educators is discussed in detail in Chapter 4. Lastly, the word

‘respond’ in the research question indicates that the research aims to uncover strategies employed for dealing with the dilemmas once they arise.

The present study has two main objectives. The first is to explore the dilemmas experienced by tertiary innovative educators while developing and implementing their educational innovations. The second is to identify resolutions employed by the teachers to respond to their dilemmas. By exploring what dilemmas arise during educational innovations, and how successful innovators respond to them, I hope to generate insight into how the innovation process can be managed.

## **1.4 Research Design**

While the methodology of the study will be considered in detail in Chapter 4, some aspects are briefly described here in order to give context to the chapters that immediately follow and to indicate how this research contributes to research methodology regarding dilemmas.

There were three main points that were considered to uncover the dilemmas experienced by university teachers during their educational innovations. First, successful innovative university educators were identified and selected as research participants. They were selected because, on the face of it, it was likely that in order to realise their innovations they would not only have experienced dilemmas but would have successfully resolved many of the dilemmas they faced. Second, participants were encouraged to explain their experiences at length in their own words. This allowed the researcher to capture participants' feelings and experiences. Third and the last, Cognitive Mapping was chosen as the central data analysis technique. Cognitive mapping allowed causal connections between events, objects and concepts to be represented graphically, thus placing dilemmas and reconciliation strategies in the distinct context created by the individual's perception. The technique allowed the investigator to create a “picture” of the participants' thinking about their innovations.

The use of semi-structured interviews as a means of gathering rich data from participants is well established. On the other hand, cognitive mapping has not previously been used as an analysis technique in dilemma research. The utility of this contribution to research methodology will be discussed in Chapter 7.

## **1.5 Structure of the thesis**

The thesis consists of seven chapters. This first chapter gives a brief overview of the research, and sets the direction for the thesis. The remainder of the thesis is organised to present the review of relevant literature, research methodology, findings, discussion, conclusions and implications. A brief description of each chapter follows.

Chapter 2: Educational Innovation. This chapter first explores the process of innovation and how it applies in education. Then, it examines types of educational innovation and factors impacting innovative behaviour of teachers.

Chapter 3: Dilemma Theory. This chapter outlines the concept of dilemma and how it can be used as a window to understand mental models. The chapter also discusses the dilemma reconciliation process and provides useful guidelines about how to read dilemma helix diagrams.

Chapter 4: Research Methodology. As the name indicates this chapter highlights the overarching research strategy adopted for this study. It describes the paradigmatic framework and methodological orientation of the study along with the methods employed to collect and analyse data. Particular attention is given to the process of cognitive mapping.

Chapter 5: Findings. This chapter presents the results of the analysis conducted on the data obtained from innovative educators. Cognitive maps and thematic analysis are used to describe the dilemmas experienced by innovators, along with the various reconciliation strategies they adopted.

Chapter 6: In this chapter the significant findings of the study, in particular the 12 dilemmas experienced by participants, are discussed in relation to relevant literature. The resolution strategies described by participants are also considered, along with consideration of the potential effectiveness of strategies in light of Dilemma Theory.

Chapter 7: Conclusions and Implications. This is the final chapter of the thesis. It begins with a summary of the previous chapters. The chapter then highlights how the study has answered the research question. It goes on to consider the implications of the research for practitioners, university administrators, and policy makers. Implications considered

relate both to the research findings on dilemmas and the methodology used. Finally, the limitations of the study and future research directions are discussed.

## **1.6 Summary**

Realising creative solutions to complex problems always involves reconciling dilemmas (Hampden-Turner, 2007). The field of education is considered by many commentators to be facing dramatic and complex problems that require innovative thinking, particularly by teachers. Innovator educators, like other innovators, face dilemmas which they must reconcile in order to develop and implement their innovations (Pareja-Roblin & Margalef, 2013). This thesis aims to uncover some of the tensions tertiary teachers encounter while developing and implementing creative educational solutions. This chapter introduced the research, by explaining the motivation, purpose, importance, scope and methodology of the study. The chapter also outlines the structure of the thesis.

The next chapter reviews the literature relevant to the process of innovation with particular emphasis on innovation in education.

## **Chapter 2. Educational Innovation**

Given that the focus of this research is the dilemmas encountered in educational innovation, it is important to have an understanding of what constitutes innovation, especially in the context of the education, and how it happens. This chapter therefore begins by discussing the concept of innovation before describing the process by which innovation takes place. Then, the types of educational innovation, the main approaches to introducing innovation, and the role of teacher in educational innovation are considered. Finally, the chapter discusses factors that can potentially impact teachers' ability to innovate, and their behaviour with regard to developing or adopting innovations of others.

### **2.1 What is innovation?**

The term innovation is derived from the Latin word “*innovatio*” which means to renew, restore or to change (Clapham, 2003). The etymology of the term suggests that innovation is a phenomenon of purposeful change that refreshes or renews. In organisational literature innovation is described as: doing things differently in the realm of economic life (Schumpeter 1939); a means by which entrepreneurs exploit change (Drucker, 1985); the creation and implementation of new alternatives to enhance performance (Norman, 1993); the taking of a novel idea into implementation (Freeman & Soete, 1997); the process through which creative ideas are successfully implemented (Cerami, 2000); where invention is implemented and taken to the market (Chesbrough, 2003); and where opportunity is turned into an idea and put into practice (Tidd, Bessant & Pavitt, 2005). Other commentators express further nuances of the innovative process (Zaltman, Duncan & Holbeck 1973; Eveleens, 2010; Smith, Busi, Ball & Van Der Meer, 2008; Nobre, Walker, & Harris, 2012). Others have discussed the challenge of providing a comprehensive definition, emphasising the ‘elusiveness’ surrounding the concept of innovation (Lloyd-Reason, Wall & Muller, 2002; Rip, 2012). Evidently, innovation is a multifaceted term, showing various aspects depending on the viewing angle. The ambiguity surrounding the concept of innovation has prompted many authors and researchers to extensively research innovation from various angles and perspectives (Rip, 2012; Smith et al. 2008).

Innovation, invention, and reform may be used interchangeably in daily conversations. However, there are subtle, but important, distinctions between these terms. Treating these terms as synonyms of each other can lead to perplexity and wrong conclusions (Spanos, 2014). Moreover, comparing and contrasting the terms can assist in understanding the concept of innovation and provide a stronger foundation for the methods adopted in this research.

Educational reform refers to the planned change to improve educational quality by correcting perceived educational problems (Brand, 2009; Hess, 2011). In elaborating the distinction between reform and innovation, Sack (1981) emphasized two points: (1) a reform, unlike an innovation, is generally initiated by top management at the organisational or national level; and, (2) its scope is quite broad in comparison to an educational innovation. Reforms are generally planned at the central level and tend to bring system-wide change, whereas innovations are planned at the local level and tend to bring improvement in some particular component of the educational system. Thus, as suggested by Adams (1978), reform is actually the generalisation of an innovation.

At first glance, it may seem that there is no difference between innovation and invention, as both phenomena deal with the novelty of an idea, principle, product, service or process (Chesbrough, 2003). However, innovation is typically defined as the adoption of a novel idea, practice or object (Rogers, 1995; Bailey and Ford, 2003, P.248; OECD and Eurostate, 2005). Invention, on the other hand, refers to something not previously demonstrated to be possible in practice (Schumpeter, 1912, p.66; Lane & Flagg, 2010; Gaynor, 2012). For instance, inventions include the periodic table, equation of relativity, the first working television system, the internet, the first modern automobile, and the first transistor. Invention involves something that emerges as a consequence of absolute creativity (OECD, 2009) whereas with innovation novelty is relative to the context (Rogers, 1995).

Schumpeter, the pioneer of innovation-based economics, also regarded invention and innovation as two distinct concepts. He differentiates between them on the basis of their potential for commercial usage (Schumpeter 1947). He views invention as an act of pure intellectual creativity, which might or might not induce innovation, whereas innovation is an act that has the potential to bring change in the factors of production to produce goods (Schumpeter, 1939). Schumpeter viewed innovation as an act that involved

potential economic benefits through application of an invention at commercial level (Schumpeter, 1939).

Modern-day scholars, unlike Schumpeter, consider innovation not only free of values but as a comprehensive system that includes a range of activities from invention to its first time successful application, so that the system tends to satisfy the requirements and meet the goals of recipients in a novel way (Kotsemir, & Meissner, 2013). According to Bailey and Ford (2003) invention is both a distinct concept and at the same time an essential part of the innovation process. They state that “innovation occurs when individuals produce novel solutions, and members of the relevant domain adopt it as a valuable variation of current practice” (p. 248).

For Merton Flemings, director of the Lemelson-MIT Program, invention and innovation are two interrelated but distinct concepts. He views invention as a spark that has potential to spur innovative activity. Gaynor (2012) also assumes innovation as a transformation of an invention into a novel and workable solution. Once an innovation has proven its worth, those at the centre of larger systems may engage in reform in order to extend the value of the innovation to others.

## **2.2 Innovation in Education**

Various aspects of educational innovation, such as the concept of innovation in education (Cox, 2008), the types of innovation in education (Hargreaves, 2004), the process of formulating innovative curriculum and teaching approaches (Shield, 1996; Richard, 2013), the barriers to innovation in education (Nisbet, 1978; Hannan & Silver, 2000; Ginsberg, 2011), the role of teachers in innovative teaching (De Lano, 1994; Lieberman & Pointer Mace, 2008; UDL, 2009; Bakkenes, Vermunt & Wubbels, 2010), and students’ reaction to innovative teaching (Pepper, 2010; Seidel & Tanner, 2013; Vuorela & Nummenmaa, 2004) have been discussed extensively in mainstream educational literature. Wolff (2007), therefore, holds that education is a discipline in which innovation has been thoroughly researched and discussed.

Although experimental learning and other related concepts emerged somewhere around the late 1940s and early 1950s the formal definition of educational innovation did not appear in the educational literature until 1964 when Matthew Miles wrote the book

*Innovation in Education*. He defined educational innovation as a wilful and planned-for change placed in response to internal as well as external pressures to enable the system to achieve its intended goals and objectives in a relatively more efficient manner. Since that time the term educational innovation has been defined in a variety of different ways. Most definitions make use of three key terms: change, newness (or novelty) and improvement (or development).

Change is perhaps one of the most frequently used terms to define educational innovation (Cerna, 2014; Cranmer & Ulicsak, 2015; Hurst, 1978; Nisbet & Collins, 1978; Pedro, 2010; Perillo, 2007; Railean, 2015; Rich, 1981; Sikorsk, Turnbull, Thorn & Bell, 1976; Tella & Tirri, 1999). According to Oxford English Dictionary, the term “change” refers to an act or process of alteration in the structure or function of an object. Generally, there is neither a positive nor a negative connotation attached to the term ‘change’ so it can be used to denote improvement as well as deterioration in an object or system. However, in the context of defining educational innovation, it has always been used in a positive sense. Rich (1981), therefore, states that while “there could be no innovation without change, most changes are not innovation” (p.45). In summary, an educational innovation must involve a purposeful, positive change in the educational system.

Many authors also use “novelty” or “newness” while defining an educational innovation (Dill & Friedman, 1979; Fullan, 2001; Fullan & Park; 1981; Hamilton, 1995; Hart, 2009; Karawas-Daukas, 1998; Lee, 2011; Markee, 1997; Ng, 2011; Nicholls, 1983). Novelty or newness in the context of innovation does not mean that the practice or artefact should be novel in an absolute sense, as is in the case of invention. It just means that the product or service created should be “perceived as new by individual or other unit of adoption” (Rogers, 2003, p.12). Hannan and Silver (2000) put this idea in these words:

An innovation in one situation may be something already established elsewhere, but initiative takers and participants see it as innovation in their circumstances. Such changes may be new to a person, course, department, institution or higher education as a whole. (p.10)

From this perspective, an innovation can be based on old ideas or practices that were originally conceived for another unit. According to Betchard and Pelletier (2001) and Walder (2014), any educational practice that intends to enhance student learning in ways other than the traditional lecture can be considered an educational innovation. As novelty is a prerequisite for innovation, it should be included in the definition of educational innovation.

Another key concept used to define educational innovation is “improvement”, or “development” (Basharina, 2009; Bechard, 2000; Cerna, 2014; Hargreaves, 2011; Hart, 2009; Lee, 2011; Markee, 1997; Morrish, 2013; Nisbet & Collins, 1978; Nicholls, 1983; Parlar, 2017; Walder, 2014). Both these terms indicate the same phenomenon, that is, betterment, addition, or other enhancement to an educational product or process. This is perhaps the most important aspect of educational innovation. Kimberly (1981) pointed out that if an innovation is not perceived to improve a product or practice then it cannot be considered an innovation. All educational innovations intend to “add value to the educational process” (Pedro, 2010, p.4).

Based on the forgoing discussion, educational innovation, for the existing study, is defined as:

*A change process that is deliberately undertaken to realise a novel product, process or practice in order to improve educational outcomes.*

### **2.3 The Process of Innovation**

As discussed in the previous section, innovation is not a one-off event or an outcome but a process of translating ideas into novel outcomes (Hasanefendic, Birkholz, Horta & van der Sijde 2017; Walder, 2014). The word ‘process’ indicates a series of steps that could either be linear or dynamic. Innovation related literature reveals various points of view with regard to the innovation process, resulting in a range of innovation process models (Eveleen, 2010; Kotsemir & Meissner, 2013; Rogers, 2003). The underlying assumption of all the models is the same: that the innovation process can be somehow described and visualised in terms of activities (Kotsemir & Meissner, 2013). The variety among innovation process models, on the one hand, indicates that each of these models has been developed for a certain context and a specific purpose (Eveleen, 2010). On the

other hand, the range of models also suggests that understanding of the innovation process itself is evolving. The evolutionary development of the innovation process is captured by two equally important strands of research based on two different major perspectives: management and conceptual (Kotsemir & Meissner, 2013). The management perspective deals with management of the innovation process under different social, economic and political circumstances. It sees innovation from the perspective of the firm. The conceptual perspective, however, tends to evaluate the ability of innovation models to describe the reality of the innovation process. As a result, the conceptual perspective deals more with the evolution of innovation models themselves rather than their application to particular contexts.

Marinova and Philmore (2003) and Goldin (2008, 2009) have comprehensively tracked the evolutionary development of innovation from the conceptual perspective. They noted that the process has evolved from a linear sequence of activities, in which innovations are developed step-by-step, to a highly complex, nonlinear and interactive process.

Rothwell (1994), Jacob and Snijders (2008) and Eveleen (2010) take a management perspective while describing the evolution of innovation process. The major focus of their work is on the continuously evolving strategies of firms that have generated innovations in the constantly changing socioeconomic and political context. Rothwell (1994) found that in the context of large product-oriented organisations the innovation creation process has evolved from a simple and linear process involving basic research into a highly complex process that requires integrated development and networking, the use of information systems, strategic collaboration between organisations, and so on. Eveleen (2010), who examined all innovation process models that appeared during the period from 1962 until 2008, also concludes that innovation typically progresses in a non-linear and unpredictable manner. He suggests, however, that there are five broad stages that can be distinguished from one another: idea generation; selection of idea; developing and testing; implementing; and evaluation.

In the context of educational change, Duke (2004) reviewed various models that are considered significant in the literature such as Havelock's six-stage change model (1973), Kanter's three-stage change model (1988), ACOT five-stage technology integration model (1991), Roger's five-stage innovation diffusion model (1993), Kotter's

eight-stage model (1996) and Chamber's cyclic innovation model (1997). He arrived at the conclusion that all innovation models share four broad common activities: discovery, design, development and implementation.

Most of the models mentioned above were not developed specifically for the context of educational change. There are many models that are proposed in the literature that deal specifically with educational change, such as Beman (1981), Miles (1986), Fullan (1991), Depover and Strebelle (1997), Levine (1980), Inbar (1996), Lachiver and Tardif (2002) and Walder (2014). Each of these models is shown in Table 2.1.

As shown in Table 2.1, the models of educational innovation all present the process as a series of stages. There is variation in the names given to stages and some models present stages in broader terms than other models. Nevertheless, the basic structure of the stages presented is consistent across the models. This structure, which will be useful for guiding methods used in this research, is discussed below.

“Initiation” (Beman, 1981; Fullan, 1991; Miles, 1986) which is also called “adoption” (Depover & Strebelle, 1997) involves analysing the situation and establishing a plan for developing or adopting an innovation. Some of the activities that are typically performed during this stage include: need assessment, alternative solutions development and a decision to start the innovation (Fullan, 1991). Levine (1980), Inbar (1996) and Lachiver and Tardif (2002), however, suggest that the first stage of innovation process involves only need assessment and problem definition. While explaining the importance of this stage, Inbar (1996) argues that the act of fully understanding the problem in its unique context is essential for developing an effective vision for its solution (Inbar, 1996; Lachiver & Tardif, 2002). The vision outlines broad goals along with main actions and activities that need to be undertaken to accomplish the goals (Inbar, 1996). Walder's (2014) model divides the initiation phase into three distinct stages. In the first stage, which she termed “Source”, the teacher innovator makes a conscious decision to construct a pedagogical innovation in response to factors like one's own conception of the act of teaching, dissatisfaction with a course that is taught in a traditional manner, discussion with colleagues, literature review and past pedagogical training. According to her, once the decision is made to pursue innovation, the second stage ‘Intervention Type’ begins. This stage involves making two important decisions. The first is to decide whether the intervention should be carried out individually or as a team. The second

decision is about whether the innovation should be implemented by the innovator or the institution.

Table 2.1 Models of educational change

<b>Educational change process models</b>					
Beman (1981), Miles (1986) and Fullan (1991)	Depover and Strebelle (1997)	Levine (1980)	Inbar (1996)	Lachiver and Tardif (2002)	Walder (2014)
Initiation	Adoption	Recognizing a need	Understanding	Need analysis	Source
		Planning and formulating solutions	Vision		
Implementation	implementation	Initiating and implementing a plan	Expectations Empowerment	Development Implementation	Integration
		Institutionalizing or terminating the results	Supportiveness		
Institutionalization	Routineization			Evaluation	Evaluation
					Continuity and improvement
					Propagation
					Consequences

Table 2.1 Models of educational change

The third stage, “Support”, involves identifying and locating necessary resources for the development and implementation of the innovation (Walder, 2014). Overall, in terms of similarities, all the identified models assume that the early stage (or stages) of the innovation process basically involves need identification and analysis and idea or plan formulation or adoption.

According to Levine (1980) an idea is a starting point of the innovation process. In most cases, ideas are left at the conceptual level and are not operationalised (Inbar, 1996); realising an idea into an innovation generally involves situations that are “difficult, sinuous and sometimes chaotic” (p.7). Beman’s (1981), Depover and Strebelle’s (1997), Miles’s (1986) and Fullan’s (1991) ‘Implementation’, Levine’s (1980) ‘Initiating and Implementing a plan’ and Walder’s (2014) ‘Integration’ stages deal with the development and implementation of innovation. Some of the main activities that are undertaken during this stage include: distributing responsibilities among stakeholders, seeking and deploying required resources, testing the innovation and integrating innovation into practice. Inbar’s (1996) and Lachiver and Tardif’s (2002) models, unlike the other models, make a clear distinction between translating vision into an action plan and putting innovation into practice. Inbar’s (1996) ‘Expectations’ stage involves translating vision into clear expectations and assessing whether the goals set for innovation could be attained. In the ‘Empowerment’ stage authority and responsibilities are delegated to those who are involved in the process of change to make the implementation of innovation possible and smooth (Inbar, 1996). Lachiver and Tardif (2002) propose somewhat similar activities in their ‘Development’ and ‘Implementation’ stages. In the former stage resources are mobilised and effective schedules are developed; and in the latter stage activities like pilot testing, training assistants and students and making changes to other related educational practices are carried out to make implementation effective and efficient.

In most of the educational innovation models, innovation sustainability is the final stage and occurs after development and implementation of the innovation. According to Depover and Strebelle (1997) sustainability is a broad and abstract concept indicating stabilization and continuation of an innovation without external support. In other words, an educational innovation can be considered sustained if it successfully displaces the previous practice and becomes a main and established practice (Fullan, 2001). Different authors have used different terms to denote sustainability, such as institutionalization

(Beman, 1981; Fullan, 1991; Miles, 1986), routinization (Depover & Strebelle, 1997), and supportiveness (Inbar, 1996). The sustainability stage involves the following main activities: the decision and commitment of stakeholders to maintain and support innovation; eliminating and replacing competing practice; establishing monitoring processes to evaluate the innovation; and refining the innovation to meet stakeholders' needs and expectations.

Unlike other models considered, Lachiver and Tardif, (2002) and Walder (2014) suggest that implementation of innovation leads to an 'Evaluation' stage. They agree that during this stage, innovative teachers reflect and obtain relevant feedback from the main stakeholders to evaluate the impact and efficiency of their innovations. As 'Evaluation' is the last stage in Lachiver and Tardif's (2002) model, they suggest an additional activity, which is to continuously make changes to the innovation to keep it relevant to the needs of stakeholders. Walder's (2014) model, however, mentions three additional stages that lead to the completion of innovation process: continuity and improvement, propagation and consequences. The first stage involves improving innovation on the basis of personal reflection and the feedback from stakeholders. This is followed by 'propagation' in which the teacher innovator disseminates his or her innovation both within and outside the university. This stage leads to the final stage that is 'Consequences'. During this stage the teacher innovator informs others about the positive impacts of his or her innovation via publishing articles in academic journals, participating and making presentations in academic conferences and writing books or book chapters.

The discussion above highlights that, while a variety of models propose that there are characteristic features of the innovation process there is no agreed number of stages in the innovation process. Those presenting models aim to articulate the activities that need to be represented in a process if an innovation is to achieve success. The literature published in the context of business organizations (Eveleen, 2010; Goldin (2009) as well as education (Duke, 2004; Fullan, 2001; Skilbeck, 1984) agrees that innovation is a non-linear and complex process. In Davis and Krajcik's (2005) words "educational innovation involves iterations of developing, implementing, testing, and refining ideas" (p.4). This means that the stages proposed in an innovation process model do not necessarily represent a sequential line of operation but are concepts that tend to assist in

unravelling the complexities involved in conceiving, developing, executing and stabilizing an innovation (Skilbeck, 1984).

All of the models reviewed, both from business and educational literature, have some broad commonalities. All innovation process models include the following main activities: (a) idea formulation, (b) innovation development and implementation, and (c) innovation sustainability. These activities are common to both individual and team-based innovation projects. In team-based innovative projects, however, there is an additional activity, which is ‘Team building’. Depending upon the requirements of the innovation, this activity may be carried out at any stage of the project. Walder’s (2014) model suggests that after deciding to undertake an innovation, innovative teachers make the decision whether to carry out the remaining process individually or as part of a team. The logic dictates that, in such a case, the next step after ‘idea formulation’ should be ‘team development’. Because innovation is an iterative rather than sequential process, the placement of team building in Figure 2.1 is somewhat arbitrary. It needs to be represented, but may occur in different places or throughout the process. Thus, team based pedagogical innovations may involve four broad steps shown in the following figure.

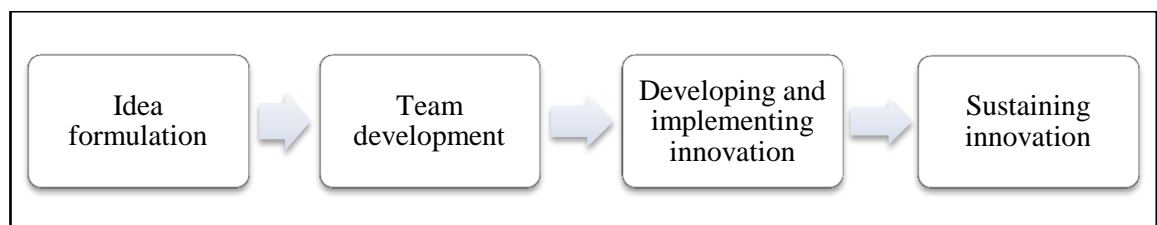


Figure 2.1 *The innovation process*

The four-step process shown in Figure 2.1 was used as the basis for developing the interview questions used in this research. The literature reviewed in relation to the innovation process also provides a basis for methods adopted in the research; in particular, the non-linear nature of innovation has informed choices regarding the approach to analysis of interview data.

## **2.4 An Overview of Innovation Types**

Kubler (1972) opines that imposing an identity by assigning it to a category is the only option through which an individual can appreciate a phenomenon. The categorisation of

innovations into various kinds indicates that innovations are not homogenous; rather they vary in terms of the object of change (Schumpeter, 1934), impacts (Abernathy & Clarks, 1985; Handerson & Clark, 1990; Chandy & Tellis, 1998; Veryzer, 1998), and developmental pattern (Sorescu, Chandy & Prabhu, 2003; Norman & Verganti, 2012). Innovation related literature discusses and proposes a plethora of frameworks providing different bases for differentiating between various kinds of innovations (Schumpeter, 1939; Ettlite, Bridge & O’Keefe, 1984; Handerson & Clark, 1990; Christensen, 1997; Chresbrough, 2003). However, none of the categorisation models can be deemed unassailable (Handerson & Clark, 1990). Each categorisation model has its own assumptions through which it creates distinction among innovations. The distinction between types assists in isolating, analysing, understanding and developing astute judgements about innovations. Below, some of the popular innovation typologies are briefly discussed.

The innovation literature makes a distinction among innovations on the basis of the degree of change or innovativeness embodied in the innovation (Dewar & Dutton 1986). Accordingly innovations are divided into two broad categories: incremental and radical. In the context of educational innovation, incremental innovation refers to making improvements within a given educational practice (Hargreaves, 2003). These improvements, however, are relatively minor and insignificant in nature because the main purpose is not to radically alter the practice but to modify, refine, simplify or consolidate it. Incremental innovation is, by far, the dominant form because of its important role in enhancing performance, lowering cost and improving desirability of educational programs. Examples of incremental educational innovations are the move from WebCT version 2.0 to version 4.2, or from partially-online courses to full-online courses.

Radical innovation is defined as one that causes discontinuity between the new practice and the one it displaces (Hargreaves, 2003). This type of innovation involves radically moving away from existing practice (O’Connor, & Ayers, 2005; Leifer, O’Connor & Rice, 2001) so that, if successful, radical innovation may render an existing teaching practice obsolete. While radical innovations may provide students with superior benefits in comparison to incremental innovation, they, unlike incremental innovations which sustain the existing status quo, tend to break the existing paradigm (Hart & Christensen, 2002), and are, therefore, relatively more risky, expensive, and time consuming (Leifer,

O'Connor & Rice, 2001). Radical innovations are either fully or partially based on entirely new knowledge and understanding (Li, Li, Li, & Zhao, 2006). Larry Keeley, COO of the Doblin Group, estimates that the failure rate of radical innovations is around 96% (Norman & Verganti, 2012). These innovations are therefore rare in comparison to incremental innovation (Rothwell, Chandy & Prabhu, 2003). Examples of radical educational innovations have been the initial introduction of ICT, and MOOCs.

Another distinction between innovations is made on the basis of the objective of change (Schumpeter, 1934, 1942). This model divides innovations into five categories: product, process, market, input and organisational. Reports by the OECD and Eurostat make use of a similar distinction when discussing educational innovations. They divide innovations into four types: product, process, organisation and marketing. In the following paragraphs each of these types is briefly described, first from the general point of view and then specifically in the context of education.

According to Schumpeter (1942) product innovation can be either the introduction of a new product or of a new feature in the existing product. Examples of product innovation include the desktop computer, laptop, digital camera, portable and MP3 player. Some scholars take Schumpeter's concept of product innovation in a strict sense and hold that during the 1930s manufacturing was the major economic activity therefore innovation in services cannot be included in the concept (Van der Have & Toivonen, 2006). However, the dominant perspective in the literature is that Schumpeter's definition of innovation is rich enough to include innovations in services (Bilderbeek, den Hertog, Marklund & Miles, 1998; Van der Have & Toivonen, 2006). Flekima, Jansen and Van der Sluis (2007) define service innovation as a deliberate introduction of a new service line or significantly improving the existing service line. They used the word 'deliberate' to indicate that the service firm's management intentionally develop and introduce novelty in the service (Flekima, Jansen & Van der Sluis, 2007). Examples of service innovation are mobile internet, mobile music, micro-savings, micro-credit and micro-insurance. In the context of educational innovation, product innovation involves introducing or significantly improving an educational product in terms of its characteristics or intended uses (OECD & Eurostat, 2005). The examples of this innovation can be improving or developing the curriculum or educational software.

As the name indicates, process innovation refers to introducing a new method or significantly improving the existing method of production (Schumpeter 1934; 1939). Some of the popular examples of process innovations include the development processes such as “xerography”, popularly known as the photocopier, by Chester Carlson in 1949, the Float Glass process pioneered in 1960 by Sir Alastair Pilkington and Kenneth Bickerstaff, and Global Positioning Systems (GPS) in 1973 by US Department of Defence. For an educational innovation to be considered as process innovation it needs to introduce or significantly improve the content delivery method, as has happened with flexible learning models and blended learning models.

Schumpeter (1934) recognised markets as an important source of innovation. He defined market innovation as the opening of a new market which is not yet utilised; for instance, creating a new market for the cell phone, desktop computer and iPad. In the context of educational innovation, market innovation means using education to provide value to a new market such as introducing new certification to attract students or recognition of prior learning to encourage older workers to enrol in tertiary qualifications.

Organisational innovation is defined as the development of a new organisation or an industry (p. 66). Due to Schumpeter’s broad definition the literature reflects serious ambiguity and confusion pertaining to this category (Lam, 2004). However, Schumpeter in his other writings, considered issues like the ‘Taylorisation’ of work, improved handling of materials, and the setting up of a new business organisation such as a departmental store as innovations. These examples largely demystified his concept with regard to organisational innovation. Most literature therefore holds that making significant improvement in the structure and processes of an organisation to enhance its capacity for learning, creating knowledge or innovativeness (Damanpour, 1987; Lam, 2004) falls into the category of organisational innovation. New forms of organisation such as merger, implementation of teamwork in production, supply chain management or management by objectives to improve the structure or processes of an organisation are some examples of organisational innovation. Organisation innovation in education is the implementation of new or improved non-pedagogical processes or organisational methods in terms of organisational practices, workplace organisation or external relations. Examples of organisational innovation can be establishing support offices like

a student counselling centre, merging of apprenticeship services with schools, student career advisory services, and student societies.

Hargreaves (2004) distinguishes between three main types of educational innovations: spliced, segmented and sequenced, on the basis of degree of novelty, size and splitting ability. He views spliced innovation as adoption of an educational practice and incrementally grafting it into a pre-existing practice which may or may not involve minor modifications to the overall architecture of a pedagogical package. An example can be integrating online learning in an existing face to face learning program. In segmented innovation a large innovation is partitioned, then, each component is separately improved and tested, and eventually integrated into a coherent whole. Like architectural innovation the improvements made in segment innovations are not significant enough to alter the function of involved components and redesigning a whole lesson is an example of this. Sequence innovation happens where a large innovation is implemented through sequencing. The innovation moves in a sequence within a network of innovators. Each member participates in improving the innovation as a whole.

Most of the types discussed above were used to assess whether teacher-innovators participating in the research represented a variety of approaches, as will be discussed in Chapter 4.

## **2.5 Top Down or Bottom Up**

The decision to introduce innovation from the top down or the bottom up is a key difference discussed in educational literature (Dearlove, 1997; Walder, 2014). According to Meyer and Theime (2003), the difference between these two approaches is grounded in their dissimilar perspectives pertaining to organisational problems. The top-down approach tends to view a problem from the organisation perspective and prescribe the course of action for an organisation in terms of what should be done to resolve the problem. Conversely, the bottom-up approach tends to understand a problem from the employees' perspective and proposes a strategy in terms of what the individual needs to do for the resolution.

Top-down is basically a management driven approach in which the initiation of the process could start from the national, institutional or departmental level but eventually

trickles down to faculty and learners (Biggs & Tang, 2011). In educational institutions this approach is generally followed when the directives pertaining to change or innovation come from funding bodies, such as the government. According to Kennedy (2013) this approach is mostly used for large-scale innovation such as national curriculum change, whose outcomes are vaguely predictable. Such innovations are mostly developed by curriculum developers or researchers writing reports for the ministry, who regard it as a product that needs to be implemented (Kennedy, 2013). In some cases even innovations are delivered to teachers in the form of a 'pedagogical package' who then merely act as an executor of these packages (Fincher & Tenenberg, 2007; Kennedy, 2013). Different stakeholders, with differing worldviews and objectives, typically take responsibility for the various stages of innovation. Consequently, the chances of failure are relatively higher with this approach (Thompson & Zeuli, 1999). However, one of the major advantages of the Top-down approach is that it is quite efficient in terms of time, material resources and control over a project (Brown, 2013).

The Bottom-up approach is viewed as more teacher-oriented, in which the innovation is generally initiated, developed and implemented by innovative teachers (Kennedy, 2013). Hence, unlike the Top-down approach this approach views the teacher as a champion, outlier or change initiator. Stam, Miedema, Onstenk, Wardekker & ten Dam (2013) in their study of innovative teachers concluded that these innovations emerge due to the dissatisfaction of teachers with their prevailing teaching practice and their desire to create a new and effective learning environment where student learning could be enhanced. Therefore, innovation via a Bottom-up approach mostly manifests itself in classrooms, small scale programmes, and projects involving small numbers of participants. Because these innovations are initiated by teachers themselves usually there is a relatively greater sense of ownership. However, the success of this kind of innovation to a certain extent depends upon the policy and support of the management with an educational institute.

More recently some scholars also suggest an alternative approach that seeks a balance between the professional autonomy of teachers and management-push of educational institutions for the implementation of an innovation, change or reform (Keppel, O'Dwyer, Lyon & Childs, 2010; Biggs & Tang, 2011; Brown, 2013; Kennedy, 2013). The approach has various names such as the collaborative approach (Keppel et al,

2010), participatory approach (Brown, 2013) and ecological approach (Kennedy, 2013). The basic understanding that underpins this approach is that Top-down approaches are mostly resisted by teachers whereas Bottom-up approaches run into opposition from administrators at the point when they are about to gain critical mass (Brown, 2013). Consequently, the only way out left is to combine both approaches in such a way that enables various stakeholders to get connected and work as a system (Kennedy, 2013). The Top-down component in this case would ensure institutional support whereas Bottom-up component would confirm faculty support and involvement so the chances of success would be relatively higher (Biggs & Tang, 2011; Wei, Schltz & Martin, 2014). Brown (2013) claims that small as well as large scale changes can be successfully implemented and sustained provided the following four conditions are met. First, stakeholders not only effectively collaborate with each other but also take ownership. Second, problems and their solutions are formulated through a collaborative or participatory approach. Third, irrespective of project time constraints the solutions are only formulated after the context and issues involved are comprehensively understood. Finally, technology must be subjugated to stakeholder requirements and users' experience.

This is an important debate in educational innovation literature, but represents some confusion between reform and innovation. It could be that the debate is driven by reformers who realise that they need to incorporate the Bottom-up energy of innovation to make their programs successful.

## **2.6 The Role of a Teacher in Relation to Educational Innovation**

Literature suggests that most quality teaching innovations are generated by teachers (Henard & Leprince-Ringuet, 2008; Clair, 2008), perhaps because innovative teachers reflect on their teaching and tend to improve it (Andrews & Lemons, 2015; Hannan, English & Silver, 1999), are open to change and risk taking (Carlson, Hitzfelder, & Hudson, 1996; Walder, 2015), and listen to their students (Baylor & Ritchie, 2002; Lunde & Wilhite, 1996; Walder, 2015). Moreover, they are flexible and adaptive (Vaughn & Parsons, 2013) and have a relatively broad understanding of technology and pedagogy (Carlsen, 1998). Innovator teachers are also found to be passionate about their teaching and have a strong belief in their ability to bring about their intended change

(Hsiao, Chang, Tu & Chen, 2011). Lastly, they are prepared to spend long hours tinkering and honing their innovations to make them relevant and useful for intended stakeholders (Emo, 2010).

While elaborating on the role of innovative teachers, Larson (1991) states that they "... set in motion a powerful 'inside-out' process that is instrumental to the effectiveness of the whole organization" (p. 554). In a typical educational setting, the role of a teacher in a classroom is equivalent to the floor people such as supervisor, manager or worker in the business context (Lebow, 2009). Comparatively, the role of innovative teachers is far more challenging because they act not only as teachers but also as researchers, curriculum developers and designers (Ni & Guzdial, 2008; Sullivan, 2007). Berry, Byrd and Wieder (2013) and Hasanefendic, Birkholz, Horta, and van der Sijde (2017) consider innovative teachers to be individual institutional entrepreneurs who not only identify key problems in their organisations, but also manage to develop and implement novel solutions to resolve these problems. To put it simply, an innovative teacher is not only responsible for his or her work but also for changes directed by politics, changes desired by administrators and changes the teacher personally wants to introduce into the classroom. Thus, the role of innovative teacher is far more complex than that of an ordinary teacher.

Like innovations in any industry, an educational innovation also requires a supportive environment for its emergence, implementation and diffusion. Hannan and Silver (2000), whose research was conducted in UK universities, found that innovative teachers need an environment where they feel secure and are encouraged and valued for their change-related efforts; there are sufficient funds and resources to design and develop innovation; and help and support from colleagues and leadership is available to implement and diffuse innovation. It is, however, important to note that educational institutions, especially those in higher education, have been described as conservative organisations (Hannan & Silver, 2000; Hoffman & Holzhter, 2012; Marcus, 2012; Yılmaz & Kılıçoğlu, 2013). Their procedures, operations and outcomes are mostly determined by deeply rooted, value-laden assumptions and are constrained by various internal and external forces (Dobson & McNay, 1996). This scenario suggests that, more often than not, innovative teachers may be faced with an environment that inhibits risk-taking and precludes individual teachers from realising change initiatives (Ewell,

2004; Hannan & Silver, 2000; Hasanefendic et al., 2017). Solomon (1999) explains the situation faced by innovative teacher in secondary schools:

Although innovative teachers are motivated by what they are attempting and are able to overcome obstacles for a time, these teachers are continually “at risk” for potential alienation of their peers. As a result, innovative teachers feel pressure to camouflage their efforts or even retreat from contact with their colleagues. The situation worsens when principals and the overall school culture are not supportive of change. (p. 177)

This suggests that innovative teachers face profound challenges and risks even when there is a positive organisational culture that values change, and leadership that support innovation. The research literature highlights numerous challenges that are faced by teachers who participate in education innovation. These challenges include those related to students (Pepper, 2010; Seidel & Tanner, 2013; Vuorela & Nummenmaa, 2004), colleagues (Awad, 2004), time limitations (Brownell & Tanner, 2012; Dancy & Henderson, 2010; Khorbotly, 2015; Dhanapal, Kanapathy & Shan, 2014; Siam & Al-Natour, 2016), workload (Fullan, 1999), financial and technical support (Dancy & Henderson, 2010; Dhanapal et al., 2014; Siam & Al-Natour, 2016) and skill and knowledge support (Dancy & Henderson, 2010; Siam & Al-Natour, 2016).

Sannino (2010) argues that challenges faced during innovation should not necessarily be taken as something negative. Challenges, if managed properly, generate positive outcomes. Nonetheless, if challenges are not addressed they may eventually lead to failure of the innovations and cause the teachers stress and burnout (Bailey, 1992). It is reasonable to conclude that the better that the challenges faced by innovative teachers are addressed, the greater the chances are for the innovation to succeed. Since every context is different so the challenges faced by innovative teachers are also mostly unique in a sense that they require contextualized solutions (Donald, 1963). Zep (2005), therefore, considers characteristics such as creativity, flexibility, technical competence, pedagogical skills, logistics skills, administrative skills and organisational and collaborative skills to be essential on the part of the teacher who undertakes innovative teaching programmes.

Besides skills, knowledge, and personal characteristics, educational innovation also requires a high degree of commitment and motivation from concerned innovators. On the basis of studies by Inan and Lowther (2010) and Perilo (2007), Eloranta (2013) suggests that one of the main reasons of the failure of Top-down educational innovations is the lack of teacher commitment and participation in the educational change, which consequently translates into a failure of capacity as well as a diminished will for change in the classroom. Thus, teachers play an instrumental role in the success of educational innovation (Batchelor, 2011; Black & Atkin, 1996; Van Driel et al. 2001). Clair (2008) concluded that teachers are not only the primary catalyst for change but are at the hub of educational innovation.

The literature reviewed in this section supports the view that teachers play a key role in educational innovation. This in turn supports the decision in this study to explore the perspective of teacher innovators in order to better understand the challenges they experience during the process of innovation.

## **2.7 Factors Impacting Teacher's Behaviour for Innovation**

Following are some of the factors that impact the response of a teacher toward adopting or formulating innovation.

### **2.7.1 *Teacher's Knowledge***

Almost all researchers dealing with innovation agree on the importance of sufficient knowledge for undertaking innovation (Anderson & Mitchener, 1994; van Driel et al., 2001). Many studies found a lack of knowledge on the part of innovative teachers to be one of the main challenges for undertaking educational innovation (Aliakbari & Sadeghdaghighi, 2012; Batchelor, 2011; Liu, 2011; Marwan, 2008; Mouza, 2003; Schell, 2006). Other studies have sought to identify the kinds of knowledge a teacher needs to design novel and effective educational strategies. Amabile (1998) suggests that one needs to have technical, procedural and intellectual knowledge in order to devise creative solutions in any field. In the context of education different researchers have suggested different kinds of knowledge (Shulman, 1986, 1987; Ball, Thames, & Phelps, 2008; Koehler & Mishra 2008). Some of the most cited models of teacher knowledge are briefly explored in the following paragraphs.

Shulman (1986) proposed a framework for describing the professional knowledge base of teachers. The framework is composed of three core kinds of knowledge, namely, content knowledge (CK), pedagogical knowledge (PK) and pedagogical content knowledge (PCK). CK refers to understanding of the subject matter (Shulman, & Richert, 1987). According to Ball et al., (2008) CK is crucial for good teaching and student learning. Teachers who do not themselves have command over subject matter cannot teach it properly (Ball et al., 2008). PK deals with the understanding of principles and processes of teaching and learning. Shulman and Sykes (1986) suggest that teachers who have sufficient pedagogical knowledge are better able to plan lessons, apply different teaching techniques, manage their classrooms and establish routines for their learners. Lastly, PCK is concerned with understanding of the specific ways of teaching and learning a particular subject matter (Shulman, 1986). Teachers with a good degree of PCK not only know their subject matter thoroughly but are also able to use analogies, metaphors, examples and simulations that are appropriate for teaching that subject matter (Shulman & Sykes, 1986).

After comparing novice teachers with veteran teachers, Shulman (1987) identified four more kinds of knowledge for teachers, thus extending the number of requisite kinds of knowledge from three to seven. The four types of knowledge identified are: learner knowledge, context knowledge, curricular knowledge and knowledge of educational goals and beliefs. Learner knowledge is about understanding learners' characteristics and preconceptions (Shulman, 1987). Every learner has his or her unique understanding, experiences, motivations, aspirations, talents and needs. Shulman and Sykes (1986) argue that the more a teacher knows about his or her learners' characteristics and views, the more easily and effectively he or she can plan instruction to bring the learners to the next level in their learning. Context knowledge, as the name indicates, refers to understanding of educational context ranging from classroom and school to the character of communities and cultures (Shulman, 1987). Curriculum knowledge includes understanding of programs and available materials for the instruction. The available material can be alternative texts, audio-visual materials and laboratory resources' (Shulman, 1987). Finally, knowledge concerned with understanding the purpose, values and philosophical underpinnings of an instructional program contributes to effective teaching (Shulman, 1987).

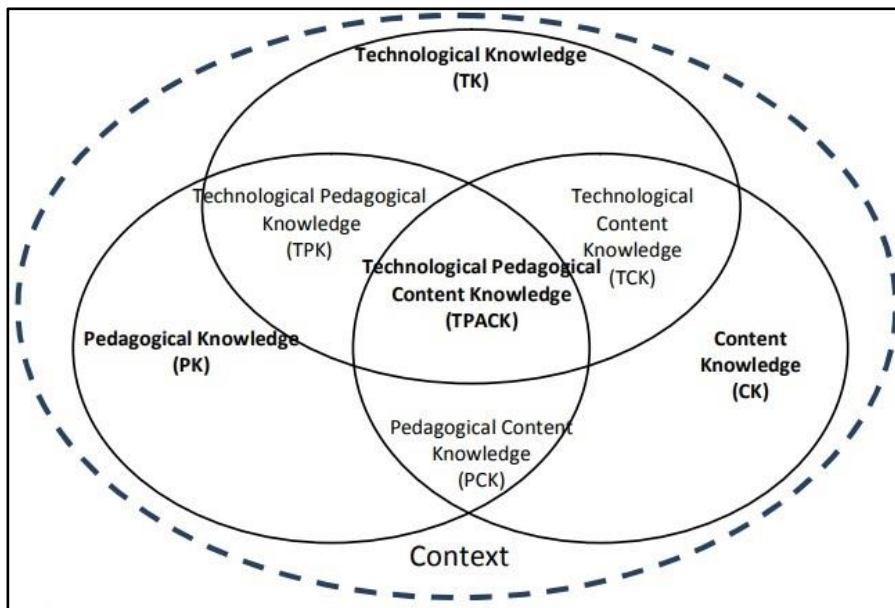


Figure 2.2 *TPACK Framework* (Koehler & Mishra, 2009; p.63)

In the 1990s and early 2000s technology permeated most of the domains in which innovation occurs, including education. Consequently, some of the requirements in terms of knowledge for teachers have changed. Building on Shulman’s (1986) framework, Koehler and Mishra (2008) proposed a technology based knowledge framework called Technological Pedagogical Content Knowledge (TPACK) to guide teachers in the integration of technology into education. This framework offers four new kinds of knowledge: technology knowledge (TK), technology content knowledge (TCK), technological pedagogical knowledge (TPK) and technology, pedagogy, and content knowledge (TPACK). TK refers to general understanding of traditional, semi-traditional and new digital technologies (Mishra & Koehler, 2006). This understanding involves instrument knowledge like installing and removing devices and software as well as knowledge about using technologies for information processing, communication and problem solving. TPK refers to the familiarity with and understanding of the existence, components, and capabilities of relevant technological tools in the context of teaching approaches (Koehler & Mishra, 2008). This knowledge enables teachers to effectively use technological tools in a pedagogical context (Harris et al., 2007). TCK is concerned with the specific understanding of the relationship between technology and teaching content (Mishra & Koehler, 2006). A teacher who has a high level of TCK can integrate technological tools that best represents his or her teaching content. Finally, TPACK refers to the understanding of the complex interrelationship between

technology, pedagogy, and content knowledge. Take as an example a teacher who wants to select appropriate networking and collaborative tools from Wiki, WebQuest, Skype, Facebook, Twitter and other social networking programs to facilitate web-based, collaborative, problem-based learning for management education. TPACK is the understanding that enables the teacher to identify and choose the best tools in terms of their affordability, advantages and constraints in relation to the selected pedagogical strategy. According to Koehler and Mishra (2008) TPACK enables teachers to creatively use available technological tools to design maximally successful, differentiated, contextually sensitive learning programs (Koehler & Mishra, 2008).

The literature reviewed above suggests that in order to develop and enact context-specific, valuable and technology infused instructional programs teachers need to have in-depth understanding of subject matter, technology and pedagogy and the interactions among these. Additionally, teachers also need to have an adequate understanding of their contexts (Cox, 2008; Mishra & Koehler, 2006). The context may include the university environment, physical features of the classroom, characteristics of learners, availability of resources, preferred instructional strategies of students and regulatory frameworks and policies of national education systems (Cox, 2008).

The empirical research supports a positive relation between TPACK components and teachers' innovative behaviour. For instance, Borko and Putnam (1995) conducted research on a multi-year and multi-phase teaching innovation program. They found teachers' PCK to be positively linked with their innovative teaching. In another study, Messman, Mulder and Gruber (2010) obtained data from 60 German vocational teachers to examine the contributions of professional knowledge, professional performance and professional development to innovative work behaviour of teachers. The study found a strong relationship between teachers' professional knowledge (occupational knowledge, metacognitive knowledge and workplace knowledge) and teachers' innovative work behaviour. Similarly, Avidov-Ungar and Eshet-Alkay (2011) obtained data from 100 teachers from eight elementary schools in southern Israel to examine the relationship between TPACK components and the emotional and cognitive attitudes of their participants towards educational change. Their results indicate that the higher that teachers score on TPACK, the more positive their attitudes towards change are.

Nonetheless, the absence of or lack of required knowledge has been identified as a barrier to educational innovation in various studies. For example, the study on Taiwanese elementary school teachers conducted by Liu (2011) attempted to understand the relationship between teacher beliefs and teaching innovation. In total, 1139 teachers participated in the research. The findings of the study show that most of the teachers have learner-centred beliefs but they could not properly translate these into matching teaching activities. The researcher identified lack of technological knowledge as being one of two main reasons for this gap. Similarly, Chen (2008) conducted a study of Taiwanese public sector educational institutes and reported that one of the main factors that prevented the teachers from integrating technology into instruction was their lack of understanding of the technology. Other studies that report similar findings include Batchelor (2011), Marwan (2008), Mouza, (2003) and, Messina and Tabone (2012).

In some studies teachers' lack of subject matter and pedagogical knowledge has been found to influence teachers' decisions to develop or implement new methods or content. For example, Aliakbari & Sadeghdaghighi (2012) surveyed 100 university and school teachers in Iran to identify barriers to critical thinking implementation. They found teachers lack of knowledge of critical thinking to be one of the reasons for teachers not implementing critical thinking in their classrooms. Zinkeviciene (2005) also reported similar findings. He interviewed five college teachers at Kaunas Advanced School of Technology in Lithuania to identify possible barriers faced by teachers during the initial stage of educational innovation. The study found the teachers' insufficient subject matter knowledge acted as a barrier to innovation. In two of the reviewed studies, teachers' lack of pedagogical knowledge was identified to be a strong barrier to innovative teaching (Andrew & Lemons, 2015; Schell, 2006).

The foregoing indicates that teachers' lack of knowledge has been reported to be one of the main challenges faced by teachers during educational innovation. However, the ways in which teachers respond to this challenge has not been discussed thoroughly in the literature. Two ways in which teachers may respond to this challenge are by teaming or collaborating with those who have requisite knowledge and expertise (Mouza, 2003; Shrum & Glisan, 2015) or by gaining the type of knowledge they think they are lacking (Andrew & Lemons, 2015). Both these options have benefits and costs that teacher innovators do well to consider.

### **2.7.2 *Teacher's Self-Efficacy Beliefs***

According to Ertmer and Ottenbreit-Leftwich (2010) teachers' self-efficacy beliefs are relatively more important than their skills and knowledge in contributing toward innovation. Teachers' self-efficacy is defined as "teachers' perceptions of their own ability to bring about desired outcomes" (p.57). Bandura (1997) identified four sources of self-efficacy: mastery experience, vicarious experience, verbal persuasion, and psychological activity (as cited in Holzberger, Philipp, & Kunter, 2013). Mastery experience refers to the level to which an individual has previously succeeded on the same or a similar task, whereas vicarious experience denotes an individual's judgement about his or her capabilities in relation to others.

Celik, (2013) suggests that a teacher's self-efficacy beliefs impact teaching practices which in turn impact students' achievement, motivation and their own sense of efficacy. The research conducted to investigate the relationship between teacher's self-efficacy beliefs and their innovative or effective teaching mostly concluded that there exists a causal relationship between those factors (Brouwers & Tomic, 2002; Piper, 2003; Caprara et al., 2006; Hsiao, et al., 2011 Schwerdtfeger, Konermann, & Schonhofen, 2008; Hsiao et al. 2011; Celik, 2013). However, some studies such as Holzberger et al. (2013) conclude that teachers' self-efficacy beliefs and their educational outcomes are related in a mutually deterministic way.

On the basis of the studies reviewed here, it can be concluded that teachers' self-efficacy beliefs strongly impact their innovative teaching behaviour. Especially in a Bottom-approach a teacher may need strong self-efficacy beliefs to initiate the process of innovation. However, these beliefs alone cannot be considered solely responsible for innovation. Rather, they contribute in concert with other supporting factors.

### **2.7.3 *Student Response to Innovation***

Students hold a central place in any educational endeavour (Knowles, 1980). Their opposition or support, therefore, plays a key role in the success or failure of an innovation. The research literature overwhelmingly suggests that students generally tend to resist novel teaching methods (Akerlind & Trevit, 1999; Allen, Wedman & Folk, 2001; Keeney-Kennicutt, Gunersel, & Simpson, 2008; Pepper, 2010; Seidel & Tanner, 2013; Vuorela & Nummenmaa, 2004). This resistance manifests itself in the form of various overt or active and covert or passive behavioural responses (Kearney,

Plax, Sorensen & Smith, 1988). The overt responses reported in the literature include awarding poor teaching evaluation scores to faculty members (Seidel & Tanner, 2013) and launching complaints to management (Burroughs, Kearney, Plax, 1989; Tolman, Sechler & Smart, 2016) whereas covert responses include absence from class (Richmond & McCroskey, 1992; Tolman, Sechler & Smart, 2016) and lack of participation in class activities (Richmond & McCroskey, 1992; Tolman, Sechler & Smart, 2016). According to Fink (2003) student resistance to new teaching methods not only leads to overall poor learning outcomes but also discourages faculty members from trying innovation. Hence, students' resistance is an important potential barrier for teachers who want to introduce educational innovation.

Why do students resist innovation? A plethora of studies have been conducted to answer this question. Some of the most important factors that have been identified as causes student resistance to innovation include: strong familiarity and feeling of comfort with traditional teaching methods due to past educational experiences (Alessio, 2004; Doyle, 2008; Messineo et al., 2007; Payne, Monk-Turner, Smith & Sumter, 2006; Thorn, 2003); lack of skills and competencies for new methods (Albers, 2009; Doyle, 2008; Keeney-Kennicutt et al., 2008; Windschitl, 2002); concern over an increase in workload (Lewis & Hayward, 2003; Lowyck et al., 2004; Keeney-Kennicutt et al., 2008); perceived risks of performance degradation (Benvenuto, 2002; Doyle, 2008; Reimann, 2011; Woods, 1994); lack of awareness of students about the benefits of the innovation (Chee et al., 2015; Dembo & Seli, 2004; Felder, 2007; Keeney-Kennicutt, Adalet, & Nancy, 2008; Sundt, 2010); and students' unmet instructional expectations (Albers, 2009; Cooper, MacGregor, Smith & Robinson, 2000; Elen & Lowyck, 2000; Felder & Brent, 1996; Sundt, 2010; Weimer, 2002).

Overcoming student resistance can be stressful and time-consuming for the concerned teachers (Sundt, 2010). In order to deal with concerns, as a first step, teachers need to investigate and identify reasons that cause students to oppose innovation (Sundt, 2010; Tolman, Sechler & Smart, 2016). Then, they need to carefully develop strategies to address the identified causes. Some of the strategies that are recommended in the literature in this regard include: explaining to students the rationale and benefits of the proposed innovation (Cheng, Lin & Wang, 2013; Cooper, MacGregor, Smith & Robinson, 2000; Felder, 2007; Livingstone & Lynch, 2000; Payne et al., 2006); providing guidance and coaching to students to prepare them for innovation (Cheung &

Huang, 2005; Akerlind & Trevitt, 1999; Smith, Sorensen, Gump, Heindel, Caris, & Martinez, 2011; Sundt, 2010; Tolman, Sechler & Smart, 2016); motivating students (Sundt, 2010); recruiting supportive students as peer mentors (Sullivan-Catlin, 2008); and modifying innovation to fit with student expectations (Keeney-Kennicutt et al., 2008; Simpson, 2008). It is, however, important to mention that the effectiveness of any strategy to overcome student resistance depends on the context in which it is implemented.

The above-mentioned discussion suggests that teachers who want to introduce innovation should be prepared for student resistance. This preparedness includes identifying potential causes of student resistance and developing effective strategies for addressing those causes. Innovative teachers also need to have persuasion and negotiation skills to be able to convince students of the value of their innovations. Lastly, these teachers should be open and flexible and be able to adapt their innovation to the needs and requirements of students.

#### ***2.7.4 Institutional Factors***

Teachers are not isolated beings but are embedded in a certain institutional context that can be a barrier or facilitator of educational change (Somekh, 2008). The institutional context includes a range of factors related to a university that can potentially influence teachers' decision-making and behaviour around adopting educational innovation (Becker & Riel 1999; Hannan et al., 1999; Stein et al., 2007). Some of the important factors that have been identified in this regard include: organisational culture (Akomolafe; Leena, 2013; Perilo, 2007), administrative support (Fullan, 1991; Hambright & Franco, 2008; Manouchehri & Goodman, 1998; Perillo, 2007) and colleagues' attitude toward change (Burgess, 2011; Hannan et al., 1999). In the following paragraphs, each of these factors is discussed briefly.

Organisational culture refers to the set of shared assumptions, values, taken-for-granted attitudes and practices that makes a university different from other organisations, universities and learning institutions (Ballard & Clanchy, 1988; Campbell & O'Meara, 2014). Research literature suggests that cultural factors play a crucial role in the success or failure of educational innovation (Akomolafe, 2011; Clair, 2008; Campbell & O'Meara, 2014; Eloranta, 2013; Hannan & Silver, 2000; Kezar & Eckel, 2002; Klokieters & Chu, 2013; Rhoads, Stevens & Hemmings, 2011; Wong and Cheung,

2009). Hannan and Silver (2000) conducted a large-scale longitudinal study in which they investigated the values and beliefs of 221 professors working in 15 universities in England. They concluded that innovation is fostered in conditions where: teacher innovators feel secure and are allowed to take risks, are encouraged to initiate change, teaching and learning are highly valued and peers and leadership take an interest in sustaining and diffusing innovations. In other words, innovation requires a flexible and open culture that values risk-taking, trust, collaboration and support. Other studies mentioned earlier in the paragraph also suggest more or less the same cultural values to affect innovation development and implementation.

Since universities generally have conservative and bureaucratic cultures (Alabaster & Blair, 1996) teacher innovators who initiate change are likely to face challenges and pressures from the university because of their deviation from traditional practices and methodologies (Hannan et al., 1999; Burgess, 2011). Hasanefendic, Sandra, Horta, and van der Sijde (2017) found in their study that successful innovative teachers overcome their cultural and institutional challenges because they, more than other teachers, are highly motivated, knowledgeable, and experienced individuals who are strongly embedded in multiple fields and can use their authority and strategic networks in an effective manner.

Administrative support refers to the contribution that administrators make toward the ability and willingness of teacher to be effective (Methne, 2013; Surry & Ensminger, 2009). This contribution can be in the form of financial support, technical support, guidance and managerial assistance in addressing obstacles that can hinder the development and implementation of an educational program (Ryan, KayHodson-Carlton, & Ali, 2005). A number of studies found administrative support to be crucial for the success of educational innovation (Hadley & Sheingold, 1993; Hannan & Silver, 2000; McGill, Klobas & Renzi, 2014; Mumtaz, 2000; Ng, 2008; Wong & Li, 2008; Walder, 2015). Some of the strategies used by teachers to obtain administrative support include: explaining the innovation (Windschitl, 2002) and modifying innovation to the requirements of the administrators (Christenson et al. 2008).

Colleagues' attitude toward change also plays an important role in the uptake of innovation by teachers (Kezar & Eckel, 2002). Teacher-led innovations mostly make the teachers unpopular with their colleagues (MacDonald, 1974). Burgess (2011) describes this situation as follows:

Other faculty might see different teaching methods as a threat or an insult. Other faculty might see spending time on teaching as undervaluing scholarship. If the innovative faculty member is untenured, then she might need these same faculty members' support for promotion and tenure. (p.3)

Hannan et al., (1999) found lack of support from colleagues, especially those senior and influential colleagues who have authority, to be an important factor that can influence a teacher's behaviour toward initiating innovation. Some other studies that convey similar findings include Kezar and Eckel (2002) and Barr (2009). Innovative teachers need to find strategies that either build support or minimise the impact of a lack of support.

### ***2.7.5 Characteristics of Innovation***

The perceived characteristics of an innovation play a crucial role in its adoption by the teachers (Fullan, 1982). According to Tillema (1994) "beliefs serve as filters which screen new information, [and] ultimately determine which elements are accepted and integrated in the professional's knowledge base" (p. 602). In other words, teachers' perceptions about an innovation determine their response towards its adoption or rejection. Rogers (1983), who reviewed more than 1500 empirical and theoretical studies on the diffusion of innovation, suggests that potential innovation adopters consider five attributes of an innovation before deciding to adopt or reject it. Four of these factors—relative advantage, compatibility, trialability, and observability—are found to be positively linked with the adoption of an innovation. The fifth factor, complexity, is negatively correlated with adoption (Rogers, 1983).

Henrichsen's (1989) hybrid model of innovation diffusion proposes some characteristics of innovation additional to Rogers' model which are likely to facilitate or hinder the adoption of an innovation by a teacher. The additional characteristics are originality, explicitness and the status of an innovation. Similarly, Stoller (1994) surveyed 60 key administrators of US universities regarding the influence of various factors on teacher's innovation adoption behaviour. She identified balanced divergence, dissatisfaction and viability to be three significant factors which strongly impact adoption. Ellis (2003) on the basis of literature published by Kennedy (1988), Fullan (1993), Markee, (1993) and Stroller (1994) added five more attributes to Rogers' model. These attributes are initial dissatisfaction, feasibility, explicitness, originality and ownership.

Taken together, these studies suggest ten main factors that impact teacher behaviour towards adoption of innovation. Each of these factors is briefly discussed below.

#### *2.7.5.1 Initial dissatisfaction*

Dissatisfaction is not an inherent attribute of an educational innovation but depends on the specific contexts and conditions in which teachers work (Andrews, 2015). It is a feeling or an emotional state of discontent that may arise from anything that an individual finds as unnecessary, unsuitable or harmful. Dillon (2000) argues that the feeling of dissatisfaction among teachers with regard to their teaching methods emerges due to personal reflection, feedback from students or criticism from colleagues. Although teacher dissatisfaction is commonly viewed as something negative, innovations are mostly introduced by individual teachers who are dissatisfied with their prevailing teaching practices (Andrews & Lemons, 2015; Davis, 1996; Dillon, 2000; Hannan & Silver, 2000). Gess-Newsome, Southerland, Johnston and Woodbury (2003) investigated teaching practice of three teachers who were required to align their teaching practice with a national reform. The teachers were given ample resources and time to change their teaching practice. Out of the three teachers, only one changed his teaching practice. This teacher modified his teaching methods because he sensed that his previous methods were not adequate. Gess-Newsome et al., (2003) found that the other two teachers did not fundamentally change their teaching methods because they were satisfied with the teaching methods they were using. Similarly, Andrews and Lemons (2015) interviewed 15 college teachers who were enacting case study teaching in their classrooms. They found teacher dissatisfaction with their current teaching methods to be a prior condition that leads them to transform their teaching practice. Thus, the degree of dissatisfaction a teacher experiences with his or her existing teaching practice plays a crucial role in innovation.

#### *2.7.5.2 Relative advantage*

Relative advantage concerns the perception that an innovation allows a potential adopter to perform an activity more effectively and efficiently than the existing system (Rogers, 2003). According to Hughes and Keith (1980) and Markee (1997) an educational innovation whose potential advantages outweigh its cost can be perceived as one with a relative advantage. The advantages can be things like improved student participation, enhanced learning on the part of students, and decreased lesson preparation time for

teachers. Some of the empirical studies that support the role of relative advantage are those of Fisher (2002), Sahin and Thompson (2006), Ntemana and Olatokun (2012), Yaghi & Ghaith, (2002) and Yildirim, (2000).

#### *2.7.5.3 Compatibility*

Compatibility refers to the extent to which a new system is consistent with existing values, practices and infrastructure (Rogers, 1983). Innovations which require fewer and more minor changes to existing values and practices are perceived to be more compatible than those innovations which require relatively more and major changes (Brewer, 2016). For example, a new pedagogical practice that does not require changes in the existing assessment practice is more likely to be adopted by teachers than one that does require these changes. Thus, the greater the mismatch between an educational innovation and existing practices and values, the higher the chances are for its rejection by teachers (Hughes & Keith, 1980; Martins, Steil, & Todesco, 2004).

#### *2.7.5.4 Observability*

Observability refers to the degree to which the outcomes of an intervention can be observed or demonstrated (Rogers, 2003) and is positively correlated with the adoption of innovation (Brewer, 2016). Ntemana and Olatokun (2012) obtained data from 213 lecturers to identify factors that influence the attitude of lecturers toward using ICT. They found observability to be one of the most important factors that influence lecturers' attitude to adoption of ICT. Similarly, Jwaifell and Gasaymeh (2013) interviewed four female teachers in Jordanian secondary schools to examine the factors that motivated these teachers to use Interactive White Boards in their educational practices. Their study also indicates that observability plays an important role in teachers' adoption of learning technologies. Some other studies that have found evidence of a positive correlation between observability and innovation adoption are Brewer (2016), Martins et al., (2004), Mumcu (2004) and Olatokun and Igbinedion (2008).

#### *2.7.5.5 Trialability*

Trialability can be defined as the extent to which a new system can be experimented with or trailed on a small scale (Rogers, 2003). If this characteristic of an educational innovation is high, it reduces the perceived risk of adoption and thereby increases the confidence of teachers to undertake it. According to Vallett, Annetta, Lamb and

Bowling (2014) when teachers know that they can return to the status quo if the innovation does not prove to be a viable option then they are more likely to adopt it. Hughes and Keith's (1980) conducted research on the perceptions of an innovation with 30 Canadian elementary teachers and found that educational innovations that allowed the teachers to experiment with them without abandoning their previous practice were more likely to be adopted than those innovations that cannot be trailed. Martins et al. (2004) obtained data from 79 Brazilian pedagogical managers to identify the factors that support or impede the use of internet as an educational tool. They found trialability and observability to be the two most significant factors that support teachers to adopt a new teaching tool.

#### *2.7.5.6 Feasibility*

The ability of an innovation to improve a certain situation indicates its feasibility. Studies conducted by O'Sullivan (2002) and Mohammed and Harlech-Jones (2008) indicate that educational innovations that are not feasible enough are relatively more prone to failure. Zhang (2011) obtained data from Chinese middle school teachers to identify factors influencing teachers' adoption of e-learning. The study found that more than half (60.87%) of the 207 teachers who adopted e-learning, adopted it because they perceived e-learning to be beneficial for them. The perceived feasibility of an innovation is also found to be a key factor in the ultimate success or failure of that innovation (Li, 2001). Hence, the more an innovation is perceived by a teacher to be implementable in his or her teaching context the more likely he or she is likely to adopt it (Kennedy, 1988).

#### *2.7.5.7 Explicitness*

Explicitness refers to the extent to which the underlying logic for the innovation makes sense to potential adopters. Henrichsen (1989) found that teachers are more likely to accept innovations that they understand. Fullan and Pomfret (1977) in their research analysed 15 case studies about curriculum implementation. They found that an educational initiative which lacks explicitness tends to create confusion and frustration in the teacher which leads to its rejection. While et al., (1991), therefore, argues that educational innovations published in academic journals and books have a greater chance of adoption than those innovations that remain only at the conceptual level. Where an innovation is well developed and its logic can be clearly articulated, people will be more

likely to accept it. However, when explicitness is taken to an extreme, oversimplification of the innovation can lead to it being viewed as either unimportant or inferior to current practice (Fullan, 2007).

#### *2.7.5.8 Ownership*

Ownership is a mental state in which an individual has a feeling that an object belongs to him or her (Breiting, 2008). In the context of educational innovation, Bergen and Van Veen (2000) and Ellis (2003) suggest the more the teacher feels that he or she owns the innovation, the more he or she invests in implementing it. While explaining the importance of teachers' perceptions of ownership of educational innovation, Orborn (2002) states:

One of the strongest conclusions to come out of decades of studies of the success and failure of a wide variety of curriculum innovations is that innovations succeed when teachers feel a sense of ownership of the innovation, or that it belongs to them and is not simply imposed on them. (p.143)

A high degree ownership towards an innovation has been found to lead teachers to express their identification with it (Pierce, Kostova, & Dirks, 2003). Some of the empirical studies that support that teachers feeling of ownership towards an innovation is positively linked with its adoption are Pierce, Kostova, and Dirks (2003), Mohammed and Harlech-Jones (2008), Gardner (2010), Ketelaar, Beijaard, Boshuizen and Den Brok (2012) and (Vallett et al., 2014).

#### *2.7.5.9 Originality*

Originality refers to the extent to which an innovation is perceived to offer a novel or unique solution (Henrichsen, 1989). Markee's (1997) diffusion of innovations model suggests that the greater the perceived originality of an innovation, the greater the chances are that the innovation is adopted by teachers. Amabile (1996), however, noted that the more an innovation is seen as original, the more it tends to create uncertainty among potential adopters. It seems that originality needs to be balanced with compatibility. Where an innovation is perceived as too original, it may be viewed as violating acceptable norms and standards. At the same time, if the innovation lacks sufficient originality, it may not be accepted as an innovation, but rather a simple

adjustment to current practices. Thus, an innovation must be perceived as sufficiently original but not so original that it is perceived as a high-risk endeavour by potential teachers.

#### *2.7.5.10 Complexity*

Complexity refers to the extent to which an innovation is assumed to be difficult in terms of understanding and application (Rogers, 2003). Fidler & Jonson (1984) argue that the complexity of an innovation causes uncertainty. Teachers generally tend to avoid situations in which they fear they will be unsuccessful (Ashton & Webb, 1986) so the more an innovation is perceived to be complex the less likely it is to be adopted (Fullan & Pomfret, 1977). Beretta's (1990) findings also support the notion that the complexity of an innovation is negatively correlated with its adoption. Li & Huang (2016) obtained data from 307 elementary school teachers and found that the 'ease of use' of an innovation to be positively linked with innovation adoption by teachers. An innovation may not be more complex than the existing practice. However, because of the degree of change involved it may be viewed as more complex by teachers. Every innovation involves some level of difficulty, skill learning, alteration in beliefs, and change in teaching strategies (Fullan, 2001). The complexity of an innovation can also be related to time and financial cost (White, Martin, Stimson & Hodge, 1991). For instance, introducing a problem based learning (PBL) approach in a university department may require upskilling of all teachers in that department. The investment of time and resources involves organisational complexity, consequently making it difficult teachers to adopt the innovation.

Stoller (1994) believes that the adoption of an innovation depends upon the ability of an innovation to fall within 'the zone of innovation'. This means that the innovation should not only be feasible but should strongly appeal to the students' needs and neither be too 'out there' nor be too similar to the existing practices.

Some scholars such as Kennedy (1998) and Wolter (2000), while recognising the significance of these factors, have strongly criticised Rogers' and Stoller's models. They hold that such models tend to establish a linear relationship between the adoption of innovation by a teacher and the attributes of innovation whereas in actuality there can be many factors beside the attributes of innovation which influence one's decision to adopt an innovation. This criticism does not seem reasonable. Rogers and Stoller do not

claim that the attributes of an innovation are the only influence on adoption. While there may be many other factors at play, those related to the innovation itself cannot be ignored.

## 2.8 Conclusion

Innovation, by its nature, is unpredictable because it tends to translate an idea into something which has not been existed before, that is, engaging in an uncertain process. The review of literature identified a wide range of factors that related to the teacher, organisational context, and the nature of innovation. This review has provided a foundation for the research by (1) establishing a definition of innovation; (2) outlining the stages of the innovation process that will guide the interview process; (3) establishing the perspective of innovative teachers as an appropriate focus for the research; and (4) identifying the need for methods appropriate to the iterative nature of innovation.

Throughout this review it was evident that literature on the process of innovation often indicated that teachers would need to grapple with dualities in order to be successful. Some of those that emerged were the choice of radical versus incremental change, Top-down versus Bottom-Up innovation, and Originality versus Compatibility.

The dualities which arise out of contradictory demands, expectations or needs are not necessarily obstacles, problems or issues that must be overcome or solved in order for the innovation to succeed. Rather, they can be viewed as *dilemmas* that require resolution: opportunities that enable innovative teachers to achieve their goals provided they are reconciled in a way that honours both aspects of the duality. Interestingly, the phenomenon of teaching has been described as the simultaneous resolution of multiple dilemmas (Berlak & Berlak, 1981, p.165). Yet the dilemmas which are faced by innovative teachers during their pedagogical innovation are rarely investigated in the literature dealing with educational innovation.

The understanding of these dilemmas is crucial for developing comprehensive understanding about issues and difficulties encountered by teachers during the course of their educational innovation activities. The next chapter provides a review of literature relating to dilemmas and their reconciliation.

## **Chapter 3. Educational Innovation**

As discussed in Chapter 1, this research will explore dilemmas experienced by teachers during team-based educational innovation. The chapter will review the nature of dilemmas, and why they are an appropriate focus for research into educational innovation. Further, Dilemma Theory, including an outline of how dilemmas can be managed, will be reviewed. Furthermore, educational literature on dilemmas will also be reviewed, considering the kind of dilemmas teachers face, and how they respond to these dilemmas. The chapter will conclude with a brief summary of the literature in which the dilemma reconciliation strategies evident in educational literature will be discussed, and used as a basis for identifying research gaps that exist and need to be addressed.

### **3.1 What is Dilemma?**

An innovator in general, and particularly in education, comes across various uncertainties during the process of developing an abstract idea into a viable solution (Porter et al., 2006). According to Sharma (1999), the whole journey of an innovation from conception of an idea to its implementation is full of uncertainties, some of which are: whether or not the idea is feasible; whether the right team members can be identified, hired and maintained; whether the solution can be formulated and tested without using significant amounts of resources; and whether the solution can be implemented and sustained. Besides uncertainties associated with the process of innovation, innovative teachers also face different, and often contradictory, expectations from various stakeholders—students, parents, teachers, management, accreditation bodies and funding agencies—with regard to their innovations (Lampert, 1985; Loughran, 2010). The uncertainties and contradictions experienced with educational innovation lead to innovative teachers frequently finding themselves in complex situations in which they may have two valuable goals, but where pursuit of one undermines the ability to achieve the other (Chee, Mehrortra & Ong, 2015).

The term used in the literature for such a conflicting state is ‘dilemma’ (Wallace, 2014). This term is derived from two Greek words, ‘di’ and ‘lemma’. The former means ‘two’;

the latter means 'proposition'. The Oxford English Dictionary defines this term as, "a situation in which a difficult choice has to be made between two or more alternatives, especially ones that are equally undesirable". While common usage may emphasise undesirable or negative alternatives, dilemmas associated with innovation are more likely to involve a choice between two desirable alternatives. Examples of common dilemmas include individual versus group, nitty-gritty versus big picture, control versus cooperation, and consistency versus change.

Cuban (1992) and Rosenak (1984) distinguish between "problem" and "dilemma" on the basis of how easily they can be resolved. A problem is any situation in which one needs to make a decision between right and wrong, whereas as in a dilemma the choice is between two 'rights' or two 'wrongs' (Glatter, 1994). In other words, problems, no matter how complex and messy, can be solved by making right choices. Dilemmas, in contrast, cannot be solved because they involve a choice between two or more desired but incompatible values. Since dilemmas are not problems that can be easily solved (Yin, 2014), they are described in the educational literature as "cognitive knots" (Wagner, 1984, p. 163), "intractable problems" (Cuban, 1992, p.10), "practical conflicts" (Lyons, 1990, p.168), "tension-fraught problems" (Cardno, 2007, p.33), "complex ill-structured problems" (Wegner, Anders & Nückles, 2010, p. 67) and "anomalies" (Cabarroglu & Tillema, 2011, p.560).

The term "dilemma" is defined in numerous ways by educational researchers. However, instead of providing a list of definitions, it is more appropriate here to focus on the ideas which underpin these definitions. In almost all definitions, a dilemma is identified to have one or more of the following three characteristics: (1) it offers a choice between two values; (2) the values in the dilemma are, or seem to be, mutually exclusive (Berlak & Berlak, 1981; Elbow, 1983; Honig, 1996; Lampert, 1985; Newman, 1997; Wallace, 2015); and, (3) the dilemma can lead to an unsatisfactory outcome, no matter which choice is made (Cuban, 2001; Dempster & Berry, 2003; Dimmock, 1999a).

Educational researchers are divided on the question whether a dilemma can have a productive outcome. The majority of commentators believe that a dilemma always involves unsatisfactory compromise (Marshall & Rossman, 2011). Nonetheless, there is strong support for the idea that some dilemmas can be reconciled (Chee et al., 2015; Lampert, 1985; Qoyyimah, 2015). The ability of people to reconcile dilemmas depends upon how dilemmas are conceptualised and on the skill involved in finding

reconciliations. A growing body of literature, centred on Dilemma Theory, gives attention to this ability (Hampden-Turner & Trompenaars, 1998). This study is based on the assumption that increased ability in dealing with dilemmas enables people to experience them as positive and use them to generate new ways of thinking and acting leading to better outcomes.

### **3.2 Why focus on dilemmas?**

In Chapter 1 of the thesis, we reviewed the need expressed in the literature for a “paradigm shift” in education. This “paradigm shift” can also be framed as a change in the culture of educational institutions. The change being advocated by many is for teaching to become “contextualised, personalised and collaborative” (Sharples et al., 2005; Harington & Harington, 2007; Hurford, 2010; Collins & Halverson, 2010; Ertmer & Newby, 2013; Fino, 2013). These ideals parallel several dilemmas used by Hampden-Turner and Trompenaars (2002) as the basis for describing differences between national cultures. According to their research, Western cultures are often characterized by universalism, individualism and analysis, with the counterparts of these values being particularism (making decisions on the basis of personalised needs rather than standardised practice), collectivism (working collaboratively rather than independently) and integrative thinking (putting parts into context rather than focusing on narrow specialisations).

From a dilemma perspective the argument for a paradigm shift in education can be viewed as a concern that Western values have been too dominant in education and that the opposing values—the counterparts in dilemmas which have been neglected to this point—need to be more strongly represented. The dilemma perspective suggests that it is not a matter of chance or accident that education needs more personalisation, collaboration and contextualisation. The contrast with Western values suggests that the values now being advocated have in the past been systematically neglected because educational institutions, faced with dilemmas, have opted for goals associated with Western values. Universalism has been chosen ahead of personalisation, individualism ahead of collaboration, and analytical thinking ahead of contextualisation.

Ramsey (2006) highlighted a similar situation in relation to the ‘Learning Organisation’. The five disciplines—personal mastery, shared vision, mental models, team learning

and system thinking—advocated by Senge (1990) also represent values that are alternatives to the Western values described by Hampden-Turner and Trompenaars; alternatives that have been systematically neglected because of a cultural preference for their opposites.

Teaching innovation involves, to quote Vuorikari, Kamyli, Scimeca and Punie (2015), “many interactions among different factors of varying levels and is a complex and gradual process” (245). These interactions often create dilemmas for innovative teachers (Olson, 1981; Walker & Dimmock, 1999). While these may at first appear as troubling and unpleasant, and so may be expressed in a negative tone by those who experience them, dilemmas present a challenge to think upon, and thus are a potential source of learning and development (Achinstein, 2002; Adler, 1997; Ben-Peretz & Kremer-Hayon, 1990; Lampert, 1985; Lima, 2001; Windschitl, 2002). Similarly, Robinson (2001) argues that paradigm shifts are seen at first as unpleasant and disruptive, even though they are necessary and beneficial for growth and progress of a discipline. The study of the dilemmas of innovative teams, as well as of those of individual innovative teachers, becomes, therefore, a positive and productive way to understand and respond to some of the challenges involved in educational-change initiatives (Pareja-Roblin & Margalef, 2013).

The teacher dilemma literature offers three main reasons for focusing dilemmas (Ben-Peretz & Kremer-Hayon, 1990; Chee et al., 2015; Dimmock & Walker, 2005; Walker & Dimmock, 1999; Kremer-Hayon & Tillema, 1999; Lefstein, Israeli, Pollak & Bozo-Schwartz, 2013; Widschtl, 2002). First, dilemmas reveal the value conflicts that innovative teachers experience and how they make sense of and manage these conflicts (Dimmock, 1996; Dimmock & Walker, 2005; Cuban, 1994). Second, they can reveal otherwise unconsciously held (and therefore unmanaged) values, dispositions and beliefs of teachers concerning issues faced during the innovation process (Ben-Peretz & Kremer-Hayon, 1990; Kane, Sandretto, & Heath, 2002; Tillema, 2004). Third, dilemmas may reveal hidden goals, interests, motivations and understandings, not only of concerned teachers but also of other stakeholders involved in the process (Dimmock & Walker, 2005). Overall, dilemmas may assist in capturing the complexity and richness of educational innovation process (Lefstein, Israeli, Pollak & Bozo-Schwartz, 2013).

According to Tillema (2014), asking teachers to make their dilemmas and resolutions explicit provides insights into their mental models or thinking patterns. When people are asked to explain their beliefs, they readily employ contrasts. For example, while describing one's own decision or action, a person might use terms like “rather than”, “instead of”, and “as opposed to” to indicate negation of a contrary choice that was also available. This suggests that people often think in terms of dilemmas. Thus, research on dilemmas can potentially reveal the mental models people use in thinking about a given problem.

Uncovering dilemmas also provides a basis for further research. For instance, each dilemma that is identified can be treated as a pair of opposing dimensions or values. Trompenaars and Hampden-Turner (1997) have shown that research tools can be developed for population surveys to uncover the patterns of reconciliation employed by communities and which distinguish them from others. Thus, exploring the dilemmas of teaching innovation can provide a basis for measuring and making comparison between different groups of people, for instance, between innovative teachers and educational administrators.

Dilemmas and their resolutions are readily teachable (Kirrane 1990). This means that research on dilemmas can also potentially help to bridge the gap between research and practice (Porath, 2016). Generally, the ability to deal with dilemmas is considered one of the core competencies of teachers (Berlak & Berlak, 1981; Lampert, 1985; Wegners, Anders & Nuckles, 2014). Research on dilemmas provides opportunity to assist teachers in (1) identifying and understanding value conflicts; (2) weighing the potential impact of choosing various available options; and (3) formulating an adequate reconciliation strategy for a dilemma. Hence, research on the dilemmas of innovative teachers can be used to enhance the competence of teachers to perform effectively in realising their innovations.

### **3.3 Dilemma Theory and dilemma management**

To understand and describe the dilemma management process, there are a number of theories and models such as Charles Hampden-Turner's Dilemma Theory (Hampden-Turner, 1983), Ropo, and Hunt's (1995) theory of entrepreneurship and Johnson's (1998) polarity management. Dilemma Theory is considered distinctly different from

other similar theories and models because it sees the world through the lens of paradox (Trompenaars, 2007). According to Seet (2007) and Zhou (2008) Dilemma Theory is appropriate for appreciating and analysing phenomena such as innovation in terms of dilemmas and their resolutions.

Dilemma Theory, based on the work of Charles Hampden-Turner, deals with values and norms (Zhou, 2008). It considers values as “differences” rather than as tangible things (Trompenaars, 2007). Dilemma Theory argues that a way to understand the world is through underlying opposing values such as order versus chaos, change versus continuity, and rules versus exceptions, to name a few (Trompenaars & Wooliams, 2003). In other words, this theory suggests that conflicts and intractable problems should be understood as several pairs of opposing values. Drawing upon Scott Fitzgerald's quotation “The test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function”, Dilemma Theory contends that values in a dilemma may appear to be contradictory; however, they can be reconciled to create value (Hampden-Turner & Trompenaars, 2015).

According to Wagner (1984), dilemma management involves deliberate conscious efforts to establish a balance between reality and what ought to become reality. To put it differently, the management of a dilemma depends upon the thinking process surrounding it (Bouchiki, 1998). Taken together, there are three basic modes of reasoning or thinking that can be used to deal with reconciliation problems: “either-or”, “both-and”, and “through-through” (Bouchiki, 1998; Buytendijk, 2010; Seet, 2007). These modes will be illustrated using the tension between consistency and innovation.

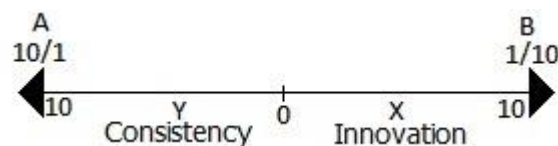


Figure 3.1 Either-or approach

The “either-or” approach, instead of synthesizing conflicting values in a dilemma, treats the values as antagonistic to each other. This approach to dilemma resolution leads to one side or value being chosen at the expense of the other (Jay, 2012; Buytendijk, 2010). As shown in Figure 3.1, this mode of thinking is linear or one dimensional. Any move toward 'Innovation' is a move away from 'Consistency'. While common, the

“either-or” approach is viewed as the most inappropriate way of thinking to deal with problems that require careful and creative management (Trompenaars, 2007).

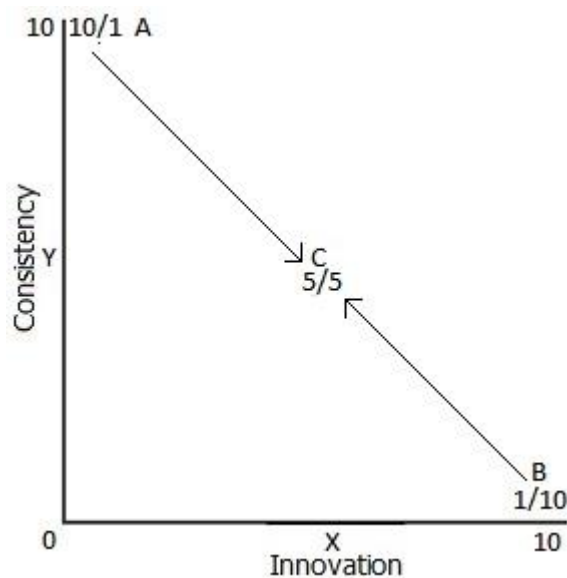


Figure 3.2 Both-and approach

In contrast to the “either-or” approach, the “both-and” approach is viewed as relatively flexible (Jay, 2012). It denotes one option to be true and a contradictory option as simultaneously true (Seet, 2007). According to Keidel (1995) there are generally two ways to apply this thinking approach. The first is to make a trade-off or compromise between two options, whereas the second is to combine both the options. The former way is generally applied by those who believe that increasing one variable essentially decreases the other. The latter way is applied by those who assume that both variables can be enhanced simultaneously (Keidel, 1995). The “both-and” mode might encourage teachers to be mainly consistent, while also being open to occasional innovative efforts.

The third and the most useful mode of thinking, and which is also advocated by Dilemma Theory, is “through-through”. Unlike the other two approaches, this aims to synthesise the apparently opposing options of a dilemma into coherence (Seet, 2007). In literature this approach to thinking is also termed: “productive reasoning” (Cardno, 1995); “creative thinking” (Lyons, 1990, p.168); and “integrative thinking” (Martin, 2007). The “through-through” approach to thinking requires going beyond linear thinking and viewing competition between options not as a destructive but a constructive tension (Barrett, 1998; Hampden-Turner, 1990a; Martin, 2007). Thinking this way enables individuals to synergise opposing values to form a virtuous circle to manage the dilemma (Trompenaars, 2007). For example, consistency and innovation

may, on the surface, be seen as in competition. But consistency in organisational processes can lay the groundwork for innovation. And the process of innovation can be used to establish new practices that become the basis for future consistency. Movement between the two values can thus strengthen both of them. Consistency is achieved *through* innovation, and innovation is encouraged *through* consistency. Trying to do both consistency and innovation at once can produce confusion and floundering, rather than movement. So the virtuous cycle usually involves sequencing one value and then the other.

Hampden-Turner (2000) termed the synergisation of conflicting values in a dilemma as reconciliation. He suggests that some, if not all, dilemmas can be perfectly reconciled based on creative ideas and capabilities. Trompenaars (2007) puts the same idea in these words: “the essence of the creative process is not in one or other position of a continuum, but in how the opposites of the scale interact ... creative people integrate all those faculties and, in the process, discover new ideas and solutions” (p.13).

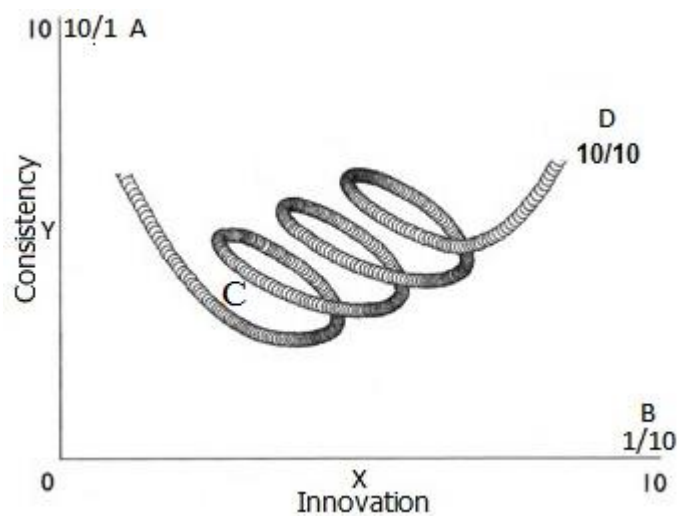


Figure 3.3 The dilemma helix (Source: Hampden-Turner & Trompenaars, 2000)

In Figure 3.3, opposing values are represented by X and Y. One can be at the extreme position (A or B) in preferring X or Y, or at compromise between two values, C, or reconciled optimal position, D. It should be noted that in order to reach reconciliation one needs to gain experience at both poles of a dilemma indicated by the two axes. To put it differently, a strategy which moves between the two poles in a helix-like pattern and over time gains experience at both poles of the dilemma, will eventually lead to an optimal position where the opposing values are both represented in decisions made and

actions taken. While 'consistency' and 'innovation' are used in Figure 3.3, any pair of opposing values can be used.

A traffic signal system is also a good example to understand the dilemma reconciliation process (Kangaslahti, 2002). A light stuck on red (stop) or green (go) is useless and dangerous. The yellow (be careful) light indicates compromise between red and green lights but does not provide a useful and lasting solution. It is the difference and constant movement of light between red, yellow and green that manages the traffic system.

Teachers are viewed by some as dilemma managers (Berlak & Berlak, 1981; Lampert, 1985) because they not only accept conflict as endemic and even useful but have the capacity for invention or improvisation. According to Berlak and Berlak, (1981) teaching is “the simultaneous resolution of multiple dilemmas” (p.165). The Berlaks found that teachers consciously and deliberately develop a “set of behaviour” (p.272) which they termed “patterns of resolution” (p.133) to respond to recurring dilemmas. This means that teachers not only espouse dilemma resolution, but practically enact strategies to respond to generic (common) dilemmas. According to the Berlaks these strategies seek “resolution where pulls of both poles are joined” (p. 133). In other words, teachers tend to reconcile generic dilemmas.

As shown in the following section, research literature reveals a number of strategies employed by teachers while dealing with dilemmas they encounter during their work. These strategies include: non-action, choosing one option over the others, making a trade-off (a reasonable compromise) between the opposing options and pursuing synthesis between opposing purposes. These strategies mirror the approaches to resolution outlined in Dilemma Theory.

### **3.4 Previous Studies on Teacher Dilemmas**

Teaching is a difficult practice because it involves continuously making decisions within a complex environment of contradictions and conflicts (Larabee, 2000). Many studies have been undertaken in the last three decades with regard to dilemmas that teachers encounter in their work. On the basis of their focus, these studies can broadly be divided into three strands: (1) those dealing with dilemmas faced by teachers when they engage in an innovation process, (2) those to do with interpersonal dilemmas encountered by teachers when they are working in teams, and (3) those dealing with

dilemmas routinely experienced by teachers during their teaching activities. It is important to mention that studies are not spread evenly across these strands, and the ‘routine’ strand—even though it accounts for many of the dilemma studies in education—is not as directly relevant to this study as the others. Eighteen studies, selected on the basis of their relevance to this research, are reviewed below: 10 are related to dilemmas teacher experienced during educational reform or innovation, seven studies focus on dilemmas encountered by teachers in their day-to-day work, and one explores dilemmas teachers face when working in teams.

### ***3.4.1 Dilemmas in educational change***

According to Fullan (1990) educational change involves combining values that seemingly do not go together. In the following paragraphs, important studies conducted by researchers in a variety of countries on dilemmas encountered by teachers involved in educational change are reviewed. The studies reviewed in this section used different theoretical models and research methodologies, but follow a pattern that provides important insights.

#### ***3.4.1.1 Olson’s Study***

Olson (1981) employed clinical interview techniques based on George Kelly’s personal construct theory to identify dilemmas teachers encounter while introducing innovative doctrines in their classrooms. Eight teachers from three schools in England who introduced the “discovery approach” to teaching participated in this research. Olson (1981) found that discovery based teaching recommended ‘low influence’ over curriculum and instruction for teachers, whereas the participants, being traditional teachers, were familiar only with a traditional ‘high influence’ or teacher-centred approach to teaching. As a result, the dilemma experienced by the participants was between “persisting with the project-recommended methods of exerting influence, or using ones they could trust” (p.269). The teachers responded to the dilemma by translating the innovation in more familiar terms via modifying the curriculum and instruction according to their usual teaching practices. To put it differently, the participants responded in an either-or mode. While they espoused change, they acted to stick with traditional practice.

The findings of Olson’s (1981) study suggest that in top-down teaching innovations teachers may dilute and modify the contents of innovation based on values different to

those upon which the change is based (Shoonmaker & Ryan, 1996; Wenger, 1998). Moreover, the findings suggest that if teachers are not clear about the nature of dilemmas they face, they may adopt strategies that are ineffective over time, diluting the impact of the change.

#### *3.4.1.2 Le Cornu and Peter's study*

Using Windschitl's (2002) dilemma framework, Le Cornu and Peters (2004) investigated the experiences of four primary teachers in a project based in South Australia entitled 'Learning to learn'. The study identified a number of dilemmas. On the basis of Windschitl's four frames of reference, the study divides dilemmas into four general categories: (a) conceptual, (b) pedagogical, (c) cultural, and (d) political.

The conceptual dilemma experienced by the teachers was whether or not what they were doing in their classrooms was 'constructivist'. The participants faced this dilemma because they did not fully understand the philosophical and epistemological underpinnings of constructivism. Consequently, they were partially using this theory in their teaching and learning practice. In other words, the teaching and learning practice the participants used was partly traditional and partly constructivist.

In total, Le Cornu and Peters (2004) identified three pedagogical dilemmas. The first dilemma was between knowledge construction and achievement of acceptable learning objectives. All participants responded to this dilemma in a similar manner: by planning the instructional program, to some extent, according to the guidelines provided by South Australian Curriculum Standards and Accountability Framework (SACSA) even if it was going against interest and expectations of students. The second pedagogical dilemma was explicit teaching versus student knowledge construction. The participants responded to this dilemma by accommodating explicit teaching in their student-centred, inquiry-based learning. The third pedagogical dilemma identified in the study was related to time allocation in the classroom. On the one hand, the teaching approach adopted by the participants required them to allocate adequate time to each student, but, on the other hand, the participants did not have enough time to meet all their teaching related obligations. The participants managed this dilemma by allocating time to teaching the whole class as well as interacting with small groups and individual students.

Le Cornu and Peters (2004) also identified two cultural dilemmas. The first dilemma was allowing students to manage and control their learning in order to assist them in the construction of knowledge versus the teacher managing and controlling classroom activities to make sure that students are on track and making progress. The participants responded to this dilemma by occasionally intervening and over-ruling students' choices when they felt that the choices could impede student learning. The second cultural dilemma faced by the participants was allowing students to control their own behaviour versus teacher managing student behaviour to create an effective learning culture. The participants managed this dilemma by allocating time to establishing norms of acceptable behaviour and thus helping students to manage their own behaviour.

The political dilemma identified in this study was the expectations of students and parents versus the benefits of the constructivist learning approach. The dilemma emerged for the participants because students and parents, who were used to traditional teaching methods, had expectations that were at odds with the methods adopted by the participants. The teachers resolved this dilemma via convincing both the groups of stakeholders of the importance and effectiveness of constructivist teaching and learning approaches.

Le Cornu and Peter's (2004) study shows that adopting innovative approaches to teaching creates dilemmas for teachers. Innovative primary teachers, instead of choosing one option over the other, tended to tackle these dilemmas by establishing what the researchers described as a 'balance' between conflicting priorities. This enabled them to make progress toward multiple but seemingly conflicting objectives.

#### *3.4.1.3 Enyedy, Goldberg and Welsh's study*

In another study, Enyedy et al. (2006), in a K-8 school in an urban area of Los Angeles (USA), identified two dilemmas that were experienced by teachers while implementing a curricular reform in their classroom. Using grounded theory, Enyedy et al., (2006) interviewed two teachers who had introduced an inquiry based learning model called Global Learning and Observations to Benefit the Environment (GLOBE) in their classrooms. According to Enyedy et al., (2006) the teachers shared similarities in terms of teaching experience, understanding of teaching content, professional beliefs and values and administrative support received for implementing GLOBE. They had, however, dissimilar teaching goals and practices with regard to implementation of the

project. Enyedy et al., (2006) attributed this variation in the goals and practices of the teachers to the difference in the perceived identities of these teachers.

The dilemma experienced by one of the research participants was between one of the three guidelines provided by the GLOBE with regard to the recommended teaching approach and her beliefs about how students learn (Enyedy et al., 2006). The GLOBE guidelines required the teacher to act as an instructionist teacher who issues directives to students about how and what to learn. Whereas she perceived herself as a co-learner and co-inquirer who lets her students learn through reflections about their own actions (Enyedy et al., 2006). The teacher resolved the dilemma by oscillating between strategies of: adherence to the prescribed guideline; deviation from it; and addition to it. The dilemma encountered by the other participant was between her beliefs with regard to the nature of science and her views about how students learn. On the one hand, she believed in student collaboration with each other and in their active participation in their own learning. However, on the other hand, she believed that learning should be highly structured and the mandated protocols must be strictly adhered to (Enyedy et al., 2006). Unlike the other participant, she compromised her beliefs with regard to how students learn and adhered to the GLOBE guidelines. This led to reducing her teaching lessons to a set of protocols with little or no authentic inquiry-based learning. In other words, the inability of the participant to reconcile the dilemma led to her acting in a disengaged way. On the basis of the findings of their study, Enyedy et al. (2006) claim that dilemmas emerged for teachers when their personal identities (sense of self, knowledge, beliefs, dispositions and orientation) came in contact with shifting practices, aims and contingencies of their teachings. Overall, this study suggests that teachers may have similar teaching beliefs, experiences, values and environments, but their different teaching goals and objectives may lead them to adopt dissimilar resolution strategies for the same dilemmas.

#### *3.4.1.4 Barker and Martin's study*

Barker and Martin (2009) describe four dilemmas which they experienced while formulating and delivering an innovative course on positive psychology in Wollongong University, Australia. The dilemmas faced by the authors were: (1) remain separate as an authority versus participate in group activities, (2) establish formal learning goals versus seek to bring personal change in students, (3) apply formal assessment processes

to evaluate student performance versus assess personal change in students, and (4) Teacher happiness versus Student happiness.

Barker and Martin (2009) resolved the dilemma between authority and participation by first establishing rules about confidentiality and setting the boundaries of disclosure for class group activities, and then participating in these activities. The strategy assisted the authors to turn the class into a mutual journey. For the dilemma between formal goals and personal change, the authors designed the course in such a way that both objectives could be achieved. Barker and Martin (2009) allowed class activities which not only assisted students in learning course content, but also acquiring skills and attitudes that are central to personal change.

Due to their institutional limitations, Barker and Martin (2009) decided they had to choose formal assessment to respond to the assessment dilemma. Consequently, they could not measure personal change and development that occurred in their students before and after the course. However, they did encourage their students to apply course lessons in their lives. Barker and Martin (2009) resolved the last dilemma by developing mutual understanding about course objectives. To develop common understanding, they thoroughly discussed and negotiated course objectives with their students. As the authors and their students were eventually on the same page in terms of course objectives, their happiness goals did not clash with each other. Consequently, both teachers and students enjoyed the class.

Barker and Martin's (2009) findings indicate that bottom-up teaching innovations produce difficult tensions for professors. While responding to these dilemmas, the professors participating in the study took into consideration both sides of a dilemma before making a decision. Consequently, they showed that they were capable of adequately resolving dilemmas they encountered while formulating and executing their innovations.

#### *3.4.1.5 Dobozy's study*

With an interest in inquiry based learning (IBL), Dobozy (2012) examined a failed teaching innovation attempt in an Australian teacher education program designed to prepare beginning teachers for flexible student-centred learning and teaching. The data for the study was obtained from 135 teacher education students. The collected data were analysed using a grounded theory approach. The results of the analysis revealed that

despite the majority of the participants claiming to value constructivist learning principles, they were actually acting more as passive ‘consumer students’ (Dobozy, 2012; p.42). According to Dobozy (2012) most of her participants were dissatisfied with the IBL because it required them to get out of their comfort zone and struggle for meaning-making. The dissatisfaction of the participants led to their becoming disengaged from the IBL process, which eventually resulted in the failure of the project.

Perhaps the most important finding of the Dobozy’s study was that it revealed an important dilemma for innovative educators: learning needs versus student satisfaction. It is, however, important to note that the dilemma was not mentioned explicitly in the study. The study suggests that, on the one hand, teachers may want to implement teaching strategies which satisfy students' learning needs, but, on the other hand, they need to maintain and improve student satisfaction ratings of their teaching and learning strategies. Another important finding of this study is that the non-resolution of one critical dilemma may sabotage the implementation of an educational innovation.

#### *3.4.1.6 Briant and Doherty’s study*

Using Berlak and Berlak's dilemma framework, Briant and Doherty (2012) conducted an exploratory study to identify professional dilemmas faced by teachers within the context of an educational reform, “the new Australian curriculum” (p.59). They interviewed nine experienced professional teacher educators which included two males and seven females from public sector Australian Universities. The data obtained from the teachers was subjected to content analysis, which facilitated the authors to not only identify dilemmas experienced by the teachers but also establish their proposed resolutions. Briant and Doherty report that eight out of their nine research participants felt there was a mismatch between their expertise and personal values and the values that were shaping the new curriculum, and this led to several dilemmas for them.

Briant and Doherty focused on the Berlaks’ curricular set of dilemmas. They found that the participants who presumed that the new curriculum would be deficient of the needed course content or that it would over focus on de-contextualised public knowledge, experienced a ‘personal knowledge versus public knowledge’ dilemma. These participants proposed resolutions that involved giving priority to ‘personal knowledge’. Some participants suspected that the new curriculum would not focus on developing critical skills and deep understanding in students, and consequently

experienced a ‘knowledge as given versus knowledge as problematic’ dilemma. They decided to align the curriculum with their philosophy of teaching by using their space of freedom to put forward their own value, treating knowledge as problematic. One of the participants thought that the new curriculum would require teachers to teach more content, which would reduce pedagogy to the transmission of content only. This participant experienced ‘knowledge as content versus knowledge as process’ dilemma which she planned to resolve by favouring ‘knowledge as process’ in her teaching strategy.

In their study, Brian and Doherty also identified a set of dilemmas around politicisation and standardisation of the new curriculum. The new set, additional to the dilemmas identified by Berlak and Berlak (1981), includes dilemmas around political expedience, professionalism, and assessment imperatives. The study reports that those participants, who felt that the new curriculum was mainly a case of political expedience, experienced an ‘education as politically driven versus education as student centred’ dilemma. To resolve this dilemma the participants proposed two strategies which included promoting those skills and knowledge that they perceived to be important and exposing the political consideration behind the new curriculum design in their programmes. Both the resolutions represented the participants’ inclination toward a “student-centred” curriculum. Similarly, the participants who viewed the new curriculum as something that would de-professionalise the teachers due to its overly prescriptive nature faced a ‘teaching as professionalised versus teaching as de-professionalised’ dilemma. To respond to this dilemma the participants proposed: invoking of an expanded conceptualisation of the curriculum that would treat the new curriculum as just part of the whole curriculum and continuing to use the same theories which were informing their use of curriculum. Both the resolutions upheld the view of teaching as ‘professionalised’ (Briant & Doherty, 2012, p.61). Lastly, there was a participant who assumed that the new curriculum was driven by an active assessment regime. The resolution proposed by her involved compliance with the assessment agenda but also maintaining a student-centred approach while teaching curricular content.

Briant and Doherty’s findings suggest that tertiary teachers not only need to keep themselves aware of what is going on at the government level in terms of changes in the curriculum but also to critically reflect on the implications of the changes. Moreover, the findings show that tertiary teachers working in dissimilar context may experience

similar curriculum or teaching dilemmas. Lastly, the findings suggest that the tertiary teachers in the study showed a lack of competence. They did this by framing dilemmas as 'good' versus 'bad', and then dealing with them in an either/or mode.

#### *3.4.1.7 Ruys, Van Keer and Aelterman's study*

Using a qualitative research methodology to explore challenges faced by the teachers during the implementation of CL (collaborative learning) in Flemish primary schools in Belgium, Ruys et al., (2014) obtained data from 15 student and novice teachers. The analysis of the data revealed five dilemmas. These dilemmas were related to professional autonomy (Teacher autonomy versus Pre-service performance assessment; Teacher autonomy versus Institutional conformity), teachers' beliefs (Beliefs versus Evidence about pupils' readiness for CL), time pressures (Investing in curriculum versus Curriculum and job pressures) and contextual constraints of school systems (Pedagogical intentions versus Contextual constraints)<sup>1</sup>.

Ruys et al., (2014) found that all of their student teachers were strongly motivated to apply CL in their classrooms; however, the majority of these teachers did not implement it during practicum because they feared that trying new teaching strategies might negatively impact their performance scores. Similarly, once graduated, novice teachers had full autonomy inside in their classrooms to make choices about their teaching strategies. Nonetheless, the majority abstained from using CL because they wanted to conform to the practices of their senior colleagues instead of keeping up with their pedagogical convictions. Another dilemma reported by Ruys et al., (2014) was that the participants were not sure about the readiness of their students for innovative teaching so they felt torn between taking risks and applying CL versus avoiding risk and following traditional teaching methods. The majority of participants responded to this dilemma by opting for traditional instruction.

Another dilemma identified Ruys et al., (2014) from teachers' accounts was that, on the one hand, teachers wanted to implement CL, but, on the other hand, they did not have enough time to engage in innovative teaching. Consequently, most of the participants adhered to the traditional way of teaching and avoided making use of new teaching methods. The fifth and the last dilemma identified in this study was between the intentions of teachers to implement CL versus contextual realities such as classroom

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<sup>1</sup> Some of the dilemmas are formulated as good verses bad rather than good verses good

space, class size and heterogeneity of students which were at odds with the implementation of CL in the classroom. Their study shows that contextual limitations negatively impacted the implementation of CL by the participants. It is also important to note that the participants did not put any real effort to change the limiting contextual elements.

Ruys et al., (2014) adds to the body of evidence that innovative teaching involves dilemmas. The relatively inexperienced participants responded to the dilemmas they encountered with either-or thinking, choosing one of the two options given in a dilemma. The study suggests that when teachers do not have sufficient control over the conditions in which they work they tend to 'play safe', opting for non-implementation of innovative teaching methods. Lastly, the study reveals four factors that impact a teacher's decision about implementing innovative teaching practice: colleagues, students, and curriculum and classroom context.

#### *3.4.1.8 Chee, Mehrotra, & Ong study*

In research based on multiple case studies, Chee et al., (2015) also demonstrate that shifting teaching practice from a traditional teaching model to a contemporary model creates dilemmas for teachers. In their research they explored dilemmas that were faced by secondary school teachers who introduced game-based learning as a pedagogical innovation in their classrooms. In total, they interviewed nine teachers, six female and three male, from five government secondary schools in Singapore. Chee et al., (2015) found that their participants experienced a number of challenges and dilemmas.

The first challenge the participants wanted to overcome was the resistance or opposition from students toward the new mode of teaching (Chee et al., 2015). The dilemma for the teachers was that, on the one hand, they needed to implement their learner-centred pedagogy to facilitate learning in their classrooms; but, on the other hand, they needed cooperation and active participation of their students who were accustomed to and liked the opposite pedagogical approach, the traditional, teacher-centred model. The participants overcame the challenge by persuading the students of the utility of their innovative pedagogy. The second challenge the participants' experienced, concerned constraints that were arising due to system requirements and normative expectations in relation to their role as professional teachers (Chee et al., 2015). The associated dilemma for teachers was that, on the one hand, they needed freedom to choose learning

standards as per the requirements of the new pedagogy, but, on the other hand, they were expected to meet the standards set by influential stakeholders within their schools. The teachers responded to this dilemma by pushing very hard at their schools for enacting the desired standards.

The third challenge, Chee et al., (2015) identified, was that the participants were experiencing pressures due to a need to ensure that their students get high marks in standardised assessment. The dilemma faced by teachers was that, on the one hand, they had relatively less experience with new teaching routines and consequently they were losing teachable moments; but, on the other hand, they needed to prove their performance to their superiors by the high marks of their students in school tests. Teachers managed this dilemma in different ways. Two of the teachers completely ignored the need to demonstrate their performance to their superiors and concentrated only on students' learning processes. One of the teachers obtained support for the innovation from a powerful stakeholder within her school, the Department Head. One did not respond to the dilemma.

The fourth and final challenge faced by the teacher was related to conflict between mandated and appropriate forms of assessment (Chee et al., 2015). The dilemma encountered was that the teachers needed to employ an assessment model that was compatible with their innovations; however, they were required to follow nationally mandated curriculum and assessment. Given that teachers were not in a position to change the nationally mandated forms of assessment, the dilemma remained unresolved for the teachers.

Chee et al.'s (2015) study suggests that teachers who introduce innovative teaching doctrine in their classrooms may face dilemmas that stem from their students, schools and educational authorities. Some of these dilemmas may be reconcilable. However, there may be some dilemmas that teachers are not be able to resolve due to their limited control, lack of authority, or constraints placed upon them by their education system. The study also shows that a variety of strategies were adopted by the participants, including the through-through approach, to respond to their dilemmas. When there was little or no control, teachers were stuck, with no way to reconcile. Singapore has a particularly hierarchical culture (Trompenaars & Hampden-Turner, 1997), so the last dilemma must have been particularly challenging.

#### *3.4.1.9 Qoyyimah's study*

Qoyyimah (2015) conducted a doctoral study to understand the tensions that were experienced by EFL (English as Foreign Language) teachers while planning and implementing moral curriculum reform in Indonesian schools. The data was collected through classroom observations and repeated interviews with nine teachers from four states and five private schools. A thematic analysis was conducted on the data that revealed the two groups of teachers responded very differently to the dilemmas involved in their enactment of the same curricular reforms.

In total, Qoyyimah (2015) identified three areas in which dilemmas arose. The first dilemma was related to two co-existing educational reforms. The first of the two reforms provided Indonesian school teachers with the relatively more professional freedom to formulate curriculum according to their school contexts, whereas the second reform sought to comparatively restrict teachers' freedom by making them incorporate in their curriculum 18 values stipulated by the Indonesian government. The two groups involved, teachers from state school and teachers from Islamic schools, understood and responded differently to the conflict situation. The state school teachers understood the dilemma and responded to it by incorporating state recommended values in their lessons. These teachers also considered other relevant factors, such as school context, student needs, and curriculum guidelines while designing their lessons. Unlike state teachers, private Islamic school teachers did not understand the nature of the dilemma. Rather than viewing the stipulated and school values as complementary to each other, they viewed them as inherently contradictory. These teachers either copied lesson plans from their colleagues working in the state schools which were available on the internet, or left the new reform unimplemented.

The second dilemma experienced by the state school teachers was "Holistic lesson plan versus Professional preference" (Qoyyimah, 2015, p. 184). The new reform encouraged adoption of a range of 18 values; however, teachers would be required to address only one to five values in each lesson plan. The state school teachers responded to this dilemma by choosing only those values which they perceived to be suitable for teaching EFL materials. Some of these teachers also infused values other than the suggested values because they deemed those values important for addressing some broader social issues. In contrast to the state school teachers, the teachers from private Islamic schools

did not report experiencing the dilemma. The majority of these teachers did not make any changes to their copied lesson plans.

In the implementation phase, the state school teachers reported four dilemmas: 1) the gap between planning lessons and actual classroom teaching; 2) how to ensure students identify as well as realise the learnt values; 3) whether to teach or model the values; and 4) how to accurately assess students' learning about the values (Qoyyimah, 2015). The first dilemma arose when teachers found that there was a difference between what they had planned and what they taught in their classes. The teachers regretted their slippages and viewed the gap as problematic. The second dilemma was responded to by teachers via modelling the intended values while also teaching the values explicitly. The strategy enabled the teachers to assist the students with not only acquiring the understanding of the concepts and to realise the importance of nominated values. Similarly, the third dilemma was responded to by the teachers via combining invisible and visible pedagogy. For instance, one of the teachers taught her students to have 'courage' when presenting their work. The fourth and the last dilemma remained unresolved because the concerned teachers did not work out any proper method that can accurately assess changes in the behaviours of students after they learned the nominated values.

The teachers working in private Islamic schools did not describe any dilemmas related to reform implementation. They did mention challenges related to their work conditions such number of students, time management and limited professional capacity. According to Qoyyimah (2015) teachers in private Islamic schools taught neither their English lessons nor the stipulated values effectively, because they were occupied with regulating classroom issues.

Overall, Qoyyimah's (2015) study sheds light on the role of dilemmas in educational reforms. It reveals that awareness of dilemmas triggers reflection in teachers and provokes them to adapt their pedagogical reasoning and practices to conflicting demands and real-world circumstances. Those who do not identify the dilemma are unable to consider how they may be reconciled. In other words, a basic aspect of dilemma competence is being able to recognise when a dilemma exists. The study also indicates that teachers who view the opposing values in a dilemma in a complementary frame, as opposed to contradictory, are likely to manage the values more effectively. Furthermore, the study suggests that teachers who receive continued professional support from their institutions in the form of capacity building programs and good

working conditions may be better equipped to handle dilemmas than those teachers who do not have access to adequate institutional support. Lastly, the study suggests that national culture or subcultures can influence reconciliation strategies of teachers.

### ***3.4.2 Dilemmas in day to day work***

Teaching is viewed by some as simultaneous resolution of multiple dilemmas (Adler, 2006; Berlak & Berlak, 1983; Lampert, 1985). This section presents some of the important studies that highlight dilemmas experienced by teachers in their day to day work. Important to note is that these studies used different data sources and methodologies and are conducted in different contexts; thus, they arrive at different findings.

#### ***3.4.2.1 Berlak and Berlak's study***

Berlak and Berlak (1975) studied sixteen primary schools that were involved in informal and open learning in England. They used George H. Mead's dialectical social behaviourism theories, which view people as conscious beings who are both objects who are acted upon, and subjects, as initiators of actions. The Berlaks' work is considered seminal on teachers' dilemmas and is among the most widely cited studies in the field. The main objective of their research was to capture teaching and learning as dilemmas and their resolutions. They initially identified fourteen dilemmas related to process of schooling (Berlak & Berlak, 1975). In 1981, Berlaks expanded their article into the book *Dilemmas of Schooling*. The book mentions sixteen different dilemmas of schooling which, based on their themes, are categorised into three generic sets: control, curriculum and societal norms. Each of these sets of dilemmas represents a specific kind of tension teachers experience during their teaching practice (Berlak & Berlak, 1983). The set of control dilemmas, for example, deals with tensions related to teachers' focus and the extent of their control over time and the behaviour of their learners (Berlak & Berlak, 1981). Similarly, the set of curriculum dilemmas represent the contradictions related to the transmission of knowledge and learning (epistemology and metaphysics). The set of societal dilemmas shows conflicts related to establishing equality, fairness and social relations.

Table 3.1 Dilemmas of teaching by Berlak and Berlak (1981)

<b>Control set</b>	<b>Curriculum set</b>	<b>Societal set</b>
Whole child versus child as student	Personal knowledge versus public knowledge	Childhood continuous versus childhood unique
Teacher versus child control of time	Knowledge as content versus knowledge as process	Equal allocation of resources versus differential allocation
Teacher versus child control of operations	Knowledge as given versus knowledge as problematic	Equal justice under law versus ad hoc application of the rules
Teacher versus child control of standards	Learning is holistic versus learning is molecular	Common culture versus sub-group consciousness
	Intrinsic motivation versus extrinsic motivation	
	Each child is unique versus children have shared characteristic	
	Learning is individual versus learning is social	
	Child as person versus child as client	

Table 3.1 shows the three sets of generic dilemmas the Berlaks identified. The language of the sixteen dilemmas represents the inherent contradictions in teachers' consciousness, situations and society with regard to schooling (Berlak & Berlak, 1981). All in all, the study contributes to making sense of the nature, depth and dimensions of teachers' work; however, it gives less attention to the work involved in managing the dilemmas that teachers experience (Lampert, 1985).

#### 3.4.2.2 Lampert's study

In her famous and widely cited article in the *Harvard Educational Review*, Lampert (1985) argues that teachers operate within conditions of 'constructive ambiguity'.

Teachers frequently encounter situations that can be construed as dilemmas rather than as easily solvable problems. Using two case studies, one from her own teaching experience and one from a colleague's classroom experience, she elaborates the kinds of polarity problems teachers experience and resolve while meeting their teaching responsibilities. The first case study mentions a situation in which a teacher wanted to manage the behaviour of unruly boy students who sat together at one table. To ensure that the boys worked productively, the teacher tended to work at the blackboard near them. This caused the girl students to start to feel they were being ignored by the teacher. The situation thus caused to a dilemma for the teacher, who needed to make a choice between two of her goals: maintaining classroom order versus promoting equal opportunity. The teacher resolved the dilemma through merging it with another pressing issue in the classroom. The issue involved organising the students' activities around some ambiguous course material which she was about to begin teaching. The teacher divided the class into four groups (two of girls and two of boys) and moved one group of boys near the girls' blackboard and one group of girls to the other side of the room. The strategy enabled her to avoid distractions that would arise from grouping boys and girls together without dividing the classroom on the basis of gender. The resolution ultimately enabled the teacher to achieve both of her pedagogical goals.

The other case study related by Lampert describes a situation in which a teacher received answers from students in response to a question she posed to her class. One of the answers was factually and logically correct; however, it did not correspond to the answer mentioned in the teacher's guide. The teacher reviewed the answer and declared it accurate. This eventually led to an argument between two students about the correctness of the answer, and a dilemma for the teacher in which she needed to decide between "child-centred teaching" and "curriculum standard teaching" (Lampert, 1985, p.187). Rather than siding with either of the two sides, she told both students that they were right in their own ways. The teacher persuaded her students that although the textbook answer was valid, at the same time it was not the only source of correct knowledge. Thus, the dilemma was resolved through upholding both the values simultaneously. Lampert's work demonstrates that teachers resolve their dilemmas through moving flexibility between poles.

### *3.4.2.3 Ben-Peretz and Kremer-Hayon's study*

Ben-Peretz and Kremer-Hayon, (1990) divide dilemmas encountered by teachers into two types: generic and specific. The dilemmas belonging to the former type are inherent in teaching practice, such as dilemmas related to classroom management, whereas specific dilemmas are “situation-bound” conflicts (Ben-Peretz & Kremer-Hayon, 1990, p. 38). They conducted an interpretive analysis on data they gathered through in-depth interviews from six secondary school teachers in Israel. The teachers had varying level of experience and expertise, from novice to senior teachers. The main aim of their research was to unveil the content and context of the dilemmas encountered by the teachers.

For novice teachers, Ben-Peretz and Kremer-Hayon (1990) found, the transition from being a student to a personal teacher lead to various dilemmas. These dilemmas were related to professional identity (commitment to teaching versus the desire to attain expertise in other fields; teaching as an unwanted profession versus unemployment), teaching competence (blame one's own incompetence to teach versus accuse students of being unable to learn), interpersonal relationships (professionalism versus interpersonal workplace relationships), personal autonomy (autonomy to make decision versus dependency on system), status as a teacher (pursue one's own goals and expectations versus adapt to the established environment) and group identity (maintain an even relationship with all colleagues versus join an influential group of colleagues).

Ben-Peretz and Kremer-Hayon also identified the generic dilemmas that were experienced by the beginner teachers. These dilemmas were about planning lessons (addressing learning needs of students versus limited resources for teaching; implementing new but relatively risky teaching modes versus using trusted but inefficient modes of teaching), curriculum design (addressing actual learning needs of students versus teaching compulsory course material), teacher control (allowing free discussion on topic according to the interests of students versus guiding the discussion according to pre-defined pedagogical objectives), teacher authority (need for maintaining authority in the eyes of his students versus awareness of a model for searching knowledge), and classroom management (viewing corporal punishment as an improper tool to improve behaviour versus using corporal punishment to discipline disobedient students; maintaining formal relationship with students versus establishing informal relationship with students).

For senior teachers, Ben-Peretz and Kremer-Hayon (1990) found, that unlike the novice teachers, they tended to experience dilemmas related to the gaps between their ideologies and their classroom or school realities. These dilemmas were related to permissiveness of school (openness of school environment versus need for teacher intervention in students' personal and social affairs due to strong normative forces), societal context (need to fulfil the requirements of the curriculum versus desire to treat classroom as an opportunity to openly discuss social and political issues involved in a situation), teacher planning (recommend a sloppy and ineffective but approved textbook to students versus teach without the text book and make students to rely on one's own lectures and notes) and classroom management (uphold the majority's behavioural norms versus preserve the minority's behavioural norms).

Overall, Ben-Peretz and Kremer-Hayon (1990) study found there are common, as well as distinct, dilemmas that emerge in the teaching space. Moreover, the study also suggests that the more teaching experience teachers have, the more likely they are to learn how they can resolve teaching-related dilemmas. An important implication of these findings is that for generic dilemmas teachers can be taught how to recognise and resolve them. For specific dilemmas, teachers can be provided with guidance about the reconciliation process.

#### *3.4.2.4 Tirri's study*

Using a case study design, Tirri (1999) explored dilemmas experienced by teachers in urban schools in Helsinki, Finland. She interviewed 33 secondary school teachers and employed qualitative content analysis on the interview transcripts. This enabled her to identify dilemmas related to: (1) teachers' work (wellbeing of an individual student versus wellbeing of the classroom; wellbeing of a student versus compliance with the mandated assessment protocols; commitment to confidentiality of student information versus wellbeing of students; interpersonal relationship with colleagues versus wellbeing of students; act as a professional teacher to assist students with their learning versus act as a therapist to assist students with their personal and social issues); (2) students' behaviours at school and work (school values versus students' personal values); (3) minority rights (uphold majority's religious and cultural norms and values versus preserve minority's ethnic identity) and (4) common rules at school (follow school rules versus conform with the practice in vogue while dealing with students'

undesired behaviours; students' freedom of choice versus mandatory activities or subjects).

Tirri (1999) found that the majority of her research participants did not know how to resolve the dilemmas they had faced. She notes that the participants used four different ways to tackle the dilemmas they were facing: avoiding, delegating, single-handed decisions and discourse. In the most cases, however, the strategy employed by the participant was single-handed decision-making. This suggests that when lacking skills to resolve a dilemma, many teachers often exercise unilateral power. Tirri (1999) claims that while making decisions, teachers generally aim to balance justice, care and truthfulness to reach better solutions.

#### *3.4.2.5 Tirri and Husu's study*

In a related study, Tirri and Husu (2002) explored dilemmas experienced by kindergarten and early elementary school teachers in urban public schools in Finland. The data for the research was obtained from 26 teachers as self-reports about conflicts the teachers experienced in their teaching and the choices they made in response to these conflicts. Tirri and Husu (2002) divided the conflicts into three broad categories: conflicts between institution and individual, inter-institutional conflicts, and cultural conflicts. The first category included ten whereas the other two categories each included eight dilemmas.

In the first category nine out of ten cases involved conflict between teachers and parents of students and in one case the conflict was between a teacher and student (Tirri & Husu, 2002). The dilemmas experienced were: best interest of students versus expectations of parents with regards to their children, and best interest of the class versus the best interest of a student. Tirri and Husu (2002) found only two of their research participants resolved these dilemmas positively, settling the conflicts through effective communications with parents. The second category, inter-institutional conflicts, involved making decisions between protecting rights of students and maintaining interpersonal relationships with colleagues. Tirri and Husu (2002) found that none of their research participants had successfully resolved the conflicts. Lastly, the cultural conflicts involved teachers and their school communities. These teachers had to decide between the best interests of their students and their school ethos (Tirri & Husu, 2002). Four of the participants had successfully resolved their dilemmas. These

participants mainly used discussion and compromise as a strategy to resolve the dilemmas they were facing.

The findings of this study indicate that simply encountering dilemmas does not result in people learning how to resolve them. Although not mentioned explicitly by Tirri and Husu (2002), the findings also point to the role of power in resolving dilemmas. The resolution is more difficult when dealing with people who cannot be directly influenced via power, so that teachers find it easier to resolve dilemmas between teachers and students, than those between teachers and parents.

#### *3.4.2.6 Buzzelli and Johnson's study*

Buzzelli and Johnson (2001) report an authority-related dilemma which a teacher faced during a “writer's chair activity” in a third-grade US classroom (p.1). Using content analysis, the researchers investigated the activity via the transcript of the teacher-student interaction that took place during the activity. They found that, on the one hand, the teacher wanted to nurture students’ creative potential as authors. On the other hand, she wanted to her students to display ethical and responsible behaviour in their writings. The former required the teacher to act as a guide who allows and facilitates students in the construction of their knowledge whereas the latter required her to act as an instructionist teacher who uses her authority to regulate students' educational behaviour. The teacher reconciled this tension through allowing students to freely construct their ideas and then employing “soft power” to regulate their writing behaviour. The soft power here means persuading students with regard to the observance of prevailing general norms of morality in their writings (Buzzelli & Johnson, 2001).

#### *3.4.2.7 Shapira-Lishchinsky*

Shapira-Lishchinsky (2010) used a grounded theory approach to explore ethical dilemmas experienced by teachers in Israeli secondary schools. She interviewed 40 male and 10 female teachers across seven regional districts. The interviews lasted between 40 and 50 minutes. The analysis of the interviews enabled her to identify 50 critical incidents. These incidents were formed into five categories: (1) caring climate (caring for students) versus formal climate (maintaining formal relationship with students); (2) distributive justice (fairness of outcome) versus school standards (criteria set by school to assess students' academic performance); (3) confidentiality (maintaining the trust of students about their private matters) versus school rules

(abiding by school regulations); (4) loyalty to work colleagues (complete faithfulness to friends) versus school norms (school standards e.g. protecting students from harm); and (5) family agenda (respect for family beliefs) versus school norms.

In terms of dilemma resolution, Shapira-Lishchinsky (2010) reports that a range of strategies were employed by the teachers to respond to the dilemmas they had faced. Almost all her research participants considered constituent values in their dilemmas to be mutually exclusive and consequently they responded to these dilemmas by choosing one value rather than upholding both values. Additionally, the majority of the participants expressed their unhappiness, anger, regret, and guilt over their own decisions. Shapira-Lishchinsky (2010) study showed that, when confronted with dilemmas, teachers untrained in dilemma resolution will often make decisions on the basis of emotion and in response to pressure imposed by their situations. While these decisions may bring about a desired outcome in the short term, teachers may later regret that they did not find a way to reconcile the dilemma.

### **3.4.3 *Dilemmas in team-based innovations***

Only one study is reviewed in this section because no other study was found addressing this subject matter.

#### **3.4.3.1 *Pareja-Roblin and Margalef's study***

Pareja-Roblin and Margalef (2013) divide teaching dilemmas into two types: interpersonal and intrapersonal. They conducted a qualitative study using a variety of data collection methods, including in-depth interviews, working sessions, participant observation and teachers' narrative. The main objective of the study was to describe and analyse interpersonal and intrapersonal dilemmas that teachers experience when they engage in collaborative inquiry. The data for the study was obtained from a group of five Belgian university teachers who were working in an inquiry community. The interpersonal dilemma participants' experienced (individual autonomy versus collective autonomy) was between pursuing their own objectives and seeking a balance between their own goals and that of their community. Pareja-Roblin & Margalef (2013) found that the majority of their research participants were not interested in giving up their personal objectives. Consequently, the majority of the participants decided the dilemma in favour of the former value, personal interest and objectives, and tended to distance themselves from their community. The remaining participants, however, did recognise

the dilemma and searched for common ground between their goals and those of their community. The intrapersonal dilemma (certainty versus uncertainty) experienced by the participant was: either sticking to the security and certainty provided by more structured and familiar tasks or dealing with the uncertainty of adopting new approaches to teaching. Pareja-Roblin & Margalef (2013) found that the participants were initially reluctant to adopt new teaching approaches due to the uncertainty associated with new practices, but later on they embraced the dilemma and started to gradually adopt new teaching practices. The Pareja-Roblin and Margalef study shows that when teachers are working in a team on an innovative curriculum project they not only faced dilemmas within themselves as individuals, but also dilemmas related to relationships between themselves and others. Moreover, it suggests that people need time to work through dilemmas, and the initial reaction may be to reject the change.

### **3.5 Summary of the chapter and research gaps**

The review of previous studies helps researchers in understanding what has been achieved, how it was achieved, and what else needs to be achieved and how to do it. On the basis of the existing literature review, it can be concluded that teachers' at all levels—primary, secondary and tertiary—face dilemmas whether they engage in educational change efforts or not (Berlak & Berlak, 1981; Lampert, 1985). Besides facing teaching or innovation related dilemmas, teachers encounter dilemmas related to relationships between team members when working in a team environment (Pareja-Roblin & Margalef, 2013). Depending upon the strategy employed, a dilemma can lead a teacher to achieve of his or her objectives (Barker & Martin, 2009; Qoyyimah, 2015), or may limit or sabotage his or her efforts (Dobozy, 2012). Teachers may respond to the dilemmas they encounter in one of the three different ways: choosing one value over another; seeking compromise between values; and synthesising opposing values. All these strategies conform to the resolution strategies discussed in Dilemma Theory: either-or, both-and, and through-through.

The studies reviewed also indicate that different teachers may respond differently to the same dilemmas (Enyedy et al., 2006). A teacher's response to a dilemma, besides other factors, largely depends upon his or her competence (skill and knowledge) to deal with dilemmas (Ben-Peretz & Kremer-Hayon, 1990; Briant & Doherty, 2012; Ruys et al.,

2014; Qoyyimah, 2015; Tirri, 1999). In some cases, teachers who lacked this competence did not recognise the existence of dilemmas that were evident to more competent colleagues (Qoyyimah, 2015). Conversely, increased competence was shown in some studies to enable teachers to adequately reconcile dilemmas they faced (Qoyyimah, 2015). In short, the competence to deal with dilemmas assists teachers to recognise the dilemma; frame the dilemma (good versus good, rather than good versus bad); and reconcile the dilemma bilaterally (rather than through the exercise of unilateral power).

While different people use different modes of thinking and so are at different stages of competence with regard to dilemma resolution, Dilemma Theory can assist in estimating the thinking mode as well as the competence level. The dilemmas and resolutions reported in the reviewed studies, from the perspective of Dilemma Theory, not only show the thinking mode employed by the respondents but also reveals their competence level. Competence develops progressively, from not recognising or ignoring a dilemma to fully reconciling a dilemma.

*Table 3.2* Possible responses to dilemmas

Thinking Style	Strategy Employed	Author(s) & Year
Lack of awareness	Not seeing or ignoring a dilemma	Chee et al., (2015); Qoyyimah (2015); Pareja-Roblin & Margalef, (2013); Tirri (1999)
Either-or	Choosing one value over the other	Barker & Martin (2009); Briant & Doherty (2012); Chee et al., (2015); Dobozy (2012); Enyedy et., al (2006); Le Cornu & Peter (2004); Olson (1981); Ruys et al., (2014); Shapira-Lishchinsky, (2010); Tirri (1999); Tirri & Husu, (2002); Pareja-Roblin & Margalef, (2013)
Both-and	Pursuing compromise between opposing values	Chee et al., (2015); Enyedy et., al (2006); Le Cornu & Peter (2004); Tirri (1999)
Through-through	Reconciliation between opposing values	Barker & Martin (2009); Briant & Doherty, (2012); Buzzelli & Johnson, (2001); Chee et al., (2015); Enyedy et., al, (2006); Qoyyimah (2015); Lampert (1985); Tirri & Husu, (2002)

Despite the fact that dilemmas have been researched and discussed from various angles and perspectives in the context of teachers' work, to date no study has specifically investigated dilemmas and their resolutions in the context of tertiary teachers working together on innovative projects. Another gap identified in the review is that the research has been overwhelming related to education at the school level, with relatively little that is related to adult education. The need exists for more research at the tertiary level.

Furthermore, most of the research on teacher dilemmas in educational change process focused on teachers' reaction to educational reform. Very few studies have investigated dilemmas experienced by those teachers who initiate change. Moreover, as we have seen, many studies stopped at the point of identifying dilemmas. In some studies such as Pareja-Roblin & Margalef (2013) and Briant & Doherty (2012), even the dilemma statements are not framed appropriately: by expressing dilemmas as good versus bad, they made dilemmas more difficult for teachers to reconcile. Pareja-Roblin & Margalef's (2013) certainty versus uncertainty dilemma statement, for example, does not show two favourable or unfavourable options. The same dilemma could be better expressed as minimizing the risk of failure versus pursuing innovative teaching methods. Lastly, little attention was given in these studies to the rigour with which dilemmas were elicited and captured.

The aforementioned gaps in the existing literature will be addressed by this research, which focuses on innovations initiated by teachers at the tertiary level. Further, it seeks to establish a rigorous method by which dilemmas can be identified. The next chapter discusses the methods used in the study to achieve these aims while answering the research question presented in Chapter 1.

## **Chapter 4. Research Methodology**

This chapter describes the overall research methodology that was adopted for the study. Research methodology is defined as an action plan for getting from here to there, where here is the initial set of questions and there is the set of answers (Yin, 1994). The chapter begins by explaining the aim of the study and research question. This discussion is followed by a consideration of the research paradigm. The chapter then explains the conceptual framework, sampling technique, instrumentation, ethical considerations and the data collection methods used. The chapter also discusses in detail the data analysis process.

### **4.1 The Aim of the Research**

The basic aim of this thesis is to uncover the dilemmas that innovative university teachers encounter during their creative endeavours along with the reconciliation strategies that they employ to successfully move forward toward realising their innovations. The study will also identify themes that emerged from interviews that cut across individual dilemmas. Overall the research aims to develop a clearer understanding of the challenges faced by those teachers who initiate a pedagogical change and suggest how the process of innovation can be effectively managed.

### **4.2 Research Question**

The most crucial step toward providing a sound conceptual basis to a research study is to come up with a sound research question (Farrugia, 2010). The overarching research question for this study was:

*What are the dilemmas experienced by innovative university teachers during the process of education innovation, and how do they respond these dilemmas?*

Answering the research question may provide valuable information to trainers, educators and researchers to better understand how innovative teachers perceive their world and respond to it. The insights gained from this research may also assist policy makers to understand the challenges and tensions faced by innovative teachers. Finally,

the findings may assist institutions of higher education in creating culture, structures and systems that encourage innovation and creativity in education.

Most of the research projects begin with the selection of a problem or area of interest and the research paradigm (Denzin & Lincoln, 2011; Gronewald, 2004). A paradigm is defined as a broad perspective based on the set of shared assumptions, standards, ideas and practices (Capra, 1996; Cohen, Manion, & Morrison, 2013). It mainly deals with three broad questions: (1) What is the nature of reality; (2) What is the nature of relationship between the researcher and what can be known; and (3) How can one find out what he or she believes can be known (Guba & Lincoln, 1998)? Overall, a research paradigm systematically guides research in finding its intended objectives (Creswell, 2013; Johnson & Christenson, 2010; Guba, 1990; Maxwell, 2011).

According to Lee and Lings (2008) the structure of the social world is different from the natural world. The object of natural science is material reality, whereas the object of social world is social (interpersonal or intellectual) phenomena. Hall and Hall (2008) argue that this difference necessitates that the approach adopted to study social phenomena must be different from that of material objects. Positivism is the dominant research approach used in natural sciences. It views the world as guided by scientific principles that explain the behaviour of phenomena through causal relationships (Jennings, 2001). Positivism is based on realist ontology and it treats “facts” as existing independently of researchers and research participants (McKerchar, 2008; Silverman, 2006). The positivist methodological approach is considered appropriate for inquiries that aim to explain and predict phenomena in terms of quantity or numbers (Carson et al., 2001). Research studies that adhere to this approach utilize quantitative methods, followed by statistical and mathematical techniques, to measure and explain objective reality (Saunders et al. 2009).

In contrast to positivism, interpretivism denies the applicability of causal explanation to social phenomena (McKerchar, 2008). It treats “facts” to be subjective, contextual and partial (Lincoln & Guba 2005). Interpretivism views the human world to be socially constructed and subjective (Veal, 2005). Schwandt (2003) states that interpretivism assumes that social actions are fundamentally meaningful. The meanings come from the actors’ subjectivity, including their intention, beliefs, and desires. Thus, to understand any situation, it is essential to understand the thinking of the individuals who shaped the situation (Schwandt, 2003; Veal, 2005). In other words, the social reality cannot be

studied in the same way as other non-human phenomena because the reality exists in the perception of the individuals involved in a given situation (Veal, 2005). Interpretivism is adopted primarily in inductive qualitative studies that aim to understand and explore social and cognitive phenomena. To make the philosophical underpinning of the research clearer, ontological commitments and epistemological positions of the research need to be discussed.

Ontology is a branch of philosophy that deals with the essence of a phenomenon and the nature of its existence (Duberl, Johnson & Cassell, 2012). It is considered to be the core of any research study (Crotty, 1998). Broadly, according to Ritchie, Lewis, Nicholls and Ormston (2012) ontology can either be realist (positivist) or constructivist (interpretivist). Realist ontology considers reality and knowledge to be absolute objects that exist independent of the subject's consciousness (Schuh & Barab, 2007). As reality exists independently of observer's consciousness it can be exactly understood through applying adequate investigating tools (Guba & Lincoln, 1998). Studies based on the realist ontology tend to exclude values, interests and assumptions. Constructivist ontology rejects the idea of one objective reality. It suggests that reality and knowledge are constructed by social actors (Lincoln & Guba 2005). Individuals intentionally or unintentionally construct internal representations which then, through the process of reflection and sharing these interpretations with others, lead to the creation of social reality (Cilesiz & Spector, 2013). Crotty (1998, p. 42) explains constructivism by saying that "all knowledge and meaningful reality is contingent upon human practices, being constructed in and out of interactions between human beings and their world, and developed and transmitted within an essentially social context. Hence, it is both cognitive and social processes that together shape living reality" (p.42).

Meanwhile epistemology refers to knowledge and knowledge creation (Conrad & Serlin, 2006). It is concerned with the idea of truth and how something can be claimed as true or false. There are two broad epistemological traditions: objectivism and subjectivism (Easterby-Smith et al., 1991; Laughlin et al., 1986). In objectivism, a phenomenon under investigation is presumed to be an absolutely independent entity; therefore the researcher can study it without influencing it or being influenced by it (Guba & Lincoln, 2005). In other words, researchers are objective and independent and use inquiry methods appropriate for natural sciences. In contrast to objectivism, subjectivism considers the reality as a projection of human imagination and

consciousness (Bernard & Tichkiewitch, 2008). It views the world as concepts and labels created by observers to structure reality (Crotty, 1998).

When investigating the experiences of innovative teachers, it is reasonable to assume that the reality of those experiences emerges only as individuals start observing, interacting and communicating about it (Campbell, Coldicott & Kinsella, 1994). Individuals' observations as a phenomenon are shaped by their values, emotions and self-interests so they cannot be separated from the reality. Similarly, language acts as a principal vehicle in constructing a social reality because, without language, making sense of any situation and enacting a meaningful conversation about it becomes impossible for individuals (van der Haar, 2002). In the existing study, constructive ontology means understanding participants' views and actions in their own particular contexts. For example, two or more participants using the same reconciliation strategy may have completely different reasons for adopting that strategy. Thus, adopting constructivist ontology will help in uncovering different understandings of participants'. Similarly, adhering to the subjectivist epistemology means that, as a researcher, I can attempt to create shared meaning from the experiences reported by participants, while exercising care to recognise that this meaning reflects what participants reported in their interaction with me, and the values and assumptions I brought to the research.

According to Creswell (2007), research studies that adhere to the social constructivist and interpretivist understanding of reality and knowledge treat their research participants, not as objects, but as subjects who create meanings from their own lived experience. For the existing study, the relevant lived experience of the research participants is related to pedagogical innovation. All the participants give meaning to their lived experience according to their own particular contexts. This research undertakes an interpretative process to understand the innovative process in terms of dilemmas faced and reconciliations adopted by the research participants. This required that I interpret the participants' understanding of innovation in a fluid and contextual manner rather than one that is fixed or Universalist.

Overall, the research adopted a qualitative interpretive approach. The main reason for this is that the focus of the existing study is the dilemmas faced during the process of educational innovation. The study aims to understand and describe rather than measure and quantify dilemmas experienced by teachers as they develop and enact their innovations. Thus, the study's interest, objectives and the type of data required to

answer the research question clearly suggest the use of interpretive qualitative methodology. The study uses semi-structured, in-depth interviews to collect data from participants for this research. The data obtained was transcribed, analysed and interpreted to identify dilemmas experienced as well as the strategies employed by the participants to respond to the dilemmas.

### 4.3 THT Framework

The Trompenaars and Hampden-Turner (THT) framework was used in this research to understand and represent dilemmas and the reconciliation strategies adopted by participants. This framework has five main steps (Zhou, 2007), shown in the figure 4.1.

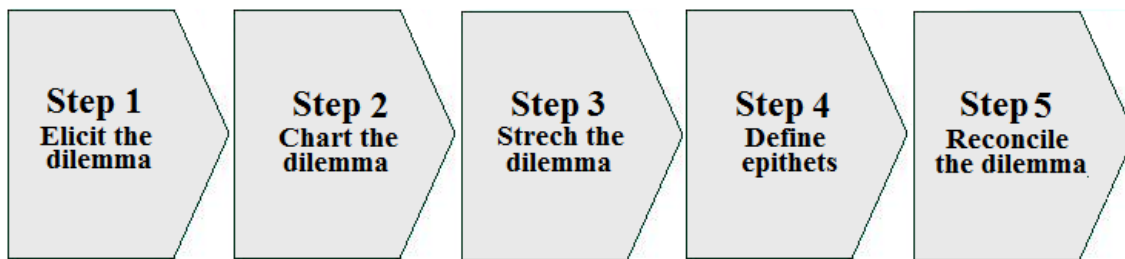


Figure 4.1 THT Framework to Reconcile Dilemmas

In Step 1, information about a dilemma is collected through a qualitative interactionist approach such as interviews (Trompenaars, van der Steege & Schreuders, 2014). From the obtained information, two apparently opposite ways of proceeding are identified. In Step 2, the elicited dilemma is charted. The two axes (x-axis and y-axis) are labelled with names for the 2 “horns” of the dilemma following the standard vertical/horizontal convention (Merk, 2003).

In Step 3, the positive and negative implications of the two extreme positions in the chart are considered. This step requires the researcher to identify how a dilemma holder might gain and lose if he or she takes the dilemma to an extreme and fully achieves Position 1 or Position 2.

In step 4, descriptive but simple enough labels that can be easily understood are developed for Position 1 and Position 2. These labels are developed on the basis of the gains and losses identified in the previous step. In Step 5, the strategy undertaken by a dilemma holder to respond to the dilemma is illustrated.

For example, as shown in Figure 4.2, a dilemma holder accomplishes his or her objectives by moving to a position that achieves both values through a series of movements (actions or decisions) which emphasise the two alternative values in sequence. If the prior action has emphasised value A, the next will emphasise value B, and so forth. The movement progressively blurs the distinction between the two values, so that ultimately an action can be viewed as emphasising both values at the same time. The ideal movement follows the path of a helix as shown in Figure 4.2.

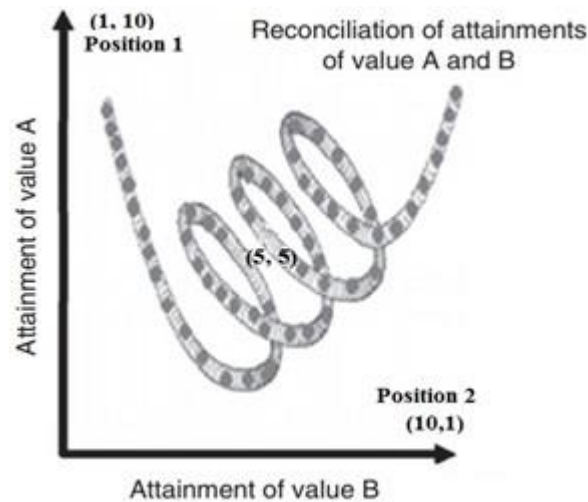


Figure 4.2 The Reconciliation Grid

It is important to note that the THT framework has successfully been used in several research studies (Burger, 2008; Hampden-Turner & Chih, 2010; Hampden-Turner & Trompenaars, 2002; Kuoppakangas, 2014; Merk, 2003; Sankaran, Glower, Walker & James, 2004; Seet & Hampden-Turner, 2005; Seet, 2007; Suomi, Kuoppakangas, Hytti, Hampden-Turner & Kangaslahti, 2014; Tse & Soufani, 2010; Zhou, 2007). Previously the framework has been applied to fields like strategic management, leadership, culture, entrepreneurship, human resource management, marketing, and change management (Zhou, 2007). In the present study the framework will be used to understand and explain dilemmas experienced by teachers during pedagogical innovations.

During his doctoral study, Burger (2008) found that different consultants drew varying conclusions when presented with the same source data. According to him, this suggests that Step 1 of THT framework lacks rigour and objectivity. Burger (2008) states:

“Steps 2 through 5 are well verified and validated through both research and practice and have been published in both the professional and formal academic press. Step 1 in particular is less rigorous in practice ... it suffers the absence of a theory base.”

Burger (2008) suggests that Step 1 could be made more rigorous by adopting new and effective qualitative approaches to elicit and analyse data. In line with this suggestion, the present study has incorporated cognitive mapping to represent and integrate the thinking of participants. Cognitive mapping meets the standard suggested by Burger (2008) since it has a sound basis in theory and is accepted as a rigorous research method (Bouzdine-Chameeva, Durrieu, & Mandják, 2015). No previous studies have been found in which cognitive mapping is used in conjunction with the THT framework. It has been adopted here because both cognitive mapping and dilemma theory aim to understand and interpret the thinking and decision making of actors in complex situations, and they share the ontological and epistemological positions of the researcher. Adopting cognitive mapping for this study represents a methodological innovation designed to respond to a reasonable criticism of an established framework.

The present study is mainly focused on the first two steps of the THT framework. The data obtained through semi-structured interviews with innovative teachers will be transcribed and subjected to cognitive mapping. The dilemmas represented in the cognitive maps will be plotted on the x-axis and y-axis of a typical coordinate plane. The later steps in the THT framework are designed to elicit a reliable strategy for reconciliation based on a full understanding of the dilemma. In this research strategies used by innovative teachers are captured. However, rather than being 'ideal' reconciliation strategies, these were not necessarily based on understanding. Rather, they were strategies adopted in response to challenges, often in complex and stressful contexts. They can, however, be evaluated on the basis of the consequences that followed and thus help to suggest how the THT framework for each can be completed.

#### **4.4 Sampling Technique**

In most cases examining an entire population is neither practical nor efficient therefore a subset of a population called a sample is selected for a study. To be able to generalise the results of a study it is essential for the sample be a representative of the target population. Therefore, the major aim of all quantitative sampling techniques is to enable a researcher to draw a representative sample from a population (Krosnick, 1999; Marshall, 1996). However, in the case of a qualitative study, it is neither productive nor realistic to have a representative sample for three reasons (Pratt, 2006). First, the nature

of qualitative research is mainly exploratory and descriptive, where the objective is to explore the research questions rather than to offer statistically quantifiable results. Second, there are accessibility issues such as identifying the total population and then gaining access to the intended subjects. Third, in qualitative studies the workload is cumbersome and it is extremely difficult for the researcher to collect and analyse data with one set of eyes and ears. Besides these reasons that justify the use of a small sample in this study, there is another reason, related to Dilemma Theory as the guiding framework. While investigating dilemmas the assumption can be made that even within a small sample most dilemmas will have been experienced by some participants. Thus at the exploratory stage a small sample can be used to identify dilemmas. Later research can use these dilemmas in descriptive research with much larger sample sizes, to compare populations using quantitative techniques.

Qualitative research is generally undertaken to provide an in-depth understanding about social or psychological issues and therefore they require flexible and pragmatic approaches to sampling (Marshall, 1996; White, 2008). Of the three most commonly used qualitative sampling methods, purposive, quota and snowball (Marshall, 1996), purposive sampling was chosen as the most appropriate method for the existing study because of the following three reasons: (1) It allows the researcher to select participants based on his or her judgement (Pitton, 2003); (2) Purposive sampling is more convenient and economical than other sampling methods (Brink (1996); and (3) It is considered the most useful technique when data collection and data analysis are done simultaneously (Mack, Woodson, MacQueen, Guest & Namey, 2005).

Purposive sampling is further divided into six types (Teddlie & Yu, 2007). These are: typical case sampling, homogenous sampling, extreme case sampling, intensity sampling, maximum variation sampling, and reputational sampling. Of these different types of purposive sampling methods, homogenous sampling was chosen. Homogeneous sampling refers to the sampling process in which subjects who share similar background in terms of age, gender, occupation, or any other identifiable characteristic are selected for examination and analysis (Saunders, Lewis & Thornhill, 2012). It is important to note here that the word similar mentioned in the preceding sentence does not mean identical. According to Cohen and Crabtree (2008) this type of sampling is used when the goal of the study is to describe and understand the experiences of a particular group of people. As stated earlier, the present research aims

to investigate experiences of innovative teachers to understand and describe the phenomenon of ‘pedagogical innovation’ in terms of dilemmas and reconciliations. Thus, as the purposeful homogeneous sampling technique corresponds to the needs of the present research so it was employed to select the research participants.

To recruit participants for the study, following criteria were established. Participants needed to:

- Be a tertiary level teacher
- Be a leading member of a team that has successfully developed and implemented a pedagogical innovation
- Have published about their innovation in a peer-reviewed journal between 2009 – 2013

Teachers were chosen for the study because, as discussed in chapter 2, out of all the actors involved in educational innovation, as initiators and implementers, they play the most important role in the success of the innovations. The focus on team innovations was because the researcher reasoned that innovations that could be implemented by an individual were more likely to be relatively simple. Innovations introduced by teams were more likely to involve more complex situations, reflecting educational realities discussed in the introduction, and would involve extra dilemmas in the innovation process. The intention behind the criterion of a leading team member was to get those innovative teachers who were not only part of innovative teams but had played a major role in successfully developing and implementing the educational innovation. The reason for confining the criteria to those teachers who have published about their innovations was because, as discussed in chapter 2, innovative teachers generally disseminate their innovations via journal articles and books. The reason for choosing peer-reviewed journals to locate and recruit research participants was that articles published in these journals are examined for their genuineness by researchers with credentials in the field. In other words, it is assumed that an educational innovation published in a peer-reviewed journal has been recognised by knowledgeable peers as being a valuable advance on previous educational efforts. Lastly, limiting the selection criterion to those teachers who have published about their innovation in the recent past was to ensure that the participants of this research be able to properly reflect on experiences. Norman (1983) and Johnson-Laired (1995) suggest that mental models become unstable over time and holders forget the details of the target phenomenon.

Thus, these criteria were used to ensure that the research participants came up with real pedagogical innovations. Table 4.1 lists the journals reviewed in order to identify potential participants. These were selected because they were peer-reviewed; address issues to do with best practices in education and technological and non-technological educational innovations; have impact factors above 0.5; and are indexed with Elsevier's Scopus.

*Table 4.1 Journals reviewed*

	<b>Journal name</b>
1	Innovative Higher Education
2	Internet and Higher Education
3	Innovations in Education and Teaching International
4	Decision Sciences Journal of Innovative Education
5	Computer and Education
6	British Journal of Educational Technology
7	International Journal of Mobile and Blended Learning
8	The Academy of Management Learning and Education

In total 168 university teachers who met the selection criteria were identified and invited to participate in the study. Of those invited, 12 declined to participate in the study, 122 did not respond to the invitation, and four who initially agreed to take part declined at a later stage. The remaining 30 teachers who accepted the invitation took part in the study.

The sample was comprised of 17 male and 13 female participants. Geographically, the sample included participants from the USA (8), UK (7), New Zealand (4), Spain (2), Australia (2), Canada (1), Hong Kong (1), South Africa (1), Greece (1), Mauritius (1), the Netherlands (1) and the UAE (1). In terms of approach to innovation introduction,

25 of the participants used a bottom-up approach whereas the remaining five were part of top down innovations. Lastly, in terms of scale, 16 of the participants implemented small-scale innovation whereas 14 enacted large scale innovations. The notion of small scale here refers to implementation of an innovation within a single classroom. The ‘Innovation’ column broadly relates how the innovator described their innovation. Details of the thirty innovative teachers who were interviewed are given in table 4.2.

*Table 4.2 Short profile of innovators interviewed*

	<b>Position</b>	<b>Gender</b>	<b>Country</b>	<b>Approach</b>	<b>Scale</b>	<b>Innovation</b>
1	Assistant Professor	Male	UAE	Bottom-up	Large	New competency-based performance assessment model
2	Professor	Female	UK	Top-down	Large	Action-research based learning model
3	Senior Lecturer	Male	UK	Bottom-up	Small	Complexity-based teaching and learning model
4	Librarian and instructor	Female	UK	Top-down	Large	Inquiry-based learning model
5	Professor	Male	New Zealand	Bottom-up	Small	Practice-oriented learning model
6	Lecturer	Female	New Zealand	Bottom-up	Large	Enterprise educational model
7	Professor	Female	USA	Bottom-up	Large	Open Educational Resources for capacity building
8	Lecturer	Male	Greece	Bottom-up	Small	Collaborative game-based learning environment
9	Professor	Female	Spain	Bottom-up	Small	Collaborative video-games-based teaching
10	Professor	Male	USA	Bottom-up	Small	Open Educational Resource model
11	Professor	Female	UK	Bottom-up	Large	Online asynchronous and synchronous teaching model
12	Associate Professor	Female	Canada	Bottom-up	Small	Quantum Theory Based Learning Model
13	Senior Lecturer	Female	Hong Kong	Bottom-up	Large	Discovery Based Learning Model
14	Senior Lecturer	Female	South Africa	Top-down	Large	Blended Learning Model

	<b>Position</b>	<b>Gender</b>	<b>Country</b>	<b>Approach</b>	<b>Scale</b>	<b>Innovation</b>
15	Associate Professor	Male	USA	Bottom-up	Small	Animation-based learning model
16	Associate Professor	Female	USA	Top-down	Large	Community Based Learning Model
17	Associate Professor	Male	UK	Bottom-up	Large	Complexity- based teaching and learning model
18	Professor	Male	UK	Bottom-up	Large	Application of multiple modalities for instruction
19	Professor	Female	Spain	Bottom-up	Small	Application of Internet-based learning and teaching strategies
20	Lecturer	Female	UK	Bottom-up	Small	Apprenticeship model of teaching
21	Professor	Male	Australia	Top-down	Small	Group Project-Based Learning
22	Lecturer	Female	USA	Bottom-up	Small	Project-Based Learning
23	Professor	Male	USA	Bottom-up	Small	Application of intentional change theory to enhance conscious learning
24	Senior Lecturer	Male	New Zealand	Bottom-up	Small	Social constructivist model of teaching
25	Senior Lecturer	Male	New Zealand	Bottom-up	Small	Facilitative model of teaching and learning
26	Professor	Male	USA	Bottom-up	Large	Integrative learning model
27	Instruction designer	Male	Mauritius	Bottom-up	Large	Social constructivist learning model
28	Instruction designer	Male	Netherland	Bottom-up	Large	Flexible teaching model
29	Associate Professor	Male	USA	Bottom-up	Small	Art-based teaching model
30	Associate Professor	Male	Australia	Bottom-up	Small	Flexible learning model

The potential candidates were sent invitation letters via email, and those who agreed were interviewed face-to-face or over Skype and telephone.

One of the problems in qualitative research is the sample size (Pitton, 2003). Literature suggests that the participants need to be selected and data should be collected until the point is reached when new data no longer adds value to the insights pertaining to the research question (Guest, Bunce & Johnson, 2005; Mack et al., 2005). According to Creswell (2007) in most phenomenological studies the data generally begin to saturate between five and thirty interviews. In keeping with these guidelines, in this study the data was collected until data saturation was reached. The data began to saturate after 28 interviews but the researcher continued interviews with participants until 30 interviews completed and no new relevant information was found to emerge from the interviews: participants were describing dilemmas and reconciliation strategies that had also emerged in earlier interviews.

#### **4.5 Instrumentation**

The present study used interviews to elicit beliefs and experiences of the participants with regard to dilemmas experienced and resolutions employed during their educational innovations. In terms of format, there are three different interview designs: (1) informal conversation interview; (2) general interview design; and (3) standardized open-ended interview (Gall, Gall & Borg, 2003). For the existing study, a standardized open-ended interview format was chosen. The standardized open-ended interview format refers to an interview design in which the main questions and the sequence in which they are asked are decided prior to beginning the interviews with research participants (Patton, 1990; Turner, 2010). In this type of interview design, all research participants are asked identical questions (Turner, 2010). The three main advantages of standardized open-ended interview are: (1) the standardized questions provided a useful structure to the interview process whereas the open-endedness provided the participants with opportunity to deliver as much information as they desire (Turner, 2010); (2) this approach allows the researcher to ask probing questions as a means of follow-up (Creswell, 2007); and (3) the standardized questions reduces researcher biases within the study, especially when there are many research participants (Gall et al., 2003). Having selected this format, a research instrument was constructed to support it.

In qualitative studies the research subjects are viewed as co-authors not as mere repositories of data. According to Moon et al., (1990) qualitative researchers tend to

understand the meaning of events, actions and interactions from the perspective of the participants involved. To fully understand the phenomenon of their interest from the participants' point of view, qualitative researchers employ open-ended in-depth interviews (Wimpenny & Gass, 2000). Van Manen (1990, p.25), in the context of qualitative investigation, argues

Every phenomenon can be fragmented down into pieces and those pieces can be explored. A deeper understanding of the pieces will yield a deeper understanding of the whole. The essences are stages by which phenomena inaugurate themselves in our consciousness and gradually develop before our inner eye and allow us to assign meanings to what we experience.  
(p.25)

In the existing study the phenomenon of pedagogical innovation is divided into four broad areas: idea conception, team development, innovation development and implementation and innovation sustainability. The conceptual basis for dividing innovation into four areas or stages comes from theoretical literature concerning the process of innovation (see Section 2.3). From these areas ten open-ended questions were developed. The interview questions were developed based on the research question and a literature review on the topic of dilemmas experienced by teachers (Olson, 1981; Pareja-Roblin & Margalef, 3013; Chee et al., 2015; Qoyyimah, 2015).

#### ***4.5.1. Pilot-testing***

Pilot-testing or pre-testing refers to the small scale trial run of a system or its components to determine whether it meets the intended requirements or not. In the case of research instruments, it is primarily used to identify flaws, limitations or weaknesses within the instrument (Cooper & Schindler, 2007; Kvale, 2007), enabling the researcher to make necessary revisions to the instrument before the formal commencement of the study (Magnusson & Marecek, 2015). In addition, it also assists in estimating the average time for completing a survey or an interview (Veal, 2005). The piloting of the instrument also provides the researcher with an opportunity to gain some experience in terms of conducting interviews for their research projects (Magnusson & Marecek, 2015).

Markula and Silk (2011), recommend conducting at least one pilot interview to obtain feedback on the interview protocol. Hence, in the existing study, prior to collecting data, a face-to-face pilot interview was conducted with a tertiary-level teacher, who, along with his team, had introduced several pedagogical innovations. The interviewee was also a close acquaintance of the researcher and knew about the study's objectives. During the interview, the interviewee understood all the questions and did not experience any difficulty in answering the questions. At the end of the interview, the researcher obtained feedback from the interviewee on the interview design. Although the interviewee found the questions to be sufficiently comprehensive and easy to comprehend, he suggested several minor changes to the instrument. Consequently, following the pilot-test, minor revisions were made to the interview design, including modifications to the sequencing and wording of some questions to make them easier to understand and answer. The revised interview questions were as follows:

#### *4.5.1.1 Idea conception*

1. How was the idea for the innovation conceived?
2. Was the idea conceived spontaneously or was it an outcome of an organised and stepwise thinking process?

#### *4.5.1.2 Team development*

3. Why did other team members get involved in the innovation project?
4. What specific dilemmas and challenges did you experience within the team?
5. How were these challenges resolved?

#### *4.5.1.3 Innovation development process*

6. How did the nature of the innovation develop over time? How did it change from what was first conceived to what was developed?
7. What specific dilemmas and challenges did you and your team encounter as the idea was introduced into the system?
8. How did you or your team members manage to resolve the encountered dilemmas?

#### *4.5.1.4 Innovation sustainability*

9. What challenges and dilemmas did you face in making your innovation sustainable?
10. How did you resolve these challenges?

These aforementioned questions provided the framework for the research and guided the analysis in the cognitive mapping stage. The researcher's understanding was also informed by the journal article published by the participant. The interview questions assisted the researcher to uncover what Taylor and Bogdan (1984) called "the important reality" which, they explain "is what people perceive it to be" (Taylor & Bogdan, 1984, p. 2). Overall, the interview questions assisted the researcher in eliciting comprehensive information with regard to dilemmas faced and resolutions employed by the participants in their creative endeavours.

#### **4.6 Ethical Considerations**

Ethics is considered the cornerstone of any meaningful research (Vallance, 2008). It refers to moral values, principles and rules that regulate and guide social and moral behaviour of people (Ghillyer, 2008). In the context of research, ethics is defined as "the responsibility of a scientist for the consequences of his research and its results" (Hevner & Chatterjee, 2008, p. 57). In social research ethical issues are relatively more complicated than natural sciences (Ericksson & Kovalainen, 2008) because such research mostly involves human participants and research activities can lead to physical damage, psychological harm or loss of privacy to them. Thus, the primary reason for the application of ethical values and principles in research activity is to ensure protection of research participants from the adverse consequences of the research activities (Cooper & Schindler, 2014).

According to Maylor and Blackmon (2005), researchers can ensure the well-being of their research participants by following the golden ethical principle: do not do to others what you would not want them to do to you. This indicates that a researcher needs to make his or her research a healthy activity for the organization and individuals involved in it, treating them with fairness and respect and, where possible, providing them with some benefits.

As is the case with most universities (Sauders et al., 2012) Massey University provides its staff and students with a comprehensive code of conduct to ensure that research activities undertaken at the university adhere to the highest ethical standards. Massey University Human Ethics Committee (MUHEC) ensures that any research which involves human subjects adequately meets the standards set down for human research

participants in the code of ethical conduct. In the existing case study, the application to carry out the research was made to the MUHEC. The study was classified according to MUHEC guidelines as a low risk study. Here low risk means that “the nature of the harm is minimal and no more than is normally encountered in daily life” (Guidelines For Low Risk Notifications, 2015, p.1). Consequently, the research did not require a detailed review of the committee.

Once ethical approval was obtained, in line with the Code of Ethical Conduct for Research, Teaching and Evaluations, the information sheet was prepared. The sheet included contact details of the researcher, research supervisor and official of the Massey University ethics committee. The participants were given an undertaking that they would not be identified by their names in the thesis or any publications resulting from this study. In line with the code, written informed consent was obtained from each of the participants prior to the interviews. The consent forms were also accompanied by a cover letter describing study objectives, potential benefits for the participants and time needed for the research activities. The cover letter, information sheet and low risk notification are provided in Appendices A, B and C of the thesis.

#### **4.7 Interview procedure and the role of researcher**

The date, time and mode of interviews (face-to-face, Skype or phone) were arranged individually with each of the 30 participants. The interviews were conducted in English. Each interview took between 30 to 60 minutes. As might be expected with a group of experienced academic teachers, most of the participants were very articulate and enthusiastic about their experience and their views regarding education. Typically, however, the researcher also needed to ask follow-up questions to obtain additional information, clarify important details or fully understand the participants’ meanings.

The main role of the researcher as an interviewer was to guide the interviewees toward the topics that were deemed pertinent to this study while also allowing the natural flow of discussion. This, on the one hand, resulted in interviews with some enthusiastic participants going far beyond the anticipated duration, but, on the other hand, also enabled the researcher to adequately capture each participant’s experience and views with regard to his or her pedagogical innovation.

As the principal investigator, the researcher could not remain completely unbiased. The review of literature and the interviews themselves resulted in having some preconceived ideas about possible responses during the interviews. The researcher acknowledges those biases as they are natural phenomenon which are present in any qualitative research. Two important measures were taken in this research to ensure descriptive and interpretive validity of the data analysis.

Descriptive validity refers to the “factual accuracy of the account as reported by the researcher” (Johnson & Christensen, 2012, p. 265). It ensures the accuracy of the data (Maxwell, 1992) by addressing two key questions: did what was described as happening in the group being studied actually take place? And, did the researcher correctly report what he or she heard or observed? One way to ensure descriptive validity is to use member checking (Creswell, 2012) where the participants personally verify that interview transcripts report what they had said (Merriam, 2002). The present study used this technique to achieve descriptive validity.

Interpretive validity means “portraying accurately the meaning attached by participants to what is being studied by the researcher” (Johnson & Christensen, 2012, p. 265). It ensures that the researcher captures the meaning of phenomena under study based on the participants' point of view (Johnson, 1997). In the present research, member checking and investigator triangulation were used to promote this dimension of validity. Investigator triangulation involves employing another researcher to examine the data in order to minimize the risk of biased interpretation. For details of how member checking and investigator triangulation were used in this study see Section 4.8.3.

In summary, while conducting the interviews, I progressed in terms of my ability to conduct interviews that would produce rich data and understanding of the topic. This progress will also have resulted in greater risk of bias. That risk was, however, minimised by employing various triangulations which are detailed later in this chapter.

## **4.8 Data analysis**

There are three ways to extract and represent the thinking of participants: content analysis, procedural mapping and cognitive mapping (Carley & Palmquist, 1992; Carley, 2003). All these techniques have their advantages and disadvantages. The

researcher uses content analysis to identify important concepts by determining the frequency with of words appearing in any text or transcript. Although content analysis is easy to conduct and can effectively identify relevant concepts, it fails to identify the specific context within which the words appear in any text. Unlike content analysis, procedural mapping can adequately reveal context by providing information about the structure of a task and group of procedures that are involved in performing the task. However, it fails to convey general information that an individual holds in his or her mental models while interacting with a complex system. Cognitive mapping is a relatively complicated technique because it combines the features of content analysis and procedural mapping. It is regarded as the most useful tool to extract and represent individual or group mental models (Carley & Palmquist, 1992; Carley, 2003; Yun, 2008) because it can identify concepts as well as the specific context within which the concepts appear (Carley, 2003). This section will outline the nature of cognitive mapping, how cognitive maps are created, and the way they were used as the basis of data analysis in this study.

#### ***4.8.1 Cognitive Mapping***

Cognitive mapping allows the researcher to construct a visual representation of a respondent's perception of an issue (Brightman, 2003). Moreover, it enables the researcher to understand which event causes, results from, or leads to another event (Carley, 2003). Eden and Ackermann (1998) suggest that cognitive mapping "through its ability to show multiple explanations and consequences is able to represent dilemmas, feedback loops, multiple options, and the anticipated positive and negative ramifications of options" (p. 285). These features render cognitive mapping as an appropriate exploration tool to elicit and understand dilemmas experienced by participants in complex situations. Because cognitive mapping is a complex process, and central to the research method adopted for the present study, a detailed explanation is presented below.

The term "cognitive mapping" is used for a variety of techniques which include content analysis, causal mapping, repertory grids and software analyses of textual data (Huff & Fletcher, 1990). Huff (1990) has discussed all these methods along with their strengths and limitations. The existing study uses the cognitive mapping approach developed and proposed by Eden (1988). According to Eden and Ackermann (1998) cognitive

mapping refers to a set of techniques used to structure, analyse and understand ideas of an individual about an issue, a situation or both. As a research tool, it is used to capture and demonstrate the cognition of researched thoughts by employing a series of links in the form of a map (Yeoman, Robertson & Wheatley, 2014). According to Jones (1993) a cognitive map:

... is a collection of ideas and relationships in the form of a map. Ideas are expressed by short phrases which encapsulate a single notion and, where appropriate, an opposite notion. The relationships between ideas are described by linking them together in either a causal or connotative manner.

(p. 11)

Cognitive mapping was developed in the context of operational research and management science. However, due to its ability to assist decision makers faced with complex situations to arrive at sound choices, cognitive mapping is used in various fields such as strategy development, risk management, project management, system dynamics (Brightman, 2004) and event and festival management (Yeoman et al., 2014).

In terms of its theoretical basis, cognitive mapping draws on George Kelly's Personal Construct Theory (PCT) of personality (Kelly, 1955). PCT assumes that while solving any problem an individual displays predictive and controlling behaviour (Ackermann, Eden & Cropper, 1992). According to Huff and Fletcher (1990), cognitive mapping can be used to investigate any phenomena that are related to human activities, especially those that involve cognition. As a research technique, cognitive mapping is mainly used for four main functions: explication, prediction, reflection and strategy (Papageorgiou & Salmeron, 2013).

In its representation scheme, cognitive mapping employs four elements: concept, relationship, statement and map (Carley & Palmquist, 1992). The concept refers to a single or composite word, or complex phrase that represents a single idea (Carley, 2003). Goal, activity, challenge, cause, consequence, etc. are represented as concepts in the map. For example, "Road rage", "traffic congestion", "increased traffic accident" are some of the concepts shown in figure 5.4. Relationship denotes a conceptual or proximal tie that exists between two concepts to link them. In figure 4.3 the relationship among the concepts is shown through arrows. A statement is made up of two concepts and a relationship between them. For example, arrows between concepts create

statements such as “Car use leads to traffic congestion”, “traffic congestion causes road rage”, “pollutant emissions generated by vehicles are positively related to air pollution”, and “road rage can cause an increase in traffic accidents”. The concepts and relationships between them are eventually arranged as a network of concepts that is then called a cognitive map (Carley, 2003). Even though the map is created with individual relationships between concepts, once developed it provides insights that may not have been previously apparent.

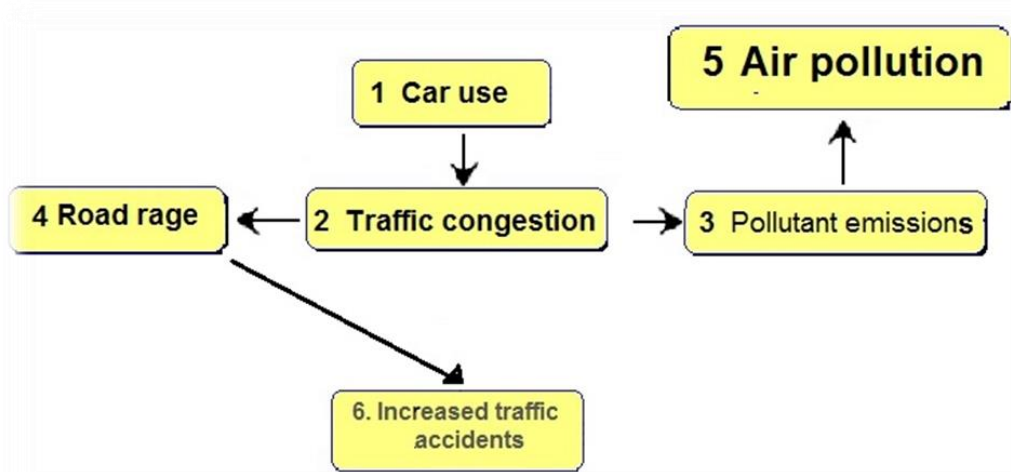


Figure 4.3 Example of a cognitive map

#### 4.8.2 Guidelines for creating a cognitive map

To create a dynamic and meaningful cognitive map, Ackermann, Eden and Cropper (2004) provide comprehensive guidelines. These guidelines cover all relevant issues from the development of concepts to tidying up and to the adequate representation of a cognitive map. In brief, the guidelines suggest that, in order to furnish concepts, the sentences of the interviews are separated into 10 to 12 words-long distinct phrases. Where possible, the concepts are written in imperative form along with the actual wordings of the interviewee rather than abbreviations. The option and outcome are clearly specified within each pair of concepts to identify the direction for the arrow, thus indicating the nature of the relationship. While developing a cognitive map, the concepts are structured in a manner so that goals (generic concepts) are placed at the top. These goals are then supported by those concepts designated as strategies, and then further elaborated on with potential options (specificities). To clarify the meaning, opposite poles are identified and are added to the concepts where they are needed. In bipolar concepts the idea which is mentioned first in a sentence is nominated as the first

pole. The concept “Dedicate time and effort to develop idea ... learn required skills” is an example of bipolar concept. It indicates that this interviewee chooses to commit his or her time and effort to develop an innovation rather than to learn required skills and knowledge. The map is tidied up and isolated concepts are assessed for their meaning. Lastly, if possible, the entire map is fitted on an A4 size paper so that all concepts can be easily cross-linked.

Although the forgoing guidelines provide sufficient understanding with regard to developing a cognitive map, these cannot guarantee the development of a “right” model (Ackermann, Eden & Cropper, 2004). This is because cognitive mapping largely depends upon human interpretation, which varies from person to person. Ackermann, Eden & Cropper (2004) therefore hold that there cannot be a definitive map of a problem or situation. To minimize researcher's bias, the cognitive maps, interpretations of the interviewee's responses in the form of a cause-effect network, should be tested and improved (Rees, 2013). In other words, a cognitive map, which is basically a visual representation of the interpretation imposed by the researcher while analysing the interview data, should be verified from the respondent who initially provided the data and whose assumptions and experiences are meant to be charted in the map.

#### ***4.8.3 Extracting and representing mental models***

Before discussing how the methodology was applied, it is important to understand that there are two different and contrasting approaches to data representation: idiographic and nomothetic (Carley & Palmquist, 1992; Eden & Ackerman, 1998; Nadkarni & Nah, 2003). With the idiographic approach the focus is on preserving the distinctiveness of subjective experiences of individuals, so the data is presented in the same terms as those used by the individual interviewee. The nomothetic approach, on the other hand, incorporates the use of general statements so that comparisons can be drawn between subjects (Tan & Hunter, 2002). Nadkarni and Nah (2003) and Scavarda, Bousdine-Chameeva et al, (2006) suggest the use of both the idiographic and nomothetic approaches while eliciting and representing the data. In line with this suggestion, the current study used both approaches.

Overarchingly, the methodology applied in this study was a four-step process for extracting, representing and analysing mental models. In the first step, the thirty innovators were interviewed regarding what they experienced in terms of dilemmas or

challenges while conceiving, realising, introducing and sustaining their innovations, and how they resolved those dilemmas. The interviews were captured as audio files and then transcribed. For member checking, each of the 30 participants was sent a transcript of their interview for validation. Only four participants suggested minor changes to their transcripts. These changes were incorporated into the transcripts.

The second step was to represent the elicited data with a map, as described above, in such a manner that the map not only highlighted all significant concepts but also depicted causal relationships among these concepts. The nomothetic approach for the representation of the individual maps was used as per the following process: identifying causal statements in a transcript, developing raw cognitive maps, designing a coding scheme and converting raw causal maps into coded cognitive maps, as proposed by Nadkarni and Nah (2003). A causal statement is defined as “a statement that a respondent makes revealing their belief that one thing causes other” (Nelson, 2005, p. 196). To identify such statements transcripts were thoroughly read and significant statements with words such as “result”, “lead”, “reason”, “so”, “because” and “so forth” were pulled out. The idiographic approach was applied and maps were created with the words that were used in the transcripts. Then, a coding scheme was created and the raw concepts were replaced with coded concepts. The process is illustrated via examples in the given figure 4.4.

Using the same approach, 30 cognitive maps were developed from the interview transcripts using the nomothetic approach to move from raw cognitive maps to coded cognitive maps. For the purpose of investigator triangulation, the researcher invited a fellow doctoral researcher to participate during the interpretation of the data. The interview transcripts were independently analysed by the researcher and his colleague. The findings of the researcher and his colleague, which were largely identical with minor differences in coding schemes, were compared, discussed and finalised. After finalising the coding, a cognitive map was developed for each of the participants.

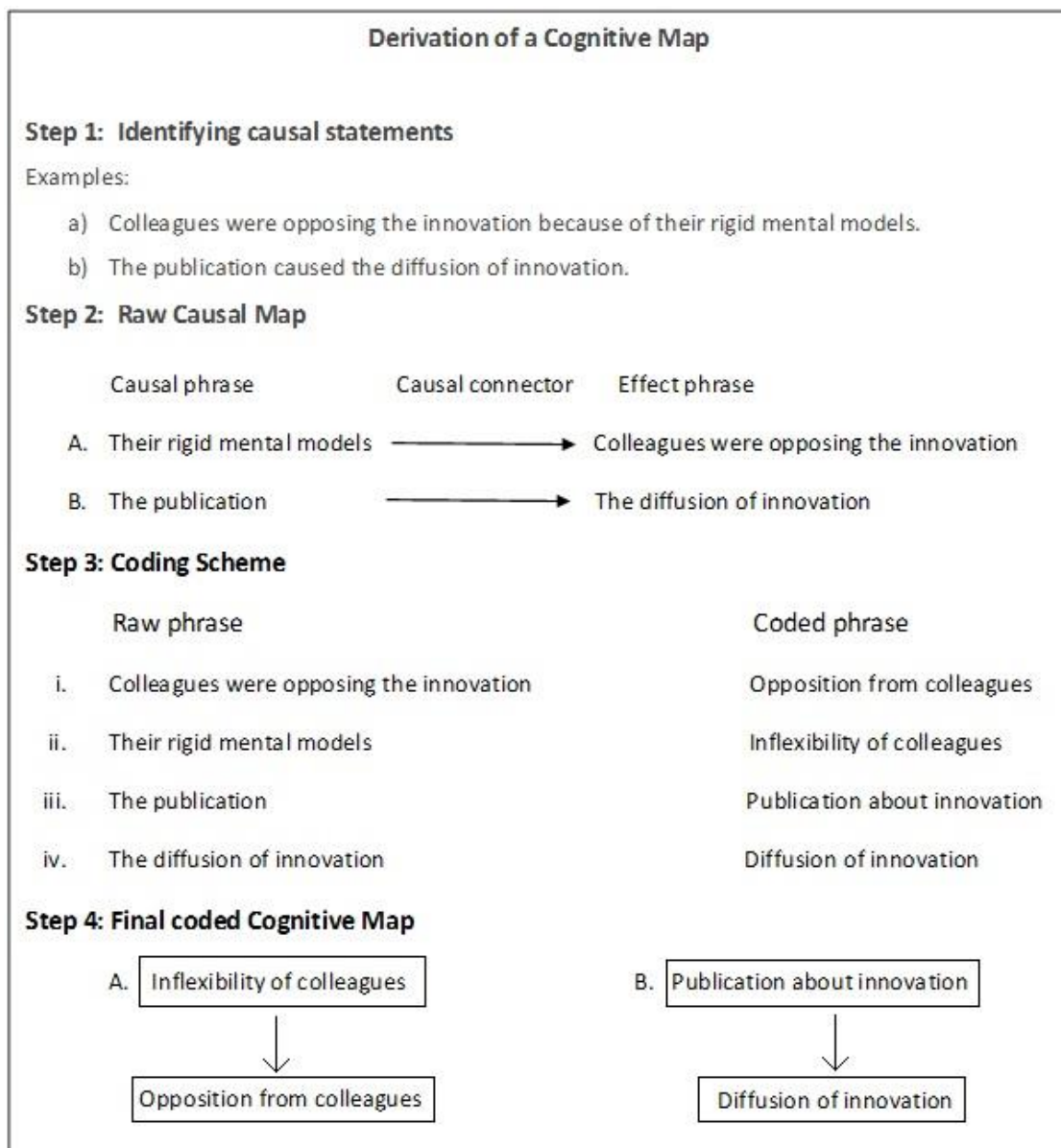


Figure 4.4 *Description of converting process of identified casual statements into a coded map.*

All cognitive maps were sent back to the respective participants for their review and verification. This was to ensure that the interpretation was in line with what the participants expressed during their interviews. The feedback from the participants was considered and discussed with them, resulting in changes being made to six cognitive maps. All the maps are shown in Appendix D.

In the third and final step, the individual coded cognitive maps were integrated into one aggregate map. The following section describes this process.

#### ***4.8.4 Aggregate Map***

The purpose of this section is, first, to outline the reasons behind constructing an aggregate map, and, second, to describe the process that was undertaken to develop aggregate map in this study. It is, however, important to mention that the process of constructing the aggregate map involved complex and subjective decisions that cannot be described here, so the description provided with regard to the process should be viewed as simplified illustration of a very complex process.

The individual cognitive maps represent mental models (experiences and beliefs) of individuals, expressed as the relationships (causal or otherwise) among the different concepts they use to understand an issue or topic (Eden & Ackermann, 1998). Individual's mental models are often sloppy, inconsistent, over-simplified and incomplete (Johnson-Laired, 2006). To overcome these deficiencies, individual maps, which are developed from the individual interviews, can be merged into a single big map (Eden & Ackermann, 1998). In the literature, such a representation has various names including collective cognitive map (Axelord, 1976), composite map (Carley, 1997), collective causal map (Bouzdine-Chameeva, 2006), group map, and aggregate map (Eden & Ackermann, 1998). An aggregate map actually pools individual maps to represent experiences and beliefs of a group or community. As it contains the collective input of all individual sources, it provides a comprehensive knowledge repository for the deeper understanding on the matter for which individual maps were created. It is assumed that aggregating the views of a community into a single map will tend to reduce the sloppiness and inconsistency of the individual maps on which it is based.

Each individual cognitive map represented the understanding and experiences of that particular participant about their innovation. The participants shared a similar professional background as university academics, and were interviewed about the same phenomena: the dilemmas they faced during innovation and the reconciliations employed to overcome the dilemmas. They all were asked the same questions with the exception of probe questions relevant to individual responses. Moreover, the researcher also used a nomothetic approach to create the individual maps. Individual cognitive maps, therefore, naturally shared some degree of similarity in terms of the concepts they expressed. However, at the same time, the maps had unique concepts because they were based on participant's unique experiences and assumptions. An aggregate map was constructed in which not only identical concepts were fused but all concepts along with

their relationships are expressed. This map could then assist the researcher in understanding and representing dilemmas and their reconciliations.

Creating an aggregate map is a complicated task because it involves careful and sensible decision-making with regard to inevitable inconsistencies between the maps (Huff & Fletcher, 1990). To create the aggregate map for the existing study, first, a list of all concepts mentioned in all individual cognitive maps was prepared. The list was then arranged in an alphabetical order using Microsoft Excel. This allowed the researcher to locate and identify the concepts in the list that had similar wordings. The remaining concepts were then, one by one, compared to all the other concepts including the identical concepts mentioned in the list. This comparison not only involved looking at the wordings of the concepts but also the contexts in which the concepts emerged. For this all individual cognitive maps were repeatedly and thoroughly scanned. Overall, the process undertaken helped the researcher to identify concepts that included: identical concepts; concepts with dissimilar wordings but which effectively had the same meaning; and individual or unique concepts that appeared in only one map.

Once the common and unique concepts had been finalised, the researcher used *Decision Explorer*: software specifically designed for developing, displaying and analysing cognitive maps, and began combining the individual cognitive maps into a single map. The concepts which commonly existed among different maps were fused using the 'Merge' command which is available in *Decision Explorer*. These concepts acted as glue through which the remaining parts of the maps were connected. One by one, all thirty maps were combined and a concentrated aggregate map was developed. This map contained all concepts pertaining to the whole experience of dilemmas and reconciliations of all participants.

#### **4.8.5 Explore Concept**

*Decision Explorer* has number of tools that allow one to break up the aggregate map into smaller maps for reflection and exploration. One such tool is 'Explore concept'. It generates a new map consisting of all the concepts directly connected to a selected concept. For example, figure 4.5 shows a cognitive map about the government's lack of interest in police reform.

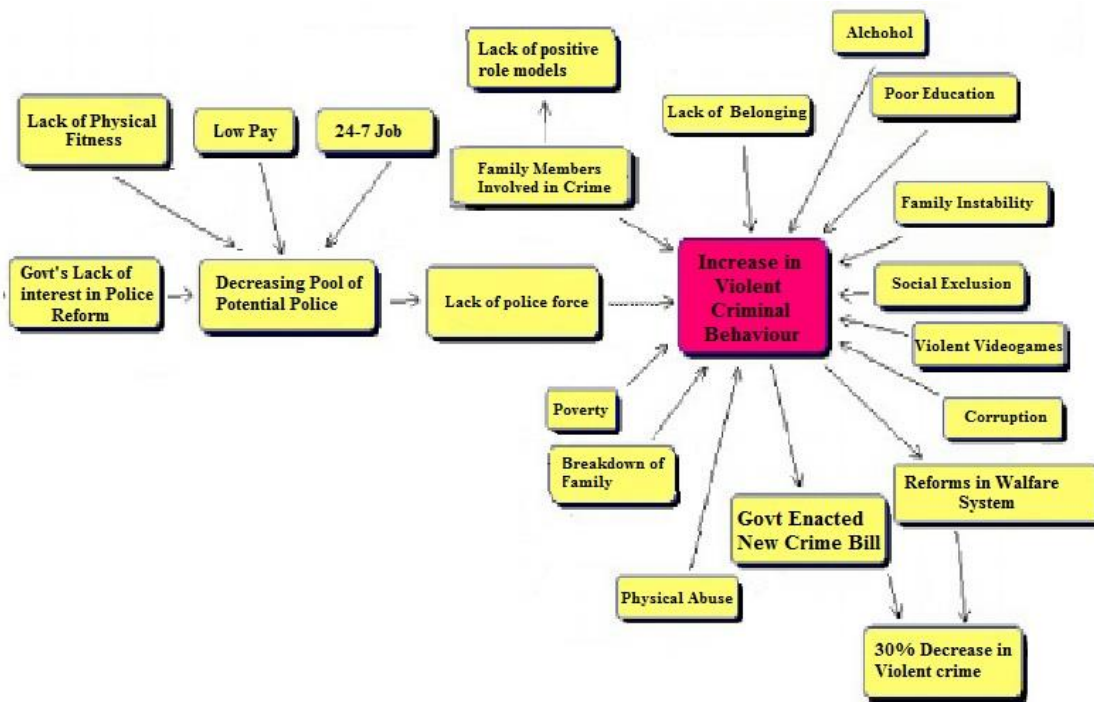


Figure 4.5 Cognitive Map

Using the 'Explore Concept' on 'Increase in Violent Criminal Behaviour' will generate a new map that will show the immediate causes and consequences of the concept. Figure 4.6 shows the resultant map.



Figure 4.6 Explore Concept on Increase in Violent Criminal Behaviour

In this study, each concept that represented a dilemma was selected and an exploration conducted, the outcome of which was a map that showed all concepts related to that dilemma. Further explorations were then carried out on each related concept. The process was repeated until all causes and consequences of the dilemma were identified. In this way, specific maps were created for each challenge, or dilemma, faced by participants, strategies for resolving challenges, and consequences of those strategies. Thus, overall, the tool assisted the researcher to represent each dilemma along with its causes and consequences.

#### **4.8.6 *Thematic Analysis***

While the primary method adopted for the study was the use of cognitive maps to identify dilemmas and reconciliations, the interview process produced a wealth of rich data that could be used for further qualitative processes. The present study, used thematic analysis which, according to Boyatzis (1998, p. vi), is “a process used as part of many qualitative methods ... it is not a separate method such as grounded theory or ethnography but something to be used to assist the researcher in the search for insight”.

Thematic analysis involved looking back on the interview transcripts with fresh eyes, attempting to put aside preconceptions of what would be found so that, with an inductive approach, themes were allowed to emerge from the data. It is worth noting that thematic analysis was undertaken as a secondary analysis in which only the most obvious and important themes were considered, and those identified in the cognitive mapping process were excluded. The method adopted followed Braun and Clark’s (2006) five step thematic analysis: familiarization with the data, identifying common thematic elements, reviewing themes, defining and naming themes and producing a report. The process undertaken is explained in the following paragraph.

The researcher and his primary supervisor thoroughly read all the interview transcripts independently to understand the views and experiences of the interviewees. This assisted them in identifying interesting and meaningful ideas and experiences. Then, preliminary codes were generated based on the information collected in the previous step. The codes that were generated individually were then pooled together, compared and discussed. The discussion facilitated the researcher to develop the final set of codes. In the third step, the agreed-upon codes were arranged and organised into several

themes. The emerged themes were then compared with each other and those depicting related issues were combined to form main themes and overarching theme. These finalised themes were then defined and labelled to reflect the aspect that they captured. Finally, the transcripts were re-explored to select the most appropriate quotations that supported the main themes.

## **4.9 Conclusion**

Academic rigour is essential for the consistency and quality of a research study. Achieving rigour in a qualitative study is especially challenging because of its subjective and interpretive nature (McBrien, 2008). Methodological decisions play a crucial role in this regard because they have implications for the validity and interpretability of the study findings. This chapter has outlined several ways in which academic rigour was sought within the study.

To have credible and sound research findings it is essential to place a study in an appropriate research paradigm (Leininger, 1994). In the existing study, the achievement of research objectives required the study to adopt the qualitative interpretive paradigm. The data that was required to answer the research question needed to be obtained from those who have initiated and enacted pedagogical innovation.

The study employed purposive sampling based around the following recruitment criteria: (1) a tertiary teacher; (2) had led a team that successfully developed and implemented pedagogical innovation; and (3) had published about their innovation in a peer reviewed academic journal between 2009 and 2013. Out of 168 teachers who met the recruitment criteria and were invited to take part in the study, 30 volunteered and were subsequently recruited. Hence, the sampling technique employed enabled the study to successfully identify and recruit sufficient number of relevant participants from around the world.

The study conformed to high ethical standards by undertaking a number of precautions to reduce the potential harm for the participants of this study. The precautions included: informing the participants about the nature and aim of the study, treating participants' identities as private and treating the obtained data as confidential. The researcher submitted a research proposal of this study to Massey University Human Ethics

Committee for their review. It is only after the approval was granted by the committee that the data collection for the study was initiated.

In line with interpretive design, the study used semi-structured interviews to elicit participants' experiences and understandings about dilemmas experienced during their pedagogical innovations. The semi-structured design not only gave the participants sufficient time and scope to respond but also allowed the researcher to follow up on comments participants made. The lead-in questions of the interview protocol were piloted before the data collection phase for their clarity and effectiveness in terms of eliciting free-flowing talk. The data obtained through the interviews was validated by the participants who were interviewed. Overall, the data-collection and validation methodology employed in this study assisted in yielding valid in-depth data on the dilemmas faced by the participants during their pedagogical innovations and their reconciliations.

The study mainly used cognitive mapping as the primary data analysis approach. The cognitive mapping approach was adopted because of its ability to assist in identifying dilemmas and their resolution strategies. The coding process was triangulated by involving an independent researcher who was not related to the study. The coding led to the development of cognitive maps which were sent for their review and validation to the concerned participants. The validated maps were then combined into an aggregate map. With the help of the 'Explore Concept' function that is available in the Decision Explorer software, relevant concepts were identified and smaller maps were created. These maps represented the dilemmas as well as the resolution strategies mentioned by the research participants. The study also used thematic analysis to identify themes that are relevant to the research question.

Attention to the quality of methodological processes is intended to build confidence in the data produced, the findings of the study, and the conclusions that can be drawn. The findings of the study are reported in the next chapter. The findings of the study are reported in the next chapter.

## Chapter 5. Dilemmas and Resolutions

The previous chapter has explained the overall methodology of this study. This chapter reports the findings from the analysis of the 30 interviews with innovative university educators. Cognitive mapping and thematic analysis were undertaken in order to identify: (1) the dilemmas faced by the research participants during their innovation processes, and (2) the strategies they employed to reconcile those dilemmas.

The findings of this research are presented through cognitive maps and themes that emerged from the analyses. Thirteen dilemmas were identified in this research. Out of these, 12 emerged through the process of cognitive mapping and one via thematic analysis. As discussed in the Chapter 4, *Decision Explorer* provides its users with an exploration tool called Explore Concept. Using this tool, the aggregate cognitive map, developed by merging the individual cognitive maps, was explored. The concepts relevant to the dilemmas participants experienced and the resolutions they applied were identified and smaller, more focused maps were created. As shown in Table 5.1, in total 11 maps have been created, each representing a separate dilemma except in one case in which two dilemmas were directly linked to each other.

In the following section, all eleven maps are introduced and are briefly explicated. In the explanations that follow each map, numbers given in brackets are the concept numbers used in the aggregate map.

The findings of the thematic analysis are also outlined in this chapter. That analysis revealed a further dilemma, the need to manage the balance between emotionally engaged and emotionally neutral activity. Having adopted the THT approach as the conceptual framework for the research, the Helix diagram used by Hampden-Turner and Trompenaars have been adopted here to graphically represent the strategies described by participants.

*Table 5.1 Dilemmas experienced during innovation process*

	<b>Dilemmas</b>	<b>Figure</b>
1	Spontaneous thinking vs. Organised thinking	5.1
2	Realisation of innovation vs. Attainment of competencies	5.3
3	Competency needs vs. Desired design	5.5
4	Diversity of opinions vs. Agreement on ideas	5.9
5	Authoritative management vs. Participative management	5.7
6	Technology development vs. Pedagogy development	5.11
7	Student needs vs. Student expectation	5.13
8	Professional reputation vs. Student needs	5.13
9	Managing risk vs. Radical innovation	5.16
10	Job responsibilities vs. Innovation development	5.18
11	Revealing innovation vs. Hiding innovation	5.20
12	Innovators interests vs. University/agency interest	5.22

A numerical value in a THT is associated with each axis and allows positions to be plotted on a 10 x 10 grid. For this study, where there is no basis yet for attaching numerical values to participants' responses, the diagrams have been used to indicate the trajectory of strategies, the movement between the two horns of each dilemma. On each diagram points A and B are used to indicate extreme positions where one value is emphasised at the expense of its opposite, and R indicates the position where the two values are reconciled.

### **5.1 Spontaneous thinking vs. organised thinking**

Figure 5.1 shows the idea conception process of all participants in an aggregate form. The map shows a key challenge was “experiencing blockages while following an

organised approach to idea development” (170). The challenge was experienced by one of the participants. The participant overcame the blockages via looking for “inspiration” (190), “intuition” (191) and “discussion with colleagues” (266). As stated earlier, each innovation had its own distinct environment and objectives so the experiences and assumptions of participants varied to some extent from one another. Nonetheless, there were some similarities in the general patterns of the idea conception process in terms of the thinking approaches used by the participants. The participants are divided into five groups on the basis of these patterns.

The first group included 12 participants whose approach, at the beginning of their idea conception process was described as deliberate and organised (231), but later changed to a mixture of organisation and spontaneity (159).

The second group was comprised of nine participants who said that they had identified the need or opportunity for innovation either fully or partially spontaneously (250). However, to respond to the need or opportunity, they adopted an organised approach (99). The third group contained four participants who described their approach as a mixture of spontaneous and organised thinking (250) throughout the idea conception process (159). The fourth group is made-up of two participants who were hired by their universities to develop a solution for a pre-defined need. One of these two participants followed a spontaneous-organised approach (159) whereas the other employed an organised approach (99) to develop their ideas (40). The fifth and last group included three participants who described their approach to idea development as conscious and organised from the beginning (231) to the end (99). Please see Appendix-1 for further details.

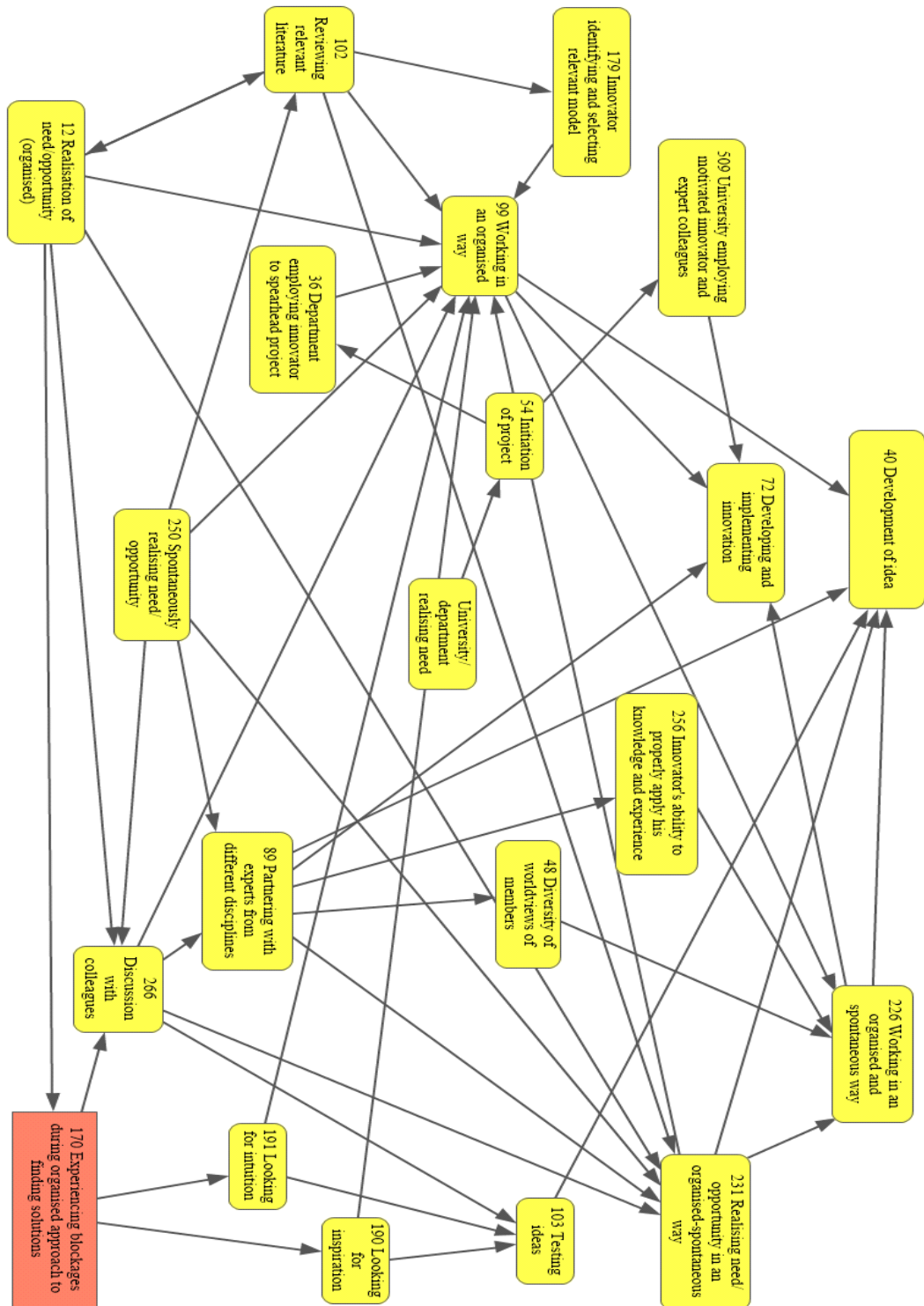


Figure 5.1 Idea conception process

The findings indicates that 26 out of 30 participants used organised as well as spontaneous thinking to develop their ideas whereas the remaining four participants

adopted a strictly linear and step by step thinking approach during their idea conception. Two of the four participants who only used the organised thinking approach based their work on established teaching models (179). One developed her idea mainly from a literature review (102) for a need that had already been identified and defined by the participant's department at her university (37). The other developed a PhD research proposal after systematic literature review (102). Hence, these four participants did not develop brand-new ideas; rather, three developed plans for adopting and integrating established innovative teaching strategies and models and one developed a plan for his research project. Overall, the findings indicate that while developing innovative ideas exemplary university teachers generally combine the two opposing thinking approaches.

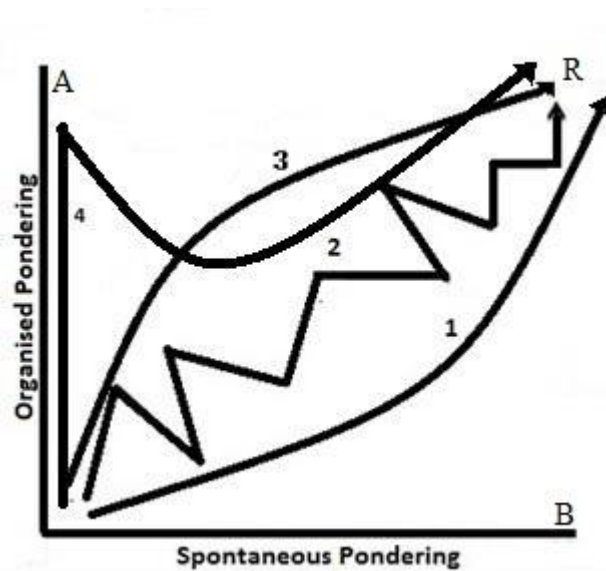


Figure 5.2 Spontaneous pondering vs. Organised pondering

Figure 5.2 shows the strategies adopted by the participants while developing their ideas. The majority of participants switched between the two modes of thinking. The three patterns of the switching were: initially spontaneous then organized (path 1), initially organized then spontaneous–organized (path 3), and spontaneous–organized or organized–spontaneous from start to finish (path 2). One of the respondents reported experiencing cognitive or mental blockages while trying to develop a creative solution through organized pondering (path 4). Some participants assumed that their idea conception process did not involve spontaneity but was an outcome of organized pondering from beginning to end, an approach which could be represented by position A. It is noteworthy that those who relied solely on organized pondering had actually

adopted an innovation developed by others, rather than generating an innovation of their own.

## 5.2 Realisation of innovation vs. attainment of competencies

Figure 5.3 represents two key challenges: “realisation of own limits” (131) and “time and resource constraints” (533). The former challenge denotes the personal lack of ability of an innovator in terms of the skills and knowledge needed to develop his or her idea into an innovation. The latter denotes the time and resource limitations faced while developing an innovation. Only one out of 30 participants faced both these challenges simultaneously. The participant responded to the challenges by “dedicating time, resources and efforts to develop [his] idea [instead of devoting them] to learn required competencies” (534). This led the participant to “partnering with experts from different disciplines” (89). The partnership approach enabled the participant to not only acquire needed knowledge and competencies, but also “saving his time and resources” (148) for “developing and implementing innovation” (72). Please see Appendix-D2 for further details.

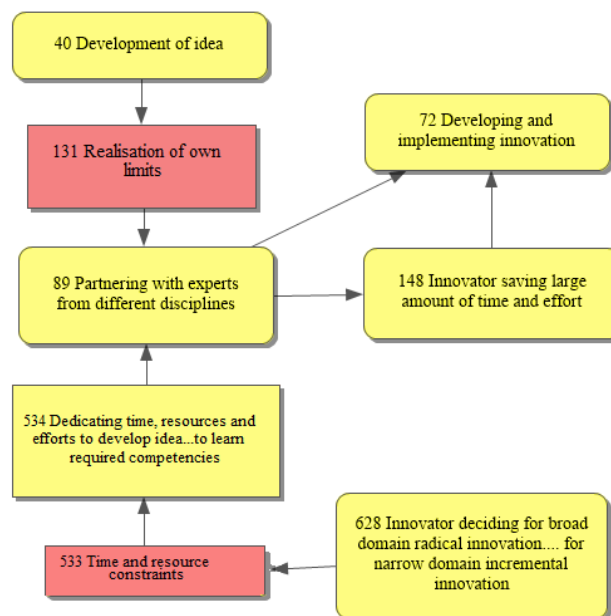


Figure 5.3 Team development

The situation points to a dilemma that was resolved by one of the participants. The dilemma was between realisation of the innovation and attainment of competencies. The challenge “realisation of own limits” (101) was faced by 21 of the participants, however, 20 of these participants did not mention that they were under pressing time and resource constraints.

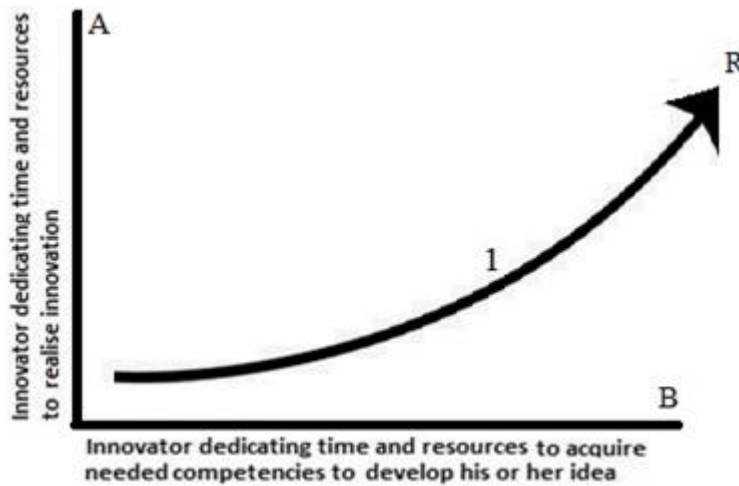


Figure 5.4 Realisation of Innovation vs. Attainment of Competencies

Figure 5.4 shows that partnering with experts who had the required skills and knowledge enabled the participant who faced the dilemma to acquire needed competencies (in the form of other people) and also to save time and resources, which would be otherwise need to be spent learning needed skills and expertise.

### 5.3 Competency needs vs. desired design

Figure 5.5 also represents a dilemmatic situation related to teamwork. The dilemma was faced by only one participant. The participant realised that she lacked the knowledge and competencies required to develop and implement her innovation (131). But, at the same time, she did not want to meet this need through formally partnering with other experts (660). The participant responded to the dilemma by “temporarily hiring experts” to help with developing and implementing her innovation (246).

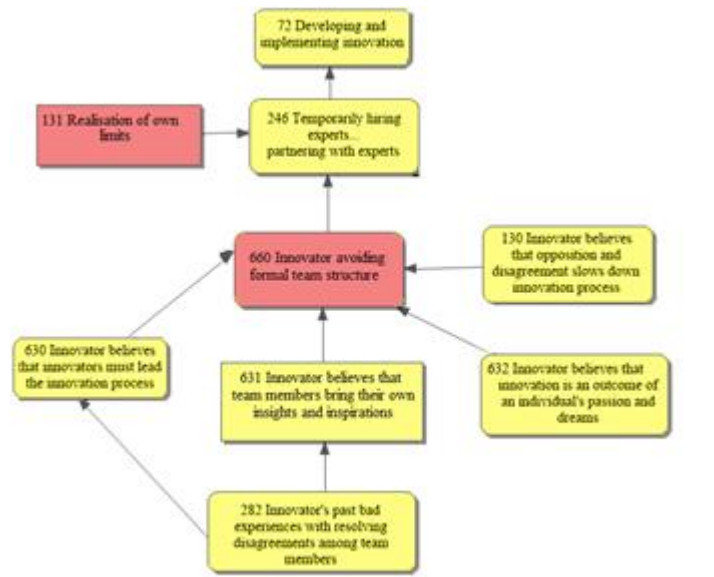


Figure 5.5 Pursuing desired design of innovation

The map (Figure 5.5) indicates that the participant had past bad experiences with teamwork. Consequently, she developed certain assumptions: instead of following her vision, team members would tend to pursue their own inspirations and ideas (631), and, only the innovator should make important decisions (630). The participant also believed that disagreement among team members “slows down the innovation process” (130). Furthermore, “innovation is an outcome of an individual’s passion and dreams” (632). These assumptions led her to avoid a team structure in which all members contribute as equals.

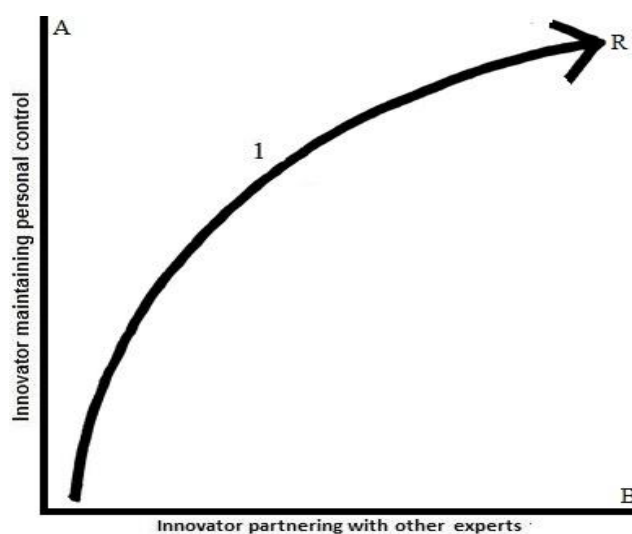


Figure 5.6 Maintaining control of the innovation vs. Partnering with experts

Figure 5.6 depicts the dilemma faced by the participant. The dilemma was that the participant wanted to address her competency needs through partnering with other experts but at the same time she wanted to develop innovation according to own understanding and preferences. Path 1 in the figure represents the strategy employed by the participant to cope with the dilemma, where the initial direction is to maintain personal control, and then experts are chosen according to the requirements of the idea and are temporarily hired on a task-by-task basis.

#### 5.4 Authoritative management vs. participative management

Figure 5.7 shows that concepts relating to team management were linked to participants' beliefs about leadership. In ten cases the participants described themselves as leaders of the team (189): the person responsible for identifying and resolving challenges. As leaders these participants, on the one hand, imposed deadlines (186), decided responsibilities of members (176), educated team members (228), and rewarded team members for their contribution (342). On the hand, they created a non-hierarchical and open environment for discussion (153), encouraged friendship between members (83), supported clear and effective discussions among team members (23) and fostered collaboration among team members (22).

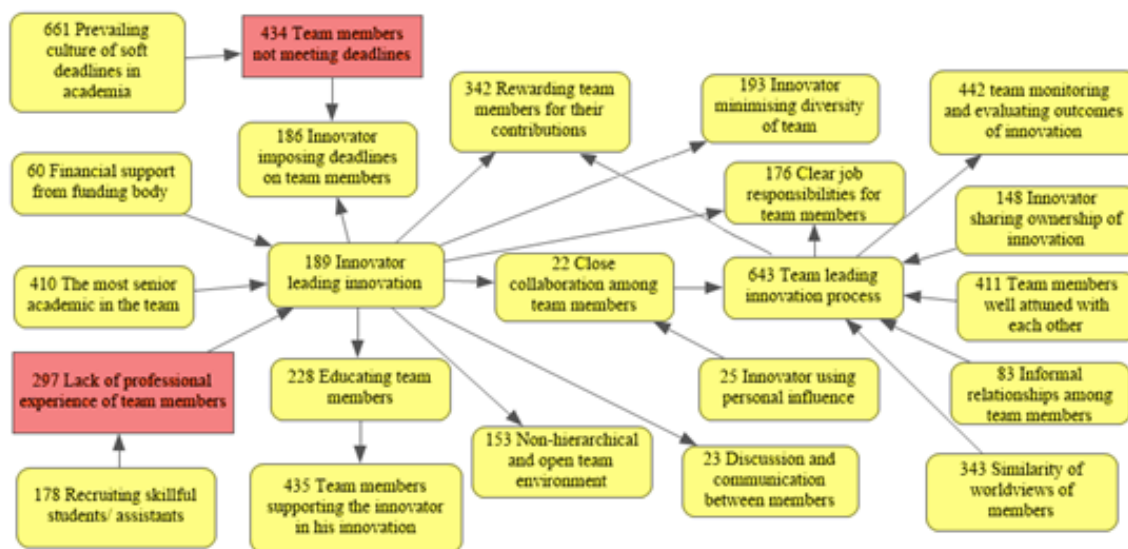


Figure 5.7 Leading innovation process

Two participants described leadership as something exercised by the team as a whole (643) and they linked it with “rewarding team members for their contributions” (342),

“clear roles and responsibilities for team members” (176), the “innovator delegating control and authority to members” (215), and “monitoring and reviewing performance” (442). One participant described his team as experts who provided support for his innovation (435).<sup>2</sup>

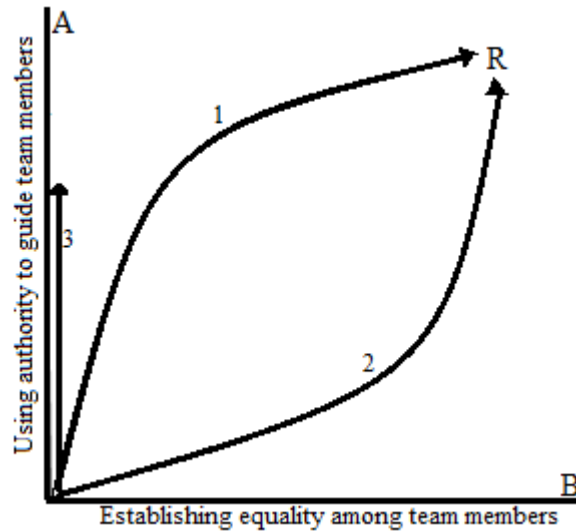


Figure 5.8 Authoritative vs. Participative Style of Team Management

Figure 5.8 indicates that the participants who were leading their innovation processes used authority to guide their team members in a specific direction and, at the same time, facilitated collaboration and participation among their team members (path 1). For those cases in which participants described the team as a whole, rather than an individual member, as leading innovation processes, the primary emphasis was on equality within the team and authority was also used to promote teamwork (path 2). In one case, the team was developed in order to support the participant in developing the innovation, an approach which resulted in increased emphasis on the authority of the innovator (path 3).

## 5.5 Diversity of opinions vs. agreement on ideas

The challenge “disagreement among members” (45) was discussed by 11 participants. Eight different factors that led to disagreement (45) were identified by participants. The factors are: “partnering with experts from different disciplines” (89), “diversity of

<sup>2</sup> For details of each of these participants see Appendix D3 .



relationship between members” (83), “monitoring and reviewing performance” (195), the “innovator and team member applying their problem solving skills” (111), “team members' mutual respect for each other” (433), the “innovator compromising on some own initial ideas” (151), “educating team members” (228) and the “innovator minimising diversity of team” (193). Ten out of the 11 strategies employed by participants aimed at “agreement among team members” (13) whereas one strategy led to “team members supporting the innovator in developing innovation” (435). It is also important to note that many participants reported that “partnering with experts from different disciplines” (89) and the “innovator partnering with innovative, passionate and charismatic experts” (210) led to the “disagreement among team members” (45).

Eight participants discussed their efforts to develop “agreement among team members” (13) and thus avoid or pre-empt the challenge described in the preceding paragraph. In total thirteen strategies are identified by participants, which facilitated them to attain consensus in their teams. The strategies identified were: “close collaboration among colleagues” (22), “clear roles and responsibilities for team members” (176), “shared passion of members for innovation” (112), “discussion and communication among team members” (23), an “informal relationship between members” (83), having “team members well attuned with one another” (411), “keeping team to minimum number required” (294), “team members agreement on the initial idea” (426), “non-hierarchical and open environment” (153), “team evaluating effectiveness of ideas” (399), “educating team members” (228), “rewarding team members for their contributions” (342), the “innovator judiciously distributing responsibilities among team members” (484) and “team members discussing issues until agreement is reached between them” (646). One of the eight participants mentioned “partnering with like-minded colleagues” (525) to be the main reason that enabled him to achieve “agreement among team members” (13).

The remaining 11 participants did not mention this challenge. Despite not acknowledging the existence of this challenge, six of these participants mentioned reasons why there was no conflict or disagreement among their team members. The following reasons were given by these participants: the “innovator making all important decisions” (364), “clear roles and responsibilities for team members” (176), “flexibility and open-mindedness of members” (117), “shared passion of members for innovation”

(112), “team members agreement on initial idea” (426), “team members well attuned with one another” (411) and “partnering with motivated and high-integrity experts” (525). Four of the 11 participants mentioned other teamwork-related challenges that have been described in the earlier paragraph. The one participant who did not have a formal team structure did not discuss issues related to teamwork.

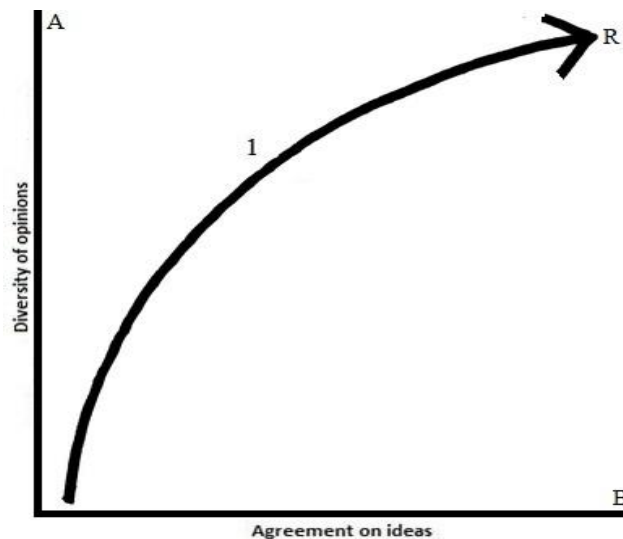


Figure 5.10 Diversity of Opinions vs. Agreement on Ideas

The dilemma encountered is depicted in Figure 5.10. Seeking diversity is indicated on the vertical axis and agreement among team members is given on the horizontal axis. Path 1 in the figure represents the pattern by which the participants tended to resolve this dilemma. The pattern adopted by the participants’ involved first pursuing diversity by formulating a diverse team and then using mechanisms to develop consensus among the team members.

## 5.6 Technology vs. pedagogy

The concept “technology-pedagogy dilemma” (38) has the word "dilemma" in it because it was directly described in this way by one of the two participants reporting it as a challenge. The main sources of the challenge identified in Figure 6.3 are the “interdependence of technology and pedagogy” (44) and the “diversity of worldviews of members” (48). Due to the “interdependence of technology and pedagogy” (44) the pedagogical experts (527) and technologists (526) in the team faced blockages while developing the innovation.

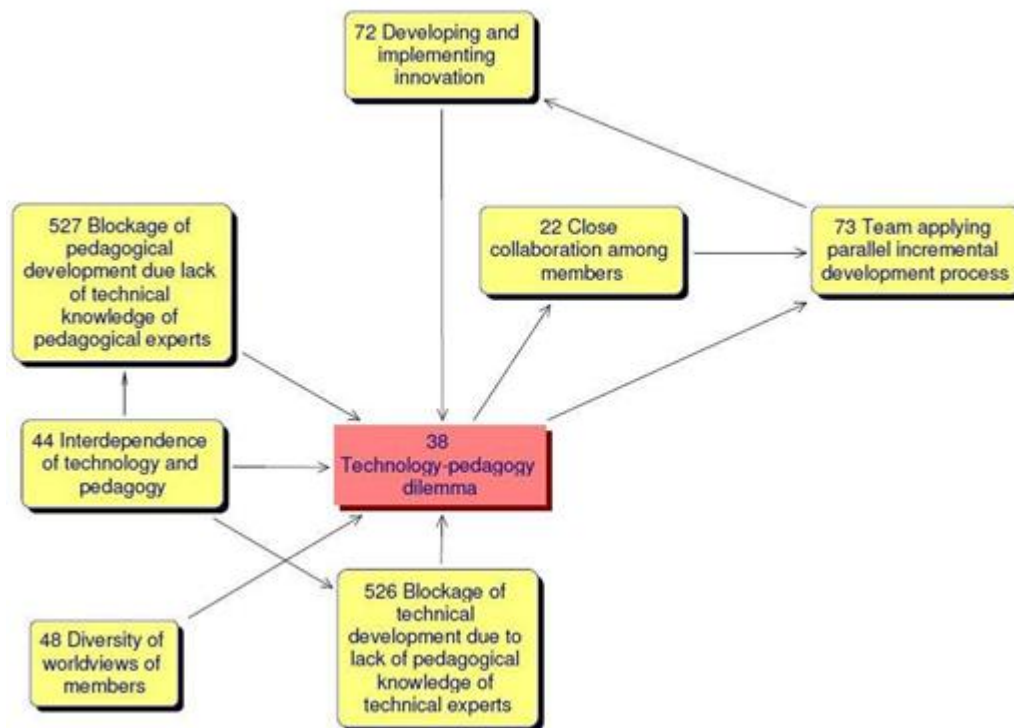


Figure 5.11 Technology-Pedagogy dilemma

The responses of the two participants who faced the dilemma were almost identical. Both the participants mentioned that they overcame the challenge via the “team applying a parallel incremental development process” (369). The only difference between the two is that in one case the participant mentioned that he first established a “close collaboration among members” (22)<sup>3</sup>.

The dilemma faced is represented in Figure 5.12. Developing technology for pedagogy is given on the vertical axis and developing pedagogy within the limits set by technology is given on the horizontal axis. Path 1 in the figure represents the resolution strategy employed by the participants. The strategy depicts continuous oscillation between the two options to gradually and simultaneously develop pedagogy as well as the technology to support it.

<sup>3</sup> For details of each of these two participants please see 4 and 22 in Appendix D3.

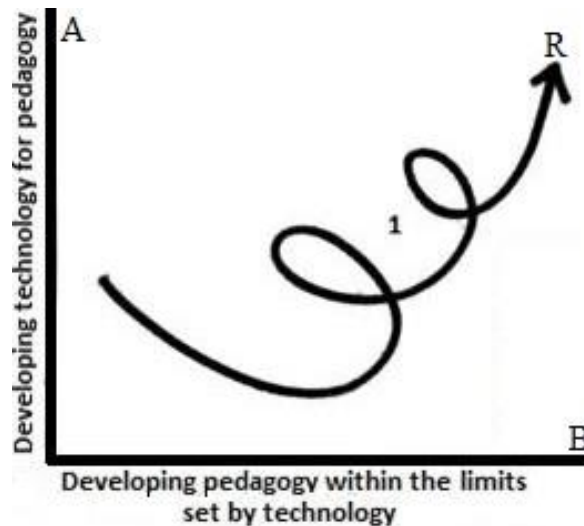


Figure 5.12 Technology vs. Pedagogy

### 5.7 Students' learning needs vs. students' expectations and Teacher's performance score

Figure 5.13 represents three key challenges related to students' responses to innovations: the "reluctant attitude of students" (337), "reluctant attitude of students and teachers" (350) and "poor teaching assessment scores" (59). The first and the third challenges are related to each other in that a "reluctant attitude of students" (337) may lead to a "poor teaching assessment score" (59). The challenge "reluctant attitude of students" (337) was faced by eight participants. Reasons given for the reluctant attitude were: "increased workload on students" (79), "development and implementation of innovation" (72), a "student-centred approach [rather than the] traditional teacher-centred approach of idea" (349), "students' lack of awareness of benefits of innovation" (353), "students' lack of understanding of innovation" (354) and "learning challenges for students" (301). A similar challenge, the "reluctant attitude of students and teachers" (350) was faced by only one participant. The sources identified for this challenge were: "students and teachers lack of understanding of innovation" (166) and the "radical nature of innovation" (331).

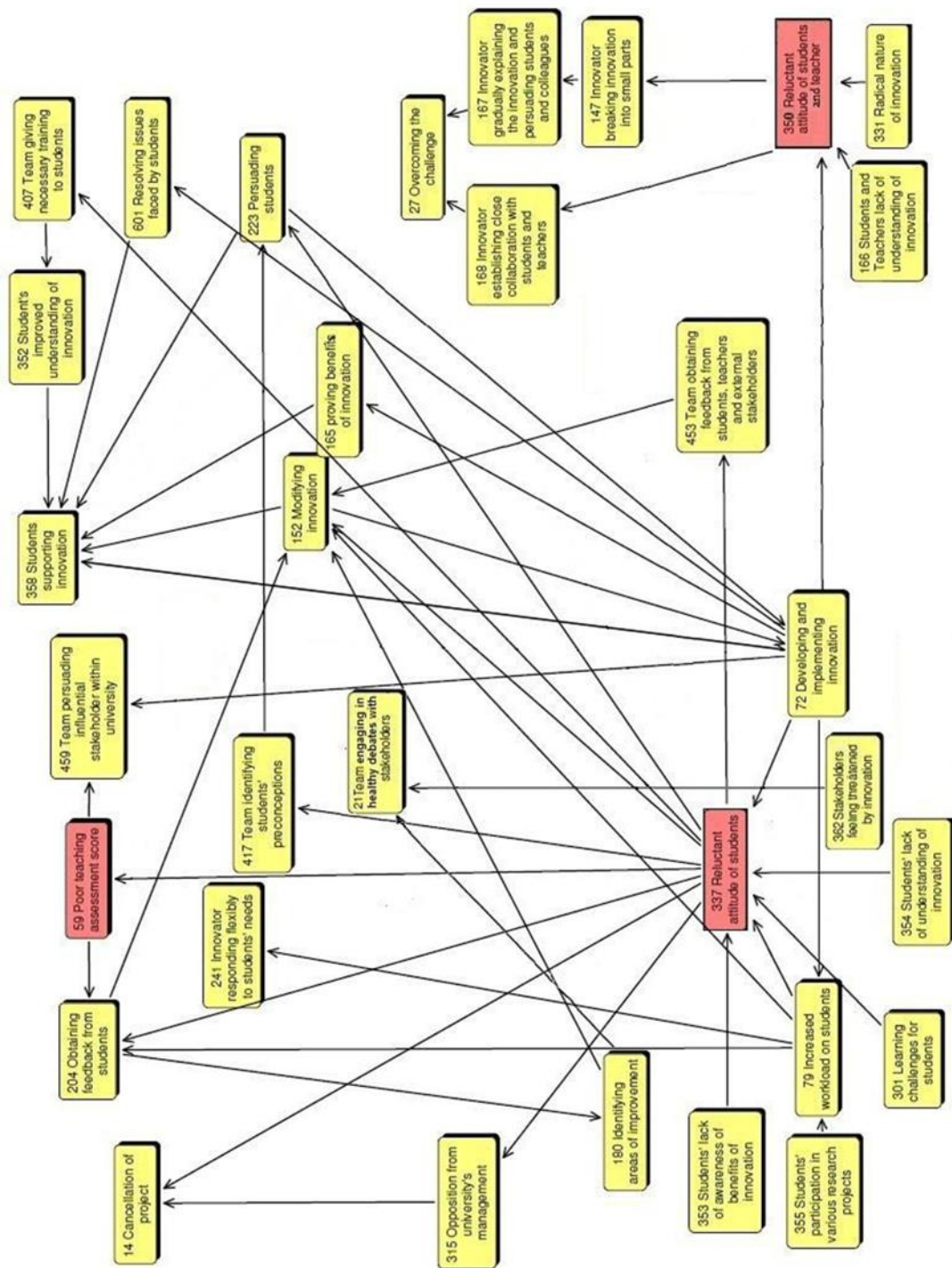


Figure 5.13 Managing Reluctant Attitude of Students

One of the participants did not manage the “reluctant attitude of students” (337) and this led to “opposition from university’s management” (315) and “cancellation of project” (14). Others who experienced the challenge used the following strategies: “obtaining feedback from students” (204) and “modifying the innovation” (152); the “team obtaining feedback from students, teachers and external stakeholders” (453) and

“modifying the innovation” (152); the “team giving necessary training to students” (407) leading to “students’ improved understanding of innovation” (352); the “team identifying students’ preconceptions” (417) and “persuading students” (223); the “innovator breaking innovation into small parts” (147) and the “innovator gradually explaining the innovation and persuading students and colleagues” (167) along with the “innovator establishing close collaboration with students and teachers” (168).

It is important to mention that five participants did not mention that they experienced any of the challenges shown on the map; however, they did discuss the strategies they used to ensure that their “students [were] supporting innovation” (358). The strategies used were: “proving the benefits of innovation [to students]” (165); “developing and implementing innovation” (72) and thus “resolving issues faced by students” (601); and the “innovator responding flexibly to students’ needs” (241).

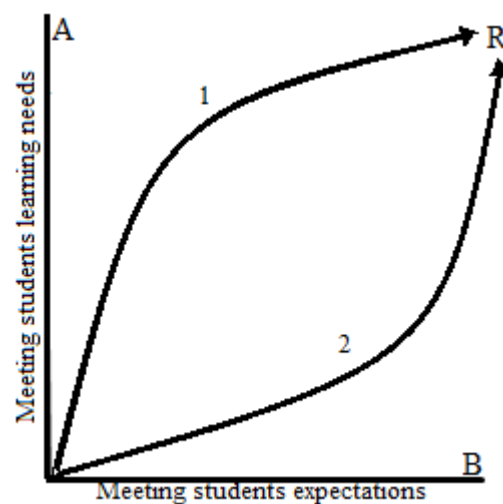


Figure 5.14 Students Needs vs. Students Expectations

The dilemma experienced by participants is shown in the Figure 5.14. Addressing students’ learning needs is indicated on the vertical axis and meeting students’ learning expectations is given on the horizontal axis. Paths 1 and 2 in the figure represent the reconciliation strategies employed by the two groups of participants: those who made a change, faced student opposition and then responded to the students’ expectations (path 1) and those who pre-empted the resistance by incorporating student expectations into the design before attempting to meet learning needs (path 2).

Figure 5.13 also shows that for one of the participants, the challenge led to the participant getting a “poor teaching assessment score” (59). The participant responded to the challenge by: persuading influential stakeholders within his university and simultaneously obtaining feedback from his students (204) and modifying the innovation (152) accordingly.<sup>4</sup>

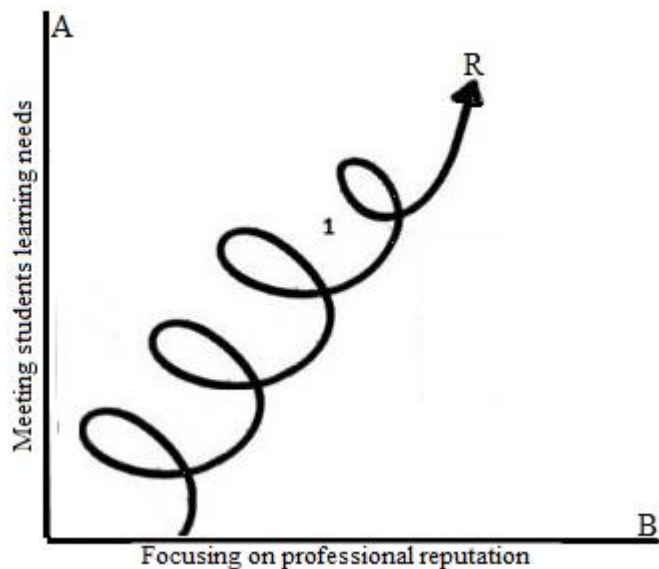


Figure 5.15 Professional Reputation vs. Student Needs

The dilemma faced by the participant is displayed in Figure 5.15. Addressing students’ learning needs is indicated on the vertical axis and improving one’s evaluation ranking is given on the horizontal axis. Path 1 in the figure represents the strategy employed by the participant, who initially made the change, then acted to safeguard his professional reputation with a variety of strategies which further improved the ability of the innovation to meet students’ learning needs.

## 5.8 Managing risk vs. radical innovation

Figure 5.16 represents two key challenges: the “high risk of failure of innovation” (66) and the “university proposing a two year validation process” (545). The former challenge is directly associated with radical and large scale of innovations (62). The latter challenge resulted from the high level of risk, along with a perceived

<sup>4</sup> For details of each of these participants please see Appendix D5.

“conservative attitude of university” (514), which led university executives to propose a process that would reduce the vulnerability of the institution.

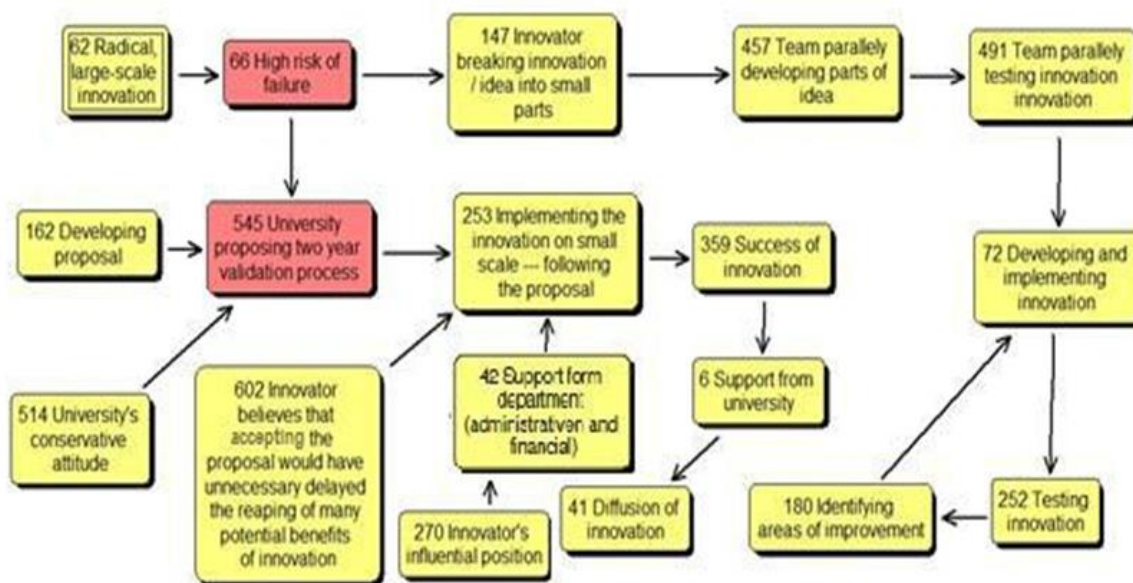


Figure 5.16 Managing high risk of failure

To manage the risk associated with the large and radical nature of the idea (66) the strategy applied by one of the two participants was to divide the vision into numerous parts (147), assign team members to concurrently develop (457) and test them (491), and have the innovator finally merge the parts in order to realize the whole vision (72). The innovation was then pilot-tested (252) to “identify additional areas for improvement” (180). In the other case, the “high risk of failure of the innovation” (66) along with “conservative attitude of University” (514) led to the “University proposing two year validation process” (545) for approving the innovation. The “innovator’s highly influential position” (270) allowed him to obtain “support from [his] department (administrative and financial)” (5) along with “implementing the innovation on a small scale ... following the proposal” (544). The “success of innovation” (359) on a small scale led to the “support from university” (6), which in turn led to the “diffusion of innovation” (42) at the university.<sup>5</sup>

<sup>5</sup> For details of each of these participants please see Appendix D5.

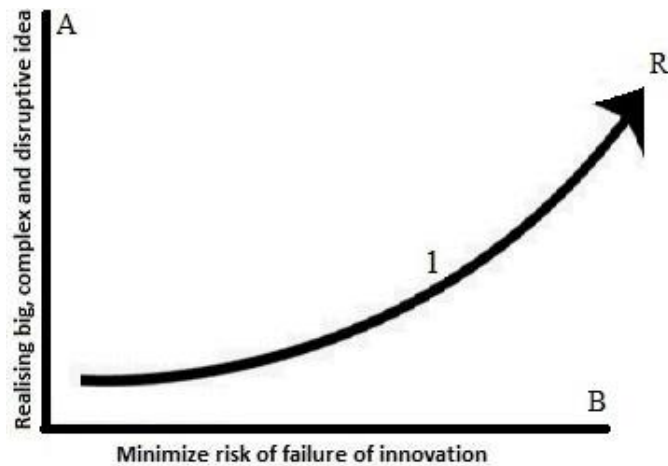


Figure 5.17 Minimizing Risk vs. Realising Radical Innovation

The dilemma is represented graphically in Figure 5.17. The realisation of a large-scale, radical innovation that necessarily involves a high degree of risk is indicated on the vertical axis; and minimizing innovation risk which, involves developing small, simple and relatively safe ideas, is given on horizontal axis. Path 1 in the figure represents the reconciliation strategy of dividing the big and complex idea into parts, then simultaneously testing and developing the parts and thereby managing the risk, and finally merging the parts and implementing the whole idea on large scale.

## 5.9 Job responsibilities vs. innovation development

Figure 5.18 depicts a scenario related to the key challenge of “increased workload” (78). The challenge was discussed by nine participants. The causes of the challenge identified by the participants were: “developing and implementing the innovation” (72), “academic responsibilities” (257), “huge demand for the innovation” (69), “changes in university's priorities” (16), the "university's constraints on teachers" (515) and the demands on the “innovator leading the innovation” (113).

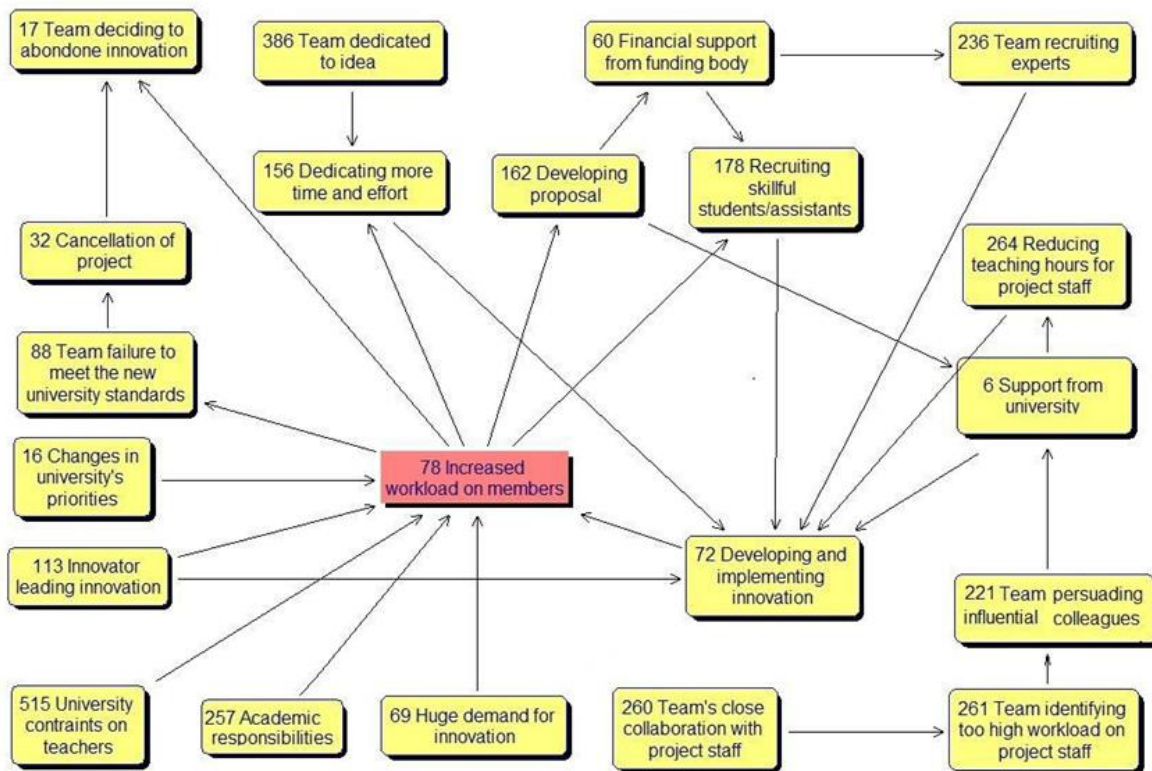


Figure 5.18 Managing increased workload

The resolution strategies used by the interviewed innovators to mitigate the challenge included: “dedicating more time and effort [than required by the job contract]” (156), “recruiting students or assistants” (178), the “team recruiting experts” (236) and “reducing teaching hours for project staff” (264). Lastly, in one of the case, the high workload ultimately led to the complete abandonment of the innovation by the team (385).<sup>6</sup> Overall, the map reveals a tension between the development and implementation of innovation and the need to meet other academic responsibilities.

<sup>6</sup> For details of each of these participants please see Appendix D6.

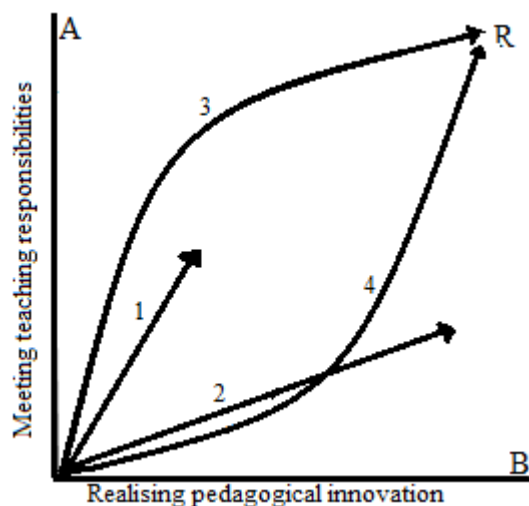


Figure 5.19 Job responsibilities vs. Innovation development

The dilemma is represented graphically in Figure 5.19. Meeting teaching responsibilities is given on the vertical axis and development and implementation of innovation is given on the horizontal axis. Path 1 in the figure indicates pursuing a compromise between teaching responsibilities and innovation development by reducing teaching effort and dedicating half of it to innovation. Path 2 involves investing more time and effort to meet teaching responsibilities and innovation development. Path 3 shows students assisting the innovator in realising the innovation as part of the innovator’s teaching method. Lastly, path 4 involves getting support from university for hiring experts to develop innovation that can improve teaching efficiency of the team members.

### 5.10 Revealing innovation vs. hiding innovation

Figure 5.20 depicts three similar challenges: “opposition from colleagues” (314), “reluctant attitude of students and teachers” (350) and “opposition from some stakeholders” (316) along with their causes, consequences and resolution approaches. All these challenges indicate reluctance, unwillingness, non-cooperation, disinclination or the active resistance of colleagues toward innovation. In total, 15 participants discussed how these challenges created a dilemma in terms of whether or not to reveal the innovation to colleagues.

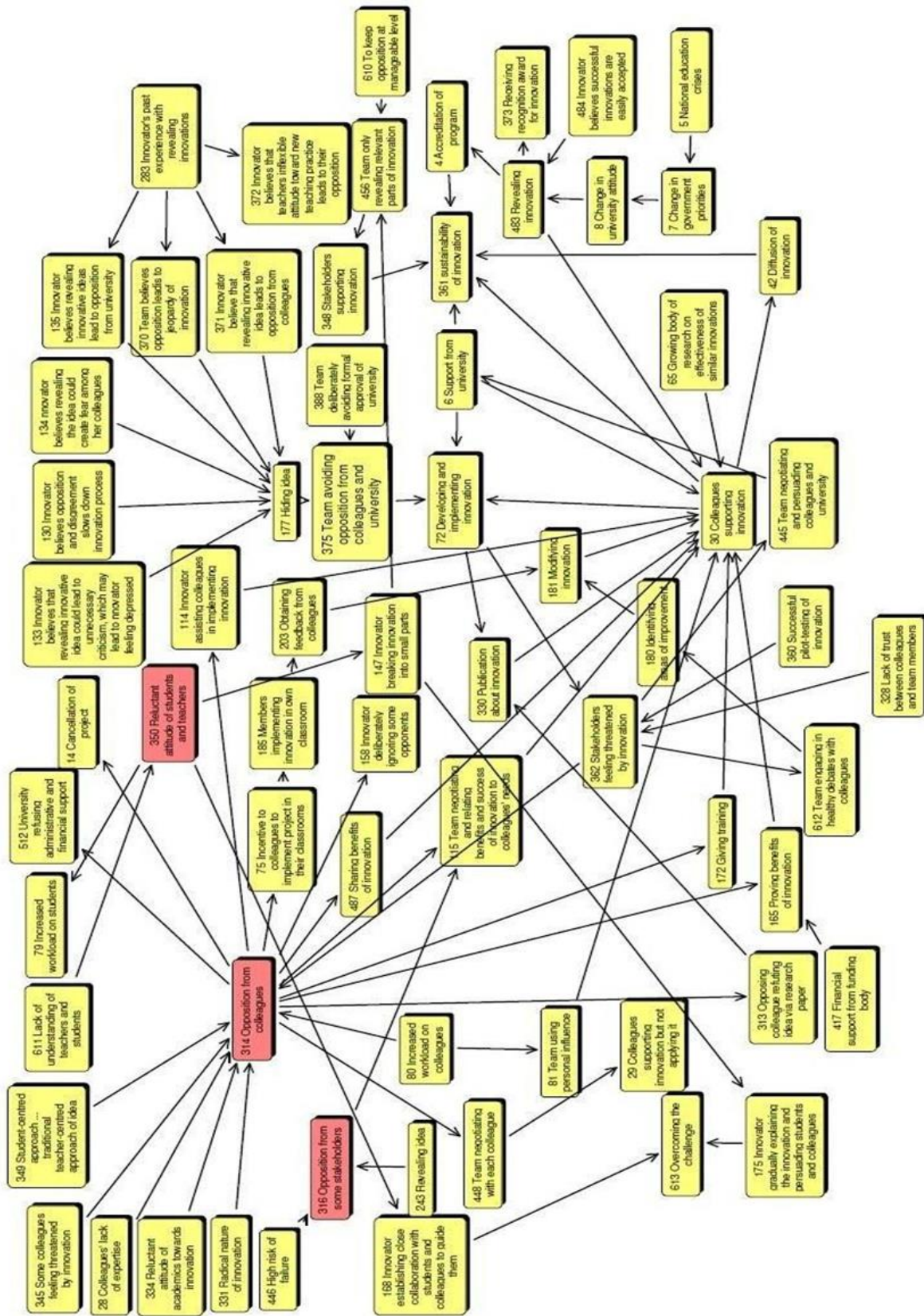


Figure 5.20 Managing colleagues opposition to innovation

Participants mentioned 10 different factors which led or could lead to these challenges. The factors are: “some colleagues feeling threatened by innovation” (345), “stakeholders feeling threatened by innovation” (362), “colleagues' lack of expertise” (28), “colleagues' lack of awareness of benefits of innovation” (27), the “reluctant attitude of academics toward innovation” (334), “increased workload on teachers” (80), “student-centred approach ... traditional teacher-centred approach of innovation” (349), the “radical nature of innovation” (331), “high risk of failure” (66), the “prevailing academic culture” (329), “lack of understanding of teachers and students” (611), “revealing the idea” (243) and “development and implementation” (72). The last two factors refer to the choice by an innovator to reveal the innovation.

Four of the 15 participants also discussed the consequences of the opposition from colleagues. These were: the “university refusing administrative and financial support” (512), “increased workload on students” (79), “cancellation of project” (14), “the innovation process getting slowed down” (130), the “innovator feeling depressed” (133) and “jeopardy of innovation” (370).

Of the 15 participants, 13 discussed the strategies they adopted in response to “opposition from colleagues” (314). The most commonly mentioned strategy was to “avoid opposition from colleagues and university” (375) or to “keep opposition at manageable level” (610). Three participants followed somewhat similar strategies: “hiding the idea” (177) until it was fully developed and implemented and then “revealing the innovation” (483); attaining “support from the university” (6); attaining “support from colleagues” (30); “receiving recognition award for innovation” (234) or “accreditation of program” (4). One participant used a strategy that involved: the “team only revealing relevant parts of innovation” (456) to stakeholders, thus “keeping opposition at a manageable level” (610).

The remaining nine participants, who encountered “opposition from colleagues” (314), used different strategies to mitigate the challenge. Two participants obtained colleagues’ support for their innovation via “proving benefits of the innovation” (165). One of these participants mentioned “publication about the innovation” (330) as a key factor to demonstrate the effectiveness of an innovation. Two participants persuaded colleagues through having the “team negotiating and relating the benefits and success of innovation to colleagues' needs” (447). In one of these cases, the participant complemented

negotiations with “incentive to colleagues to implement project in their department” (75). In two cases, the strategy was the “team negotiating to persuade colleagues and university” (445). In one of these cases, “publication about innovation” (330) was used to attain student support. In one case, the challenge was solved through the “team engaging in healthy debates with colleagues” (612) and “modifying the innovation” (152). Another participant resolved the challenge through the “innovator breaking the innovation into small parts” (147) and then “gradually explaining the innovation and persuading students and teachers” (175). Lastly, in one case, the strategy involved the “team negotiating with each colleague” (448) which resulted in “colleagues supporting innovation but not applying it” (29).<sup>7</sup>

Overall the “opposition from colleagues” (314) and its resolution strategies, indicate an important dilemma: the need to reveal an innovation in order to obtain required support for developing, implementing, sustaining or diffusing innovation, and the need to hide the innovation in order to avoid opposition from colleagues or the university or both.

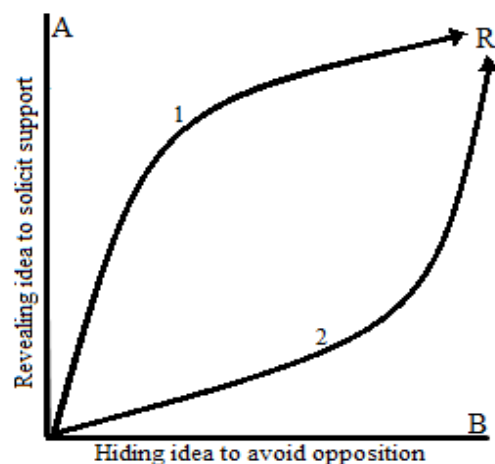


Figure 5.21 *Revealing Innovation vs. Hiding innovation*

The dilemma is represented graphically in Figure 5.21. Revealing the innovation to obtain support is given on the vertical axis and hiding innovation to avoid opposition is given on horizontal axis. Path 1 in the figure indicates the strategy where the innovator chose to hide the idea until it was developed and then, when the innovator felt it was safe, revealed it to get support. Path 2 was a strategy that involved revealing only relevant parts to those stakeholders whose support is vital for developing innovation, while hiding it from others, and thus keeping the potential opposition to the manageable level.

<sup>7</sup> For details of each of these participants please see Appendix D7.

## 5.11 Innovators interests vs. university/agency interest

Figure 5.22 displays those components of the aggregate cognitive map that relate to the participants' experiences obtaining support (financial or administrative or both) from their university or financial support from external funding agencies in order to develop, implement or sustain their innovations. Participants used various strategies to respond to "financial constraints" (53), "lack of provision of resources from university" (298), "opposition from university's management" (315), that the "innovator needed skills and resources" (646) and "incompatibility of the innovation with the existing system" (76).

Ten participants did not mention that they faced any of the above challenges; however, nine of these discussed reasons or strategies that enabled them to gain support from their universities for their innovations. Out of these nine participants, for three the "innovator's influential position" (270) led them to receive "support from university" (6). Two participants received "support from university" (6) because in their cases "initiation of project" (84) was an outcome of the "university realising the need" (511). In other words, these were top-down university-initiated innovations. In two of the cases, there was "availability of funds for innovation" (8) that motivated participants to develop their ideas for innovations (40). One participant received "support from university" (6) because of her "university's positive attitude towards innovation" (513). Finally, one participant received "support from university" (6) because in his case "development of idea" (4) was leading to the "merging of bottom-up and top-down approach" (303). To put it simply, the participant received support for developing his innovation because his idea was addressing not only the needs of his students but also of the broader strategy of the university.

Out of the remaining 17 participants who faced the challenges, 14 successfully obtained "support from university" (6) for their innovations. Three participants practically demonstrated the viability of their innovation via the "success of the innovation" (359), the "team revealing the innovation" (483) and "successful pilot-testing of the innovation" (360). One these three participants assumed that his "publication about innovation" (330) was also an important factor that assisted him to obtain "support from the university" (6).

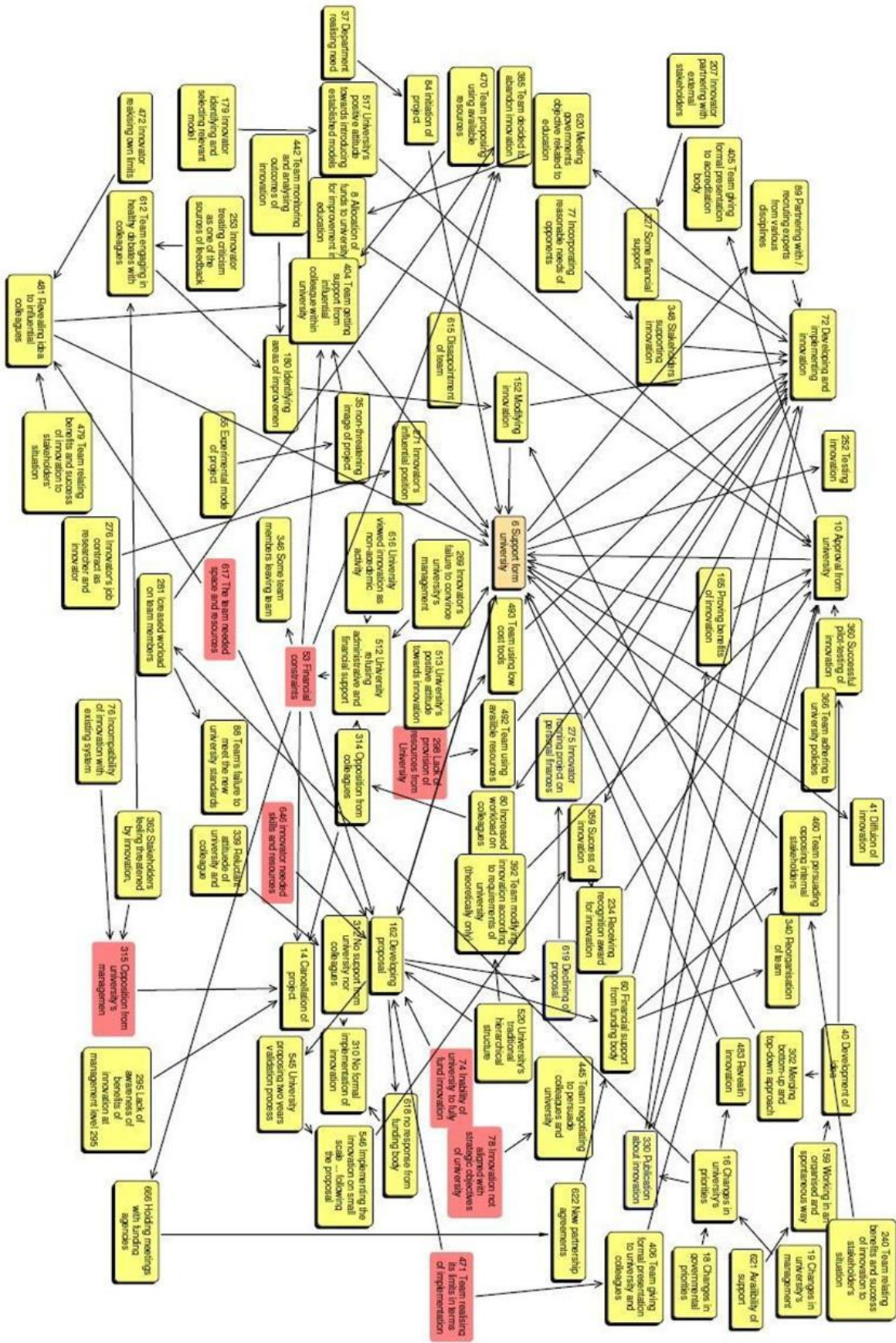


Figure 5.22 Obtaining support from university or funding body

Three participants received “support from university” (6) through “proving the benefits of innovation” (165) or “giving presentations” (173) to colleagues at their universities. One of these four mentioned “team proposing to use available resources” (470) and the “non-threatening image of project” (35) as further reasons for receiving support. Another participant used a similar strategy that included the “team negotiating and relating benefits and success of innovation to stakeholders needs” (479) and using “publication about innovation” (330) to obtain “support from university” (6). For one participant the strategy involved “modifying the innovation” (152) and using “publication about innovation” (330). Another participant mentioned the “innovator persuading influential stakeholders” (222) as the reason for the team to having “support from the university” (6).

In order to get “approval from the university” (10) for implementing his innovation the strategy used by one participant was “modifying the innovation only on paper” (438). The same participant also mentioned “publication about the innovation” (330), the “innovation generating money” (86) and the “innovator receiving recognition award for innovation” (234) as three important factors that ensured continued “approval from university” (10) for the innovation. For one participant her receiving “financial support from a funding body” (60) led to “colleagues supporting innovation” (221). Lastly one participant received “support from university” (6) for her innovation because of her “university's positive attitude towards innovation” (513).

Eleven participants received “financial support from a funding body” (60) for their innovations. For three out of these 11, the support led to “modifying innovation” (152) according to the needs of the funding agencies. Two participants received “financial support a from funding body” (60) in response to participants “partnering with external stakeholders” (321). The remaining six obtained “financial support from a funding body” (60) through “developing a proposal” (162) which was subsequently submitted to funding agencies. Five of the eleven participants who obtained “financial support from a funding body” (60) also received “support from the university” (6) for their innovations.

Four participants attributed “cancellation of project” (14), “no formal implementation of innovation” (310) or the “team deciding to abandon the innovation” (385) to “opposition from university's management” (315), “no support from university nor colleagues” (312), the “university's conservative attitude” (514), “financial constraints”

(53) due to the “university refusing administrative and financial support” (512), “legal and administrative complications of innovation” (302) due to “opposition from the university's management” (315), “no response from funding body” (618), the “innovation's failure to meet the new university standards” (88), “lack of awareness of benefits of innovation at management level” (295) and the “innovator or team feeling depressed” (46).<sup>8</sup>

Overall, the forgoing suggests that tension exists between the interests and goals of educational innovators and their universities or funding agencies. The innovators seek to resolve this tension by adopting strategies designed to meet their own interests as well as those of their universities or external funding agencies. When this tension cannot be resolved, the result can be that the innovation is terminated.

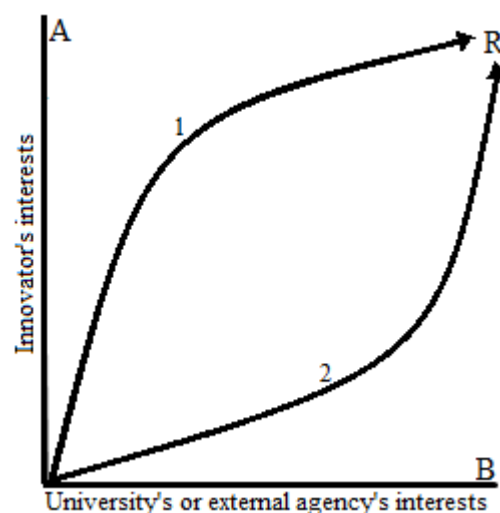


Figure 5.23 Innovator's interest vs. University's or external agency's interests

The dilemma experienced is represented graphically in Figure 5.23. The innovator's interests is given on the vertical axis and the university or external agency's interests is given on the horizontal axis. Paths 1 and 2 in the figure represent the strategies employed by the participants. The former indicates where innovators pursued their own interests first, then worked out how to make these sustainable by incorporating the interests of others. Path 2 involved pursuing only those of their ideas that fulfil needs that have already been recognized and promoted by those agencies that can provide needed support.

<sup>8</sup> For details of each of these participants please see Appendix D8.

## 5.12 Thematic analysis

Thematic analysis of interview transcripts mainly focused on themes which had not been identified using the cognitive mapping process. The themes that emerged involved the emotions present in the educational innovation process. Overall, the analysis resulted in the identification of four sub-themes and one overarching theme. The four subthemes are: Empathy with students; Love and hate responses from students; Perseverance: not giving up; and Passion and enthusiasm help sell the innovation. Each of the four subthemes involves the emotions present in the innovation process, and the four are related one another through the overarching theme: The two-edged sword of emotions. These are reported below.

### 5.12.1 Empathy with students

Eighteen of the 30 participants indicated that their innovations were the result of a general sense of empathy for students. They expressed concern that the learning needs of students were being neglected or that the experience of learning was negative for learners. The following quote demonstrates how strongly one participant felt about the learning needs of students.

*It's really too bad that the students... are dying... intellectually dying. And you have the opportunity to step in and to help them, but you are not helping them. (Participant 23)*

Other participants indicated that they were sensitive to negative emotions, such as boredom and isolation that students may be feeling. They discussed how they felt responsible for the negative emotions students experienced. One participant described his experience in this way:

*The university wasn't doing enough and the students were not really satisfied... they were finding the orientation program quite boring... and I worked out what would be better for the international students. (Participant 25)*

Similarly for one participant the objective of educational innovation was to make learning engaging and interesting for students. She commented:

*It is just about coming up with something that excites the interest of students about what they want to learn, not boredom and rigidity.*  
(Participant 20)

Empathy with students not only worked in a general way but also prompted some participants to initiate an innovation, and then they used it as the basis for making on-going improvements. For instance, one participant commented:

*My students said that they were not happy with the way they were being taught. So I have been actively trying to get students away from the lecture model into the experimental model of learning so that they can really understand what they are doing by doing it... [At first] it wasn't a satisfactory experience for any of the students, so then I began to experiment with what I needed to do [for them] to have a better learning experience (Participant 22).*

While discussing his reasons for innovative teaching, one participant shared this observation about his early days experience as university lecturer:

*I think what inspires me is my students...I can see in my early teaching career students struggled and had bad learning experiences due to poor teaching and poor teamwork...I have always been informed by what my students say rather than what educationalists and institutions are saying (Participant 30).*

Given that participants felt a strong sense of empathy with students, participants expressed discontent not only with traditional teacher-centred teaching strategies but also with policies and structures that support such strategies. One participant said:

*I would change everything if I could. And one of my things is about how to go and help other people sort of steer [them] away from a very traditional model that I really believe doesn't work anymore (Participant 20).*

Another participant commented:

*All students are different but they all go to the same classrooms. It takes them four years to get their degrees and when something goes wrong the*

*students have to pay the bill and not the system... It should be different if students need it... If kids are able to do things they really like then they are more proactive...They will spend ten times more time than on the skills they don't need or don't like (Participant 28).*

To sum up, the comments of participants clearly suggest that they felt strong empathy with students and their issues. The emotion motivated them to find, develop, improve and diffuse their innovations. Empathy with students also created a feeling of discontent among several participants toward university policies and objectives.

### **5.12.2 Perseverance: Not Giving Up**

The second theme that emerged from the data was the persistence of participants. Participants reported that the time involved in realising an innovation required them to manage their emotions in order to persevere. The challenges that they encountered might cause them to want to abandon the project. Several participants discussed how they were not prepared to give up, and related strategies that involved persistent effort including committing time and effort beyond that normally expected of an academic. For instance, one participant commented:

*I think...you just get a thicker skin. If I go back...to when I started doing this, I took it very personally when people didn't like my ideas...I have worked with staff that have jeopardised [the work] on purpose...and sabotaged everything so it didn't work. And I think once you've been through that type of stuff you just get a bit of a thick skin...[I've developed a] "I'm doing it whatever you think" type of attitude...You just bulldoze your way through it (Participant 20).*

Likewise, one participant described how, despite financial difficulties, he and his core team not only kept their project operational but also managed to improve it. The participant stated:

*As with any project, the money runs out...it was after three years and three months that the money ran out. Everybody left the project and there was no funding for it...We managed to find small amounts of money to keep the two main developers developing the platform ... It was for one year that we*

*kept the project running without money at all then I moved to [name] university and we managed to get money from the different source (participant 18).*

A few other participants reported that they had to spend large amounts of time and effort on persuading their colleagues and administrative officers of their universities about the value of their innovations. One stated:

*It took me months, and hours of talking and brain storming. It was a lot of talking. I will sum up an innovation as being lot of talking. The strategy was not giving up and always talking about it. Always talking about the benefits. Speaking out with the benefits to each and every person you are talking to. And figuring out upfront their perceived risks and doing everything that can mitigate the risks. That was the biggest part (Participant 7).*

Another participant commented:

*This initiative is very much part of the brick and mortar of the university which is interesting because for ten years it wasn't. We were sort of trying to persuade the university that what we were doing was useful and the people were benefiting from it... It can take a long time with the big institutions before an innovation is accepted (participant 11).*

Some participants described how the innovation required dedication in terms of putting in long hours and consistent effort over a long period of time:

*When you are dedicated to something then you make sacrifices... you have to spend extra time and effort to achieve your goal...Now after five years I am happy that we have reached a good, let's say, reasonable level...Innovation needs constant fine-tuning. It's been five years that we are improving it and it will go on (Participant 1).*

*It takes huge amount of effort and rewards and vision to do that and to enable such a level of change to happen... That was a two and half year time period and it took a lot of consensus-making through it and lot of education (Participant 21).*

*Somehow you have to develop the ability of protecting whatever you are doing and expanding it as much as possible... You need humility and persistence. You need both. You need the combination of both (Participant 3).*

In two cases, despite perseverance and hard work, the participants could not convince the leadership of their universities of the value of their projects. Consequently, one of these projects was refused financial and operational assistance and the other was cancelled. Both these situations led to participants feeling disappointed with the leadership of their universities and abandoning their innovations. One of these participants commented:

*The top management was trapped in really short-term thinking...After three years of trying we realised that there was no incentive for us to keep going like that. The university was kind of punishing us. [It was] saying “no” to everything. You get tired after a while hitting your head against the wall... I also finally decided that it isn’t worth it (Participant 5).*

The other participant expressed even more severe opinion:

*We did almost everything whatever we could do...We did the research as we went [along] and published about the program in refereed journals that could be another reason to argue and continue its existence... The acting Pro Vice-Chancellor was replaced by another Pro Vice-Chancellor... He cancelled the program altogether... It happened in such a dictatorial way that it left those running the program...with a bitter feeling... Even if there was an opportunity to merge it with other program, now we were not interested (Participant 25).*

In summary, participants indicated, by their comments, that they were emotionally engaged with and committed to their innovations, and these emotions enabled them to persevere despite challenges. That also meant investing time and effort beyond what might be normally expected. Further, when their efforts could not prevent the closing down of the initiative participants experienced strong emotional reactions, and negative feelings toward those involved in terminating the program. They contrasted their own perseverance with what they perceived as short-term thinking by the university.

### **5.12.3 Love and hate responses from students**

A third theme that emerged was that the reactions of students to innovations were emotional. Given that teachers were prompted by their own emotions and generally aimed their innovations at having an emotional impact on students, this may have been an expected, foreseeable outcome of their projects. Nevertheless, some participants expressed surprise at the emotional reactions of students. For instance, one participant commented:

*So we gave them something that they really wanted to do...So the security guard was coming around 7 o'clock at night and kicking them out at night. So they were staying much longer than we ever thought they would. They really enjoyed it (Participant 24).*

In many cases innovations were reported as producing positive emotions. Comments included:

*Students really like it. They consistently comment at the end of the semester that it was one of the most profound things we did in the class. (Participant 22)*

*The students participated in the session were pleased and interested in their experiences and they said things like "this was my best university experience" and so on (Participant 8).*

*I did not face any challenge from my students. They liked the innovation because it solves some the issues they were facing (Participant 21).*

In a few cases an innovation generated both positive and negative emotions.

*I get students who completely hate it, and hate me as a result...And then there are students who think that this is the greatest thing that they ever learned in their life (Participant 29).*

*We went for it. It was too much for the students. They didn't like it... There are those who think "I didn't do well enough" and there are others who go "I got that. Yes, that makes sense" (Participant 17).*

The comments indicate that participants were interested in the emotional response to their innovations by the students. Although students mostly responded positively, there were some who had strong negative reactions to participants' initiatives. Overall, this theme suggests that students respond emotionally to innovations and the reaction can be love or hate rather than indifference.

#### ***5.12.4 Passion and Enthusiasm Help Sell the Innovation***

The fourth theme that emerged from the thematic analysis was the role of emotion in promoting the innovation. The emotions involved reportedly prompted participants to communicate with others about their projects. These were the basis for enthusiastically “selling” the idea to potential adopters. Explaining her success in encouraging others to adopt her innovation, one participant said:

*I think a lot has to do with my enthusiasm...it is enthusiasm, commitment and being able to explain it in a simple way so that people actually understand...You have to sell your idea, or sell why your research is really, really important (Participant 12).*

Another participant commented:

*We had to be very diplomatic and persuasive with the senior colleagues of the faculty... It was my responsibility to try and move the process forward. I suppose, you can say that my role was that of a reconciler. I tended to work in a way that I would go around and do persuasion and negotiation (Participant 2).*

One participant signalled that she was so passionate to promote her innovations that she not only tried to persuade others with the help of documented evidence but also went out and helped others in implementing the innovations. The participant said:

*I think it's just about the way we convince or I convince people...we gathered quite a lot of very strong student voice data about it...there are seven or eight different programs now in our faculty that do this...we went and helped them [in implementing the innovation]...I think when you go and help other people there is a way of convincing them (Participant 20).*

At the same time, some participants mentioned that too much passion could contribute to undesirable emotional reactions, such as fear, amongst some colleagues. Further, participants reported that they needed to protect themselves from the negative emotional reactions of others that might dampen their own and their team's enthusiasm for the work. Comments included:

*You shouldn't be very active to convince others about your idea... I think one should be more concerned with materialising the idea than convincing others about the effectiveness of it... When you are asked [about the innovation] by those who are not yet open to the idea, then it is better to avoid telling [them] the idea. Or you can put it in such a way that they may not see it as something big. In fact, such ideas create unnecessary fear among people (Participant 19).*

*The nature of innovation is that it should be kept secret until it happens. If I go and describe what I want to do, the people around me would say things like "that would be difficult", "that won't work due to so and so", "you would have a problem with this and a problem with that", and so on. And I would get depressed after talking to these people (Participant 6).*

One participant was so concerned with protecting herself from negative emotional reactions of others that she not only hid her initiative from colleagues and university staff, but also avoided asking permission for implementing innovation from university authorities. The participant commented:

*We didn't actually say what we were going to do... I think we probably would have faced a lot more resistance of people... lots of academics are very resistant to any type of change in my opinion... So, you have to do it sometimes [with a] little bit of stealth... We didn't really ask permission about what we were doing; we just went for it (Participant 20).*

These comments demonstrate that many participants use their enthusiasm and passion for innovation to successfully influence and convince stakeholders and colleagues about the value of their work. Some participants, however, did not enthusiastically promote their innovations. Their comments suggest that they were more concerned with protecting their work from the negative emotional reactions of others. Apparently, these

participants believed that too much passion for spreading an innovation could generate fear amongst colleagues and stakeholders, which could further lead to unwanted consequences for their innovations.

#### **5.12.5 Overarching Theme: The two-edged sword of emotions**

All four specific sub-themes identified above contributed to an overarching theme: the two-edged sword of emotions. The subthemes indicate that emotions play a key role in many of the dynamics and challenges of educational innovation, and impact innovators both positively and negatively depending on how effectively the innovator manages them.

Taken together, the identified sub-themes suggest that participants' emotions not only prompted them to initiate innovations to address students learning needs and issues, but also contributed positively toward keeping participants working on innovations despite the various challenges they encountered. While implementation of innovations by participants can lead to positive emotional responses from students, in some cases projects produced a negative emotional reaction from students toward both the innovations and the teachers involved. Similarly, while emotion can contribute to the perseverance of an innovator, it makes it more difficult for innovators to accept the termination of a project. Emotions are also “two-edged” when it comes to promoting innovative ideas: enthusiasm and persuasiveness can make ideas attractive to others, but some participants reported that they needed to play down their enthusiasm in case it produced fear amongst colleagues.

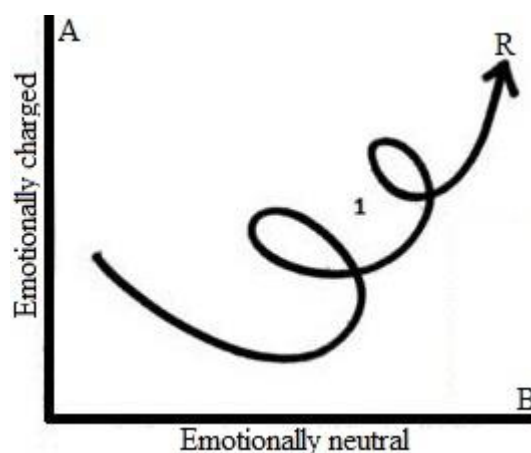


Figure 5.24 Emotionally charged vs. emotionally neutral

This duality of emotions can be framed as a dilemma, as shown in Figure 5.24, in which innovators need to determine the part emotions need to play in their actions. Emotionally charged action is on the vertical axis and emotionally neutral action is on the horizontal axis. Because this challenge emerged in the analysis following the interviews participants were not asked about strategies for dealing with this dilemma. Path 1 in the figure represents the resolution strategy that could be employed by the innovators seeking to reconcile the dilemma. The strategy depicts continuous oscillation between the two options to develop and implement the innovation.

### **5.13 Chapter Summary**

This chapter has reported the findings that emerged from this study. The findings outlined dilemmas that were faced by the participants during their innovation processes, along with the ways in which these dilemmas were resolved. In total, this study identified 13 dilemmas. Twelve were identified using the cognitive mapping process and one through thematic analysis. Each of these dilemma and their resolutions were graphically represented using THT diagrams. These illustrations show the conflicting demands faced by the participants during their innovations along with the strategies employed to resolve these demands.

As can be seen from the cognitive maps presented in this chapter, challenges differed from one another in terms of their complexity. Some maps contained a relatively small number of concepts. This usually reflected a low number of participants discussing the challenge, which limited the number of reasons given for it arising and the number of resolution strategies described. The more complex challenges for innovators included: finding the balance between authority and participation when leading a team; responding to student expectations; deciding how much to reveal about an innovation; and balancing one's own interests with those of the university or funding agency.

Likewise, the Helix diagrams reveal that the strategies used to reconcile dilemmas differed from one another in terms of complexity. While most strategies sought resolution (represented by point R in each of the diagrams),

most often the trajectory of the path taken by innovators was a smooth curve rather than a helix or a movement back and forth between the ‘horns’ of the dilemma. Dilemmas with more complex reconciliation trajectories are likely to be those that are not quickly resolved, perhaps occurring throughout the innovation process. Dilemmas with more complex trajectories included: the need for both spontaneous and organised thinking; combining technology and pedagogy; managing workloads in order to completely meet the demands of both the innovation and other job responsibilities; and the need to manage emotions throughout the process of innovation.

The dilemmas uncovered in this research and presented in these findings can also be compared with those established in earlier studies. In the next chapter, the findings presented in this chapter will be discussed in the light of relevant literature.

## Chapter 6. Discussion

To increase the rate of innovation both in tertiary education and in industry, it is important to understand how innovators perceive their environment and respond to it. The present research has explored the dilemmas experienced by innovative educators. In total, 13 dilemmas emerged from the analysis of 30 interviews with successful innovative teachers. The teachers had used a range of strategies to overcome dilemmas they encountered during their innovation processes. However, they did not always perfectly reconcile the dilemmas they were faced with. The aim of this chapter is to interpret and discuss the findings of the study. First, it will highlight the nature of the dilemmas and the reconciliation strategies employed by the participants of the study. Then the chapter will evaluate the effectiveness of the strategies teachers used. Finally, the chapter will review an overarching theme that emerged from the interviews, the ‘two-edged sword of emotions.’

Literature informs us that all creative endeavours are fraught with tensions, and that the effective resolution of these tensions enables progress toward intended goals (Bailey & Ford, 2003; Wooliams & Trompenaars, 2013). Pedagogical innovations are not an exception to this reality (Samaras, 2002; Grossman, 2005). With that in mind, the purpose set for the study was to identify: (1) dilemmas, if any, encountered by innovative teachers during their innovation processes; and (2) strategies that were used by those teachers to cope with the dilemmas. To achieve this purpose, thirty innovative teachers who had not only introduced pedagogical innovation, but also published about their interventions in peer-reviewed academic journals, were identified, recruited and interviewed. The interviews were transcribed and cognitive maps were generated for each of the participants. These maps were combined into a single (aggregate) map to illustrate all the concepts and causal relationships that exist among the concepts. Finally, the aggregate map was analysed which led to the identification of 12 dilemmas and the various ways these dilemmas gave rise to actions designed to reconcile tensions inherent in innovation.

The interview transcripts were also subjected to thematic analysis. This analysis resulted in identification of four sub-themes and one overarching theme. The

overarching theme also indicated an additional dilemma faced by innovative tertiary teachers. In the following sections of this chapter, the findings of the study are presented and discussed in detail.

## **6.1 Organised versus Spontaneous Pondering**

The findings (see Section 5.2.1) reveal the first important dilemma that most of the participants went through during their innovation process. The participants had to choose between two opposite approaches to thinking: whether to be spontaneous or organised. The majority of participants switched between both modes of thinking. The three patterns of the switching were: (1) initially spontaneous then organised; (2) initially organised then spontaneous–organised, and (3) spontaneous–organised or organised–spontaneous from start to finish. Three of the participants assumed that the conception process for their idea did not involve spontaneity, but was an outcome of organised pondering from beginning to end. It is noteworthy that those who relied solely on organised pondering had actually adopted an innovation developed by others, rather than generating an innovation of their own. Lastly, one of the respondents reported experiencing cognitive or mental blockages while trying to develop a creative solution through organised pondering. The respondent successfully cleared the blockages or impasses by deliberately switching to the spontaneous mode of thinking.

Unlike the traditionally held notion that spontaneity and organised thinking represent two ends of a continuum and consequently are mutually exclusive phenomena, the findings demonstrate that the majority of educational innovators who participated in this study used both methods of pondering, particularly during their idea conception phase. While none of the literature on pedagogical dilemmas reviewed in the context of this research has mentioned the same or similar findings, the findings are in consonance with the large body of literature of other disciplines such as psychology, leadership, entrepreneurship and creativity and innovation.

As early as in 1900, Théodule-Armand Ribot, a French philosopher and psychologist, described in his paper “The nature of the creative imagination” that during creative idea generation “mental states become joined together so that one state tends to involve the other” (p. 649). Sir Ken Robinson, a leading expert on creativity and innovation, views creativity as neither a completely rational nor entirely emotional process, but as

something that requires whole-brain thinking (Robinson, 2001). According to him, while it certainly involves rationality, creativity also heavily relies on a person's feelings, intuition and imagination (Robinson, 2001). Among others to support this finding are Basadur, Graen and Green (1982), Basudar and Funkbeiner (1985), Dietrich (2004), Johnson-Laird (1983), Facioaru (1985), Finke, Ward and Smith (1992), Guilford (1967), Gobara (2003), Gobara and Ranjan (2013), Howard-Jones (2002), Isenman, (1997), Kahneman (2011), Koestler (1964), Kris (1952), March and Weil (2005), Mumford et al. (1991), Nijstad, De Dreu, Reitzchel and Bass, (2010), Nordgreb, Bos, and Dijksterhuis (2011), Osborn (1953), Thurstone (1962) and Zhong, Dijksterhuis and Adam (2008).

*Table 6.1* Different labels used to denote spontaneous and organised thinking

<b>Authors</b>	<b>Labels used</b>
Kris (1952)	Primary and Secondary thinking
Finke et al., (1992)	
Osborn (1953)	Imagination and Judgment
Thruston (1960)	Prefocal and Deductive thinking
Koestler (1964)	Bisociative and Associative thinking
Guilford (1967)	Divergent and Convergent thinking
Mumford et al., (1991)	
Basudar and Funkbeiner (1985)	Ideation and Evaluation
Howard-Jones (2002)	Generative and Analytical thinking
March & Weil (2005)	Spontaneity and Planning
Nijstad et al., (2010)	Flexible and Systematic thinking
Kahneman (2011)	System 1 and System 2 thinking
Nordgren, Bos, and Dijksterhuis (2011)	Conscious-deliberation and unconscious thought
Gobara & Ranjan (2013)	Type 1 and Type 2 thinking

All these studies suggest that devising novel solutions require an innovator to use two different (and opposite) types of thinking approaches. It is worth noting that the studies mentioned use different labels for the spontaneous and organised approaches to thinking.

What patterns of combinations of the two opposing modes of thinking do educational innovators employ to generate innovative, instructional ideas? Answering this question requires understanding the two main steps involved in the generation of a creative idea or solution: realising the need and the formulation of a solution. The need for an improved or novel solution generally arises either due to an opportunity that is not really being taken care of or by something that offers a challenge to existing practice. To put it differently, the need (problem or opportunity) is identified first; then, an innovative solution is formulated or adopted to address that need (Finke et al., 1992; Mumford et al., 1991). The findings (see Section 5.3.1) indicate that the participants identified need for their innovations either spontaneously, as a result of organised pondering, or through a combination of both these modes of thinking. To develop solutions for the identified needs, the participants used either strictly organised pondering, or organised pondering with moments of spontaneity.

The aggregate map revealed four distinct patterns used by participants during the formulation step. Three involved both spontaneity and organised thinking, whereas the fourth one did not involve spontaneity, but was an outcome solely of organised and deliberate pondering only. Each of these groups is discussed separately in the following lines.

The largest group was comprised of those participants who initially undertook an organised approach to identify and interpret the need for their innovations; however, later they used spontaneous-organised pondering to formulate their ideas. This pattern is consistent with the basic theme of most of the stage-based models of the creative process proposed in the literature such as Wallas (1926), Rossman (1931), Guilford (1967), Koberg Bagnall, (1981), Barron (1988), Isaksen & Trefflinger (1985) and Parnes (1992). All these models propose that ideation in the initial stages, where the need for innovation is identified, defined and understood, requires an organised thinking process, whereas in the later stages spontaneous as well as organised thinking need to work in tandem to generate and evaluate solutions. Some studies suggest that solutions

developed following this pattern are of a relatively higher quality and originality than the solutions for which the problems or opportunities are realised spontaneously (Redmond, Mumford & Teach, 1993; Reiter-Palmon, Mumford, O'Connor, Boes & Runco, 1997). This study did not attempt to evaluate the quality or originality of innovations, so neither supports nor opposes this claim.

For the second largest group, the need realisation was largely or fully based on the spontaneous thinking. The realisation was followed by organised thinking which led to the formulation of their innovative ideas. The spontaneous mode of thinking assists innovators to access those areas of their mind or consciousness that lie beyond rational control (Robinson, 2001) so that they “deal positively, or ‘adequately’ with a totally strange set of relationships without having a model of how to act” (Moreno, 1946, p. 111). Gobara (2013) suggests that the spontaneous mode of thinking, due to its analogical and free associative nature, enables innovators to apply not only their domain-specific knowledge and experience, but an overall understanding to discover and make sense of remote or subtle connections between items involved in a situation. Thus, the spontaneous mode of thinking helps innovators to make sense of a novel situation. To develop a solution for such a need, an innovator generally uses organised pondering to deconstruct the identified need into manageable parts, develop solutions for the each part and then merge all the smaller solutions to form an innovative idea (Andelson, 2003; Mumford, Reiter-Palmon, & Redmond, 1994). As noted earlier, relevant literature suggests that the formulation of adequate novel solutions requires spontaneous and organised thinking to generate and select or refine solutions respectively. The largest group of participants, however, claimed that they realised the need for their innovations spontaneously, but formulated innovative solutions through solely organised pondering. A possible explanation for this apparent contradiction may be, as Kahneman (2011) found, that when a person stumbles upon a problem, the spontaneous thinking mode automatically generates vague and unrefined tentative solutions that are quickly refined, using an organised approach. From this perspective, the solutions developed by the participants were most probably not a result of only organised thinking, but of spontaneity also, even though participants experienced the process as organised. If this is the case, the creative process adopted by the participants was in agreement with the idea that innovative idea development requires spontaneity to generate novel and genuine solutions. This is followed by an organised thinking process

to assess and select the most appropriate solutions, leading to the formulation of an innovative idea (Boden, 1991; Dennett, 1978; Zhong, Dijksterhuis & Adam 2008).

The third group included those who followed a mixed (spontaneous-organised) pondering approach from the realisation of a need to the development of an idea. This is in line with what Guilford (1975) pointed out, that the two modes of thinking can be used together when spontaneous thinking is used on the way to an organised solution. Charles Sanders Peirce, the great American mathematician, physicist, philosopher, and logician, stated:

[B]ut man is so continually getting himself into novel situations that he needs, and is supplied with, a subsidiary faculty of reasoning for bringing instinct to bear upon situations to which it does not directly apply. This faculty is a very imperfect one in respect to fallibility; but then it is only needed to bridge short gaps. (as cited in Hartshorne & Weiss, 1934, p. 498)

Nordgreb, Bos, and Dijksterhuis (2011) also found in their experimental study that organised–spontaneous thinking works best to develop solutions for novel and complex problems. The Creative Problem Solving (CPS) model proposed by Treffinger (1995) suggests that both modes of thinking are essential for realising a need for an innovation and generating a creative idea. The CPS assumes that organised thinking in the beginning of a creative process leads to the identification of the main problem area. The spontaneous thinking results in the generating of various problem statements that facilitate the development of many varied and novel solutions. The organised thinking is then applied to evaluate, select and cluster solutions in order to develop an idea that is viable as well as innovative.

The fourth and last group contained four participants who claimed that their entire idea generation process involved only organised thinking. These participants classify their innovations as ‘incremental’ and none of them claimed to have developed a brand new solution. The main difference between this group and other three groups is that the participants of this group did not generate novel ideas for their innovations. Instead, they identified well established pedagogical innovations that corresponded to their needs and developed plans for their adoptions. It is important to note that all creative ideas, in one way or another, are based on reorganisation and recombination of previous

ideas (Johnson, 2010; Kaplan & Vakili, 2014). However, analysing and selecting a creative idea for adoption does not require one to generate a creative idea. In other words, adoption of innovation requires logical thinking instead of creative thinking. In some ways, this highlights the contribution of this study. Other studies of dilemmas have focused on the implementation of top-down innovations, which puts emphasis on logical rather than creative thinking.

The first three groups developed innovative ideas while following various models that have been described in literature. However, the participants did not report that they intended to follow any particular model. This suggests that the identified patterns represent three different, naturally-occurring approaches that can be followed by innovators in order to deal with the dilemma. The fourth and last group of participants did not intend to generate an innovative solution; they, therefore, did not switch to the spontaneous mode of thinking. Thus, the findings support Moreno's (1972) proposition that in creative endeavours spontaneity is required for "an adequate response to a new situation or a novel response to an old situation" (p. 1).

To what extent did participants find it challenging to switch between modes of thinking? The findings (see Section 5.2.1) indicate that only one of the 30 participants experienced mental blockages while developing a creative solution. The respondent overcame these blockages by deliberately accommodating spontaneity in an otherwise organised process, by seeking intuitions, inspirations and expert tips.

Why did other participants not report that switching mode involved a cognitive challenge? There are a number of possible explanations. Firstly, educational innovators may be generally better able to detect task demands in terms of modes of thinking. Gabora (2003) proposed that innovators have a relatively high capacity to shift between analytical and associative modes of thinking in response to the situation. Ansburg and Hill (2003) in their study of analytical ability in the context of creativity and deductive reasoning found this ability to be an important trait that distinguishes innovators from other analytical thinkers and problem solvers. Other studies reported similar findings include Dorfman, Martindale, Gassimova and Vartanian (2008) and Vartanian, Martindale and Kwiatkowski (2003). Secondly, for the majority of educational innovators it may be that the transition from one mode of thinking to the other is smooth and occurs without any problem. This is in line with what Hoppe and Kyle (1990) found

in their experimental study on the role of corpus callosum in creativity. They contended that creative individuals had a relatively higher “bilateral integration of cerebral function without marked inhibitory effects from right or left cerebral hemispheres (p.154).” In other words, creative people are relatively more flexible with the two modes of thinking therefore they can easily switch between the different modes of thinking (Martindale, 1989). Thirdly, it may be that while developing innovative ideas, educational innovators rarely come across mental blockages; however, they effectively resolve these through shifting to the spontaneous mode of thinking. This is also in congruence with the established literature. For instance, according to de Bono (1967) innovators come across a cognitive impasse because novel problems require new and fresh solutions, whereas organised thinking relies on their knowledge and experience of tried and tested methods. Consequently, innovators use lateral thinking, which enables them to piece together their logical solutions and thus overcome cognitive impasses. Duncker (1945) also postulated that in cases of mental fixation the associative mode of thinking generally enables problem solvers to overcome their impedances. Through a series of experiments, Smith and Blankenship (1989, 1991), demonstrated that incubation (an unconscious cognitive process) ameliorates cognitive blockages. They claimed that putting a problem on the back burner not only enables creative problem solvers to avoid inappropriate or unneeded information, but also assists them with getting the required insights. Other literature which supports the same finding include Kris, (1952), Goldman, Wolters and Winograd (1992), Claxton (1997), Sio and Ormerod (2009) and Ritter and Dijksterhuis (2014).

To conclude, the dilemma under discussion is a naturally occurring dilemma that most innovators handle without conscious effort. The study sample of the existing study was limited to those who had successfully realised their innovations and published about them. By focusing only on successful innovators, the study may have excluded all those who did not resolve this dilemma. Without reconciling this dilemma, a person would either adopt others’ innovations or would not get the innovation fully realised.

## **6.2 Realisation of Innovation versus Attainment of Competencies**

With regard to team building and team working, the findings (see Section 5.2.2) revealed four distinct dilemmas. The first of these dilemmas stemmed from the tension

between two contrasting needs experienced by the participant. Only one of the participants reported to have faced this dilemma. The dilemma was that, on the one hand, the participant wanted to develop an idea into a viable pedagogical solution within a certain stipulated timeframe and resources, and on the other hand time and resources needed to be devoted to the acquisition of skills and expertise essential to developing the idea.

The participant responded to the dilemma by partnering with experts who had the required skills and knowledge base. Together, they developed and implemented the idea. The partnership enabled the innovator to not only acquire needed competencies (though these were in the form of other people) but also to save time and resources, which would be otherwise spent on learning needed skills and expertise. It is important to note that while all other participants also formulated teams to overcome their competencies shortage, only one reported facing this dilemma: his situation involved a serious time and resource constraint. For the majority of participants also, the formulation of teams was prompted by the same need, a competencies shortage. However, they did not indicate having a pressing time constraint and this may be the reason they did not report this dilemma.

Although innovative ideas are generally conceived by individuals, their development and implementation is carried out by teams (Adair, 1996). Yet the tension between the desire of an innovator to develop an idea into an innovation and his or her needs in terms of acquiring required competencies, has not been mentioned or discussed in educational innovation related research. It may be that this is a relatively straightforward dilemma that is easily remedied by most innovators.

In the context language teaching, Shrum and Glisan (2015) mention that language teachers often compensate for their lack of knowledge of a particular subject by team-teaching a course, or a part of it, with a teacher from another discipline. Overall, the strategy adopted by the participant was an effective way of accomplishing both objectives, though it did require that he or she involve others in the work, thus increasing the social complexity of the work that may lead to some of the dilemmas discussed later in this chapter.

### **6.3 Competency Needs versus Desired Design**

This dilemma was also reported by only one of the research participants (see Section 5.2.2). The dilemma concerns the tension between the participant's needs and her desires, with regard to the development of her innovation. The participant, on the one hand, needed to acquire certain required competencies through partnering with other experts to develop her innovation within a certain specified time frame; on the other hand, she also wanted to develop her innovation solely according to her own understanding. She contended that, within a team environment, team members tend to bring in their own aspirations rather than following the aspirations of the innovator. Additionally, the participant believed, teamwork involves disagreements which can negatively impact on the overall progress of the project. These two presumptions led the participant to avoid forming a formal team. The innovator eventually consulted or employed experts without formally teaming with them. This strategy enabled her to acquire the required skills and realise her innovation within the required timeframe and also in the way she had initially imagined.

This dilemma has also not been identified earlier in both education and innovation-related literature. In the context of entrepreneurship, however, Wasserman (2012) found that entrepreneurs often find themselves in a dilemma "whether to 'go solo' or to form a founding team" (p.73). Going solo for entrepreneurs can increase the risk of failure for them whereas forming a team usually leads to entrepreneurs facing team tensions (Wasserman, 2012). Wasserman suggests that entrepreneurs should go solo only if they: (1) want to maintain control; (2) have sufficient resources; (3) do not have a strong need for validation or support; and (4) ensure the business is small. These findings are partially similar to the situation of the participant. What distinguishes the findings of the existing study from Wasserman (2012) is that the participant, who encountered the dilemma, wanted to avoid team tensions but did not have sufficient capabilities (skill, knowledge, or competence) to fully realise her project without the support of capable and competent people.

Rees (2001) mentions three important reasons some people are disinclined to work in teams: (1) a lack of patience to work with others; (2) the fear of losing personal power and identity; and (3) unwillingness to deal with team related issues such as building consensus among team members. Two of these three reasons were mentioned by the

participant. According to Kanter (1982), innovations are generally nondemocratic processes that are best pursued by individuals who want to make something happen. These individuals like to form their teams of workers and lead the process of innovation. Kanter's observation stands true for the existing case. However, most of the participants of this study partnered with their team members instead of hiring them for their innovations. One reason of this discrepancy may be that Kanter's study was in the context of industry. Perhaps the reason why most participants did not report this dilemma is that the educational context involves less opportunity for commercial gain and greater opportunity for collaboration with expert colleagues.

In the context of musicians work, Smith (2003) reveals that hiring talented people instead of partnering with them is an effective strategy to utilise other people's talent without facing the challenge of ownership and control from them. According to Smith (2003), hired people do not expect themselves to be formal partners in the effort so they do not struggle for ownership in the product or for becoming the leader of the team (Smith, 2003). Thus, the strategy adopted by the participant to hire and consult relevant experts without fully partnering with them, may be one of the effective ways to reconcile the tension between meeting competency needs and maintaining personal control of the innovation, but one that is more common in fields other than education.

#### **6.4 Diversity of Opinions versus Agreement on Ideas**

The fourth dilemma involved a conflict between the two requirements of an innovative team: diversity of skills and opinions and consensus on ideas (see Section 5.2.2). On the one hand, the participants sought to have a diversity of skills and opinions within their team, believing this would contribute to the quality of the innovation process. On the other hand, they also needed agreement among their team members with regard to the best course of action for developing their innovations. The achievement of the former goal needed the participants to encourage variety in their teams, whereas the latter required the participants to get their team members to agree on certain steps that they would take towards the accomplishment of their innovations. The goals are by nature incompatible with each other, in the sense that the attainment of the first will decrease the probability of accomplishing the second, and vice versa.

Many strategies were adopted by the interviewed innovators; however, these strategies reveal the same basic pattern which involved sequencing. Initially diversity was pursued by formulating a diverse team; then different mechanisms were put in place to enable the team to build consensus among members. Mechanisms mentioned included: building close collaboration among team members, establishing personal and informal relationships between team members, encouraging flexibility and openness in team; encouraging clear communication, dividing teams into sub-teams, clear division of responsibilities, and the innovator making compromises on his ideas.

According to Adler and Gundersen (2007), the very diversity in a team which enables it to formulate novel solutions, makes it difficult for team members to reach agreement on ideas and issues. It is well established that excessive attention to diversity in the team can lead to conflicts among team members (Keller, 2001; Tamara & Erickson, 2007) and lower efficiency of team performance (Ancarani, Ayach, Di Mauro, Gitto & Mancusso, 2013), whereas too much effort seeking consensus among team members, may lead to groupthink (Janis, 1972).

The term “groupthink” was coined by Irving Janis to describe a certain kind of group behaviour (Janis, 1972). He defines it as “a mode of thinking people engage in when they are deeply involved in a cohesive in-group, when the members striving for unanimity override their motivation to realistically appraise alternative courses of action” (Janis, 1982, p.9). From Janis’ perspective, groupthink refers to extreme agreement-seeking tendencies in a team. The three key factors identified in the experimental literature which can cause groupthink in teams are high cohesion, insulation from experts and directive leadership (Rose 2011). Homogenous teams are considered relatively more prone to groupthink than heterogeneous or diverse teams (Day, 2013; Horowitz & Horowitz, 2007).

Adair (2004) distinguishes between teams on the basis of their size and relationship. He divides them into two types: primary and secondary teams. Primary-team refers to a small group of people closely linked with each other and who work together. In a secondary team there are large numbers of people who may or may know each other or work together. Seen from this perspective, all participants of the existing study formed primary teams. These teams were made up of different experts including teachers, technologists, instructional designers and students because the participants were finding

themselves limited in their capabilities to develop and implement their innovative ideas. Thus, the participants created diverse primary teams to realise their innovations.

In the context of teams, Huckman and Staats (2010) distinguish between two distinct types of diversity: interpersonal diversity and intrapersonal diversity. Interpersonal diversity refers to differences between team members on the basis of their characteristics, whereas intrapersonal diversity refers to the variety of characteristics that each team member possesses. Thus in the existing study, the kind of diversity which was mainly pursued by the participants was interpersonal diversity among team members in terms of skills, knowledge, experience and perspectives.

Interpersonal diversity in teams is an extensively researched phenomenon in management and psychology literature. Huckman and Staats (2010) render it to be a double-edged sword for teams because it can lead to both positive and negative consequences. There is research which indicates that it is positively linked with creativity and innovation (Lovelace et al., 2001; Carbonell & Rodriguez, 2006; Perry-Smith, 2006), task efficiency (Keller, 2001; Pelled et al., 1999), external communication and knowledge sharing (Anacona & Caldwell, 1992; Cumming, 2004) and team performance (Horowitz & Horowitz, 2007; Huckman and Staats, 2011; Van der Vegt & Bunderson, 2005; van Knippenberg & Schippers, 2007). Nonetheless, there are also studies which suggest that interpersonal diversity is linked with decreased communication between team members (O'Reilly, Caldwell, & Barnett, 1989) and increased task related conflicts (Keller, 2001). Ancarani et al. (2013) indicate that high team diversity leads to lower efficiency of the team.

Although differences, conflicts or disagreements among team members lead to lower efficiency of the team and in extreme cases may lead to dissolution of the team, if they are managed properly they enable teams to generate viable and creative solutions (Thompson, 2008). Maznevski (1995) also argues that interpersonal diversity leads to high performance of a team only when its members are able to build consensus on issues and ideas. To build consensus among team members, the participants of the existing study used a variety of approaches. The same approaches have been identified in the literature as effective for managing diversity in teams. The approaches included: building close collaboration between members (Gray, 1989), developing personal and informal relationships (Thomas & Ely, 1996), clearly dividing duties and

responsibilities (Tamara & Erickson, 2007), encouraging flexibility and openness in the team (Kramer, 1989), clear communication among team members (Nielsen, 2008), dividing teams into sub-teams (Bryson, Ackermann, Eden, & Finn, 2004) and the leader compromising on their own ineffective ideas (Kramer, 1989).

The finding that participants favour forming diverse teams and then employing various diversity managing methods appears to be an effective reconciliation strategy for managing the dilemma between diversity of opinions and agreement on ideas, with substantial support in the relevant literature.

## **6.5 Authoritative versus Participative Style of Team Management**

Participants had to choose between the authoritative and participative styles of leadership to manage their teams (see Section 5.2.2). The dilemma was discussed by twelve of the research participants. On the one hand, the participants had their own certain specific ideas that they wanted to accomplish by leading their teams in a certain specific direction. On the other hand, they also wanted an environment where members could safely and openly share their ideas, concerns and issues and contribute effectively toward the development of innovation. The strategies of the interviewed innovators revealed three different patterns: (1) leading team members using management techniques such as dividing key responsibilities, imposing deadlines, motivating team members, explaining vision or persuading team members, while creating an open, non-hierarchical or collaborative environment where team members bring in and discuss their ideas and effectively contribute toward the development and implementation of the innovation; (2) enabling team members to closely collaborate with each other and to be directly involved in leading the innovation process; and (3) using authority to guide members in a certain specific direction to accomplish goals, in which case the members are not provided with an open environment to discuss and decide ideas.

This dilemma has not been reported by other investigators who researched dilemmas encountered by teachers. However, it is frequently mentioned in literature related to leadership (Cloete, Bunting & Bunting, 2002; Huxham & Vangen, 2013; Kanter, 1983; Kouzes & Posner, 2011).

According to Lussier and Achua (2009) the effectiveness of a leadership style depends upon the availability of information to a leader. For instance, if leaders have all the needed information then an authoritative approach is appropriate, whereas if he or she has little information, then a participatory approach to leadership is suitable. The participatory approach refers to including and involving all team members in decision-making processes. In the context of managing an innovative team, Wilson, Evered, Härtel and Neale (2004) suggest that leaders need to establish close relationships with their team members, while using a reasonable level of authority to set goals and manage boundaries so that the team can perform effectively. This is the same strategy that was used by the research participants. In terms of managing the dilemma between authority and participation this strategy assisted the participants to reconcile the dilemma by enabling them to foster close collaboration within their teams through using their influence as leaders of their projects.

In contrast to the aforementioned strategy, an alternative strategy was to aim for close collaboration amongst team members and full empowerment of the team. In the literature, there are numerous names for such an emergent informal leadership model such as “self-managing work teams” (Manz and Sims, 1987, p.119), “shared leadership” (Pearce and Conger, 2003, p.1), “distributed leadership” (Obadara, 2013, p.69) and “collaborative leadership” (Bess & Dee, 2012, p. 869). Shared leadership is defined as “a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organisational goals or both” (Pearce and Conger, 2003, p. 1). The participants who successfully created shared leadership among their teams reconciled the dilemma between authority and participation by empowering their teams after establishing close collaboration among their team members.

Unlike the other two strategies described above, the third strategy employed in the context of the dilemma appears to be based on either-or logic: the participant took authority and participation as two mutually exclusive values. The participant chose authority over participation and did not reconcile the dilemma. While this strategy may work in the short term, literature suggests that there may be negative long term consequences, including reduced commitment to the team and its goals.

## 6.6 Technology versus Pedagogy Development

Two of the research participants experienced this dilemma in their technology-based pedagogical innovations, which springs from the interdependence of technology and pedagogy (see Section 5.2.3). The participants needed to decide where to put their focus in terms of the priority between pedagogy and technology when developing their innovations. On the one hand, one participant wanted to develop effective pedagogy but needed to be aware of possibilities in terms of technology. On the other hand, another participant sought to develop appropriate technology for pedagogy but that required knowing the actual pedagogy. To resolve this dilemma, both the participants used the same strategy, which was to develop their innovation via stepwise incorporation of both pedagogy and technology simultaneously.

According to Kohn (2009) the relationship between technology and pedagogy is always problematic, especially “with regards to the question of who is, or should be, in the driving seat” (p.577). This conflicting or contradictory relationship, although discussed extensively in the education literature (Colpaert, 2006; Dron, 2012; Felix, 2003; Fullan, 2011; Liu, Magjuka, Bonk & Lee, 2007; Maor, 2006; OECD, 2010; Ramsey & Khan, 2017; Weller, 2011; Welle-Strand & Thune, 2003), has not been explicitly identified as a dilemma for teachers in the literature that specifically focuses on dilemmas experienced by teachers during pedagogical innovation or reform. This discrepancy in the two strands of the literature may be due to the variation in the focus of these strands. The former seems to be mainly concerned with the tensions that are experienced by teachers or instructional designers during the planning stage, whereas the latter focuses on the tensions that are experienced by teachers during (or after) the implementation of an innovative teaching project. Another possible reason for the tension between technology and pedagogy not being identified as a dilemma in the literature, is that more often than not innovative teaching strategies are based on either technological thinking or pedagogical thinking, but not both (Walder, 2014). It is reasonable to assume that the dilemma between technology and pedagogy is most likely to be encountered primarily when the intent of the innovator is to develop a technology-mediated pedagogical innovation or a technological-pedagogical innovation.

With regard to the relationship between technology and pedagogy, there are three different perspectives in the educational literature. Each of these perspectives has

different implications for the dilemma under discussion in terms of choices the teachers should make. The overwhelming position is that technology should serve pedagogy (Sinclair, 2015). The proponents of this view consider technology as a powerful but basically aimless phenomenon; aimless in terms of not having a specific aim for instruction (Clark, 1983; Fletcher, 1996; Fullan, 2011; Hammond & Manfra, 2009; Kohn, 2009; Maor, 2006; Rourke & Coleman, 2010; Topper, 2000). Fullan (2011) elaborates this understanding as “without pedagogy in the driver’s seat there is growing evidence that technology is better at driving us to distraction” (p.12). Those who subscribe to this perspective assume that sound pedagogical principles are crucial for technology to act as a means for pedagogical change (van Merriënboer, Bastiaens, & Hoogveld, 2004). Fletcher explains this understanding of the relationship between technology and pedagogy via an interesting scenario:

When you go to the hardware store to buy a drill, you don’t actually want a drill, you want a hole, they don’t sell holes at the hardware store, but they do sell drills, which are the technology used to make holes. We must not lose sight that technology for the most part is a tool and it should be used in applications which address educational concerns.  
(Fletcher, 1996; p.87)

The aforementioned quote clearly indicates that the proponents of this perspective view pedagogy (strategy or method) as the main element, and technology as a tool for supplementing the pedagogy. Consequently, they suggest a ‘pedagogy-first’ approach to designing instruction (Fullan, 2011; Rourke & Coleman, 2010). Pedagogy-first means first identifying educational aims and the pedagogy for achieving them and then selecting and sequencing technological tools according to the identified aims and pedagogical approaches (Bowers, 2008).

In contrast to the aforementioned position, Harvey (2002), Palloff and Pratt (2001), and Westera (2015) have proposed exactly the opposite; that is, technology is an enabler of pedagogy so it should be in the driving seat, not pedagogy. Madibaand Mwamza-Simwami (2008) put this idea in these words: “pedagogy is shaped by the existing technological tools instead of it dictating how technological advances have to support teaching and learning” (p.1033). According to Westera (2015) the idea that technology should serve pedagogy is based on an outmoded model of instrumentalism, which

ignores the fact that technology, unlike pedagogy, is constantly evolving and creating new opportunities for amplifying human cognition (intelligence, reasoning, and problem solving). The proponents of this view suggest that accepting technology as the driver of pedagogy enables the teacher to go beyond the dogma of using new technological tools within old pedagogical models (Harvey, 2002; Westera, 2015). Unlike the previous perspective which suggests a subservient role for technology, this perspective views technology as a constructor of pedagogy achieved by identifying appropriate technology first and then designing for it. From this perspective, teachers can resolve the dilemma between technology and pedagogy by identifying and selecting appropriate technology and then selecting or developing pedagogy for it. This strategy was also not applicable to resolving the dilemma the participants were facing, because it suggests choosing technological tools independently of pedagogical considerations.

The proponents of the third perspective consider technology and pedagogy to be equally as important within the context of instruction design (Dron, 2012; Okojie, Olinzock & Okojie-Boulder, 2006; Ramsey, Khan, Weston & Marshall, 2017; Weller, 2011). Dron (2012) suggests that there is a weak distinction between technology and pedagogy in the sense that they both offer techniques and tools for learning. He views them as equally important elements of an “assembly” (Dron, 2012, p. 27). This understanding of technology and pedagogy is not very different from Koehler and Mishra’s (2006) TPACK framework which views technology and pedagogy as two of the three key interdependent components of effective instruction (see Section 2.7.1). Weller (2011) also considers “an iterative dialogue between technology and [pedagogical] practices” to be crucial for designing effective instruction (p.12). Thus, from this perspective, the tension between technology and pedagogy can be resolved by considering and using technology and pedagogy simultaneously in such a manner that they support each other. This view is in line with the findings of the existing study. That is, innovative teachers participating in the study reconciled the dilemma between technology and pedagogy in such a manner that understanding of pedagogy is achieved through application of technology, and the perfection of the technology happens through consideration of the pedagogy involved. Participants did not indicate an ideological preference for putting one element ahead of the other.

## **6.7 Students' Learning Needs versus Students' Expectations**

With regard to students' learning needs, participants indicated (see Section 5.2.4) that they had faced two distinct dilemmas. The first involves the tension between an academic innovator's desire to address the learning needs of his or her students and the need to meet the expectations of these students. This tension was experienced by several of the research participants. On the one hand, the participants desired to enhance learning outcomes of their students by introducing their innovative initiatives; but, on the other hand, they wanted to meet the expectations of their students who, for instance, may value a predictable learning environment more highly than the opportunity for enhanced learning.

Eight of the participants faced opposition from their students because the students were finding the implemented initiatives too unusual, complicated or futile for them. Condensed, the resolution strategies employed by those participants who faced opposition from their students were: (1) identifying expectations of the students by obtaining their feedback on the innovation and then modifying the innovation to align it with their expectations; (2) modifying the innovation and thereby persuading the students; and (3) persuading the students by improving their awareness and understanding about innovation with necessary training, explanation of the innovation, or demonstration of the benefits of innovation. Five of the participants did not experience student opposition to their innovations but they viewed students' support as vital for the success of their innovations, so they (4) identified preferences of their students during the idea conception or development phase and incorporated them into their innovations.

This dilemma, or variations on it, has been identified and reported in various studies of pedagogical innovation (Berlak & Berlak, 1981; Chee et al., 2015; and Tirri, 2009). All these studies report that, while enacting (new) pedagogy, dilemmas emerge between teachers and students. To Berlak and Berlak (1981) these dilemmas are related to control over time, operations and evaluation standards. Chee et al., (2015) found that, while implementing pedagogical innovation, innovative teachers encounter a dilemma between commitment to their innovation and to the preferences of their students. Similarly, Tirri (2009) also reports that teachers experience conflict between their implemented pedagogies and the preferences of their students regarding learning. Thus,

these studies clearly support the notion that while developing and implementing pedagogical innovation teachers may experience a conflict between actual learning needs and learning preferences or expectations of their students.

According to Chee et al., (2015) the aforementioned conflict, if not managed, may lead to resistance from students. This resistance has been identified in the literature as one of the main barriers to the implementation of pedagogical innovation (Akerlind & Trevitt, 1999; Ramsey et al., 2002; Seidel & Tanner, 2013; Silverthorn, 2006; Smith, Cooper, & Lancaster, 2002; Sundt, 2010; Vuorela & Nummenmaa, 2004). Seidel and Tanner (2013) while elaborating the impact of students' resistance on teachers' behavior toward new teaching practices state:

There is a little doubt that the potential for student resistance in response to attempting a new teaching strategy is a widespread fear of many instructors. Even the rumor that another instructor who tried innovative approaches may have experienced student resistance could be enough to deter instructors from ever trying these teaching methods themselves (p. 587).

Akerlind and Trevitt (1999) suggest that teachers who intend to introduce teaching innovation should be prepared to manage student resistance. In other words, they suggest adoption of proactive approach for managing students' resistance. Keeney-Kennicut et al. (2008) termed this strategy as "reflection-in-action" (p.2). The existing findings indicate that several participants in this study appeared to adopt the reflection in action strategy, by identifying possible points (preferences and expectations of their students) that could trigger students' resistance to their innovations and addressing them while developing their innovations. This allowed them to manage the dilemma before students' resistance could fully emerge. Consequently, they did not report experiencing resistance from their students toward their pedagogical innovations.

Introducing a pedagogical innovation implies an enforcement of changes. These changes may invoke negative feelings among students—those on whom the changes are forced—which can eventually lead to the cancellation or abandonment of the innovation (Cheng, Lin & Wang, 2013). Hence, it is necessary to know the reasons behind the resistance. Participants mentioned a number of sources of resistance, all of which have been discussed in earlier literature on educational innovation. Sources of resistance

mentioned were: increase in the workload of students (Ramsey, Franklin & Ramsey, 2002; Kelly, 2002; Sundt, 2010), non-traditional nature of teaching method (Akerlind & Trevitt, 1999, Ramsey et al., 2002; Seidel & Tanner, 2013; Chee et al., 2015; Yuksel, 2006) and lack of awareness of students about the benefits of the innovation (Chee et al., 2015; Dembo & Seli, 2004; Felder, 2007; Keeney-Kennicutt, Adalet, & Nancy, 2008; Sundt, 2010).

According to Hewton (1987, as cited in Akerlind & Trevitt, 1999) there are three broad ways to introduce educational reform or innovation. These are the use of authority to impose innovation, the use of logic to persuade students on innovation, and changing the attitude of students toward innovation. The majority of the strategies proposed in educational literature can be categorised according to this framework. Strategies include continuous implementation of an innovation despite students' resistance to it (Keeney-Kennicut et al., 2008), persuading students through explaining the purpose and value of the intended innovation (Cheng, Lin & Wang, 2013; Felder, 2007; Seidel & Tanner, 2013; Sundt, 2010) and improving awareness of students through giving them necessary training (Akerlind & Trevitt, 1999). Some studies also suggest a rather different approach to cope with student resistance, which is to modify the innovation according to expectations of students (Keeney-Kennicut et al., 2008; Sundt, 2010). Only one of the strategies suggested in the literature was not used by any of the participants in this research. That was the continuing imposition of an innovation in the face of resistance from students. This may relate to the finding that innovators were often motivated to introduce change on the basis of empathy they felt for students and a desire to enhance the learning experience. See the discussion later in this chapter (Section 6.13). Overcoming resistance with force would be at odds with innovators feelings of empathy.

The strategies used by the participants of this study enabled them to successfully overcome students' resistance by addressing actual sources of the resistance. Participants, who assumed that the reason for resistance to innovations was lack of awareness of benefits of innovation or the complex nature of the innovation, persuaded their students through deliberate use of explanations. One of the participants raised the competence level of students for his innovation by giving them training; he presumed that his students were opposing the innovation due to their lack of the necessary competence to make it work. Lastly, two of the participants modified their innovations

to make it acceptable to their students. One of these obtained feedback from his students and identified and addressed weaknesses in the innovation. The other modified his innovation without consulting his students. It is, however, important to note that none of the participants mentioned that their modifications, in anyway, led to reducing the effectiveness of their innovation in terms of addressing the actual learning needs of their students. Thus, all the strategies used by the participants were based on the assumption that achieving improved learning outcomes was the primary value, and would not be compromised.

It seems that educational innovators are primarily driven by their desire to see better learning outcomes. However, implementation of their innovation leads them to confront the realities of student life. Successful reconciliation by innovative educators appears not to involve compromise, but rather, a variety of strategies that deal with resistance by addressing the underlying, legitimate concerns of students.

## **6.8 Professional Reputation versus Students' Learning Needs**

The second dilemma about students' learning needs indicates that a tension can also exist between educational innovators' twin desires to address the learning needs of their students and to maintain and improve their professional reputation. Teacher-innovators are, essentially, teachers who need to maintain and enhance their professional reputation, which normally depends, to some extent, upon student evaluation of their teaching. Pedagogical innovations are often carried out while keeping in mind learning needs, and not the expectations of the concerned students. Sometimes, therefore, innovations fail to meet students' expectations, which can lead to the teacher getting lower teaching evaluation scores. This situation was reported by only one of the research participants. On the one hand, the participant wanted to improve student learning by introducing his pedagogical innovation; but, on the other hand, he was getting lower ratings in the performance evaluation from his students. The students were in opposition to the innovation because it had increased their study workload. To mitigate the dilemma, the participant persuaded influential stakeholders (e.g. the upper management) within the university while simultaneously obtaining feedback from the students, and modified the innovation accordingly.

This dilemma is a variation on the dilemma arising from dealing with the tension between learning needs and learning expectations of students. The literature reviewed, within the context of dilemmas faced by teachers during educational change, highlighted similar dilemmas. Cheng (2010) found that during an educational reform implementation in Hong Kong secondary schools, some of the teachers experienced a dilemma between their well-being and the reform ideal. The actual dilemma experienced by the teachers was that, on the one hand, they wanted to implement the reform in its true letter and spirit to improve students' learning. However, the implementation was strongly resisted by the students because it was increasing their workload. The students eventually refused to cooperate with the teachers. On the other hand, the teachers needed their students to cooperate, learn and perform well in their exams because in Hong Kong, a teacher's performance is evaluated on the basis of his or her students' examination results. The main difference between this dilemma and the dilemmas identified in the existing research is that in the former, teacher performance was linked to students' examination performance whereas in the latter, it was connected to SET (student evaluation of teaching). Similarly, McCuddy and Pirie (2007) explored the views of academics to identify the factors that inhibit teachers' innovating. They found that SET discourages teachers from initiating innovation. Dobozy (2012) also identified a very similar dilemma dealing with the conflict between learning needs versus student satisfaction (see Section 3.4.1.5).

To understand why the participant faced this dilemma, it is necessary to understand the role, uses and consequences of SET. It is used in universities and colleges to evaluate performance of faculty members (Earnest, 2007; Huemer, 2005; Pounder, 2007). It is widely used in educational institutes because it is an inexpensive and easy to administer method and it also gives managers a feeling of objectivity (Cahn, 1986). With regard to the validity of SET in measuring teaching effectiveness, there is a disagreement amongst researchers. Some consider it an effective measure to assess teachers' performance (Cahn, 1986), while others claim that SET effectively and validly measures only students' satisfaction with teaching quality (Huemer, 2005; McCuddy & Pirie, 2007). The latter claim seems more plausible because studies conducted on student perception of effective teaching reveal that it is influenced by many irrelevant factors such as the gender of the teacher (Anderson & Miller, 1997), the size of class (Hanna, Hoyt & Aubrecht, 1983), an easy exam process (Simpson & Siguaw, 2000),

grade leniency (Marsh, 1984; Lersch & Greek, 2001; Mason, Edwards & Roach, 2002) and course content (Cashin, 1990). Moreover, the literature suggests that students generally lack the knowledge or expertise to evaluate a teacher's level of knowledge, the effectiveness of course content and the comprehensiveness of a course (Cashin, 1983; Lowman, 1984; Seldin, 1993). Huemer (2005) and McCuddy and Pirie, (2007) link the widespread use of SET in universities to a prevailing social belief that considers the university as a business and students as its customers. This belief compels universities, like other businesses, to focus on the expectations of their students rather than learning needs, which are often in conflict with these expectations (McCuddy & Pirie, 2007).

Literature reveals that the results obtained from SET are used by managers at higher education institutes for making decisions about transfer, promotion and contract renewal of faculty members (Marsh, 1984). When SET is used this way teachers feel compelled to limit their instructional strategies according to the expectations of their students (McCuddy & Pirie, 2007; Ryan, James & Allen, 1980; Sacks, 1986). Seidel & Tanner (2013, p. 586), in the context of pedagogical innovation, have expressed the concern in this way: "when teachers try something different in the classroom and student resist, the teacher may back down. Often, this is due to fear of what will happen to their student evaluations and contract renewal". This implies that student resistance to a pedagogical innovation can lead to a dilemma for innovative teachers in choosing between a high SET score and innovation implementation (McCuddy & Pirie, 2007). The findings (see Section 5.3.3) indicate that this was experienced by one of the participants after receiving a low score for his teaching from his students.

Three of the strategies discussed in relation to the dilemma between students learning needs and students expectations also apply here. A teacher could abandon the innovation in order to respond to student expectations (Seidel & Tanner, 2013). While this will allow the innovator to satisfy students and achieve high SET scores, the teacher will not be able to use the innovation to provide the intended educational experience to students. Alternatively, a teacher might choose to ignore resistance while pursuing the innovation (Keeney-Kennicut et al., 2008). This strategy may enable the innovator to keep providing the intended educational experience to his students, but it may lead to serious professional consequences due to getting low SET scores.

A third approach is reflection-on-action, which involves implementing the innovation, while responding to feedback from students. This will enable the innovator to meet both responsibilities. The findings (see Section 5.3.3) reveal that the participant who experienced the dilemma between his professional reputation and students learning needs reconciled it through adopting this strategy. The participant also managed the expectations of managers by alerting them to the dilemma and attempting to persuade them of the value of the innovation.

## **6.9 Job Responsibilities versus Innovation Development**

Nine participants reported experiencing high workload. Four of these nine reported encountering a dilemma between working on their innovation and meeting their teaching responsibilities (see Section 5.2.6). On the one hand, the participants and their teams wanted to dedicate their job time toward developing, testing, applying, or refining their innovations while, on the other hand, they had to comply with their job responsibilities based on their formal employment contract. Introducing innovation always involves an increased workload. To manage their high workload, which they were experiencing due to simultaneously meeting both the aforementioned obligations, the following key strategies were adopted by the participants: (1) investing more time and effort than their job contracts required; (2) involving some of their competent students, in order to share the workload; (3) persuading their university about the need for their innovation and the benefits of it for students which led to increased support from the university resulting in a formal reduction in their teaching-related responsibilities; and (4) persuading their university of the value of their innovation and obtaining (financial and administrative) support to employ more team members. The findings also indicate that for one of the participants, the failure to manage this dilemma was among the major causes that eventually led him and his team to abandon their innovation.

A very similar dilemma has previously been identified in the reviewed literature (Le Cornu & Peters, 2004). When adopting new teaching practices, teachers often experience workload intensification, which hampers their ability to adequately respond to their work responsibilities (Cheng, 2010; Radloff, 2008; Sudgen, 2010). A number of studies of tertiary teachers have convincingly shown that high workload has a negative

impact on teachers' behavior toward engaging in innovative activities (Cheng, 2010; Fink, 2003; Radolf, 2008; Sarayon, 2014). High workload is, therefore, highlighted in the educational research literature as one of the main barriers to the development and implementation of pedagogical innovation (Brownell & Tanner, 2012; Cheng, 2010; Radolff, 2008; Sabagh & Saroyan, 2014; Sunal et al., 2001). This understanding of high workload within the context of teaching innovation is in line with the findings of this study in the sense that the findings reveal that the inability of an innovative teacher to manage a high workload, may lead to abandonment of the innovation.

The workload of innovative teachers does not come purely from developing or adopting new practices but also from their job responsibilities (Cheng, 2010; Zuljan & Vogrinc, 2010). Fink (2003) found that the activities that occupy the time of professors in universities are: teaching, classroom administration and research. To put it simply, in universities, teachers are expected to work for specified number of hours to meet their job responsibilities, which generally include developing lessons, delivering instruction, assessing students, managing and administrating classrooms, along with conducting research and publishing papers in academic journals and conferences. Christensen et al., (2008), estimate that at least 80% of university teachers' time is spent on meeting their job responsibilities. Other studies such as Brownwell and Tanner (2012) and Sabagh and Sarayon (2014) also reported that teaching and research related activities occupy most of a professor's job time. These studies indicate that, teachers in universities normally have limited time to focus on and engage in activities that are in addition to meeting their standard job responsibilities. Pedagogical innovation, as a process, is considered highly time-, resource-, and labour-intensive (Brownwell & Tanner, 2012; Schneider & Pickett, 2006). Thus, while developing an idea into a pedagogical innovation, a tertiary teacher will almost inevitably experience conflict between meeting his teaching responsibilities and realising his innovation.

In the existing study, only four participants reported this dilemma. One of the reasons for these participants reporting this dilemma may be that they felt the pressure of workload relatively more strongly. The two ways suggested in the literature to reduce teacher workload, yet improve students' progress through pedagogical innovation, is to employ more teachers (Christensen et al., 2008) and reduce the teaching responsibilities of faculty members (Frost & Teodorescue, 2001; Sabagh & Saroyan, 2014). Both of

these suggestions are in congruence with the findings of the current study. The study reveals two more ways through which innovative teachers manage their workload dilemmas. These are: utilizing students for sharing the workload during the development and implementation of an innovation, and investing more time and effort than normal or expected. Thus, in total, four resolution strategies are identified in this study for the dilemma the participants experienced due to their conflicting agendas.

All four strategies assisted in resolving the dilemma. Utilizing students and employing more teachers appear to be based on ‘through-through’ thinking. For instance, involving students provided new learning opportunities for advanced students through involvement in the innovation. Employing more teachers was the result of job responsibilities being expanded through recognition of innovation as a part of normal work. Working longer, on the other hand, followed a ‘both-and’ approach, while dividing time between activities was a clear compromise based on ‘either-or’ thinking. Where the ‘either-or’ approach may compromise the quality of the innovation, the ‘both-and’ strategy endangers the well-being of the innovator

## **6.10 Managing Risk of Innovation Failure versus Realisation of Large Scale Radical Innovation**

One of the research participants reported encountering a dilemma while realising a large-scale radical innovation (see Section 5.2.5). This dilemma springs from the tension between two conflicting goals: the goal of realising a large-scale radical innovation and the goal of averting the risk of failure associated with such an innovation. In other words, on the one hand, innovators want to turn big and complex ideas into large-scale radical innovations, but on the other hand, they are only ready to bear the risk associated with developing small-scale, incremental innovations. The reconciliation strategy used by the participant involved dividing the initial big and complex idea into numerous ‘doable’ parts, concurrently developing and testing these parts separately, and finally merging them to realise the idea as a whole.

All innovators face decisions about the scale of their projects, and understand that increasing the scale increases the risk of failure (Baine, 1993). However, only one participant reported this dilemma. It could be that other participants faced the same dilemma but responded to it early in the process by scaling their innovations back to an

acceptable level of risk. The participant who faced the dilemma had made a conscious decision to embark on a large-scale risky project and had to deliberately work to reconcile the dilemma.

The educational literature reviewed for this research mentions a similar, but not identical dilemma (Ben-Peretz & Kremer-Hayom; 1990; Pareja-Roblin & Margalef, 2013). These studies suggest that teachers sometimes come across a dilemma in which they need to choose between old-but-secure and new-but-risky approaches to teaching. The present research found that innovative teachers while developing their disruptive ideas into radical innovations may find themselves in a dilemma between realisation of their risky idea and having a reduced risk of failure for the innovation.

Literature about radical innovations highlights the tension between realising a radical innovation and minimizing the risk associated with it (Christensen & Bower, 1996; Culp, 2013; Jerrard, Barnes & Reid, 2008; Desouza, 2011; Hernandez, Noruzi & Sariolghalam, 2010; Taplin, 2005). While not focused on education, this research assists in understanding and explaining the dilemma.

To understand the dilemma, it is necessary to understand the relationship between innovation and risk. Schumpeter (1942) termed innovation process as “creative destruction” (p.84) because innovation, as a phenomenon, is an anti-systemic activity (Radej, Šribar & Kovač, 2012) undertaken to improve an existing system through either evolutionary (incremental) or revolutionary (radical) changes (Trauffer, Herstatt & Tschirky, 2005). Thus, all innovative projects carry some risk (Boulding et al., 1997; Vargas-Hernandez, Noruzi & Sariolghalam, 2010; Jerrard, Barnes & Reid, 2008). According to Piller, Ihl & Vossen (2011) the more an innovation is perceived as being in conflict with the prevailing system the more risk of failure it carries.

Innovation literature suggests that while risk cannot be completely avoided, it can be managed (Christensen & Bower, 1996; Keizer, Johannes & Halman, 2007). There are various models available in the literature to assist innovators with assessing and mitigating the risk associated with innovation (Chapman & Ward, 1997; Edward & Brown, 2005; Keizer, Halman & Song, 1991; Smith & Merritt, 2002). These models vary in terms of their methodologies, but agree on the four major steps involved: identifying risks, ranking risks in terms of priorities, planning and implementing solutions and learning from the outcomes of the solutions, in order to identify and

minimise risk in a project (Vargas-Hernandez, Nourozi & Sariolghalam, 2010). Culp (2013) warns that risk-minimizing models adopt a funneling process enacted to minimise uncertainties in a project. Consequently, in most cases, the rigorous application of such models leads to reinforcement of existing mental models of the enactor, and the only ideas that pass through the funnel tend to be those that are weak and incremental. Thus, too much focus on risk management in the beginning of an innovative project can stifle or restrict it, especially if the project is dealing with radical innovation (Culp, 2013; Jerrard, Barnes & Reid, 2008; Taplin, 2005). In line with this warning, the participant who experienced the dilemma did not use any risk management strategy in the early stages of his project. This approach enabled him to conceive and develop the idea for a radical innovation. He reported holding off risk minimizing strategies until the implementation phase of the project.

Radical innovations involve high level of uncertainties and so are largely unpredictable and risky (Cardinal, 2001; O’Conner & Ayers; 2005; Marklund, Vonortas & Wessner, 2009). At the same time, they are generally preferred over incremental innovations because they have greater impact and scope (Chandy & Tellis, 1998; Desouza, 2011; Keizer & Halman, 2007; McDermott & Connor, 2002; Thieme, Song & Calantone, 2000). This situation is generally viewed as a dilemma for organisations choosing between radical and incremental innovation (Christenson 1997, Culp 2013; Desouza, 2011; Vargas-Hernandez, Nourozi & Sariolghalam, 2010; Tapline, 2005; Tushman & O’Reilly, 1996). This view corresponds with the findings (see Section 5.3.5) of the existing study in a sense that the participant faced the same tension, between low impact but less risky innovation and high impact but high risk innovation.

Tushman and O’Reilly (1996) suggest that instead of choosing incremental innovation over the radical innovation or vice versa, organisations can successfully manage the dilemma of choosing between “evolutionary and revolutionary change”, through engaging in both types of change simultaneously (p.8). The findings (see Section 5.3.5) of this study, however, reveal that the dilemma was resolved by the participant, not by pursuing both strategies simultaneously, but sequentially. In the first step, the participant divided his idea for radical innovation into many ‘doable’ components. These parts were developed and tested separately, which minimised the risk of failure. Then, the parts were combined into a single radical innovation and implemented. Thus, the innovator developed his radical innovation through following an incremental

strategy. The resolution suggested by Tushman and O'Reilly (1996) for the dilemma aims at a compromise between radical and incremental innovation whereas the resolution followed by the participant tends to unify both the values in the dilemma.

A similar dilemma involving risk was reported by one of the participants. In his case, the tension experienced was between precise and safe development and rapid implementation of the innovation. In this case, on the one hand, participants wanted to avoid the risk of failure, a concern which required him to test and validate his innovations prior to formal implementation. On the other hand, he also desired that his innovations be launched quickly in order for him to achieve the full potential benefits associated with the innovations. The participant resolved the dilemma by applying the innovation on a small scale to keep the potential for failure low, with the subsequent implementation of the validated innovation at the full scale.

Overall, the findings suggest that during their innovations, educational innovators may come across dilemmas related to minimizing risk and realizing the innovation. Instead of pursuing just one of the two objectives, successful educational innovators can attend to both and reconcile the dilemma.

### **6.11 Revealing Innovation to Obtain Required Support versus Hiding Innovation to Avoid Opposition**

Four participants reported facing a dilemma arising from their feeling that they had to choose between revealing the innovation in order to solicit support or recognition from universities or colleagues, and hiding the innovation in order to avoid opposition (Finding 5.2.7). The other participants, some of whom did face opposition from their colleagues and universities after they revealed their innovations, did not report considering the hiding of their innovations to be a viable tactic to deal with opposition from colleagues or university. In other words, while all the participants may have faced this dilemma, only four reconciled it. Most resolved it by revealing the innovation even though that meant they faced opposition.

The strategies used by participants were: (1) revealing the innovation in a prudent manner—the right part to the right colleague—to keep opposition at a manageable level, while obtaining the required support from colleagues and university; and (2) hiding the innovation from the university and colleagues, with exceptions made for a few like-

mindful colleagues, in order to avoid opposition until the innovation was fully developed, tested and implemented. The second strategy was employed by three of the research participants. One participant revealed her innovation when the university's attitude and environment toward pedagogical innovations, became favourable. The disclosure of the innovation enabled the innovator to gain the university's support to sustain her innovation. One participant reported that when she revealed her innovation colleagues opposed the work, but she successfully managed the opposition by: getting students to share their positive learning experiences; publishing about the innovation in a credible academic journal; holding negotiations with the colleagues and in return making modifications to the innovation; and assisting colleagues to implement the innovation in their respective domains. The innovator's influential position at the university enabled her to simply ignore some of the most reluctant opponents. For the other participant, the revelation of the innovation led to her getting a recognition award from the university. The innovation enabled the university to receive endorsement for a course from an accreditation body. The participant reports that following accreditation of the course she did not face any opposition from her colleagues or university toward the innovation.

The factors which were assumed by the participants to be responsible for the opposition from colleagues are: a student-centred rather than teacher-centred approach of the innovation in question; a lack of expertise of colleagues in developing or implementing an innovation themselves; a generally inflexible attitude of teachers toward new teaching practices; unawareness of colleagues about the benefits of innovation; colleagues feeling threatened that they might have to change their teaching practices due to the innovation; and colleagues' concern that innovation will lead to an increase in workload.

Although, the dilemma has not been mentioned in the related literature, relevant aspects of it have been identified and discussed in many studies. The findings of these studies can help in understanding and explaining the dilemma faced by the participants and the course of action taken by them to respond to it.

Teachers' resistance to change is viewed in the literature as one of the major factors in the failure of innovations (Fullan & Hargreaves, 1996; Zimmerman, 2006). According to Nisbet & Collins (1978) educational innovations are not introduced in a vacuum; rather they are either superimposed or merged with existing practices, structures and

ways of doing things. Whether merged or imposed, innovation generally leads to the modification or complete replacement of existing approaches, values or competencies. Thus, educational innovation causes disruption in the status quo, which may lead to positive, negative or both the types of consequences for the people concerned (Fullan, 1982). Among teachers, however, just the idea of a shift in the status quo generally leads to negative feelings such as fear of the unknown and anxiety (Bitner & Bitner, 2002; Fullan, 2001; Greenberg & Baron, 2000; Heyworth, 2003). It is because they assume that new practices might have a negative impact on their job performance, relationship with other teachers, and other job related factors (Burgess, 2011; MacDonald, 1974; Zimmerman, 2006). The negative feelings of teachers toward innovation give rise to widespread resistant behaviour. Zimmerman (2006) calls this behaviour “denial” and warns of its disastrous consequences with these words:

This negative reaction can take the form of denying the message, the messenger, the pertinence of the message, and/or denying whether one has the capacity to deal with the message. (p. 241)

Some authors divide those teachers who resist innovation into two distinct categories: resisters and saboteurs (Schlechty, 2001; Creighton, 2003). The main difference between these two types is that the latter tends to jeopardise change efforts. To sabotage an educational innovation, the saboteurs accumulate followers through successfully sowing the seed of distrust among teachers about the innovation (Creighton, 2003; Schlechty, 2001). This understanding of teachers’ opposition being detrimental to development and implementation of innovation is in congruence with the perception of the participants who reported to have experienced the dilemma under discussion.

According to Smart, Sim and Finger (2014) the traditional approach to dealing with potential teacher opposition was to keep the teaching practice private. This would enable teachers, especially novice teachers, to hide vulnerabilities in their practice. In the existing case, three of the participants followed the same traditional strategy; however, they did not consider that their innovations were weak or ineffective. Instead, they assumed that they were surrounded by teachers and administrators, some of whom, if informed about the innovations, would have acted as guardians of orthodoxy and conservatism and might have sabotaged the innovation. Smart, Sim and Finger (2014) suggest that teachers should make their practice open, as it enables them to improve their practice. This is what all the four participants did, once they had fully developed

and implemented their innovations. Two of the participants did face opposition and improved their innovation. The remaining two did not face any opposition and their innovations were accepted and supported by their universities. The strategy of hiding the innovation to avoid opposition from stakeholders until the innovation is fully realised appears to be one of the effective reconciliations of the dilemma between revealing innovation to obtain required support or recognition for the effort, and hiding innovation to avoid opposition from colleagues and organisation.

The factors which were assumed by the research participants to be responsible for giving rise to opposition or resistance from their colleagues, are the same or similar to the factors that are mentioned in theoretical and empirical studies. These factors are: (1) a student centred approach of innovation (Huberman, 1973); (2) lack of expertise of colleagues to develop and implement innovation (Creighton, 2003; Fullan, 2001; Greenberg & Baron, 2000; Margolis & McGettigan, 1988; Witt et al., 1984a); (3) inflexible or reluctant attitude of colleagues toward pedagogical innovations (Huberman, 1973; Haregreaves, 1993; Gitlin & Margolis, 1995; Newhouse 1998); (4) unawareness of colleagues about the benefits of innovation (Creighton, 2003; Fullan, 1972; Newhouse 1998); (5) increase in colleagues' workload (Pimmel & Weed, 1974; Tye & Tye, 1993; Johnson & Pugach, 1990; Witt et al., 1984a; Witt et al., 1984b; Le Fevre, 2014); and (6) a feeling of threat among colleagues that they might have to change their teaching practices due to innovation (Creighton, 2003; Nisbet, 1974; Nisbet & Collins, 1978; Schulman, 1969).

According to Ketelaar (2012) it is important to understand and address the causes that are related to teachers' resistance, in order to overcome the resistance. The findings indicate that the various strategies used by participants were devised in the light of presumed causes of the teacher resistance to innovation. Most of these strategies are also the same strategies suggested in theoretical and empirical literature for dealing with teacher resistance to pedagogical innovation, or reform. The strategies used were: (1) negotiation with colleagues (Yilmaz, 2013); (2) sharing or proving benefits of innovation to colleagues (Knight, 2009); (4) modifying the innovation (Knight, 2009; Thanh, 2008); (5) explaining the innovation to colleagues (Knight, 2009; Tye & Tye, 1993); (6) offering incentives to colleagues for implementing the innovation (White, Martin, Stimson & Hodge, 1991), (7) giving necessary training to colleagues (Knight & Cornett, 2009; Knight, 2009); (8) revealing relevant aspects of innovation to colleagues

and (9) publication about innovation. Revealing only relevant aspects of innovation to colleagues and using publication to convince opponents, are not mentioned in the literature reviewed. Publishing is a strategy likely to be unique to tertiary educators. Thus, the findings of the existing study not only support some of the findings of previous studies about managing resistance to pedagogical innovation, but also reveal additional strategies used by innovative teachers to manage teachers' resistance toward innovation.

## **6.12 Innovator's Interests versus University's or Funding Agency's Interests**

Participants reported that a dilemma arises from the conflict between the interests of an educational innovator and the interests of the organisation that provides the financial or administrative support for the realisation of the innovation (Finding 5.2.8). Typically, teacher innovators have some specific goals in mind with regard to their innovations. However, to realise their innovation, they generally need financial and administrative support from the university or an external agency, which is pursuing its own specific requirements, goals and interests. Predictably, there exists some degree of divergence between the goals and interests of innovators and the organisations from which they intend to receive support for their innovation.

Out of those participants who encountered this dilemma, four failed to reconcile the dilemma. This eventually led to the cancellation or non-continuation of their innovations. The remaining participants who successfully settled the dilemma, used following key strategies: (1) pursuing only those ideas associated with needs that were recognised and understood by their universities; (2) developing proposals and obtaining funding for their innovations from external funding agencies whose goals were a better match with the innovators'; (3) persuading their universities by proving the benefits of their innovation, and (4) modifying their innovations according to the needs and requirements of their universities or external agencies.

This dilemma did not arise in some circumstances. It was not faced by participants who led university-driven innovations; who held influential positions within their universities (or had team members who did); and whose university had an innovation-supportive attitude and environment. Additionally, two of the four participants who hid

their innovations also did not experience this dilemma. The incremental nature of the innovation, adherence to university requirements, a non-threatening image and the experimental mode of innovation were also identified by the participants as factors that allowed them to obtain support from their universities without compromising their interests.

Many versions of this dilemma have been identified in the educational literature. For instance, Chee et al., (2015) report that, while implementing pedagogical innovation, their participants encountered a dilemma between selecting appropriate learning standards and meeting the formal protocols set by influential stakeholders within their schools. Likewise, Olson (1981) found that during implementation of an educational reform, teachers faced tension between using project-recommended methods, and methods they deemed appropriate. Other studies which report similar dilemmas include Ben-Peretz and Kremer-Hayon (1990), Cheng (2010), Qoyyimah (2015), Le Cornu and Peters (2004), Shapira-Lischinsky (2011), Tirri (1999), Tirri and Husu (2002), Windschitl (2002) and Yin (2015). The findings of these studies have been discussed in Chapter 3. It appears that teachers often come across situations where they have to decide between needs of their students and the established ethos or protocols of their educational organisations.

There are various resolution strategies identified in the literature that used by teachers to respond to the aforementioned dilemma. Most studies report that teachers, especially novice teachers, resolve the dilemma in favour of one option over the other (Qoyyimah, 2015, Shapira-Lischinsky, 2011; Tirri, 1999; Tirri & Husu, 2002). Although it is the most easy and commonly mentioned strategy, it generally leads to the diminishing of the effectiveness of the innovation or reform (Olson, 1981, Qoyyimah, 2015). In the context of educational reform, Chen (2010) found that teachers resolved the dilemma between curricular requirements and students' learning needs by simultaneously pursuing both of them. These teachers however, treated the two parts of the dilemma independently of each other. Consequently, they had to expend a great deal of effort and time to resolve this dilemma (Chen, 2010). Qoyyimah (2015), who also analysed an educational reform in her doctoral study, reports that one of the two groups of her research participants reconciled the same dilemma through improving the reform by simply inserting "their personal priority" into it (p.203). According to Qoyyimah (2015), the process of recontextualisation of an educational reform policy, offers a

discursive gap to concerned teachers, which, if utilised properly, enables them to reconcile the tension between structural conditions (for example, curriculum guidelines) and relational aspects (for instance, students learning needs) in their teaching practice. Contrary to these studies, Chee et al. (2015) report that their research participants successfully resolved the dilemma they were facing by pushing very hard at their schools for what these teachers desired to be the learning standards. Thus, the dilemma of choosing between innovator's interests and university's interests can be resolved in different ways.

The existing study, as described earlier, identified four solutions for the dilemma under discussion. A majority of the participants obtained support for developing the innovation by proving to influential stakeholders within their universities that their innovations were viable and cost-effective. This strategy is in line with what Windschitl (2002) reported in her study. She found that innovative teachers often find themselves responsible for persuading stakeholders to accept new practices for learning as useful and necessary. This strategy allows teacher-innovators to obtain support for realising their ideas without compromising the effectiveness of their innovation (Voltz, 2003). The next largest group of participants, who faced the dilemma, indicated that they modified their innovation according to the requirement of their universities, which enabled them to get support for their innovation. Christenson et al, (2008) view the strategy of adapting innovation to the demands of the organisation to be an effective one for obtaining support, but they assume that it may affect the effectiveness of the innovation. They put their concern as follows:

To win the support of all the powerful entities within the organisation whose endorsement is critical to getting the innovation funded, the innovative idea morphs into a concept that fits the business model of the organisation, rather than the market for which the innovator originally envisioned it (Christenson et al, 2008, p. 75).

Interestingly none of the participants of this study who adapted their innovations to the demands of their universities indicated that they had to compromise the integrity of their innovations. Like the previous strategy, this strategy also assisted the participants to resolve the dilemma.

The third largest group of the participants resolved the dilemma by obtained funding for their innovation from organisations whose interests were already in consonance with the interests of the participants. Two of the participants indicated that support from external agencies assisted them to obtain administrative support from their universities, who saw it as validation of the quality of the innovation. Lastly, one of the participants resolved the dilemma by pursuing only those of his interests that were in line with the interests of his university. Thus, all the strategies employed by the participants facilitated them in reconciling the apparently conflicting goals of innovating and meeting the needs of the host institution.

### **6.13 The two-edged sword of emotions**

The thematic analysis of the interview transcripts resulted in identifying four sub-themes: (a) empathy with students, (b) determination and perseverance, (3) love and hate responses from students, and (d) passion and enthusiasm help sell innovation. These contributed to an overarching theme, the two-edged sword of emotions, that is, the recognition that emotions play a key role in innovation, which can both help and hinder the successful resolution of dilemmas. In the following section, the ‘two-edged sword of emotions’ is discussed in relation to the research question. The discussion draws on educational research on teacher emotion-regulation and general psychological literature on emotion-regulation and emotional burnout. Finally, the section considers a dilemma based strategy for encouraging emotion-regulation by innovative teachers.

The findings indicate that participants experienced various emotions before and during their creative endeavours (see Section 5.3). The emotions they experienced not only impelled participants to initiate their innovations, but also assisted them in implementing and diffusing their innovations despite many challenges. Further, participants, in most cases, successfully generated positive emotions in their students toward their initiatives. In this way, emotional impact acted as a basis for validation of their innovations. Further, many participants effectively played down their emotions when they perceived the need to manage the negative emotional reactions of colleagues toward their innovations.

Beside positive impacts, the findings also reveal that, in a few cases, the implementation of innovations generated negative emotional responses in students towards both the

initiatives and the teachers involved. Similarly, despite their determination and persistent efforts, some participants could not save their projects from termination, which led those participants to abandon their innovations, a situation which was associated with strong negative emotions. In summary, the findings suggest that participants experienced emotions as an important element in their innovation efforts. They allowed emotions such as empathy to guide their efforts. They took some care to manage the emotions they experienced during their teaching and innovation. Further, they tended to regulate or manage their own and others' emotions to protect their innovations from potential adverse effects of negative reactions.

Emotion-regulation is an emerging topic in a variety of fields. In educational literature, research on emotion-regulation has generally been in the contexts of teachers' day-to-day work and education reforms. With regard to teacher-initiated innovations, it appears to be an under-researched topic. In educational literature, teaching is viewed as an emotional activity (Hargreaves, 1998) with several studies concluding that teachers frequently experience positive and negative emotions during the teaching process (Frenzel, Goetz, Stephens & Jacob, 2009; Hamre & Pianta, 2005; Meanwell & Kleiner, 2014; Sutton & Wheatley, 2003; Trigwell, 2012; Zembylas 2003; Zembylas, 2005). Similarly, teachers experience a range of emotions during reform efforts (Cross & Hong, 2009; Schmidt & Datnow, 2005; Lee & Yin, 2011; van Veen & Slegers, 2006). Emotions influence teachers' decision-making, particularly in relation to educational goals (Brief & Weiss, 2002; Hargreaves, 1998; Isen & Labroo, 2003; Mennin, 2006; Oatley & Johnson-Laired, 1987; Pitkäniemi, 2017; Sutton & Wheatley, 2003). How teachers respond to their emotions can have important consequences both for the teachers themselves, and for other stakeholders involved in the situation (Meanwell & Kleiner, 2014; Pitkäniemi, 2017).

Because of the role emotions play in both day-to-day teaching and educational reform, some research has focused on interventions that enable teachers to manage their emotions effectively. This involves use of emotion-regulation strategies (Gong, Chai, Duan, Zhong, & Jiao, 2013; Jiang, Vauras, Volet, & Wang, 2016; Sutton, 2004; Tsouloupas, Carson, Matthews, Grawitch & Barber, 2010). Typically, effective strategies are those that assist teachers to accentuate their positive emotions and prevent or down-regulate their negative emotions (Fried, 2011; Hagenauer & Volet, 2014; Lee

et al., 2016; Sutton et al. 2009). Sutton (2004) concluded that emotion-regulation helps teachers to manage their emotions to meet the emotional demands of their work.

While the research discussed in the preceding paragraphs does not relate directly to educational innovation, strategies identified in these studies may provide a strong basis for supporting teachers involved in innovative efforts.

Many studies have found that intense emotional labour (Larrivee, 2012; Keller, Chang, Becker, Goetz & Frenzel, 2014) and frequent experience of negative emotions, lead teachers to feel emotionally burned-out (Antoniou, Ploumpi & Ntalla, 2013; Carson, 2006; Gruenert & Whitaker, 2015; Jacobson, 2016). Emotional exhaustion, depersonalisation and diminished personal accomplishment are viewed as three main dimensions of emotional burnout (Parker, Martin, Colmar, & Liem, 2012). Teachers' emotional burnout has been linked to increased absenteeism (Gabriel, 2013), high attrition (Jacobson, 2016) and decreased motivation for engaging students (Mendler & Mendler, 2011; Muller et al., 2011).

The studies discussed in the previous paragraph examined the experience of teachers working in primary and secondary education, and it may be that teaching at tertiary level does not involve the same emotional intensity. Nevertheless, the thematic analysis in the current study suggests that the process of innovation involves sustained emotional engagement over a long period of time and the potential for strong negative feelings, particularly when innovators experience significant setbacks. None of the participants in the current study reported experiencing extreme emotional burnout. The decision to select for the study innovators who had reached the point of publishing accounts of their innovations, made it less likely that participants would have experienced extreme burnout.

The combination of literature that warns of the potential for emotional burnout in the teaching profession and the findings that suggest educational innovation is an emotionally intense process provides a warning that caution is needed and it would be wise for institutions encouraging innovation to provide support for emotion-regulation amongst innovators.

A valuable perspective on strategies that enable emotion-regulation comes from the general psychological literature. Gross (1998a, 2002) divides emotion-regulation

strategies into two broad categories, preventive and responsive. Preventive strategies involve influencing one's emotions by selecting or modifying the situation or the perception of the situation (Gross, 1998b). Responsive strategies regulate emotions once they have arisen, by modifying one's physiological, experiential or behavioural response to them (Gross, 1998b; Gross & Thompson, 2007).

Emotion-regulation strategies can be either preventative or responsive, and there was evidence of both types in the experience of participants involved in this research. Several participants reported that they: (1) recognised the potential for negative reactions of others; (2) realised the impact such reactions would have on their own emotions; (3) predicted the danger this could pose for their efforts and for the innovation project as a whole; and (4) adjusted their actions accordingly. Some, for instance, chose not to communicate with particular groups. Others altered the manner in which they communicated. This preventative approach appears to have potential as a teachable procedure to use when planning innovation.

Because not all reactions are predictable or preventable, innovators also need to learn responsive strategies. Some participants in this study reported deliberately calling on their personal determination and enthusiasm for the desired outcome, as a response to the negative reactions of others. Further research is needed to determine whether these preventative and responsive strategies are teachable and applicable for other innovators, and to identify other strategies that can work in the context of educational innovation. Generally, the findings of the current study with regard to teacher emotion-regulation appear to be in line with other studies (Gong, Chai, Duan, Zhong & Jiao, 2013; Hagenauer & Volet, 2014; Jiang, Vauras, Volet & Wong, 2016; Lee et al., 2016; Sutton, 2004; Sutton & Harper, 2009).

Dilemma Theory, which has been the focus of this research, provides a further perspective on how to enable innovative educators to regulate their emotions. As discussed earlier (see Section 3.3), one of the advantages of Dilemma Theory is that it is teachable and practice oriented. Efforts made to educate teachers regarding the dilemmas they are likely to encounter in the innovation process can include dilemmas pertinent to the regulation of emotion.

The overarching theme of the 'two-edged sword of emotions' harmonises with a dilemma discussed by Parsons (1991) and Henderson (2001): whether to be emotionally charged or emotionally neutral. This dilemma indicates a situation in which one has to decide whether one should emotionally engage with the situation or whether one should remain emotionally neutral and objective (Ramsey, 2001). According to Parsons (1991), on the one hand one cannot remain completely emotionally detached from the world, while on the other hand no system can be organised or developed without the renunciation of some emotions. Teaching without concomitant emotional involvement may lead a teacher to not recognise, acknowledge or respond to the learning and other needs of his or her students and consequently, he or she may not initiate and put required effort into activities that can address the needs of the students. On the other hand, conceiving, developing and implementing innovation may involve emotional engagement over a long period of time, which may lead an innovative teacher to feel emotionally drained. One effective way to deal with this dilemma is to balance emotional engagement with an appropriate degree of detachment (Henderson, 2001). Given that the current study suggests that innovative teachers start from a position of emotional engagement, it seems that balance is best achieved by learning skills associated with detachment and emotion regulation.

## **6.14 Conclusion**

This chapter has discussed 13 dilemmas and the strategies participants used to resolve the dilemmas with respect to their innovations. As the discussion indicates, most of the dilemmas have previously been considered in relevant literature. However, a number of features of the discussion are worthy of consideration, including the range of literature that turned out to be 'relevant', the lack of compromise strategies adopted, and the tendency for innovators to adopt 'through-through' thinking.

The research was undertaken in the context of tertiary education, so it was natural to look first to educational literature to find support for the dilemmas participants were experiencing. However, while six of the dilemmas discussed in this chapter had been considered in the academic literature on education, another six dilemmas were considered in literature from other disciplines. These included literature on creativity and innovation, teamwork, decision-making, leadership, organisation development and

risk management. This suggests that understanding, and therefore managing, the process of educational innovation involves integrating concepts from a range of disciplines and has not been adequately dealt with in educational literature to this point.

It is not surprising that the innovative university educators who participated in our study encountered dilemmas that related to a range of disciplinary fields. They were pursuing improved learning outcomes for students, while working in educational institutions with multiple stakeholders. Further, they undertook projects that required them to exercise leadership of diverse teams. Thus, innovation required them to be much more than creative teachers.

For some of the dilemmas discussed, literature suggested that teachers would need to compromise the quality of their teaching in order to meet the requirements of other stakeholders. Yet, with several of the dilemmas, participants in the study reported resolving the dilemmas with no such compromise. Perhaps the literature is written from an idealistic or ideological position by authors who feel that, for instance, creative innovators should not have to deal with the tension that arises from working for an organisation that imposes limitations or restrictions on their efforts. Whatever the reason, participants did not report being hampered to the extent the literature seemed to suggest they might be; they reported that they found strategies to deal with tensions without compromising outcomes, and these strategies mostly resulted in improvements to their innovations.

One reason for this might be that this study involved participants who had brought innovations to a successful conclusion. Innovators who were unable to deal with tensions may have had to abandon their projects. Still, the discussion indicates that innovators do not need to assume they will have to compromise. The experience of many innovators is that they can find strategies that will work.

Finally, many of the strategies discussed appear to be examples of innovators using “through-through” thinking to achieve resolutions. As discussed in Chapter 5 dilemmas are often thought of as “either-or” choices, or at best “both-and”. The discussion of the dilemmas presented in this chapter supports the contention that “through-through” resolutions are superior in terms of effectively dealing with tensions in the process of innovation.

It is important to mention that, like other studies, this research has limitations. The next chapter discusses these limitations along with implications for further research. Primarily, though, the chapter considers how this study answered the research question proposed at the start, and the implications the study's conclusions have for those interested in educational innovation.

## **Chapter 7. Conclusions and Implications**

The study sought to identify dilemmas faced by innovative university teachers during their educational innovations and the resolution strategies the teachers employed. The key findings of the study were discussed in the previous chapter (Chapter 6). The aim of this chapter is to conclude this research report. As it is the final chapter of the thesis the reader is provided with a summary of the study, outlining the purpose of the research, the methods used and the findings. This is followed by the implications of the study. The chapter then highlights some of the limitations of the study and areas for further research.

### **7.1 Summary of the Thesis**

Education institutions, especially those in higher education, are under increasing pressure from stakeholders to prepare students for rapidly evolving labour markets and societies. One way to enable educational institutes to provide quality education to students is to increase the rate of successful teaching innovations in these institutes (Eaude, 2011; Russell, 2009). Teachers, being at the centre of education systems, can play vital role in the development and implementation of an educational innovations (Batchelor, 2011; Black and Atkin, 1996; Christensen, 2008; Clair, 2008; Frymier, 1987; Henard & Leprince-Ringuet, 2008; Van Driel et al. 2001).

A question that arises is that if innovation can improve education, then why is every teacher not a pedagogical innovator? Perhaps it is because those teachers who are involved in developing or implementing innovation face serious challenges (Bailey, 1992; Fang et al., 2010; Nisbet & Collins, 1978) and dilemmas (Briant & Doherty 2012; Chee et al., 2015; Enyedy et al., 2006; Olson, 1981). Wooliams and Trompenaars, (2013) suggest that all creative endeavours are fraught with dilemmas and the effective resolution of these dilemmas enables the interventions to progress toward their intended goals. In the context of teacher innovators, this means that the resolutions of the dilemmas they encounter while realizing their innovations, enable them to attain their objectives and goals with regard to their innovations.

This research is based on the assumption that how innovators identify and resolve the dilemmas they encounter during their creative journey is crucial for advancing pedagogical innovations (Tillema & Kremer-Hayon, 2002). There are some studies that have investigated the dilemmas encountered by teachers during innovation or reform (Briant & Doherty 2012; Chee et al., 2015; Enyedy et al., 2006; Olson, 1981). Although these studies provide important and useful information, they do not show how resolutions of dilemma assist innovative teachers to achieve their objectives with regard to conceiving, developing, launching, or sustaining their innovations. Further, most are based on research in primary and secondary, rather than university education and the studies mentioned do not provide any information about dilemmas experienced by innovative teachers working in teams on innovative projects. Lastly, none of these studies has used a validated framework to represent dilemmas and their resolutions. Keeping these gaps in the literature in mind, the following research question was developed.

**What are the dilemmas experienced by innovative university educators during the process of innovation, and how do they respond to these dilemmas?**

Identifying and representing the dilemmas experienced and the resolutions employed by teachers in attempting to realise innovative doctrines, required the researcher to attend to two important methodological challenges: (1) Allowing participants to reveal their assumptions and experiences in their own language; and (2) capturing these in such a way that dilemmas and their resolutions could be clearly identified and differentiated from other events or actions. In line with these considerations, semi-structured interviews and cognitive mapping were used as methods of collecting and analysing data. The semi-structured interview design not only allows research participants to have sufficient freedom to discuss issues of importance, but also permits the interviewer to follow up on comments participants may make. Cognitive mapping was selected because it allows researchers to construct a “picture” of a participant’s assumptions and experiences concerning a particular issue (Eden, 1988). To overcome some of the limitations of cognitive mapping, thematic analysis was used to determine relevant themes that might otherwise have been missed.

In total, 30 innovative educators were interviewed. The interviews were transcribed and coded. Cognitive maps were developed from the coded data, one for each participant,

with the help of *Decision Explorer* a specialised software program. The transcripts and cognitive maps were sent to participants for their review and validation. The validated maps were combined into an aggregate map. The aggregate map revealed 12 dilemmas and the strategies used for resolving them. Finally, the interview transcripts were re-analysed to identify themes relevant to the research question. This analysis resulted in four sub-themes and an over-arching theme. The overarching theme also represented an important dilemma. The dilemmas along with strategies for resolving them and the areas of the innovation process to which they contributed, are shown in Figure 7.1.

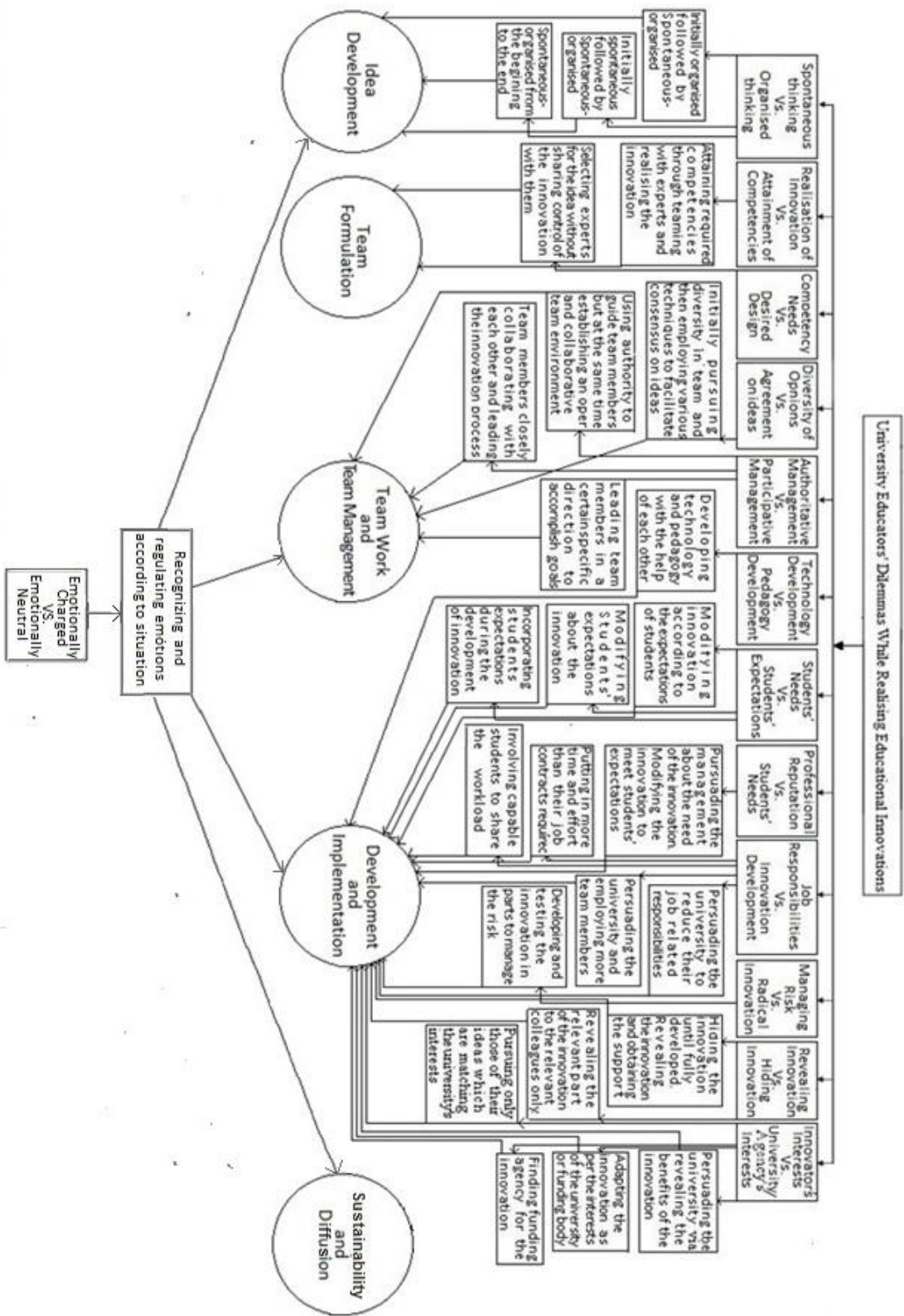


Figure 7.1 The dilemmas, their resolution and key areas of innovation process

## 7.2 Answering the Research Question

In keeping with Dilemma Theory, as discussed in Chapter 4, this research project was exploratory. The aim was to identify the range of dilemmas that teacher innovators might encounter. In a semi-structured interview, not all participants will comment on every dilemma they encounter. They may only discuss those that were most pertinent to their particular experience. By interviewing a sufficiently large selection of teacher innovators, however, the study is able to identify a range of dilemmas that are possible. These can be used in later descriptive research incorporating quantitative methods to examine the extent to which various groups experience the various challenges discussed here.

Even though the study did not aim to be descriptive, it was notable that one dilemma was consciously or subconsciously experienced by all participants. All participants also reported resolving one or more dilemmas using the same “through-through” thinking pattern articulated by Trompenaars (2007). The remaining 12 dilemmas identified were possibly faced by all or the majority of participants, but they were not reported by the majority of the participants during the interviews. On the basis of their nature, the dilemmas identified in this study can be divided into three types: creative, administrative and emotional dilemmas. The creative dilemmas were related to the inventive aspects of participants’ innovation processes. These included: organised versus spontaneous pondering, realisation of innovation versus attainment of competencies, competency needs versus desired design, diversity of opinions versus agreement on ideas, authoritative versus participative style of team management; technology versus pedagogy development, students’ learning needs versus students’ expectations, and managing risk of innovation failure versus realisation of large scale radical innovation. All but one of the participants, who encountered these dilemmas, responded with strategies based on through-through thinking.

The administrative dilemmas related to the organisational aspects of participants’ universities. These were: professional reputation versus students’ learning needs; job responsibilities versus innovation development; revealing innovation to obtain required support versus hiding innovation to avoid opposition; and innovator’s interests versus university’s or funding agency’s interests.

With the creative dilemmas, participants were usually in a position of power or equality with those who represented interests different to their own making it relatively easier for them to reconcile the conflicting demands posed by the dilemmas. However, for most participants, when they encountered the administrative dilemmas, a power imbalance existed in favour of their university administration. Consequently, participants had to put relatively more effort into resolving the administrative dilemmas. Out of all participants who faced the administrative dilemmas, two used resolutions based on either-or and both-and thinking patterns. All the remaining participants used resolutions based on through-through thinking to reconcile their dilemmas.

The emotional dilemma was related to participants' emotion-regulation. The dilemma faced was: acting in a way that was emotionally charged versus emotionally neutral. Unlike the other 12, this was not explicitly mentioned as a dilemma or challenge by participants, perhaps because participants experienced this dilemma while resolving challenges which were more directly obvious and easily reported. Because the dilemma emerged after the interviews, participants were not directly asked about their strategies for resolving the dilemma and regulating their emotions. Many described actions, however, that appear to be based on a through-through approach. Two participants who were unable to resolve administrative dilemmas were left with strong negative emotions, which still affected how they thought about the university. These participants eventually abandoned their innovations. The findings suggest that administrative actions of their universities evoked the negative emotions in these participants.

The innovative university teachers in this study were able to successfully respond to the challenges they encountered, at least in part because they view the seemingly opposite objectives in a dilemma in creative ways and attempt to reconcile these opposites. While we cannot generalise on the basis of an exploratory study, this suggests that teaching through-through thinking may be a valuable way to support prospective educational innovators.

### **7.3 Contributions to theory**

The findings of this study make a number of contributions to the literature on dilemmas in the realm of teaching and educational innovation. The study sheds light on dilemmas that teachers are generally reluctant to discuss (Shapira-Lishchinsky,

2010). While prior studies have identified dilemmas experienced by teachers during their teaching practice and educational change, this study went beyond that and identified the strategies that are used by successful innovative teachers to overcome the dilemmas they face during their innovation. The findings also reveal the “two-edged” role of emotion in relation to conceiving, implementing and promoting educational innovation. The findings suggest that during their educational innovations, successful innovative teachers experience dilemmas. A further contribution is that the dilemmas identified in this research provide the basis for developing dilemma-based instruments that can be used in descriptive research, along the lines of those used by Hampden-Turner and Trompenaars. The implications of the findings for methodology, practitioners and the university are discussed in sections 7.3.1, 7.3.2 and 7.3.1 respectively.

### **7.3.1      *Implications for Methodology***

The study has important methodological implications. Cognitive mapping has not previously been used in any study to identify and make sense of dilemmas faced by teachers. As a researcher, I reflected on my experience of the mapping process personally and in conversation with supervisors and colleagues. The process, based on my experience in this research, appears to be an effective exploratory technique for understanding how participants understand their world and respond to it. A number of valuable benefits were evident. The aggregate cognitive map generated a visual representation of common as well individual dilemmas reported by participants. It showed the way that dilemmas progressively emerged throughout the innovative process. Potentially, the aggregate cognitive map could indicate how resolution strategies adopted early in the process might lead to the emergence of dilemmas later, though this analysis was not attempted as part of this study.

The application of cognitive mapping is not limited to education or innovation. Rather, it could be applied to any complex context that gives rise to dilemmas and problems that need to be effectively resolved. As a research tool, it can be used to organise and reduce data into manageable concepts and connections. Moreover, it enables researchers to represent and analyse individual as well as group experiences to identify unique and common dilemmas, issues or problems, their causes and consequences and how they are addressed and eliminated. The development of an aggregate cognitive map requires

hours of concentrated work that requires the researcher to become extremely familiar with the data

As with any other research technique, cognitive mapping also has some weaknesses concerning qualitative data analysis (Munlo, 1997, Vasconcellos, 2014). As discussed in Chapter 4 (see section 4.9.1), cognitive mapping tends to capture a ‘personal construct system’ of a subject in terms of cause–effect relationships between different concepts relevant to the issue under investigation (Eden & Ackerman, 1998). Moreover, cognitive mapping is more concerned with ‘what’ leads to ‘what’, rather than “why” something leads to something else. Perhaps it is because cognitive mapping is based on Kelly’s (1995) PCT which assumes that human reasoning is driven by action, not the other way around (Munlo, 1997). To overcome these deficiencies of cognitive mapping, thematic analysis (Braun & Clarke, 2006), which is a common qualitative research technique, can also be employed to identify themes relevant to the research question. The thematic analysis used here resulted in identifying four sub-themes and one overarching theme that would not otherwise have been noted. Thus, semi-structured in-depth interviews, cognitive mapping and thematic analysis can be used together in one study for obtaining a more comprehensive understanding of the phenomenon at hand. This was a first effort at using cognitive mapping in the context of Dilemma Theory, so more studies are needed to extend understanding of how it is best used.

### **7.3.2      *Implications for practitioners***

Understanding dilemmas assists people in making wise and informed decisions, creating awareness of the different or conflicting demands in a situation (Castano, Hartmann & Dewulf, 2017). According to Oshry (2007) in order to navigate through dilemmas, it is essential to have an awareness of available alternatives. Without this understanding, people may opt for a strategy based on historical forces that may no longer be relevant to the situation. Awareness enables practitioners to pursue both objectives in a dilemma with vigour, rather than, by default, favouring one objective over the other.

The findings of this study not only reveal 13 dilemmas relevant to teacher innovators but also some effective and pragmatic strategies that can be used to resolve them. The findings of this study, therefore, have implications for teachers, trainers, instructional designers, training developers, e-learning professionals and all who intend to adopt or

develop and implement innovative educational solutions. Keeping in view the findings and conclusions of the study, the following implications are suggested.

First, teachers should make use of their spontaneous thinking processes to enhance their innovative potential. The literature suggests that teachers mostly rely only on the organised thinking process to develop solutions (Griffith, 2010; Byrnes & Baxter, 2012; Parsons & Freed, 2012), whereas, the existing findings indicate that the use of spontaneity is essential for realising innovative solutions. Adding spontaneous thinking to existing organised thinking may be the springboard teachers can use to enter the field of innovation. While some people do this naturally, for others it may need to be a deliberate process for which training is required.

Second, when they have innovative ideas but find themselves unable to develop and implement the ideas due to shortcomings in their skills and knowledge, instead of learning requisite expertise, the teachers can consider seeking collaboration with experts who have the required skills and knowledge. This will enable them to realise their innovations relatively more rapidly and easily than learning skills and doing innovations individually. According to Joyce, Murphy, Showers and Murphy (1989) and Rosenholtz (1991), traditional teachers generally avoid collaboration with other teachers because they fear that the experience may lead to the exposure of their professional shortcomings to their peers. The experiences of participants in the study suggest that innovative educators can overcome shortcomings in their skills and knowledge through collaboration with other teachers.

Third, in the context of teacher collaboration for the purpose of developing solutions for educational problems, teachers who intend to lead collaborative projects may need to seek diversity as well as consensus among their teams. To maximise diversity they can partner with experts who have different backgrounds and thinking styles and provide team members with an open environment for discussions (Hawley & Valli, 1999). For consensus building, teachers may need besides establishing and maintaining formal relationships, to encourage discussions, close collaboration and informal relationships among team members.

Fourth, since all innovations carry risks, teacher innovators need to pursue strategies and activities that can assist them in identifying and managing these risks. The findings

suggest that for incremental innovation, pilot testing, which involves a small scale implementation of the innovation, is an effective way to identify potential risks and their causes. When developing radical innovation, teachers may follow a three step process: (1) breaking their overarching creative idea it into small doable parts; (2) developing and testing each of these parts separately; and (3) combining all the completed parts into a whole and pilot testing it, before formally implementing the innovation.

Fifth, teachers may need to try to make their innovations more relevant to the stakeholders, including students, faculty and university executives, by taking into account their needs and expectations. It may preferably, be done during the early stages of the innovation process. This can assist the teachers to avoid or minimise resistance to their innovations, aid them in sustaining and diffusing their innovations and improve their professional reputation. When teachers encounter opposition from any of the stakeholders toward their innovation, they may need to look for the actual root causes of the opposition, and seek to address these without compromising the effectiveness of their innovations.

Sixth, in situations of work overload due to job content and innovation demands, the teacher needs to look for effective ways to manage their workload. Two ways that have been found effective in this regard are: sharing responsibilities with learners and, employing more members for their teams. Strategies like these may allow pedagogical innovators and their team members to reduce their workloads, enabling them to meet their job demands as well as realise their innovations.

Seventh, teacher innovators may recognise their own and other stakeholders' emotions and understand how these emotions can affect their innovations. Teachers can put in place emotion-regulation strategies when they think that these strategies might assist them in achieving their innovation-related goals. Teachers can use both preventive and responsive emotion regulation strategies to regulate their emotions

Lastly, teachers who intend to develop and launch innovative methodologies need to be reflective during decision making, in the context of their innovation processes. Identifying seemingly contradictory demands in a situation and employing strategies to

address these conflicting demands can assist them to realise their innovations successfully.

### **7.3.3 *Implications for University Administration and Policy Makers***

While the findings of the current study are not generalisable, they still highlight a number of key areas for university administration and policy makers to consider.

Collaboration with other teachers can enable teachers to overcome their skill and knowledge inadequacies. According to Fullan (2001), working in small teams enables teachers to formulate innovations that are relevant and meaningful to them and their students. Some participants suggested that “bouncing ideas off colleagues” assisted them to generate innovative ideas. One way for administrators to increase collaboration among their teachers can be to encourage and support the getting together of their teachers, made possible through mechanisms such as friendly spaces, group meetings and teacher communities.

Not all university educators are innovative; several participants felt that most university educators are not innovative and indicated that their innovative drive separated them from their colleagues. Universities could make provision for those who have a track record of innovation by reducing their workload in some areas relative to that expected of others. According to Hargreaves (1994) increased workload can cause teachers to abandon their innovations even if they know that a project can lead to improvements in student learning. Activities such as thinking, planning, developing, testing and implementing innovations, need time and effort on the part of the teacher. Thus, assisting innovative educators with workload problems may enhance the pace of innovation at the universities. Particularly when operating in complex and changing environments, the pace of change is an important consideration. By increasing the pace of innovation, universities may be able to try more initiatives and identify those that provide the greatest value.

Many universities around the world use SET scores to assess teachers' teaching performance. The experiences related by participants support the view in the literature that this can inhibit teachers from initiating innovations (McCuddy & Pirie, 2007). University administrators who truly expect and desire educational innovations in their universities need to design and enact SET that is consistent with and promotes

educational innovation. Some universities are experimenting with alternative evaluation models that are supportive of innovation, such as IDEA and SETERS (Bassi, Clerici, & Aquario, 2017).

Most educational innovations need financial or material support (Castillo, March, Stockslager, & Hines, 2016). Many research participants identified obtaining this support as an important challenge that they faced while developing their innovations. The set of societal dilemmas shows conflicts related to establishing equality, fairness and social relations. They also indicate that the challenge stimulated them to find creative strategies. Two ways in which universities can help innovative teachers to resolve this challenge are: (1) allocating funds and resources to teacher-led educational innovations; and (2) assisting innovative teachers in identifying funding opportunities and helping them in writing and submitting grant proposals. Interestingly, it may be important to make it somewhat difficult to get the funding, so that innovators still experience a degree of challenge.

University administrators need to consider how application of policy will affect those involved in innovation. Given that innovation is critical to the future of universities, innovative teachers need to be rewarded for their efforts. Four of the participants reported that they were not able to sustain their innovations because their projects were terminated by administrators, and that the termination took place without consultation or consideration of benefits being generated by the innovation. It was evident from their comments that the action of their universities had a negative impact on the innovators, who may be reluctant to engage in future projects.

The findings also have implications for teacher training and development programs. First, promoting empathy with students' issues and difficulties could be valuable, since this emotion appears to motivate participants to experiment with innovative teaching practices. Second, teacher training programs should include sessions highlighting the role of emotions in learning, teaching and innovation and promoting effective emotion-regulation strategies. These may help teachers to channel their emotions and protect themselves from emotional exhaustion. Third, training provided to teachers should target teachers' perceptions and attitudes about the negative reactions from others, so that they view these reactions in a new way, perhaps as natural responses that can help teachers to identify weaknesses in their enacted teaching practices. Finally, training

teachers to understand and manage the dilemmas involved in the innovation process could help them to interpret challenges more meaningfully and deal with them constructively.

#### **7.4 Limitations and implications for future research**

There are several limitations of the current study. In this section, the limitations of the study are considered, along with suggestions of how these limitations can be mitigated with further research. In some cases, the limitations are the natural consequence of the type of study undertaken, and suggestions for further research are given that stem from the natural progression of advancing knowledge in a field of research.

Like all other qualitative research studies, the main limitation is that the findings of this study cannot be extended to the whole population. Generalisability requires descriptive research where data is collected from the entire population or at least from a representative segment of the population. In the case at hand, there are four main reasons for the findings of the study being non-generalisable. First, the main objective of the study was not to confirm dilemmas that had been previously identified, but to explore the experiences of successful teacher-innovators and identify the dilemmas encountered by them during their teaching innovations. Second, due to limitations in terms of time, resources and capabilities, it was not possible to identify the entire population or recruit a representative sample. Third, the data was collected from human subjects who were not identical, but different from each other in terms of their organisational context, culture, knowledge, experiences, understandings, priorities, choices and so on. Lastly, the interview questions for this study were developed by the researcher and his supervisor. The instrument was carefully designed but it was not an evidence-based instrument. The questions were exploratory, designed to generate rich data that could be analysed.

The exploratory research reported on here can be the basis for future descriptive studies. For this to occur the thirteen dilemmas identified in this study can be treated as thirteen propositions about innovative educators and a survey instrument should be developed. Trompenaars and Hampden-Turner have established a method for using dilemmas in descriptive research tools (the THT method). In this method, each dilemma is presented to participants along with five suggestions for resolution. The data generated when

participants indicate which suggestion they prefer, allows researchers to uncover patterns of reconciliation within the population under investigation.

One application of such an instrument would be with primary teachers, secondary teachers, tertiary teachers, trainers and instructional designers. Doing so, would enable researchers to test whether there were differences between the various educational contexts, in terms of the dilemmas experienced and the resolution strategies adopted. The findings generated from such studies could give a valuable guide to teachers who intend to develop and implement innovative teaching practices in different contexts. The findings may be able to guide universities seeking to assist teachers with the management of their teaching innovations.

Since the existing study employed a semi-structured interview to collect data from the participants, one of the main limitations associated with interview design is also applicable to this study. While data obtained through interviews is considered valid, it may convey a distorted picture of reality because interviews may or may not capture all needed information about a phenomenon under investigation. One way to counter this limitation could be to complement interviews with observations (Corbin & Strauss, 2015). In the present study, this approach was not taken because the achievement of the study objectives required the data to be collected from only those university teachers who had already successfully developed and launched their pedagogical innovations. An alternative approach would be to conduct a case study of a number of teaching innovations that commence at the same time, some of which will succeed and some fail. To collect data for such a study, both interviews and observation could be employed.

Another limitation of the current study is that the data was collected only from the university educators who, along with their teams, developed and implemented innovative teaching solutions. Although most of the present findings are largely consistent with the findings reported in other studies, they may reveal some biases of the innovators that arise due to their role as the main developers and implementers of their innovations. Administrators might hold very different views to those reported in this study. It is unlikely that other stakeholders would have such vivid memories of innovation projects as the innovators themselves, and the passing of time makes it unrealistic to gather further data about the projects and events discussed by participants

in this research. It would be more practical to include the perspectives of other stakeholders in new research such as that suggested in the previous paragraph.

The present study mainly used cognitive mapping to analyse and represent the data. Although this has been identified as one of the strengths of this study, it can also be viewed as a weakness. This occurs as the representations of experiences and assumptions in the form of cognitive maps are not exact depictions of reality, but approximations of thinking processes as seen through the researcher's lens (Rouse & Morris, 1986). To overcome this limitation in the existing research, an outside researcher who was not connected to the research was utilised and data interpretations (maps) were triangulated with the participants' feedback. It is important to note that while these measures can greatly reduce the researcher's bias they cannot eliminate the effect of a researcher's background on the interpretation of the data. Another important limitation associated with cognitive mapping is that there is always a question about when there is sufficient data to be representative of the phenomenon under consideration. To put it simply, a cognitive map is always deficient in the sense that more concepts can be added to it to make the map more detailed and comprehensive. On the other hand, to keep the map coherent and understandable, boundaries for the map must be chosen. In other words, researchers using cognitive mapping face a dilemma in terms of the level of detail that is included. For the existing research, the boundaries were set by the researcher in light of the objectives of the study. An argument can be made that boundaries were arbitrary and need to be adjusted to produce either more or less detail.

One of the main limitations of the cognitive mapping for the existing study was that in order to identify common dilemmas and resolutions, generalised concepts were used. For instance, the development of a preliminary idea and the development of a full-fledged plan were represented by the same general concept, 'Idea Conception'. The focus on dilemmas led to the actual stories of the innovations, each of which was thought-provoking, receding into the background. Thus, findings will have missed some important information that sheds light on the experiences of the innovators involved in the study. This limitation should be addressed by complementing the study with a narrative analysis of the interview transcripts, and perhaps some case study work that digs deeper into the details of particular experiences.

It is important to note that for the existing study the data was collected from those educators who had developed and implemented their innovations and had published about them in academic journals. By focusing on successful innovative educators, the study automatically excluded all those who could not develop, implement, sustain or publish about their teaching innovations. Consequently, the findings do not reveal the dilemmas that were ‘fatal’ for innovative teaching projects. To unearth such dilemmas along with their causes and consequences, a future study should investigate those innovative university educators who failed to realise their innovations; possibly considering innovations that ended at different stages of the innovation process.

Lastly, there is a need for research to consider the perspectives of administrators. How do they respond to the suggestions made earlier? What do they currently do to encourage innovation in their universities? And, how do their actions harmonise with the findings of this study? The outcomes of such study will assist us in getting a better understanding of innovation in an organisational context.

## **7.5 A Final Word**

Teachers are the catalyst for change in education (Ferreira & Janks, 2011). It is, however, important to consider that a teacher does not work in isolation, but rather acts as a component of a complex, integrated system. Accordingly, the decisions and actions of teachers with regard to adopting or developing innovations have consequences not only for the teachers themselves, but also for the other stakeholders within the organisational system. The competing demands arise out of the diverse interests of the stakeholders, often creating dilemmas for teachers who intend to develop and launch innovations designed primarily to address the educational needs of their students. These dilemmas are neither good nor bad in themselves. If resolved properly, they may assist in achieving inspiring outcomes. If they are not effectively resolved, dilemmas may give rise to forces that sabotage the best efforts of the innovators.

In the context of pedagogical innovation, dilemmas can be viewed as either inhibiting or enhancing of teachers’ abilities to realise their innovations. To transform dilemmas that they may encounter during their innovations into reconcilable challenges or opportunities, teachers need to have a keen understanding of them (Trumbull, 1987; Oshry, 2007). The present research has attempted to assist those who are or want to

engage in pedagogical innovations by revealing not only the relevant dilemmas and their causes but practical and pragmatic ways to resolve those dilemmas.

In the course of this research the researcher was able to spend time talking to 30 innovative educators who were prepared to take risks, work hard and make sacrifices in order to generate better learning for their students. While many commentators discuss dilemmas as negative, the educators who participated in this study consistently took a positive view of most of the challenges they faced. Their comments showed that they realistically accepted challenges as a natural part of the process of innovation and would do their best to resolve them in ways that enhanced their work.

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# Appendices

## Appendix A Research Ethics Approval



3 September 2012

Sajid Khan  


Dear Sajid

**Re: Identifying the Characteristics of Mental Models of Flexible Instructors Who Design Innovative Approaches to Their Instructional Programmes**

Thank you for your Low Risk Notification which was received on 24 August 2012.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

**A reminder to include the following statement on all public documents:**

*"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research."*

*If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail [humanethics@massey.ac.nz](mailto:humanethics@massey.ac.nz)."*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely



John G O'Neill (Professor)  
**Chair, Human Ethics Chairs' Committee and  
Director (Research Ethics)**

cc Dr Phil Ramsey  
School of Management  
PN214

Prof Sarah Leberman, Acting HoS  
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Massey University Human Ethics Committee  
Accredited by the Health Research Council

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## **Appendix B          Invitation to Participants**

Dear -----

As part of my doctoral research I read your article “-----  
-----”. I was very interested in your work because it relates closely to the research I am doing. I am exploring the challenges faced by people introducing innovations in education, and I hope to interview people – like yourself – with experience in this area, and whose work has been published in peer reviewed Journals. I’m sure you appreciate that there are a limited number of people who fit this criteria.

With that in mind, I would like you to consider this request for an interview, which can be conducted via Skype or phone at your convenience. Allow me to give you some background on me and my research. I am enrolled in a PhD at Massey University in New Zealand. My supervisors are Dr Phil Ramsey and Dr Sarah Laberman. The research is based on Dilemma Theory and the idea that innovators encounter a series of dilemmas that need to be reconciled before they can successfully complete their work. Through interview I hope to establish whether there are common dilemmas experienced by innovators in education, and the strategies that are used to resolve them. By doing this, I hope to develop a clearer understanding of the mental models of those involved in change and suggest how the process of innovation can be effectively managed.

If you are willing to take part, please respond to this message. I am happy to send you more information, and to arrange for an interview at a time that suits you.

Yours faithfully

Sajid Khan

## Follow-up E-mail

Dear \_\_\_\_\_

Thank you very much for accepting the request. The details of the project along with the consent form are enclosed for your consideration, please. For the interview, I will need 60-90 minutes of your time. As far interview questions are concerned, they tend to extract information regarding the memorable challenges you faced during given phases of your project.

- 1). Idea conception
- 2). Team development and management
- 3). Development and implementation of innovation
- 4). Innovation sustainability

For the interview any date between \_\_\_\_\_ that better corresponds to your schedule is fine for me. Thank you once again for considering my request

Best regards

Sajid Khan

## Appendix C Information sheet and Consent Form



### **Identifying the characteristics of mental models of flexible instructors who design innovative approaches to their instructional programs**

You have been asked to participate in a research study which intends to identify the characteristics of the mental models of innovative instructors that enable them to achieve in-depth understanding of their context and respond to it through innovative approaches to their instruction. The insights obtained from the study will not only contribute toward filling the gap in the literature, but will help educationists, policy makers and researchers to understand that how some instructors are able to apprehend a context more unerringly and then devise innovative instructional practices. Your participation in the research may also assist you to develop greater personal awareness of some of your mental models. The risks to you are perceived to be none, or minimal.

This research study is being conducted by Sajid Khan, a doctoral student in the School of Business, Massey University, Palmerston North Campus, New Zealand. Sajid Khan is supervised by Dr P.L.Ramsey and Prof Sarah Leberman of the School of Business at Massey University.

Participants for this research are selected through purposive sampling. Each participant is required to take part in an interview. The interview is expected to consume approximately 60-90 minutes of the participant. It is worth noting that the information provided by the participants will be kept strictly confidential and anonymous. The audio recordings will be listened to only by the researcher and his supervisors.

Participation in the research study is voluntary, with participants having the right to:

- Choose not to answer any question(s);
- Withdraw from the study at any time, either during or after the interview. In case of withdrawal, the data obtained from the participant will be eliminated from the study and will be subsequently destroyed;
- Contact the researcher for clarification of question (s);
- be given access to summary findings upon conclusion of the study.

If you choose to participate and would like a summary, please provide your email address in the attached form. The copy of the results will be forwarded to you when it becomes available.

The findings from this research project will be used in the researcher's doctoral project. It is also possible that they may be published in an appropriate academic journal and/or as conference papers in the future. However, no individuals involved in this study will be identified in any publications resulting from this study.

If at any time you would like to know more about the research or have any questions concerning the research, please feel free to contact the research supervisor, Dr. Philip L. Ramsey via email at [P.L.Ramsey@massey.ac.nz](mailto:P.L.Ramsey@massey.ac.nz)

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researchers named above are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher, please contact Professor John O'Neill, Director Research Ethics telephone 06 350 5249, email [humanethicspn@massey.ac.nz](mailto:humanethicspn@massey.ac.nz)

**Informed Consent Form**

Identifying the characteristics of mental models of flexible instructors who design innovative approaches to their instructional programs

Please answer all questions. Encircle Yes or No for each question

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	Yes	No
2. I understand that my participation is voluntary and that I can withdraw at any time, without giving reason.	Yes	No
3. I agree to take part in the above research study	Yes	No
4. I agree to the interview being audio recorded	Yes	No
5. I understand that I will not be identified by name in the final product. However, my views can be used by the researcher as anonymised quotes in his publications	Yes	No
6. I would like to receive a summary of the results	Yes	No

Name of Participant \_\_\_\_\_

Email address \_\_\_\_\_

Date \_\_\_\_\_

Signature \_\_\_\_\_

*Name of Researcher* \_\_\_\_\_

*Date* \_\_\_\_\_

*Signature* \_\_\_\_\_

## Appendix D1 – Idea Conception Process

	Participant	Explanation
1	Participant 1	The participant surveyed student opinions about learning experiences. The outcome of the feedback didn't turn out as was hoped by her. None of the students found the course to be a satisfactory experience. The participant realised that she needed to move away from the lecture model towards the experimental model of learning so that students understand and learn things by doing them. The participant followed a process which was based on organised as well as spontaneous thinking in which she read relevant literature, formulated solutions and tried them in her classroom. The outcomes of the experiments were carefully monitored, and the feedback was obtained from students and colleagues. The feedback was assisted her to identify weaknesses in the solutions. Some of the solutions were discarded, and others were honed and re-tested and adopted.
2.	Participant 2	The participant wanted to improve the efficiency and effectiveness of an already running capacity building programme at his university. He critically analysed the programme and its surrounding environment and found that the programme needed a major overhaul in its structure and contents. He exchanged his views with colleagues and also pondered over the programme, its objectives and needs. The participant's knowledge and experience in innovation, entrepreneurship and strategy development, random and abstract thinking style and deliberation with colleagues enabled him to furnish a broad vision for the new programme.
3.	Participant 3	To really understand problems with the curriculum design, the participant reflected at his own curriculum and the curriculum of a group of teachers he was working with. He found that the curriculum development practice was based on the idea of linearity and causality. To understand the issue better, the participant undertook a research study. It involved reading papers, interaction and deliberation with others and interviews with teachers. The research process was very messy and bumpy, but it helped the participant to add bits here and

	<b>Participant</b>	<b>Explanation</b>
		bits there. The whole way through to the point, of the idea for a curriculum based on the complexity and ecological perspective was developed.
4.	Participant 4	The participant and other staff members at the department were struggling with the absenteeism of their undergraduate students. The participant thought about the situation in a systematic and structured way and realised that he would need to make courses more interesting and engaging to increase the participation of the students in them. He assumed that technology had not been effectively used for supporting the teaching and learning environment. The students were, therefore, finding the courses boring and so the department faced the issue. The participant conducted many meetings with the staff of his department to understand the needs of the students and teachers for creating the best course of action for addressing the issue. The participant's knowledge and experience of different pedagogies and instruction technologies also helped him in identifying and deciding on technologies for the model. The participant's extensive conversation with his staff members and his understanding of technology and pedagogy enabled him to develop the idea for his student-centred model.
5.	Participant 5	In the advisory board meeting the teaching situation at the department was analysed in terms of goals and objectives of the courses and the methods used by the teachers to teach their subjects. The meeting recommended that the existing teaching model should be improved for teaching skills and knowledge to auditing students. The participant, her departmental colleagues and some of the board members held joint brainstorming sessions. Diversity in knowledge, experience and worldviews of board members and the participant's knowledge and understanding of auditing and finance and her past experience as a student in an innovative course greatly assisted the members in understanding problems and formulating way outs. The joint

	<b>Participant</b>	<b>Explanation</b>
		brainstorming sessions ended with setting a clear and broad vision for developing a community based pedagogical model for auditing graduate courses.
6.	Participant 6	The participant's experience in capacity building and corporate collaboration and passion to improve the efficiency of the capacity building program assisted her in critically examining the program in terms of utilisation of teaching and learning resources, interests, needs and demands of different stakeholders and identifying different leverage points in the system. The examination assisted her in identifying the actual issues in the program and their root causes. She did not have skills in instruction design and instructional technology to conceive a viable solution so she teamed with those who had the relevant skills and understanding. Through collaboration and joint brainstorming the team developed the idea for transforming the existing capacity building program into an open resource based program.
7.	Participant 7	The university wanted to improve the quality of teaching and research so the participant was given a job contract as "Researcher and Innovator". He analysed the teaching methodology used against the learning goals set for one of the courses. This informed him about the gaps in the methodology and content of the course. The participant's unique and broad view about education and knowledge of educational psychology and academic and non-academic (life related) experiences facilitated him to comprehend the issues and develop solutions to increase students' conscious learning. The process to develop idea was largely organised.
8.	Participant 8	The participant reviewed literature about the needs of adult learners and found that there was a long standing need that had not been addressed previously in the literature. The participant passionately wanted to develop an appropriate solution for the identified need. He

	<b>Participant</b>	<b>Explanation</b>
		involved an experienced and knowledgeable colleague who had interest in similar issues. The exchange of ideas between the participant and his colleague and their diverse understandings allowed them to conceive solutions incrementally as well as directly. The solutions were carefully put together and a rough idea for using multiple modalities for teaching was developed.
9.	Participant 9	The participant's many years of experience as a teacher taught her that the traditional lecture model was incompatible for teaching an 'Entrepreneurship, Innovation and Creativity' course for students and was also void of any expression of identity for her. She needed an effective teaching strategy for teaching the course. To develop the strategy, the participant followed a creative process which involved unhinging her brain to allow all types of good and bad ideas to emerge, and then subjecting these ideas to critical inspection; one by one. The process facilitated the participant with distilling useful from other ideas and developing the idea.
10.	Participant 10	The participant's past positive educational experience at one of the finest universities in the world changed his worldview about education and practice from being two separate things to being two sides of the same coin that are closely connected to each other. The participant's classroom observations of business students not being able to apply their learning in the real business environment and his distinct worldview gave rise to the feeling that there should be an educational model that should combine organisational theory with organisational practice. He wanted to come up with a top of the line model. The participant developed the idea through not only using his own knowledge and personal experience but also by holding lots of discussions with his colleagues. An iterative process was adopted in which solutions were formulated, experimented, improved and re-experimented. Finally, a plan was furnished for implementing the model for teaching courses to business and management students.

	<b>Participant</b>	<b>Explanation</b>
11.	Participant 11 Ostwald	The participant was struggling with the problem of lack of students' engagement with learning. He reflected on the situation, considered different approaches, and identified the need for a teaching model based on problem-based learning. The opportunity was approached in an ordered or hierarchical way but occasionally the participant was coming across mental blockages in that process which he resolved in three different ways: consulting colleagues and experts for their opinions, seeking inspirations and looking for intuition. These three sometime worked and sometime they didn't. He was testing ideas, cycling through them and sometime rejecting them until he could get back on to that linear and step-by-step process towards a conclusion. While developing the idea, the participant frequently consulted relevant literature to see how similar problems had been resolved in the past. The testing and the pondering process enabled the participant to develop the conceptual framework.
12.	Participant 12	During their post graduate degree the participant and his colleagues took a course which was taught in a very unconventional way. The course altered their whole conception of teaching and learning. While teaching an undergraduate course, the participant decided to develop a (pedagogical) model that is fit for teaching OD (Organisation Development). The participant invited his colleagues to assist him in developing the model. Both analytic and spontaneous approaches contributed to the development of the model. To work out issues and create an effective model, the team members reviewed a large amount of literature related arts based practices, deeply reflected on their existing teaching practices and held discussions to share views and explore possibilities for addressing the issues.
13.	Participant 13	The Government wanted to improve the quality of teaching and learning so funding was allocated to various universities including the university in which the participant was employed. This made the university environment very conducive for introducing teaching-

	<b>Participant</b>	<b>Explanation</b>
		related innovations. The participant was employed as a Quality Enhancement Manager at the university and she had a prior positive experience of introducing various innovations. She instantaneously realised that there was an opportunity for using the funding for developing an action-research-based pedagogy to enhance teaching. The participant partnered with an experienced and capable colleague to develop the project . The participant and her colleague followed an organised approach to develop their innovation.
14.	Participant 14	Interest in solving issues arising due to cultural diversity, personally observing work and performance of newly arriving international students and discussions with colleagues together made the participant aware of the need for an effective student orientation program at his school. The participant pondered over the need and developed a broad idea for the program. The participant’s theoretical knowledge of HRD and related fields and practical experience with different training and educational methodologies aided him in developing a basic idea for the orientation program.
15.	Participant 15	The absence of sound theoretical explanations behind the success of one of the novel instructional programs at the university crossed the participant’s mind as challenge. She thought different aspects of the program in the light of her knowledge of various learning theories and her professional experiences as a teacher. One night she intuitively felt that Quantum theory could fully explain the situation. So the logical evaluation along with intuitive thoughts led the participant to identifying the reasons of the success of the program and formulating main principles for her e-learning theory.
16.	Participant 16	The participant desired to improve the student learning experience which led him to inquire at his students about problems, challenges and difficulties they were facing. Another reason for the participant asking his students about their learning experience was his past

	<b>Participant</b>	<b>Explanation</b>
		personal observation with regards to students struggling and having bad learning experiences. The students' responses provided the initial spark to the idea. The participant followed the spark by a planned process in which each issue that the students had faced was logically analysed and thereby the initial idea for the innovation was developed.
17.	Participant 17	The shift in the university's instructional environment from traditional face-to-face to online teaching created new needs for the university in terms of skills and competencies requirement for the faculty. The new needs and the participant's interest in solving pedagogical problems together made the participant to recognise an opportunity for a new faculty development program. The participant carefully designed and conducted a study for which the data came from capacity building professionals. The analysis of the data led to the development of a basic plan for the capacity building program.
18.	Participant 18	While doing her PhD as a distance student the participant felt that there could be a more interactive and engaging online teaching model than contemporary e-teaching models. Soon after finishing her PhD, the participant undertook a comprehensive investigation that followed a logical progression from fully understanding the problem to developing a viable model for it. The participant's deep interest in e-learning and reviewing relevant literature enabled her to understand, examine and navigate the issues. The process led to the development of a comprehensive theoretical e-learning model.
19.	Participant 19	The participant and his partner's interest in online education and their discussion between each other and with other staff members led them to identifying a need for an active e-learning and teaching model that can address the sense of isolation and helplessness experienced by e-learners. The participant and his partner carried out an investigation to identify teaching strategies that are engaging and motivating learners. The review of relevant literature assisted the innovators to understand

	<b>Participant</b>	<b>Explanation</b>
		and explore the problem. Many solutions were formulated and tested. The idea was the outcome of the investigation and testing the solutions.
20.	Participant 20	<p>The participant's past observation of a successful flexible teaching system , personal experience with differentiated and contextualised learning, deep interest in the flexible educational models , desire to bring changes in education system and knowledge and understanding that was attained during his job as an instructional designer assisted him in identifying inflexibilities within the existing system . He partnered with an educational technologist and simulation expert to develop a flexible educational model.</p> <p>The participant did not have all the expertise required to develop a model that could satisfy the identified issues so he partnered with an educational technologist and simulation experts. Different views and expertise of the team members assisted the participant in developing solutions. The desired model was developed and tested as a computer simulation.</p>
21.	Participant 21	<p>The participant noticed that at his university instead of students, teachers were making all the decisions about the activities and tools the students were using in their learning process. This triggered off his feel of a need for a learning platform that offers sufficient flexibility to students in terms of choosing learning tools and activities. The participant partnered with other experts to develop the idea. The participant and the other experts adopted an evolutionary approach in which they were developing solutions and mentally testing them. Each solution was giving rise to the other solution finally leading to the conception of the idea.</p>
22.	Participant 22	<p>The Government launched an initiative aimed at improving the quality of pedagogy at educational institutions. As an in-charge of the capacity building centre at the university , who had some knowledge</p>

	<b>Participant</b>	<b>Explanation</b>
		and understanding of pedagogy and technology which he gained during a course in capacity building in instruction and program development , the participant instantly realised an opportunity for a capacity building program for teachers . The participant reviewed different modern pedagogical models and developed a conceptual framework for the program based on needs and culture of the university. The participant’s knowledge and understanding of pedagogy and technology and extensive discussions with his staff members assisted him in the process.
23.	Participant 23	The participant along with her teaching partner taught a course following a traditional lecture-based teaching model. They obtained feedback from their students regarding their teaching style, course contents and tools used to deliver the contents. Although the participant and her teaching partner had put their best efforts in teaching the course, the feedback revealed the students did not like their teaching style and the content delivery approach. This caused the participant to feel frustrated with the traditional teaching model. The feeling of frustration and the participant accidentally stumbling upon a TV program (The Apprentice) which was promoting certain specific ways to harness talent led her to ostensibly identify an opportunity for an innovation. The participant and her partner followed a logical and stepwise approach and developed their apprenticeship based teaching model.
24.	Participant 24	The participant was following a teaching model which involved delivering information for a fixed number of hours to students via direct contact with them. This model was followed because of the environment of the university in which he was employed. The participant had some learning objectives that he wanted to achieve. He intuitively realised that the learning objectives he was pursuing were not really compatible with the constraints he was facing at that moment. This got him thinking that there was a need for innovation.

	<b>Participant</b>	<b>Explanation</b>
		<p>The need was discussed with an expert colleague and a partnership between the participant and his colleague was formed. Other reasons for the partnership were that - like the participant - the co-innovator was also interested in exploring and solving the identified problem, the participant needed somebody with expertise in technology enhanced learning and psychology to develop innovation and the participant's belief that good ideas require collaboration between experts. The partnership enabled the participant to properly apply his pedagogical knowledge and consultancy experience to investigate and look at problems in depth. The partnership also resulted in the team having multiple opinions and views which assisted the team to investigate all the possibilities and constraints which led to the development of a comprehensive plan about how to develop, implement and monitor the innovation. The participant's and his colleague's motivation to develop a robust and stable solution was one of the main reasons that made them to explore and think over the problem and devise the plan.</p>
25.	Participant 25	<p>The participant followed a lecture-based teaching. The main reason for this was the country's society's strict adherence to the traditional teacher-centred teaching approach. Despite her intense efforts, the participant wasn't achieving her desired learning objectives. This led her to recognise that the teaching strategy she was following was ineffective for the objectives she had in her mind. The way forward the participant realised was a distinct student-centred teaching model for teaching engineering and telecommunication courses to students. The participant's creative and strategic thinking played a key role in figuring out what needs to be done to improve students' learning achievement. The participant partnered with a like-minded innovator who was also interested in developing the innovation. The approach employed to develop and test the innovation was largely organised.</p>
26.	Participant 26	<p>The poor academic performance of the students led to high dropout rates at the university. The senior management of the university</p>

	<b>Participant</b>	<b>Explanation</b>
		realised that there was a gap between what the university was expecting from its students in terms of their learning performance and the quality of teaching it was offering to the students. A project was initiated and the participant and other experts were hired to address the identified gap. While developing the innovation, the team followed an organised process; however, there were moments of spontaneity along the way.
27.	Participant 27	The department at which the participant was employed had a certain well-defined and specific need that they wanted to address so a project was initiated. The participant was approached and asked to spearhead the project which she accepted. The participant's own interest in the project and her positive reputation in terms of successfully implementing new ideas in her classroom were the two main reasons due to which she was appointed as a project manager. The participant adopted a conscious and deliberate approach which involved searching and reading what had been done in the area and also using her own knowledge and experience. Finally the idea was put together for the project.
28.	Participant 28	The participant wanted to improve students' learning outcomes so he looked into different teaching and evaluation methods used by universities in his region and identified that there was an opportunity available for him to bring improvement in the existing student evaluation practice at his university. The participant reviewed relevant literature to see how similar opportunities were handled at technologically advanced universities around the world. The review helped him to identify and select an already established, well-tested and proven teaching evaluation model. The main reason to select an established model was that the university had a very positive and welcoming attitude toward introducing popular and validated models. To adapt the innovation to fit the university setting from developing a proper platform to designing a curriculum to preparing labs were

	<b>Participant</b>	<b>Explanation</b>
		considered and a blueprint was prepared for introducing the OSCE model.
29.	Participant 29	The participant wanted to improve the quality of her teaching so she began reviewing literature about different teaching models. She came across a teaching model that she thought could improve the learning process of her students. The university in which the participant was working had a very encouraging attitude and environment toward introducing new teaching practices. The university also had a teacher-led innovation fund for financially supporting innovations. The participant analysed the model against the requirements of her specific situation and formulated a preliminary idea of how to make the model relevant and apply it.
30.	Participant 30	The participant critically investigated the environment at his university and identified “the ineffective use of animations” as the broad problem area for his PhD research. A systematic review of relevant literature was conducted to understand and narrow down the problem area to the point where it could be investigated and an adequate solution could be developed for it. This enabled the participant to develop a research proposal using the staircase approach.

## Appendix D2 – Team formulation

	Participant	Explanation
1.	Participant 2	The participant realised that he did not have skills and competencies needed to develop the idea. Moreover, he had limited time and resources. The participant preferred partnering with experts over spending time, effort and resources on learning all the missing required skills. Another reason for the participant preferring partnership over learning skill was that he wanted to develop broad domain radical innovation instead of small scale incremental innovation. The partnership saved him large amount of time and resources which he dedicated to the development of the innovation.
2.	Participant 9	The participant temporarily recruited experts to develop her innovation because she believed that disagreements among team members and opposition from stakeholders can slow down innovation process. She, on the basis of her past bad experience with resolving conflicts and disagreement among team members, believed that team members bring their own insights and inspirations into project rather than following those established by the innovator. She also believed that innovation is an individual's dream and passion and only the innovator is supposed to lead the development process. So, she deliberately avoided having a formal team structure.

### Appendix D3 – Team management

	Participant	Explanation
1	Participant 1	The participant partnered with an experienced innovative colleague at her institute because she wanted to publish about the innovation. She and her other team member were philosophically aligned in terms of believe in the importance of group work and importance of owning work and students taking responsibilities so they wrote the article together. The other team member did not get involved in the project so there were no conflicts between the members.
2	Participant 2	The team was too big and too diverse so there were lots of conflicts among team members. The participant believed “if the diversity is not managed properly it leads to the disintegration of a diverse team”. To manage the diversity of the team it was divided into numerous sub-teams. The participant, who was the thought-leader, distributed the responsibilities among the sub-teams so there was no conflict in responsibilities. The strategy assisted the participant to keep the team intact.
3	Participant 3	The team members belonged to different philosophical schools of thought such as Symbolic-interactionism, Foucauldian post-modernism and Complexity perspective. Such diversity in perspectives is good for looking at things from different angles and devising solutions. However, the team members did not have a deep understanding of the ecological and complexity perspective. So, the first thing the participant did was explaining to the members the key principles of the theory and how these could be applied to a curriculum to address some of the issues. After this discussion the members were very much on board. Later on, the participant and team members worked closely together while developing and applying solutions and writing papers.

	<b>Participant</b>	<b>Explanation</b>
4	Participant 20	The participant partnered with instructional designers and simulation experts. The members came from two completely dissimilar backgrounds: education and simulation. Those who came from the field of simulation did not know about education and the members from education did not know about simulation. Consequently, they were not getting along really well with each other. The participant persuaded the members via educating them how simulation and education could be used to support each other. The members supported the participant in developing a model.
5	Participant 17	In the beginning of the project, the team members had subtle conflicts among each other. The members had different perspectives and were interested in addressing not different aspects of the same question but different questions altogether. The participant being responsible for the project had to bring all the members together on the same page. In order to do this, he made the members sit down around a table and discuss and clarify their positions and objectives. Similar meetings had been carried out for three to four months in which members discussed issues which brought them closer to one another. They started appreciating each other and ultimately, at the end, everybody agreed on a common approach. Team members also had a mutual respect for each other which is important for overcoming conflicts.
6	Participant 23	The participant and her partner had occasional fights about the contents and what they should be doing. They used to overcome these disagreements through discussion and cooperation with each other.
7	Participant 19	In the initial stages of the project there were lots of conflicts in the team due to the lack of communication between members and language problems. The language problem is a common thing in interdisciplinary teams and the existing team was a highly

	<b>Participant</b>	<b>Explanation</b>
		interdisciplinary one in a sense that it was made up of educational researchers, psychologists and pedagogues. Through dialogues and discussions the members promoted and strengthened the relationship among each other. There were regular face-to-face, short and effective team meetings in which the members were collectively assigning duties and responsibilities. Those who were assigned tasks had to show tangible results of the assigned tasks. All these strategies enabled the team to overcome conflicts between its members.
8	Participant 14	There were some issues between team members in the design phase of the program. The team members overcame those issues through talking and working together and applying their problem solving skills. The members also had a well-established professional and personal relationship with each other and were excited about the innovation.
9	Participant 6	There were lots of personal style conflicts between the participant and his other team members. The participant had expertise in generating ideas and developing plans for new businesses but he did not have technical and operational knowledge whereas the other members were good on the technical and operational sides but were lacking creativity. They were like opposite to each other. Another reason for the internal conflicts between the members was that they were not communicating effectively with each other. The participant via using his personal influence made the members to collaborate and appreciate each other. In addition, everybody in the team had the same goal in mind which kept the project going and the team didn't fall apart.
10	Participant 11	The participant said "there is always some level of conflict especially when members are from different organisations". In the participant's team some members had different objectives and

	<b>Participant</b>	<b>Explanation</b>
		<p>they wanted to take the team into a particular direction. One of these members said “I can’t continue going down this path” so he left the team.</p> <p>To manage and overcome the deeper conflicts, the participant had to let go some of the things that he earlier had imagined to be accomplishing. The participant believed that a leader has to be willing to let go some of the things and let the change take a slightly different direction as long as it is not way-off things. So, the participant showed flexibility to let go at least those things for which he didn’t have quite the support he needed. The team also did a lot of workshops without putting personalities on the line. In these workshops the members debated and argued on all sorts of different options and used to reach some level of agreement. The members, however, never reached a hundred per cent 100%) consensus on issues.</p>
11	Participant 24	<p>The members had conflicts related to the research project not necessarily between them. They were from different fields so they had differences about things. The participant believed that one should be flexible and open-minded and should treat conflicts as a dialectical process. So, in the participant’s team the conflicts used to lead to discussions between team members in which thesis and antithesis would eventually end up in synthesis. These syntheses illuminated the innovation process.</p>
12	Participant 4	<p>While developing the model, the team faced a dilemma between technology and instruction. Both technology and pedagogy were the main features of the innovation. As a well-connected team, the team developed the innovation via parallely focusing on technology and pedagogy.</p> <p>Preconceptions lead to disagreements in the team so the first thing the members were asked was to identify and challenge their</p>

	<b>Participant</b>	<b>Explanation</b>
		preconceptions. The members overcame most of their preconceptions about the way the tomorrow's teachers should be taught. The participant believed that if there are strong social connections between people then even if they have completely opposing views of an issue they would not let conflicts appear. He fostered social relations among his team members and brought the members together. The participant also developed a plan for all team members so that everybody in the team knew what they need to do and when.
13	Participant 15	In the participant's team whoever writes the first draft of a paper he or she is the lead author. And then whoever edits it first is the second author and whoever then edits it is third. So, this was also one way to avoid conflicts within the team. The participant also invited some deep thinkers to share her theory with them and to get their perspective. The actual objective she had was to help team members to understand where she was coming from. The team members closely collaborated with each other while planning and executing the innovation.
14	Participant 22	The participant was the in-charge because he was the most senior academic in the team. He assigned tasks to other team members but at the same time he created an open space for discussion between members. The space was deliberately created so that members could bring their own perspectives of the things. The team would mostly find a kind of agreement within but sometimes discussions would lead to disagreements. In such cases the participant, being the in-charge, would make the decisions. In the participant's country there is a culture that promotes hierarchy respect so everybody would agree to his decisions.
15	Participant 21	The team members had previously collaborated on similar projects with each other so they were well acquainted with each other. The

	<b>Participant</b>	<b>Explanation</b>
		members used to discuss issues with each other. Although the members had different ideas during the design phase these ideas were evaluated via testing them which solved the differences between team members if there were any with regards to which idea was better and which was not.
16	Participant 28	Since introducing OSCE was the participant's idea and he initiated the project so he was leading the team. He set-up the objectives and responsibilities for the team members. The participant and the team members used to have regular meetings in which members would give their opinions and recommendations. The participant would consider these opinions and would finally make the decision which would be acceptable to all.
17	Participant 7	The participant was given the grant for the project so he was responsible for it. To manage conflict among team members, he created a non-hierarchical and open environment in which the participant and other members would openly discuss and criticise ideas and concepts. The team would finally reach some conclusion which would be acceptable to most of the members. The participant also delegated power and control to team members to create a sense of ownership among them. He also discouraged competition among team members to avoid potential conflicts. The participant partnered with motivated and high-integrity people, which was also one of the main reasons that the team did not have any conflict among its members.
18	Participant 5	The team members were so committed and passionate about the innovation that the conflicts were very few and far between them. The participant believed that conflicts arise when the leader delegates too much responsibilities to other team members so she was very careful in distributing duties and responsibilities. The participant also believed that lack of communication between team

	<b>Participant</b>	<b>Explanation</b>
		members tends to create conflicts therefore the participant used to arrange regular team meetings in which members would discuss things.
19	Participant 16	The focus of the participant had always been teamwork so he was able to avoid conflicts within his team. He deliberately kept the team to the minimum number required for the project. Another thing which kept the team united was that the members shared passion for innovation.
20	Participant 12	The participant and his team members took a course together during their Master's program. They shared also similar views with regards to teaching practices so they became close friends. The participant and his team members knew one another really well because in the past they had collaborated on many projects and had also co-taught courses together. They did not have any conflicts because they used to discuss issues until an agreement was reached between them. Another reason for not having any conflicts in the team was because the team as a whole was leading the project. The members would sit together and decide tasks for each member like what should be included in the articles and who is going to write what.
21	Participant 27	The challenge was that the team members were not meeting the deadlines. The participant assumed that in academia people have become very used to soft deadlines. As the participant was made responsible for the project so she had to act as an administrator which included enforcing deadlines. The strategy enabled her to improve the pace of the project.
22	Participant 8	The assessment experts in the team came from different research theoretical backgrounds. Some came from Cognitive psychology and others came from Sociocultural Theory. On the basis of the members' research backgrounds, they were divided into two work

	<b>Participant</b>	<b>Explanation</b>
		<p>groups. The team was too large so it was divided. The challenge arose when the work-groups came up with two completely different assessment methodologies. The challenge was resolved via adopting both approaches and making them a feature of the innovation. One of the reasons for adopting both the approaches was that the innovators came from a multidisciplinary background.</p> <p>The second challenge was keeping the development of the new pedagogy and the new technology in harmony while developing the teaching and learning approach. It was faced because the two were dependent on each other. The designers in the team came from two completely dissimilar professional backgrounds. They were either pedagogues or technologists. The instructional experts were saying “we can’t develop a new pedagogy until we know what it possible with technology” whereas technology designers were saying “well, what’s the pedagogy so that we can develop technology for it”. To solve the problem, the team members (pedagogues and technologists) were made to frequently interact with each other to assist each other. The frequent meetings between the team members made it possible to incrementally develop both - technology and pedagogy.</p>
23	Participant 26	<p>The team had people from both the uniterisky and its subsidiary. There was a gap between the teaching and learning cultures of the two domains. The challenge was that the members were not cooperating with each other. In order to create harmony, the participant tried to convince the team members to focus on commonalities of the two domains rather than looking at what was different in them.</p>
24	Participant 30	<p>The research involved a theory from Cognitive Psychology whereas the participant and his primary adviser did not have any expertise in this subject. So, they partnered with one of the</p>

	<b>Participant</b>	<b>Explanation</b>
		professors, whose theory they were planning to use, from the psychology department. As the participant and his adviser were from the Decision Science and Information System whereas the other professor was from Psychology department so there was a communication wave length issue between the members. The partners overcame the issue via dedicating more time and effort to communication and explanations.
25	Participant 29	The participant recruited research assistants and students to assist her in the project. They had no working experience so the participant had to lead the project and make all the decisions.
26	Participant 10	The members used to discuss issues and would reach some conclusion. There were no internal conflicts whatsoever because all members agreed on the idea of the best way to help educating adults is to make them learn by doing.
27	Participant 18	The team had no major conflicts among its members in terms of what they were trying to do and the way they did those things. The participant assumed that it was because the members shared the same goal and were excited to be on the team.
28	Participant 13	There were no conflicts between the members because they were able to differentiate between their roles. The members were flexible and easy going people and were very close friends as well.

## Appendix D4 – Managing Reluctant Students

	Participant	Explanation
1.	Participant 20	<p>The teachers did not cooperate and made the students do assignments, presentations and all kinds of things by themselves.</p> <p>The students went mad because it was a lot of work to do. They began resisting the reform which changed the situation and within a year the innovation was put away.</p>
2.	Participant 5	<p>In the first instance people did not like the change especially if they felt that it would increase their workload. The students had been really unhappy about the change in teaching from a very traditional teaching to the hands-on practical strategy where people were critiquing them and evaluating them. So, the students were challenged by this change but after the implementation they actually saw the advantages of the strategy for them. Also feedback from the students, teachers and other stakeholders was obtained and the course was improved accordingly so the students bought into the change.</p>
3.	Participant 21	<p>The students didn't believe that they could do it. To overcome the students' reluctance, the most important thing was to listen to the feedbacks of the students. The team conducted 170 sessions and collected students' feedbacks after every session. This helped the team to recognise the things that needed to be changed.</p>
4.	Participant 12	<p>The participant got some students who completely hated the innovation and hated him as a result and picked him as a horrible teacher. In terms of student evaluation, he got bad ratings from these students. He had to speak to my HOD and Dean. They are kind of enlightened smart people who recognise that teaching evaluation is kind of a crappy way to measure teaching quality. They were very supportive like “this is good, if you want to do it, just do it”. The participant inquired a lot and tried to accommodate students’</p>

	<b>Participant</b>	<b>Explanation</b>
		suggestions. It's been several years since he has actually had a student who has really complained or complained bitterly about the course.
5.	Participant 4	Students expected that the lecturers would drive the lesson and that they knew everything. The team, on the other hand, wanted to give over the power to the students. There was a bit of reluctance about that among the students. We identified their preconceptions and explained the benefits of this socio-cultural pedagogical model to them. Onwards they were much more open to it . The security guard used to come around 7 o'clock at night and kicking them out at night so they were staying much longer than the team ever thought they would and they really enjoyed it.
6.	Participant 1	The students were facing some learning issues so one of the big challenges for the participant was that some students were slaking off. The students did not know much about the new activities and roles and their advantages. The participant believed that student feedback was the most important tool that a teacher had so she was constantly using it. The participant found that she wasn't communicating properly so she had to find better ways to communicate. She just kept tinkering and trying and coming-up with ways that worked. She also prepared the students beforehand to make them understand what they were going to do so that they would be able to adjust their behaviours. She kind of rehearsed the model so when challenges popped up students had a context how to deal with it. The strategies helped the participant to keep the students engaged.
7.	Participant 26	The students were quite overloaded with work load so that was a challenge. One needs to have a very open mind and change things so it was the same with the team. The team tried to understand the students' concepts of higher education what it meant to them and

	<b>Participant</b>	<b>Explanation</b>
		where they needed support and where they didn't need support and so on. The team realised that some of our ideas needed a bit of changing. The team also changed things when it discovered more about the students' issues but the basic premise didn't really change. It was just some of the techniques that the team used.
8.	Participant 29	The challenge was that in the school, besides participant's project, there were many other student-related projects so sometimes students were feeling tired and exhausted to take part in the project activities. Remaining flexible is always important. For example, if a student tells you, he can't attend a session or activity because he wants to attend another program so you should let him or her attend the other first. It's about having flexibility.
9.	Participant 28	The first thing the team wanted was to take students on board. The innovator put the case in front of them and explained to them the potential outcomes of the innovation. He explained to them the benefits in terms of clinical skills and competences which they would gain during their course .The students were also given training in OSCE.  To improve the new examination system the team was constantly obtaining feedback from students and the employers. The team was also regularly reviewing and monitoring the outcomes of OSCE and fine tuning the system.
10.	Participant 25	The team would devise a method then apply it on different groups of students then evaluate its outcomes. The students were asked about the methodology then their suggestions would be carefully incorporated to make the methodology more useful.
11.	Participant 16	The students supported the innovation because it tended to resolve the issues they faced.

	<b>Participant</b>	<b>Explanation</b>
12.	Participant 23	The students complained that they had to do more work than other students in other courses. So there was a little bit of resistance around how the team was doing it. The team actually wanted to come up with something that could excite interest of students about what they wanted to learn not boredom and rigid. The participant asked the students about what they would like it to be like and then she made some changes to the course.

## Appendix D5 – Managing Risk

	<b>Participant</b>	<b>Explanation</b>
1.	Participant 2	It was a large and complex innovation so building the whole thing was a too high risk of failure. The risk was managed by dividing the vision into numerous multiple small proofs of concepts. Then, making the team members to concurrently develop and test these concepts. The parts were then put together to realise the vision. Finally the innovation was pilot-tested which informed the innovator about some weaknesses in the innovation.
2.	Participant 4	The participant needed support from the university's administrators to implement the innovation. He developed a formal proposal to the concerned department of the university. Due to the risk of failure of the program and conservative attitude of the administrators, a two-year innovation validation process was proposed. Instead of following the proposed solution which would unnecessarily delay the reaping of many benefits associated with the program, it was decided to implement the program on a smaller scale. The innovator's influential position within his department allowed him to obtain financial and administrative support from the department for implementing the innovation within the department. The implementation was successful so the financial and administrative support was extended by the university which made it possible for the team to implement the innovation at the university level.

## Appendix D6 – Managing Workload

	Participant	Explanation
1	Participant 1	Fundamentally, the challenge was to develop and implement the project and get through the amount of teaching material that was supposed to be covered. There was always that temptation to abandon the project and go back to the 'lecture model'. The challenge was managed by involving and effectively using the teaching assistants.
2	Participant 2	It was very hard and frustrating. Much time and effort was put into getting through all different processes involved in making the change to occur.
3.	Participant 12	The team members devoted more time and managed the workload they were experiencing due to handling their multiple responsibilities at the same time.
4	Participant 14	<p>Due to the involvement in the project, the amount of work increased and the team was finding it hard to manage the program. The team involved a student to take part in the activities of the program. This allowed the program to run efficiently and smoothly.</p> <p>The change in the university's upper management led to a change of priorities of the university with regards to academic work. This eventually led to an unmanageable amount of workload on the team members.</p> <p>The new management had no idea of the benefits of the innovation so the innovation was cancelled. The cancellation seriously disappointed the team so the members collectively decided to abandon the program. The large amount of work involved in keeping the project running productively was also one of the main reasons due to which the member abstained from reviving the program.</p>
5	Participant 22	Since the team of three could not possibly complete the project due to the sheer amount of work involved and the time and resources available. The team developed a proposal for funding to an external funding body

	<b>Participant</b>	<b>Explanation</b>
		and obtained the required support. The team adopted an innovative approach which involved offering internships to students to work on the project. The students were giving a small amount of stipend each month. The team also recruited some new members for the project.
6	Participant 18	Following the successful piloting, many colleagues supported the innovation. The size of the demand for it grew very rapidly which created an unexpected high workload on the team. To manage the situation, the team invited their extra responsive and focused students to voluntarily participate in developing the forums. The students assisted the team with implementing the innovation across various departments of the university.
7.	Participant 13	While developing the project, the core team was closely working with the project staff. The team soon noticed that the project staff had a too high workload to adequately work on the project. The core team talked with the head of school  , reduced the teaching times for the staff. This was to ensure that the staff had enough time to work on the project. The strategy enabled the team to move the processes forward.
8	Participant 28	The members were feeling stressed. The project was not a part of the team members' job descriptions so the members had to make a lot of sacrifices in the form of time and effort in order to achieve the goal.
9	Participant 29	Managing the workload was an issue for the participant from the beginning of the project. As university faculty, she was dealing with quite a lot of stuff including research, teaching and administrative work. The team members were not well experienced so the innovator also had to lead the project. The participant could not change the system, but what she could do, and did, was to work harder and prolong her working hours and even work on weekends.

## Appendix D7 – Managing colleagues

	Participant	Explanation
1	Participant 25	<p>The idea was kept hidden from the teaching and administrative staff to avoid their opposition. Based on her past experience, she assumes that new ideas may bother colleagues and university so one should do it little bit stealth. The participant believes that innovative may bother other people which may lead to these people to try to stop the innovator from shaping his idea. So, she avoided revealing her innovation.</p> <p>The national educational crises in the country forced the government to change its approach and priorities toward education. The Bologna process was started which changed the negative attitude of the managements at the universities toward teaching innovations. Consequently, the team disclosed the innovation which led to the team getting support from the university to further develop the innovation and carry on with it.</p>
2	Participant 23	<p>Revealing an idea gives opportunity to opponents to attack it. The idea was therefore not shared with other people with the exception of a few likeminded colleagues, which led to the team successfully avoiding opposition from colleagues. The team did not even ask for the permission. The innovator had previously worked with staff that have jeopardised her innovation on purpose and gone through and sabotaged everything so it didn't work. She thinks that one should not reveal his innovation because it can prompt staff and management to try to sabotage it. So, she is bit more careful these days about to whom she should reveal her ideas. Based on her past experiences, she thinks that academics are very resistant to any type of change due to their inflexible attitudes.</p> <p>The innovation was revealed after its successful implementation. The innovation was then discussed with colleagues, which assisted the team in identifying some potential areas for improvement in the</p>

	<b>Participant</b>	<b>Explanation</b>
		innovation. The support of colleagues was obtained by modifying the innovation, getting the students to share their positive learning experiences with the colleagues, conducting negotiations, assisting colleagues in implementing the innovation in their respective domains and publishing about the innovation. The university's student-centred culture was also a key factor which made the colleagues to accept the idea. The innovator's influential position at the university enabled the participant to simply ignore some who did not want to change their views about the innovation.
3	Participant 9	The participant did not face any challenge from colleagues and management because she hid her innovation. She believes that disclosing ideas could make other teachers creating hurdles for the participant. She thinks that innovative ideas create unnecessary fear among people. The participant also believes that if she had revealed her idea it would have lead to unnecessary criticism from people around her and she would feel depressed.
4	Participant 2	It was a large-scale disruptive innovation and so was perceived as a threat by all those who like to live in the status quo. There was a whole lot of resistance to change. People resist change because they fear that they will need to learn everything from scratch. They don't see the bigger picture in terms of opportunities such change can bring. So, to convince the opponents to buy in, the participants used translators (communicative team members) to communicate with those. A portfolio of proofs of concepts was created and each internal stakeholder was shown only what was relevant to him. This was done so that none of them could actually see all of the fronts and attack the whole idea. .
4.	Participant 27	Some of the faculty members did not want the innovation. The team used two different strategies to convince them. The innovation and its benefits were thoroughly discussed with these teachers. Second,

	<b>Participant</b>	<b>Explanation</b>
		<p>they were offered financial incentives for implementing it in their classrooms. They had academic freedom to try and implement different teaching strategies so they voluntarily went for it. The team gathered feedback from these teachers about their experience with the innovation. The data was analysed and published as an article. The data also helped the team to enhance the innovation. Some of the things were dropped because they were not really beneficial for the students.</p> <p>The team did not face any major challenge from the stakeholders while sustaining the innovation. It was not a disruptive innovation and there it was brought in by the administration so there was a buy-in by the faculty. The participant believes “the biggest challenge for such innovations is that the academic world is ever changing and some of the thing that you are doing may not be relevant anymore. So, sustainability is only possible when innovation can be continuously adapted to the changing situation”.</p>
5.	Participant 10	<p>A lot of staff was feeling threatened by the idea of an organisational clinic. They did not like it because they did not have the competence to work in this field. And, before the team could present the proposal, those staff members, who were personally feeling threatened, had already communicated with the pro-vice-chancellor. This person refused to extend financial or other supports required for establishing the clinic. Actually the university saw it as a non-traditional and non-academic activity. The team would have surely gotten the support for establishing the clinic if so many staff members were not opposing it.</p>
6.	Participant 19	<p>Initially many colleagues were sceptical to adopt the innovation for teaching because they didn't know that a video game can be used as a learning tool and environment. The team persuaded them by sharing the results of the project with them. With the passage of time the growing interest of the educational community about video</p>

	<b>Participant</b>	<b>Explanation</b>
		games also strengthened and consolidated the idea as a solid line of work.
7.	Participant 11	The biggest challenge is always to convince those who don't want to change their ways. The prevailing academic culture causes a sort of inertia that's really hard to overcome but there has to be somebody to create conditions for sustaining the change. The teachers adopted the change after the team demonstrated to them that whatever the team was doing was working. Actually the statistics helped the team to convince the people. The team also committed a huge amount of efforts and time to train the teachers for implementing the innovation.
8.	Participant 4	There will always be teachers who oppose reforms and innovations. They don't want to give over the power to their students. Some of the teachers were therefore strongly opposed to the innovation. They didn't know how to use instruction technologies. Some of these got together and wrote a paper against the idea. In response, the participant and one of his team members also wrote a paper to refute their argument and to explain how technology and the socio-cultural perspective improve students' engagement and learning. The publication and the team's relentless discussions with opposing teachers about the viability of the socio-cultural perspective enabled the participant to convince the majority of the opponents.
9.	Participant 20	The teachers were against the innovation because they couldn't teach any longer the way they used to teach. These were typical traditional teachers who had not taught before as a facilitator in the classroom so they had to work really hard. The teachers did not cooperate and made the students to do assignments, presentations and all kinds of things by themselves. The students went mad because it was a lot of work to do. They began resisting the reform which changed the situation and within a year the innovation was put away.

	<b>Participant</b>	<b>Explanation</b>
10.	Participant 7	The participant held an influential position in the university. Some of his colleagues wrongly presumed that the innovation might be imposed by the university so they started opposing it. The inability to implement the innovation, a too high workload and the inflexible attitude toward change were also some of the reasons for their active resistance to the innovation. To persuade these teachers, the participant and his team members discussed the innovation with each of these faculty members. They all agreed that it was beneficial for the students but none of these teachers adopted it.
11.	Participant 6	The idea was revealed to all stakeholders of the faculties, the provost, the president and so on. Some of them opposed the idea. They viewed the project being too risky. It was the first large scale educational resource project and there was a risk of failure. It took the team a lot of talking to take them on board. The strategy was talking and not giving up. The team first identified all potential risks and then brainstormed to identify the ways to mitigate those risks. The needs of the stakeholders were also identified. These helped in negotiating and making the case for the project.
12.	Participant 18	The success was also a bit frightening for some people. People oppose things when they do not know that something is useful. The colleagues were not feeling secure because there was a lack of trust. The team was working at a distance so it was difficult for the members to establish friendship and effective working relationship with colleagues. The innovation was also not aligned with the strategic objective of the university. The team resolved the challenge by persuading the university and the staff. The team had written a paper about students' reaction to the innovation which assisted the team to convince them.
13.	Participant 24	Innovation means introducing disruptions, introducing new terms of reference so people who are going to face those new terms of

	<b>Participant</b>	<b>Explanation</b>
		<p>reference will inevitably feel threatened by it. The innovation faced opposition from all main internal stakeholders: students, teachers and administrators. The participant believed that opponents' feedback could be really useful for improving the quality of his innovation so he and his team members engaged with the internal stakeholders in healthy debates. Some of the suggestions of the opponents were quite good and the team made changes to the innovation in the light of these suggestions.</p> <p>The needs of the stakeholders were met because team needed their support for implementing and sustaining innovations. Some of their demands were incorporated into the innovation. The participant published a journal article about his work which highlighted the usefulness of the innovation to university and colleagues.</p>
14.	Participant 3	<p>This challenge arose when the innovation was introduced. It was radically different than what teachers and students were expecting. The innovation was based on the complexity theory so it was hard for them to understand it. The team members were finding it hard to explain it to those who think in a linear relationship, top-down from teacher to learner. To overcome the challenge, the innovation was conceptually broken down into parts and explained to the teachers and students. The team also worked collaboratively with teachers and students to guide them.</p>
15.	Participant 26	<p>The teachers were already quite overloaded with work so the team had to negotiate quite a lot on one to one basis and on a very personal basis to help the project move forward. The team had to convince them that it was something that was really accounted for their students.</p>

## Appendix D8 – Obtaining support from university

	Participant	Explanation
1	Participant 20	<p>The success of the pilot project and the participant using his journal articles to persuade management enabled him to obtain the approval to implement the innovation. The journal article was revealing the viability of the model.</p> <p>Those who had power were against it and did not really interested in structural improvements of the system. They (administrators) perceived it to be incompatible with the existing educational system therefore they cancelled it. They said that the innovation was causing them too much trouble so they had to cancel the whole initiative.</p>
2	Participant 10	<p>Before the team could present the proposal, these staff members, who were personally feeling threatened, had already communicated with the pro-vice-chancellor. This person refused to extend financial or other supports required for establishing the clinic. Actually the university saw it as non-traditional and non-academic activity.</p> <p>The participant tried very hard but could not convince the university to support the innovation. There was no support from the university which created serious financial hardships for the project. The team partially resolved this issue through partnering with external stakeholders. The partnership led to team receiving 10,000 NZD for developing the centre.</p> <p>The university created many legal and administrative complications for the team. The university made it nearly impossible for the team to carry on with the innovation. So, there were financial, legal and administrative issues. “You get tired after a while hitting your head against the wall”. The team members said “we have had enough”. Eventually the team decided to abandon the innovation</p>
3	Participant 14	<p>The participant could see that if the idea was going to run then it needed someone more than him so he presented the concept to a Pro-</p>

	<b>Participant</b>	<b>Explanation</b>
		<p>Vice-Chancellor at his university. The participant wanted to explain to the Pro-Vice-Chancellor that the university wasn't doing enough and that the students were not really satisfied and how the project could solve this problem. The Pro-Vice-Chancellor agreed to fund the project and also sanctioned new positions for the program.</p> <p>The program was piloted and the problems were worked out. The team was continuously improving the program in response to the feedback it was receiving from the staff members. The staff suggested that some of the course contents were not interesting so the team dropped and included new ones. The program was continuously modified to keep it relevant to the needs of the stakeholders. It was necessary for keeping the program running</p> <p>The change in the university's upper management led to change in the priorities of the university with regards to academic work. The team changed the nature of the project from education to research to persuade the new management.</p> <p>The new priorities resulted into the unmanageable amount of workload on the team members. The team failed to meet the new university standards. The new management had no idea of the benefits of the innovation so they cancelled the innovation altogether. The cancellation seriously disappointed the team. They collectively decided to abandon the program.</p> <p>The large amount of work involved in keeping the project running productively was also one of the main reasons due to which the member abstained from reviving the program.</p>
4	Participant 21	<p>The team needed space and other resources to test the idea so the concept was discussed with the department director. Due to experimental nature of the project, the innovation was viewed as non-threatening. Moreover, the team proposed that they would be using only the available resources. The director finally agreed and</p>

	<b>Participant</b>	<b>Explanation</b>
		<p>issued tables, computers, cameras, and other required equipment for the project.</p> <p>The team needed resources to implement the innovation. Neither the department nor the staff extended any support in this regard. Each staff member has his own research interest; everyone tries to be a champion in publishing papers. Unfortunately the measure of excellence and success in the university is limited to the publications only. The team submitted a proposal to National Agency for Education regarding how to implement the innovation in schools but it did not receive any feedback from the agency. So, the team could not formally institutionalise the innovation.</p>
5	Participant 8	<p>The money ran out and suddenly the team was left with three years of work. Everybody left the project except the participant and one of his colleagues. To keep the project running and further develop it, the participant put in application for grant to an external agency but the application was declined. Consequently, the participant and his colleague had to use their own money to keep the project running.</p> <p>You got to go where the funding is if you want to develop and sustain your innovation. The participant and his colleague developed proposal to an external agency in which they proposed to move directions towards informal learning, open sourcing and community based inquiry learning. The foundation agreed and the team received large amount of money. The team was reorganised and the innovation was modified.</p>
6	Participant 15	<p>The big challenge for the participant was to take her theory that was so new and trying to find funding to test it and apply it in practice. She utilised the services of the research department at her university to develop an effective proposal for funding to various prestigious grants in Canada. The University was very helpful and had acceptance for new things, ideas and innovations. It had an academic</p>

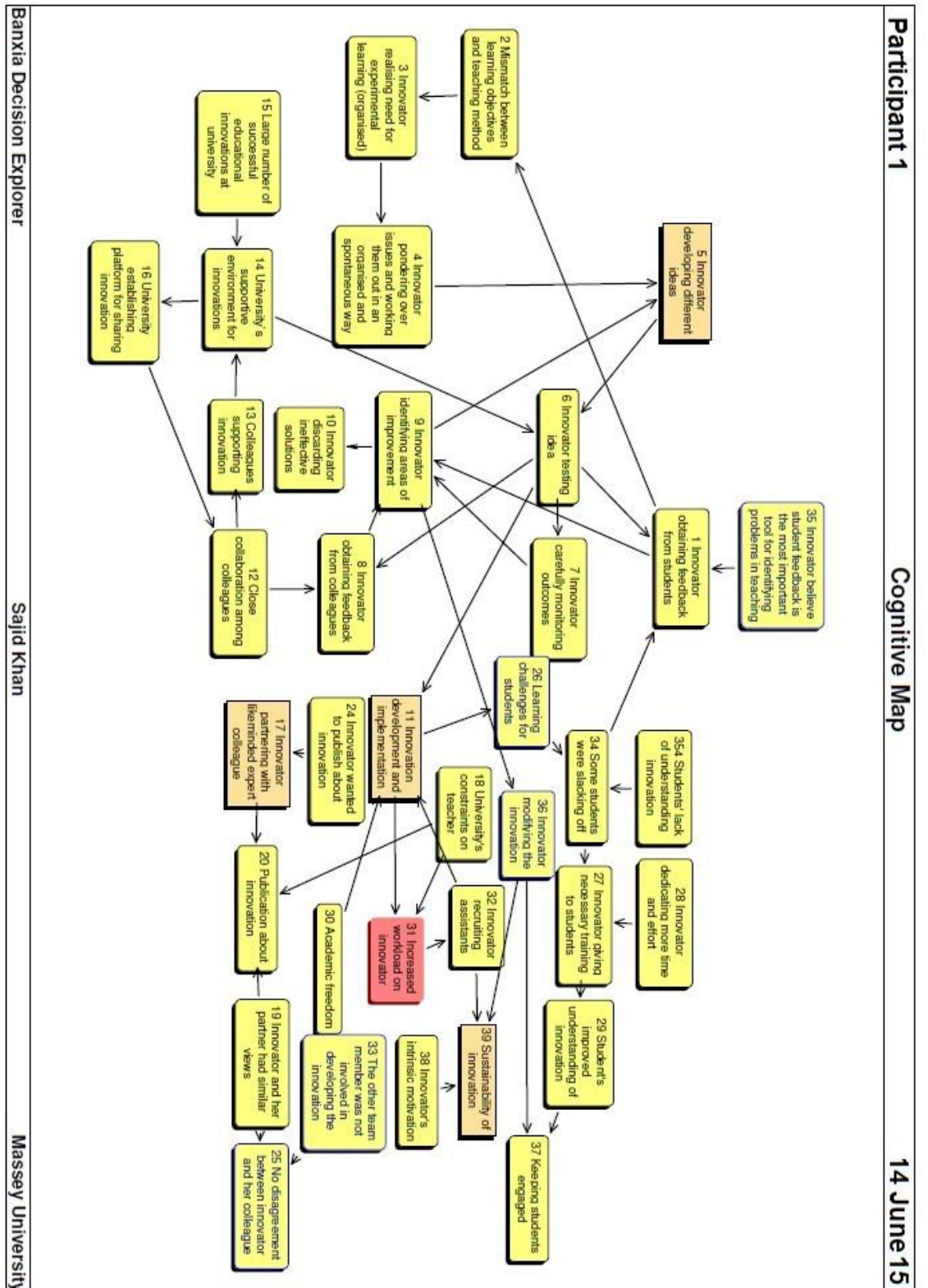
	<b>Participant</b>	<b>Explanation</b>
		and research centre which assisted the participant in selling her idea and getting the funding for the project.
7	Participant 24	<p>Innovation means introducing disruptions, introducing new terms of reference so people who are going to face those new terms of reference will inevitably feel threatened by it. The innovation faced opposition from all main internal stakeholders: students, teachers and administrators. The participant believed that opponents' feedback could be really useful for improving the quality of his innovation so he and his team members engaged with the internal stakeholders in healthy debates. Some of the suggestions of the opponents were quite good and the team made changes to the innovation in the light of these suggestions.</p> <p>Some of their demands were incorporated into the innovation. The needs of the stakeholders were met because the team needed their support for implementing and sustaining innovation. The participant published a journal article about his work which highlighted the usefulness of the innovation to university and colleagues.</p>
8	Participant 18	<p>The innovation was not aligned with the strategic objective of the university so the team had to persuade the university and the staff. The team had written a paper about students' reaction to the innovation which assisted the team to persuade the university and colleagues.</p>
9	Participant 7	<p>The participant had a job contract as "Researcher and Innovator" which was an influential position at the university so he did not face any barriers or issues in getting money and other support from the university. The challenge was that the university did not have as much money as the participant needed to do his project. The participant applied for grants and receive around a million dollar for the project.</p>
10	Participant 11	The participant needed right technical skills (manpower) and money

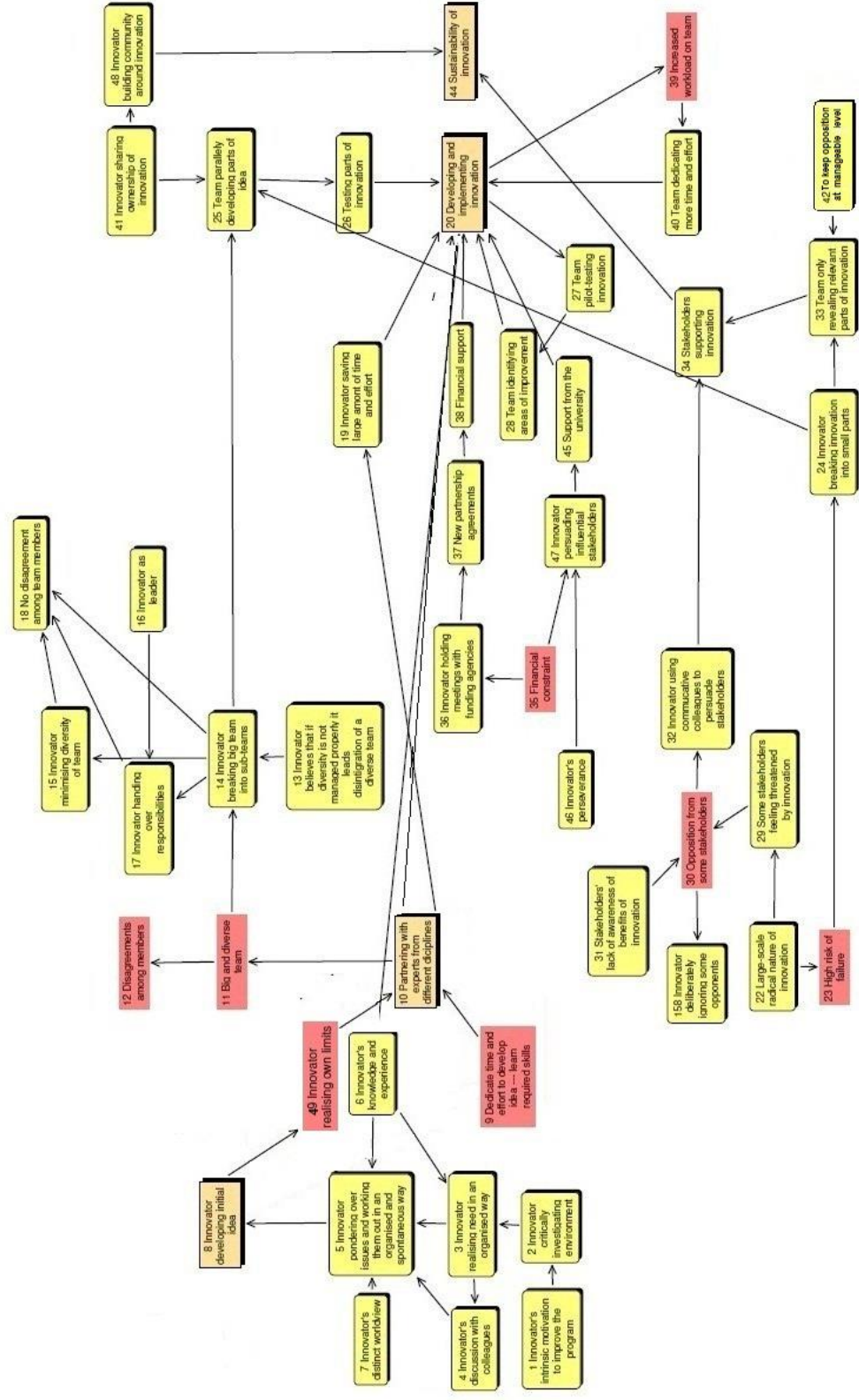
	<b>Participant</b>	<b>Explanation</b>
		for the project. Both the requirements were managed logically. To convince the university, a case was made to show that the cost was minimal and benefits were much higher which would manifest and that the effort was minimal but the advantages would be much higher. The resources were made available to the participant so that he could work on the innovation.
11	Participant 9	The participant's influential position within his department allowed him to obtain financial and administrative support from his department for implementing the innovation within the department. The implementation was successful so the financial and admin support was extended by the university which made it possible for the team to implement the innovation at the university level.
12	Participant 16	The existing idea was developed to address the gaps identified by the students but the same gap existed and had also been identified by the university so in the idea the two approaches submerged. The university supported the idea and the project was initiated.
13	Participant 22	<p>Due to the conservative, traditional and hierarchical structure of the university only conventional programs were given approval. So, the program was tailored but only on paper for the senate of the university. The model was accepted and the team was allowed to use available resources from the centre for doing the program.</p> <p>Since the team of three could not possibly complete the project due to the sheer amount of work involved and the time and resources available. So, the team developed a proposal to for funding to an external funding body and obtained the required support.</p> <p>There was continued approval for the program which was the key to sustain the innovation. The program was generating revenue for the university. The team published articles about the model and also received an international "Learning Excellence Award" for the program.</p>

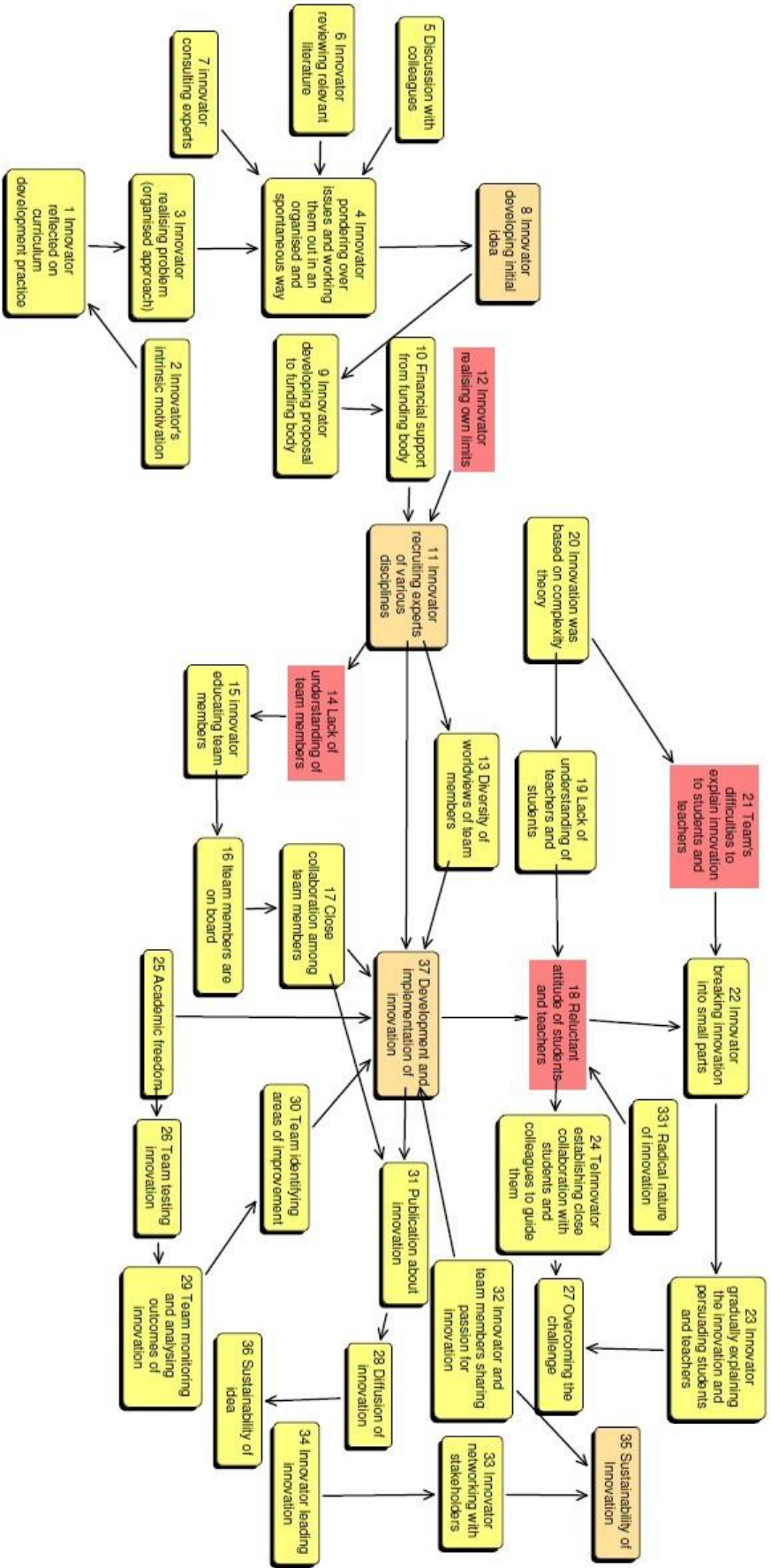
	<b>Participant</b>	<b>Explanation</b>
		The program was very successful and many students enrolled in the course. It was generating money for the university so the university loved it. The team was given support to develop the program further and sustain it.
14	Participant 28	The challenge was that the team could not develop the assessment stations and apply the assessment model until it was approved by the executive committee of the university and the accreditation committee of the education ministry. The team gave a formal presentation to the staff members and executing committee which included the vice-chancellor, pro-vice chancellors and deans. The team was planning to use a popular assessment model so the committee granted the approval without creating any hurdles. The team then presented the blueprint of the plan to the people in the accreditation office and got the approval. Following this approval, the university provided the team with the logistics and manpower to implement the model.
15	Participant 6	The team applied for financial support to an external funding agency and received the grant for developing the open educational resource. The influential stakeholders within the institution at which the participant was employed viewed the grant as an endorsement of the idea so the university assisted the participant in developing the idea.
16	Participant 2	The participant found that the project had no money to develop the desired resource so he held meetings with funding agencies. The meetings resulted into new agreements and partnerships which led financial support from the agencies. The participant eventually persuaded the provost and director after meetings and negotiations with them. They joined the team and became the supporting persons within the university which enabled the team to get support from the university for the project.

	<b>Participant</b>	<b>Explanation</b>
17	Participant 29	The university in which the participant was working had very encouraging attitude and environment toward introducing new teaching practices. The university also had teacher-led innovation fund for financially supporting innovations. The availability of fund prompted the participant to analyse an innovative teaching model against the requirements of her specific situation and formulate a preliminary idea.
18	Participant 17	The participant was working as an academic director. Due to his influential position in the university, he did not come across any serious challenge while obtaining financial and administrative support from the concerned offices. While developing and implementing the innovation, the team also adhered to all the policies of the institution. Moreover, the proposed innovation was not breaking any barriers.
19	Participant 5	The university provided financial support. However, the support was not enough for developing the innovation. Since the university had a weak financial condition, so, the team looked for external funding. The team found a funding agency that specifically allocates funds to tertiary institutions for innovations. The team bade their proposal in and receive the funding.
20	Participant 27	The team did not face any major challenge from the stakeholders while sustaining the innovation. It was not a disruptive innovation. Moreover, it was brought in by the administration so there was already a “buy-in” by the faculty.
21	Participant 1	The participant was given all the support that she needed for her project. The university in which the participant was working was very supportive of teaching innovations.
22	Participant 26	The university wanted to improve the learning outcomes of students and they initiated the project so the team did not face any

	<b>Participant</b>	<b>Explanation</b>
		administrative or financial problems.
23	Participant 3	The participant developed a proposal to a National Body for sports education. The money received enabled the participant to recruit three experts and a post-doctoral research fellow for developing a physical education program based on complexity theory.
24	Participant 25	The national educational crises in the country forced the government to change its approach and priorities toward education. The Bologna process was started which changed the negative attitude of the managements at the universities toward teaching innovations. Consequently, the team disclosed the innovation which led to team getting support from the university to sustain it.



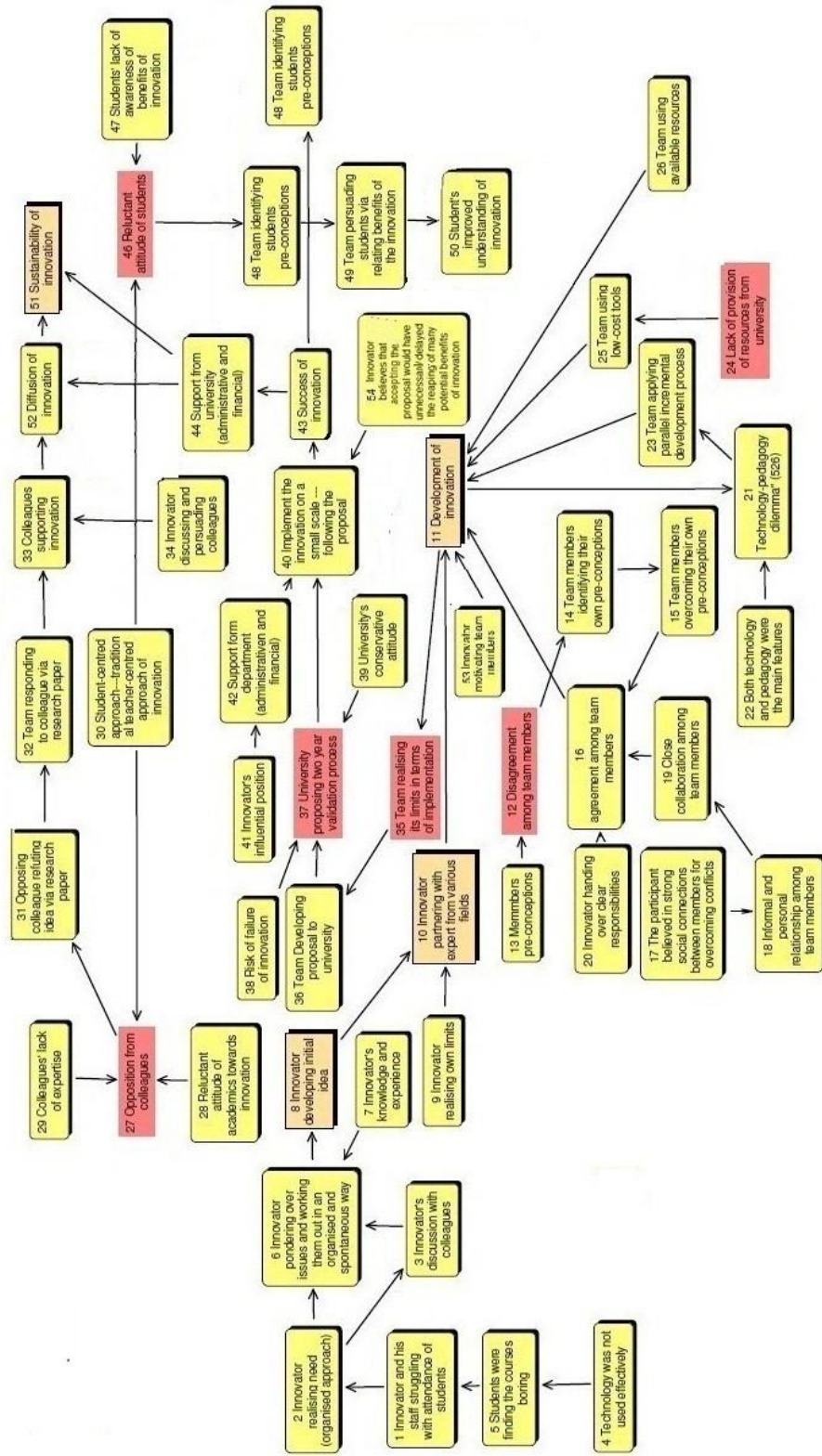


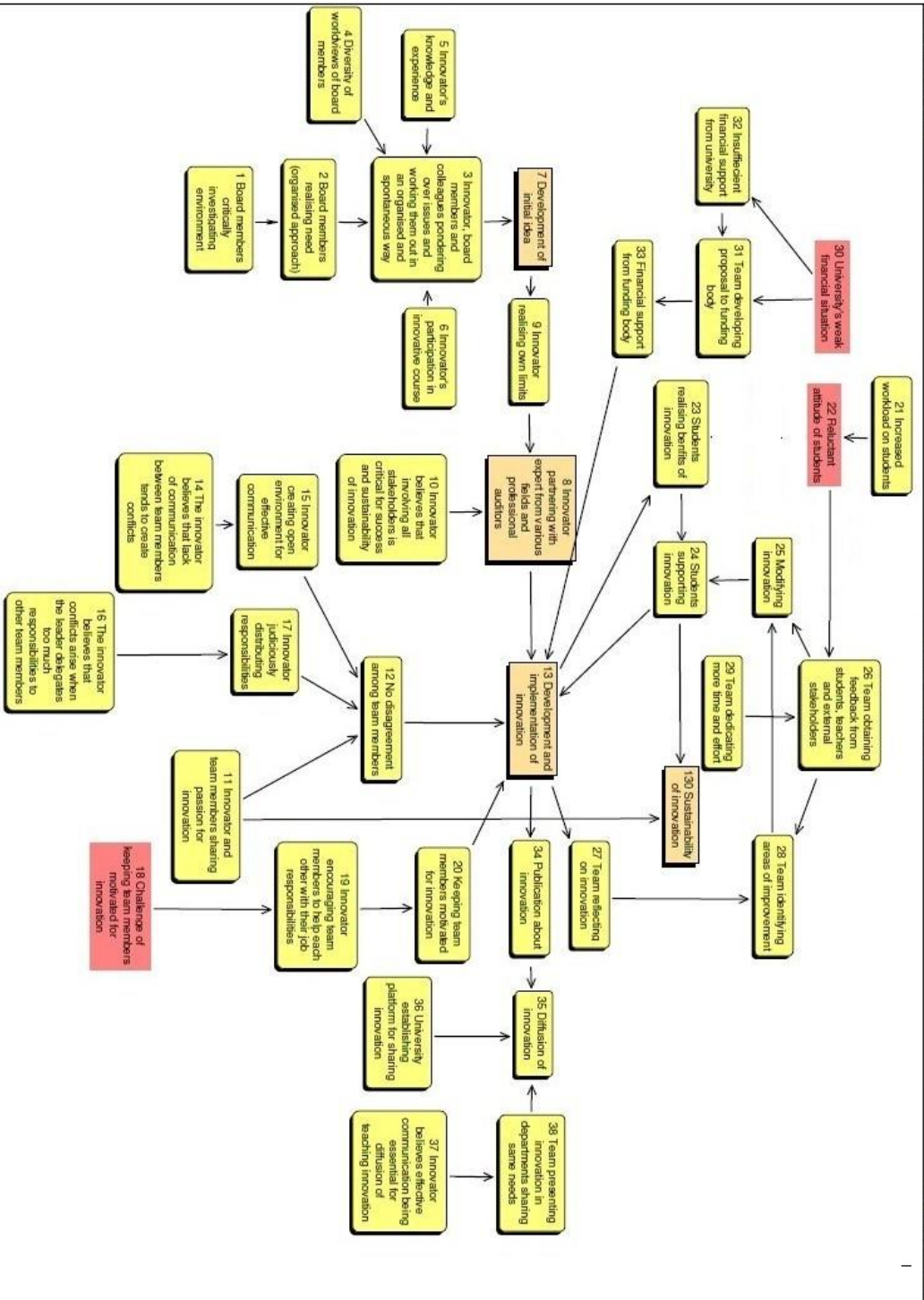


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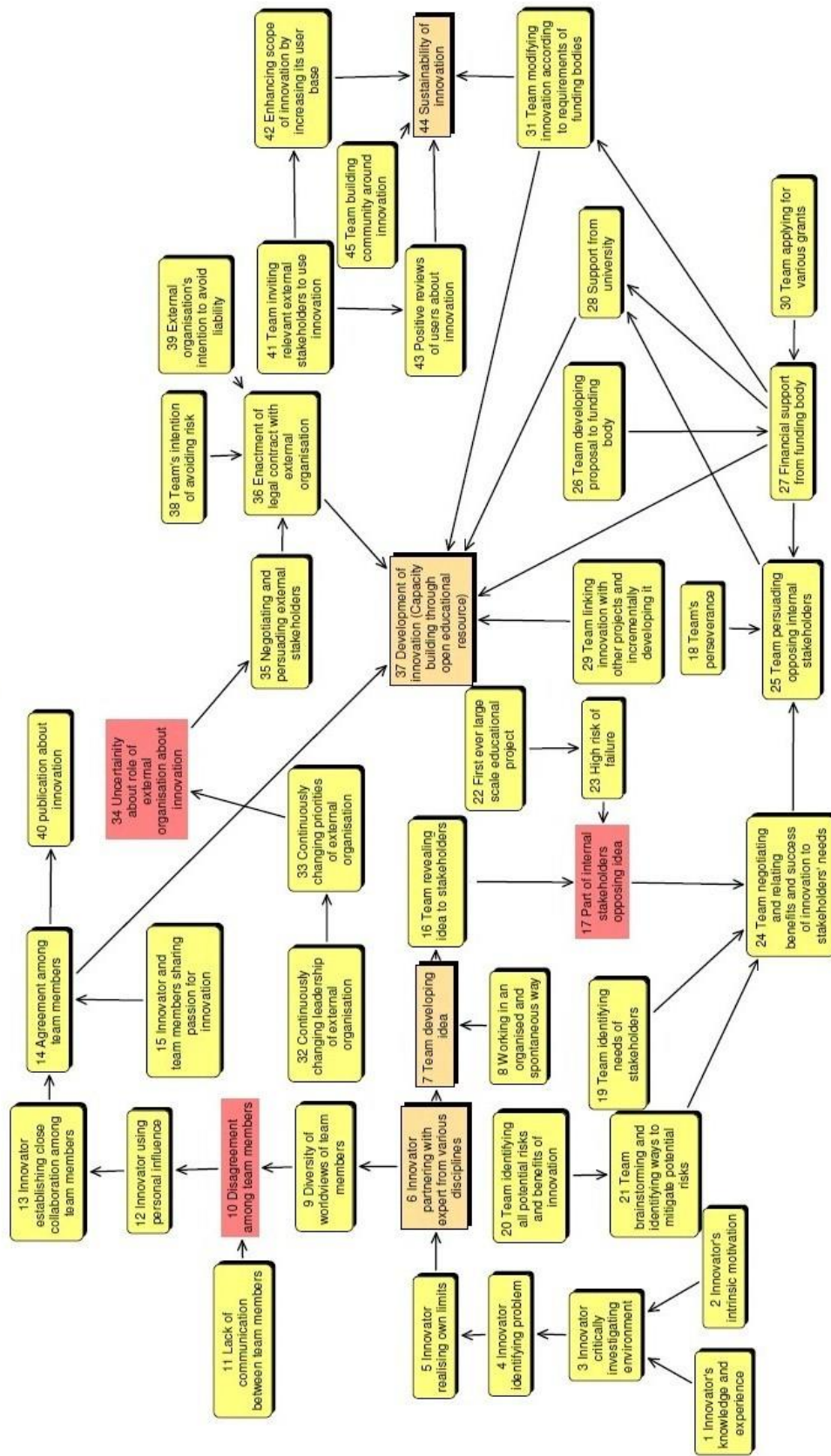


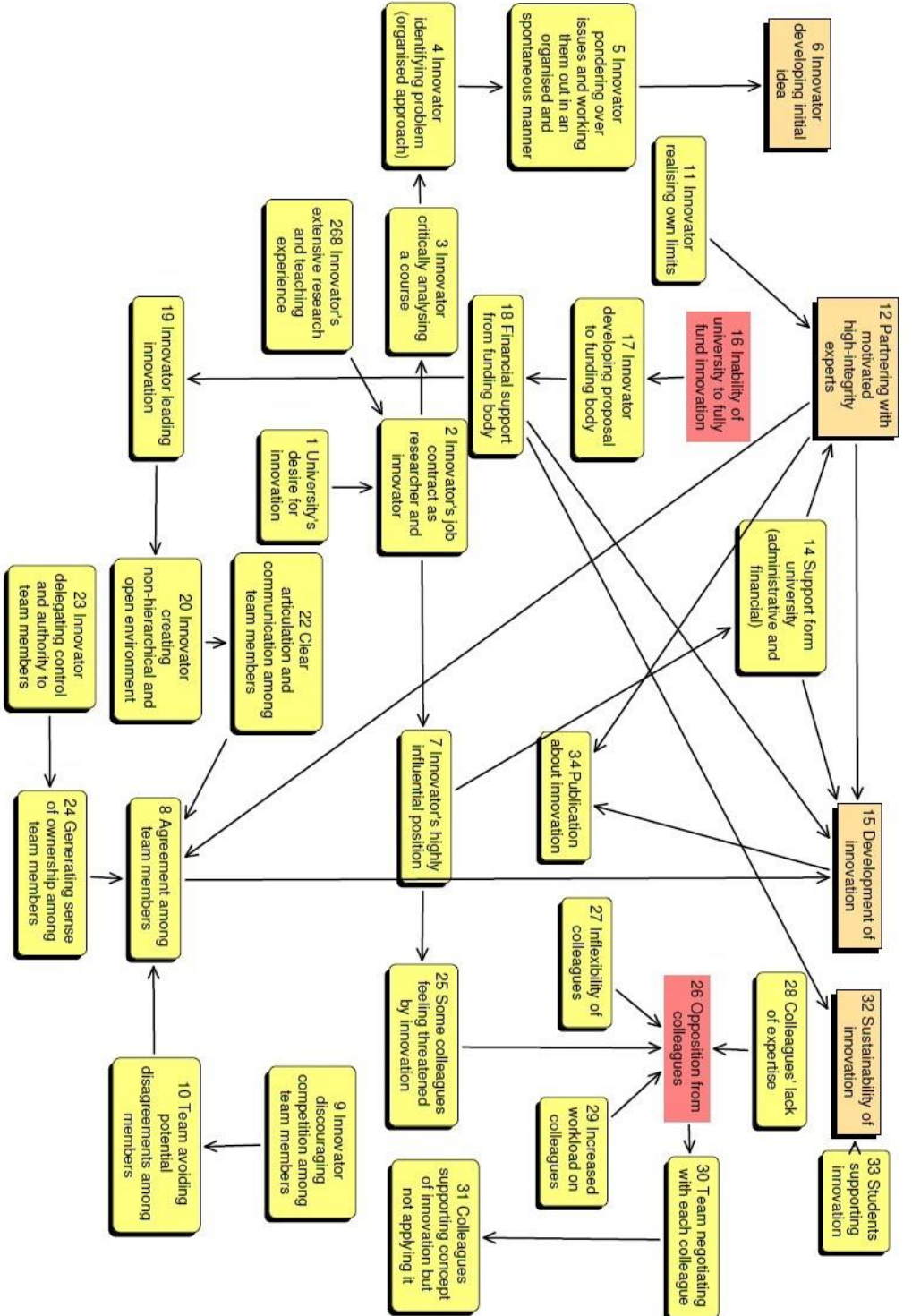


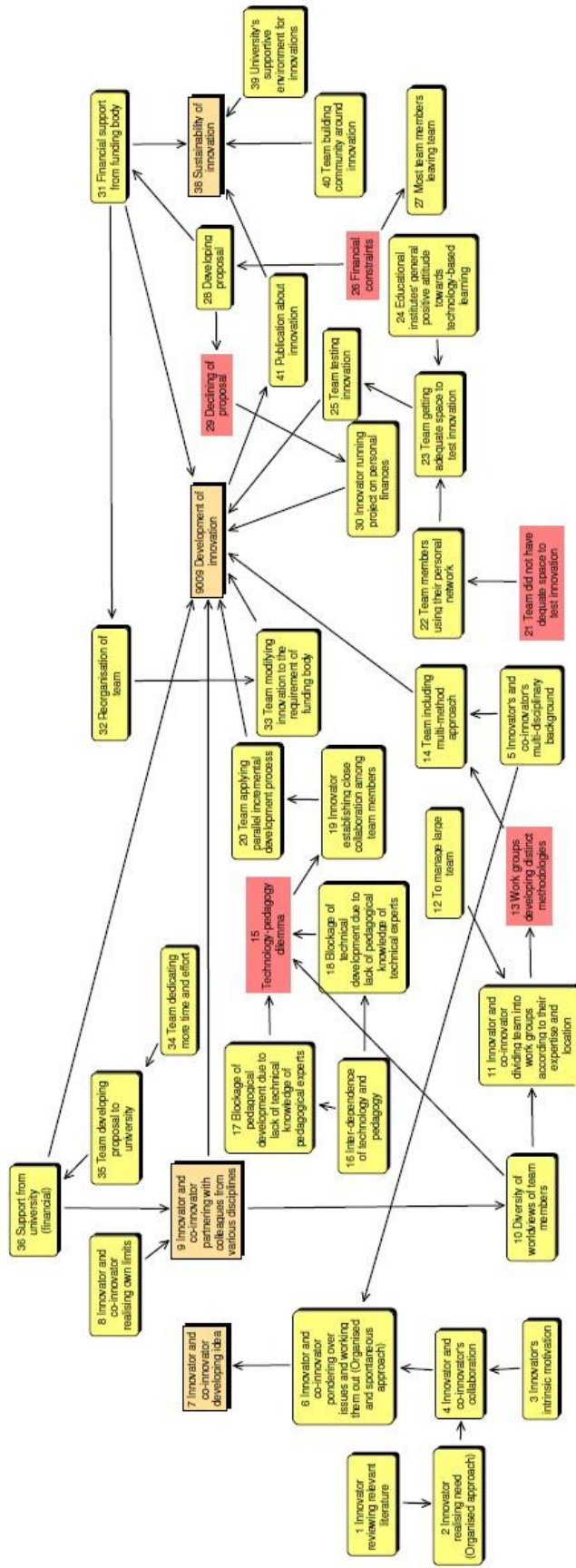
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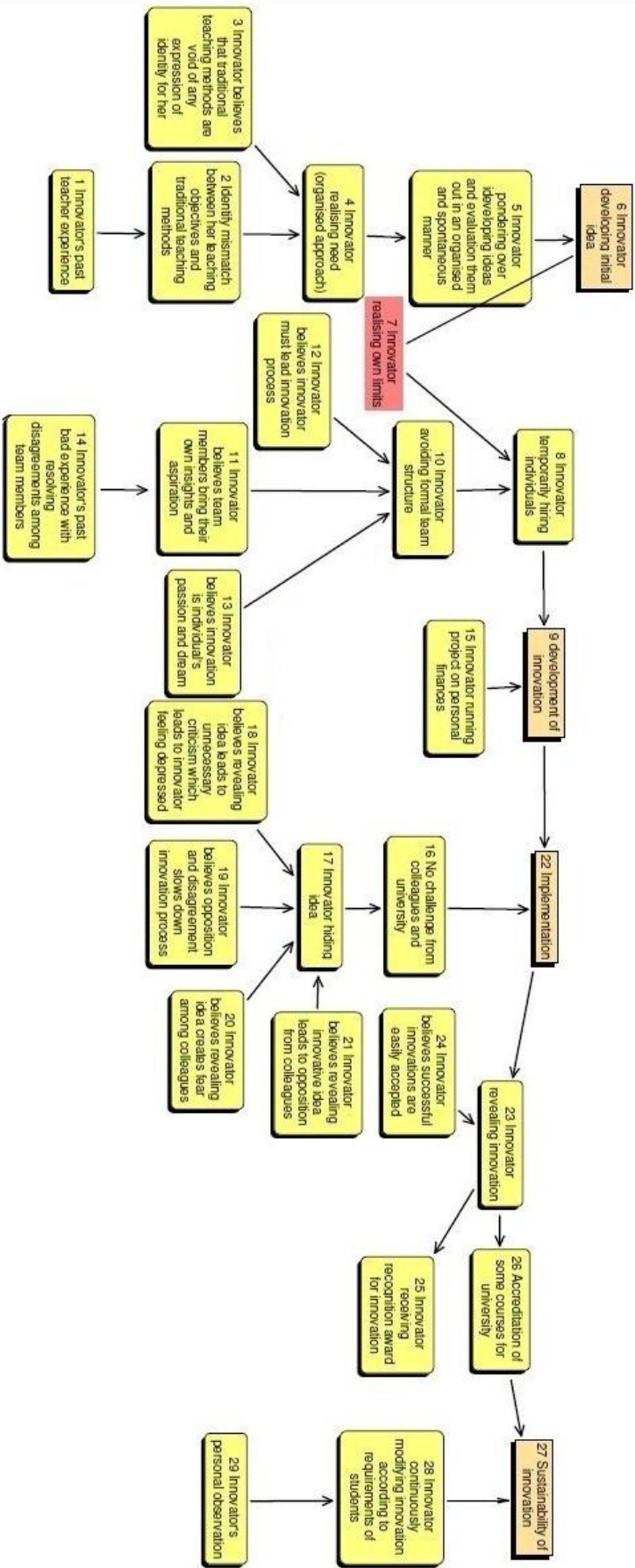
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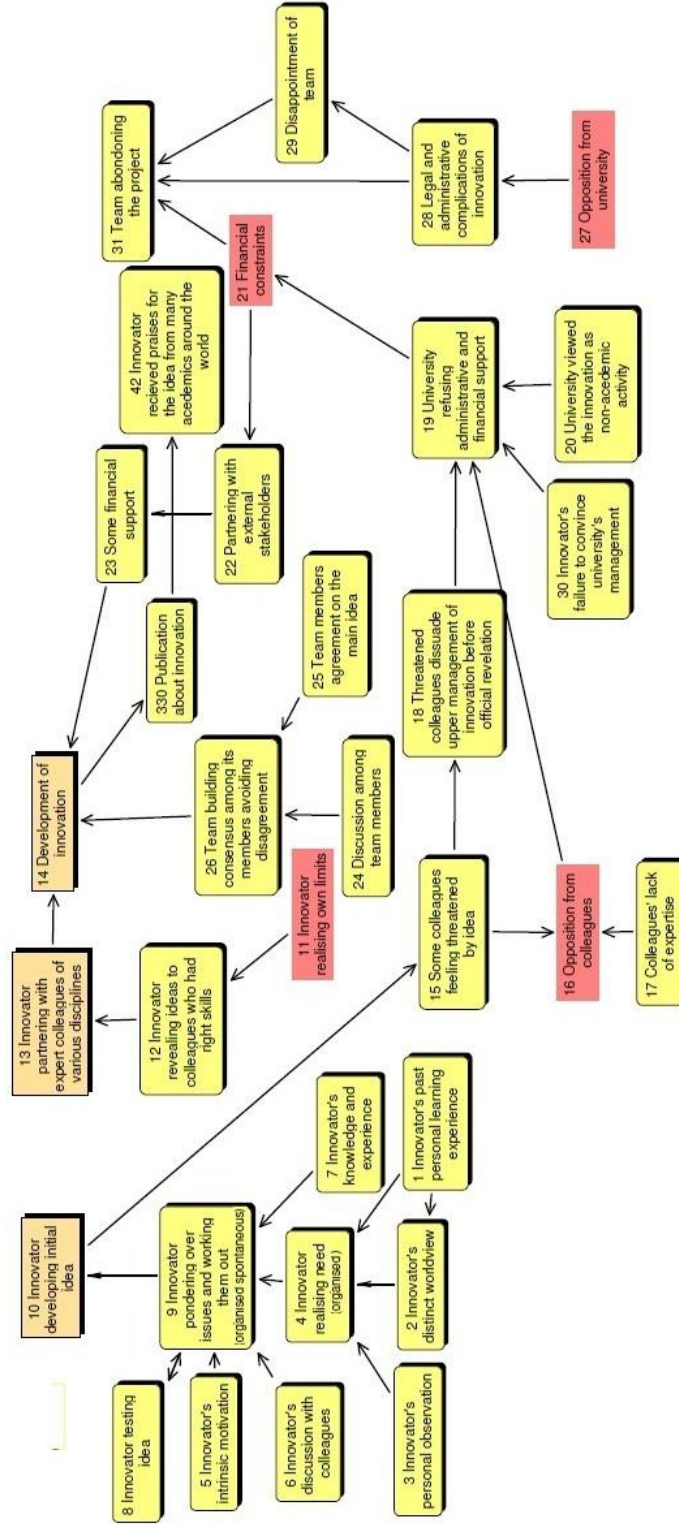
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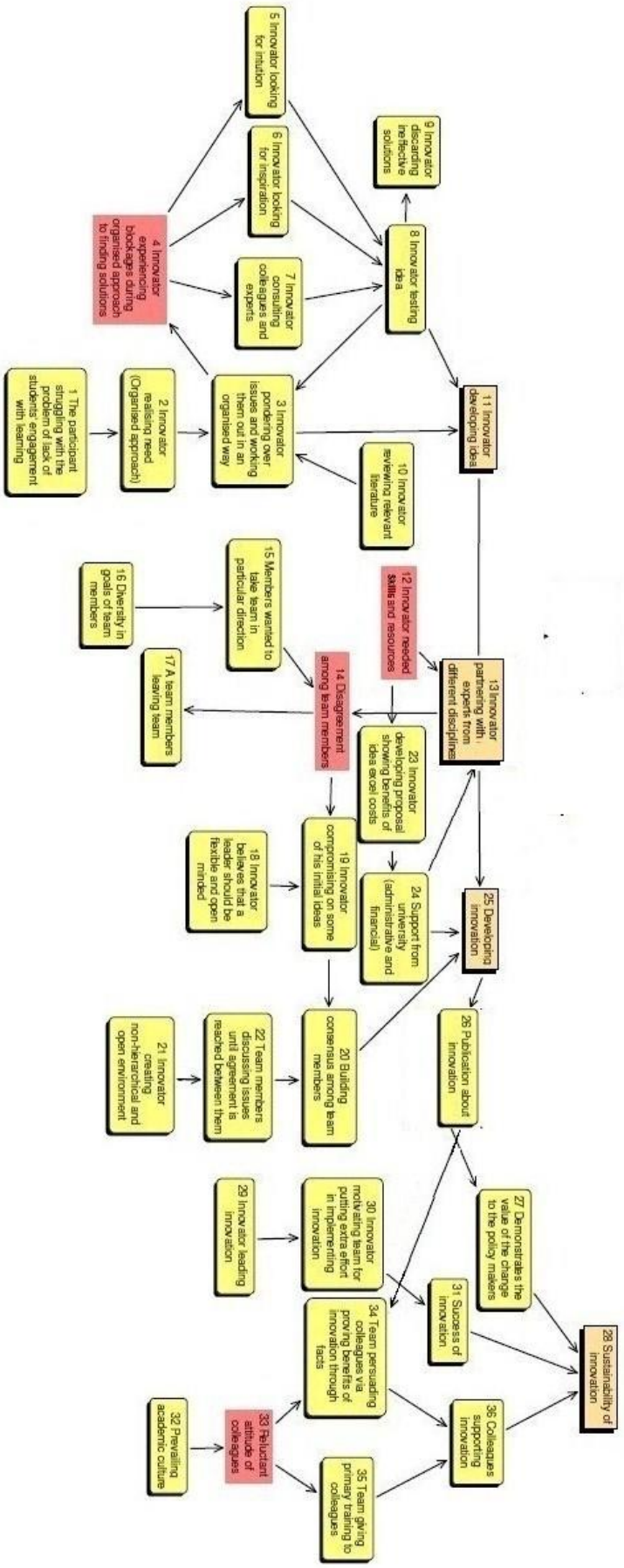


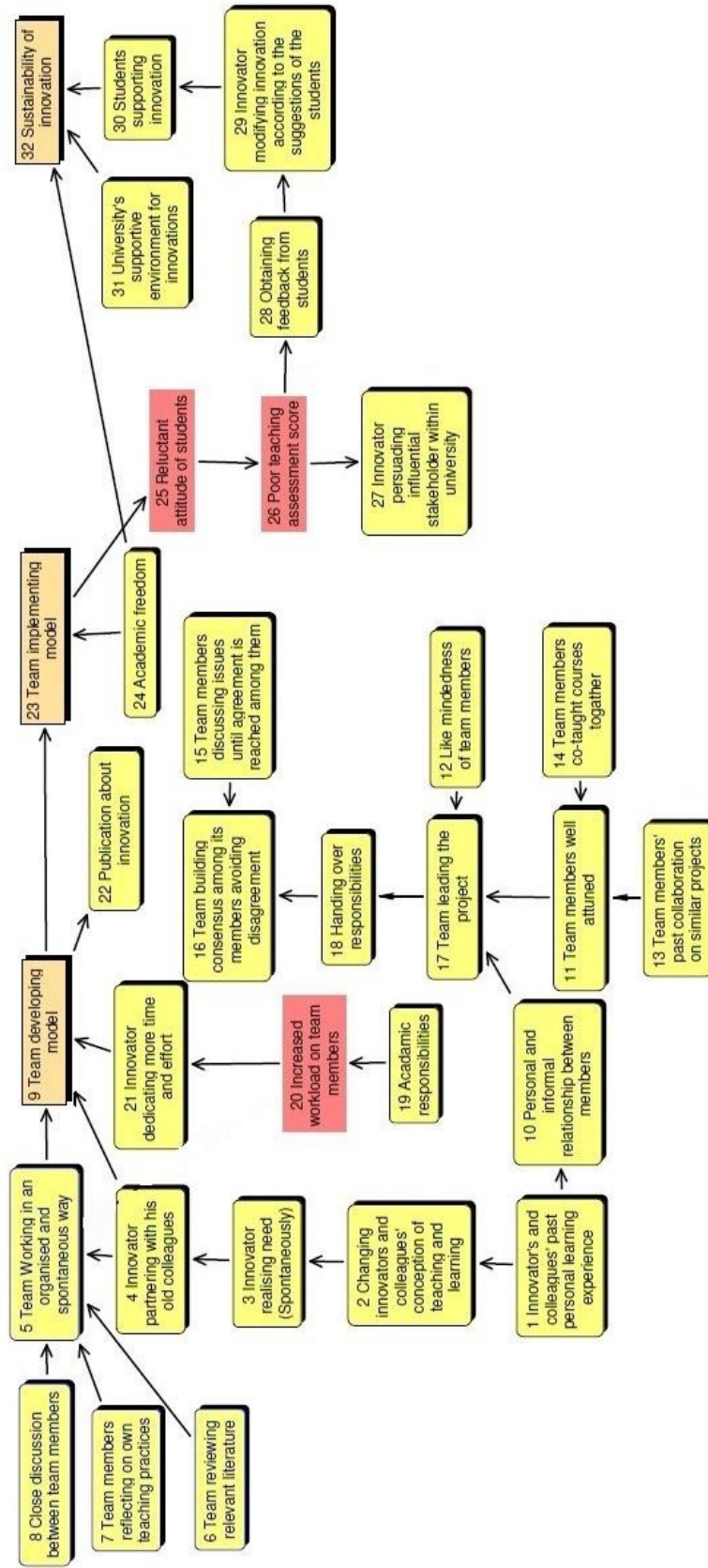


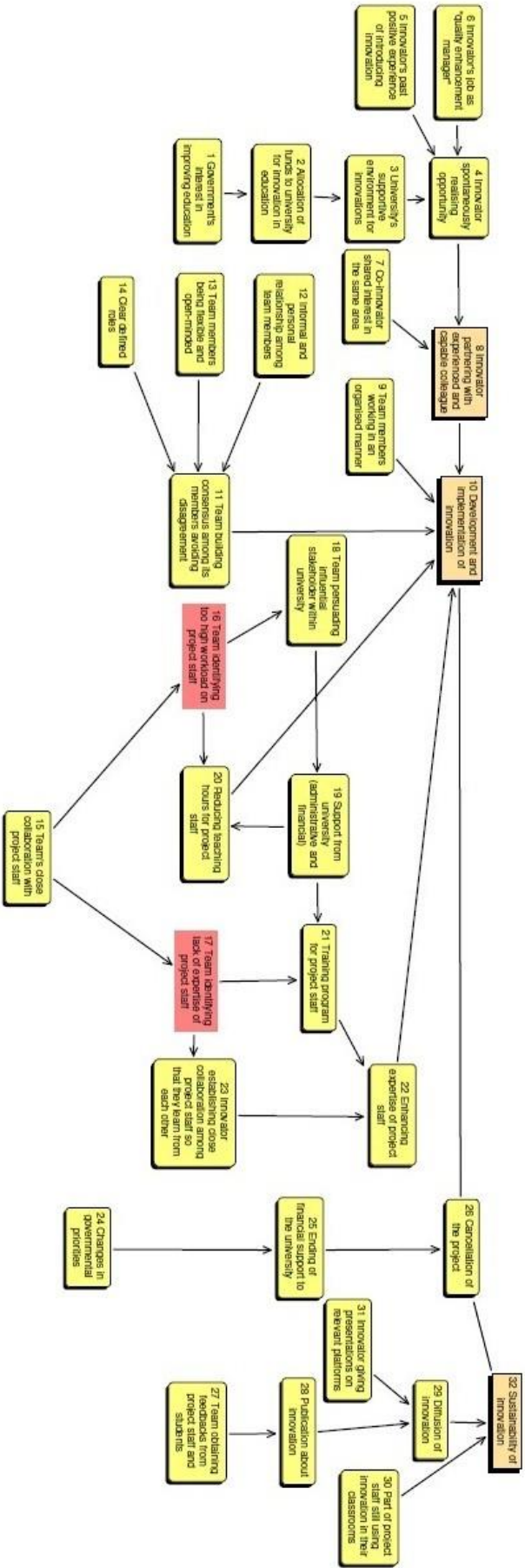


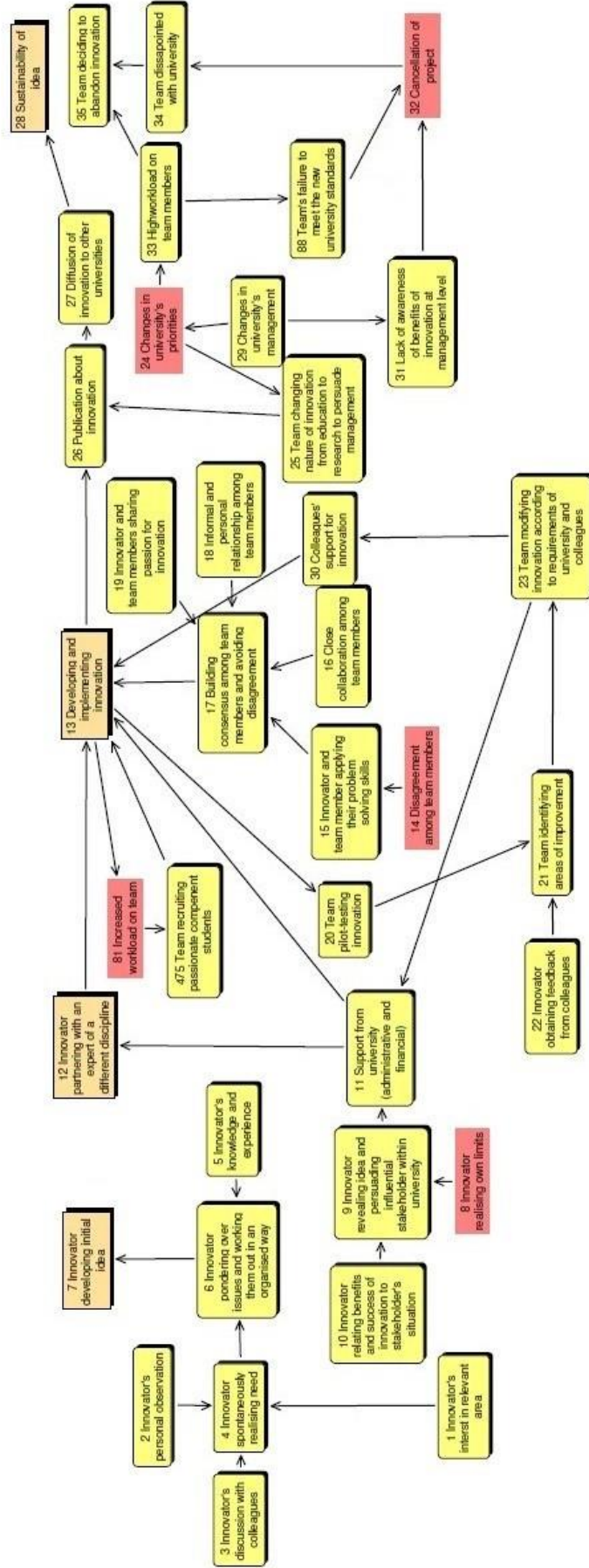


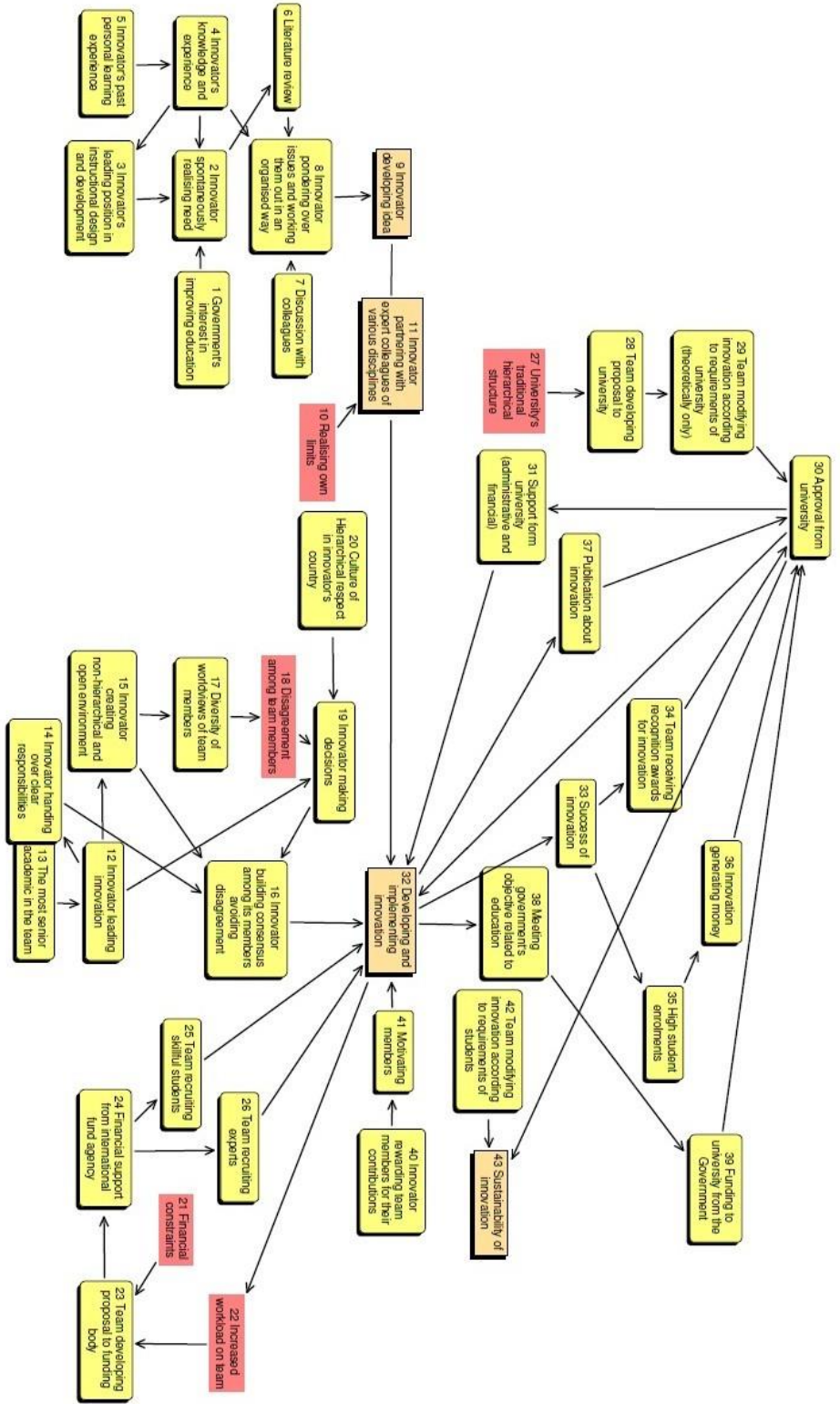


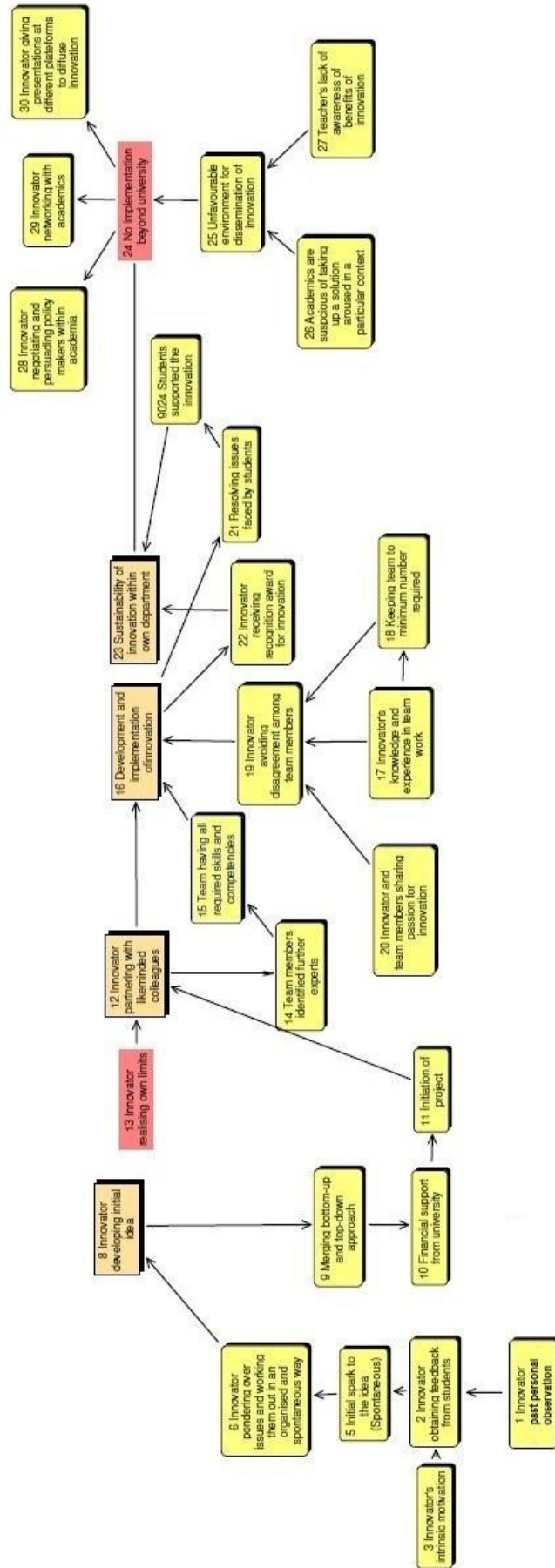


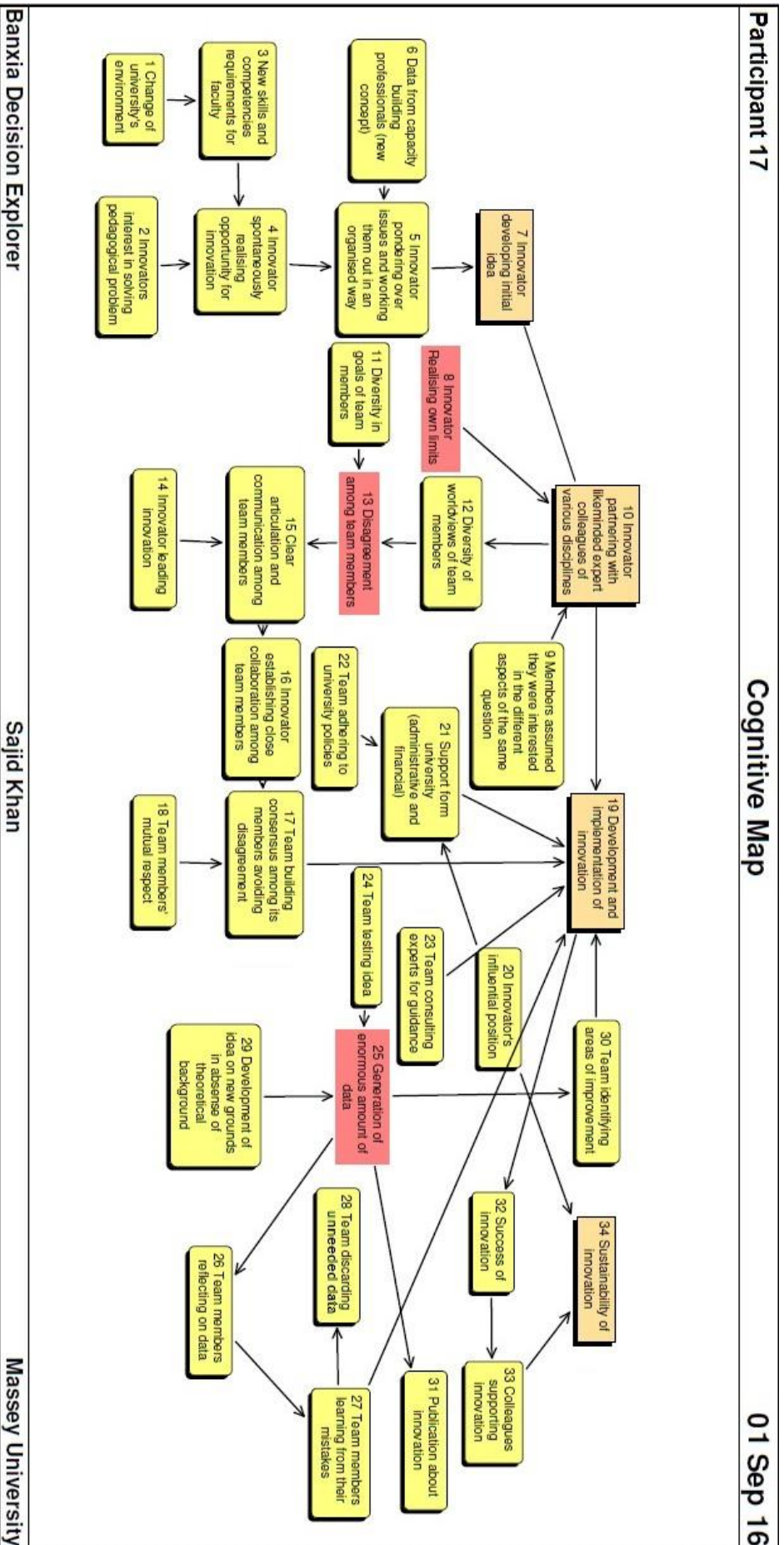


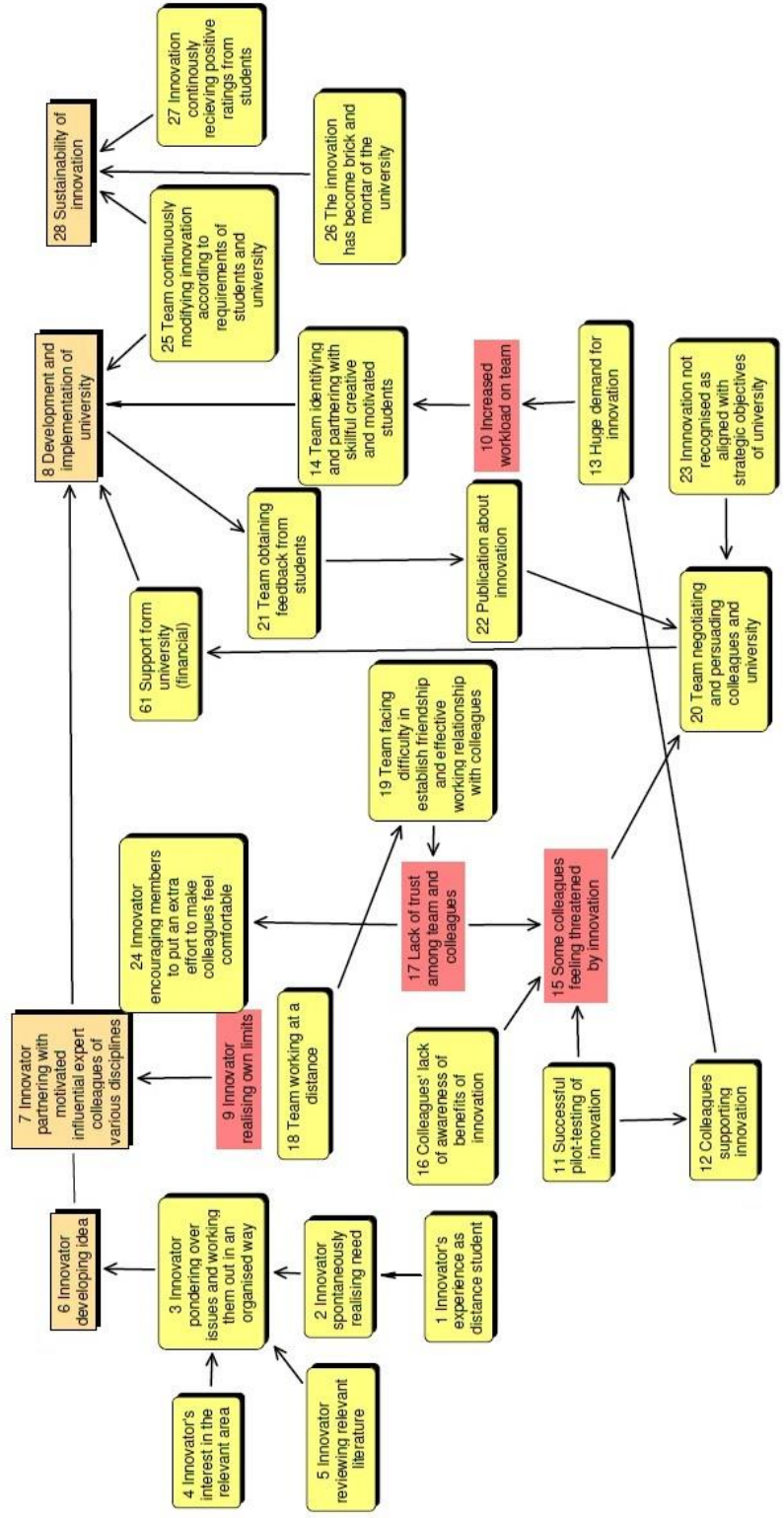


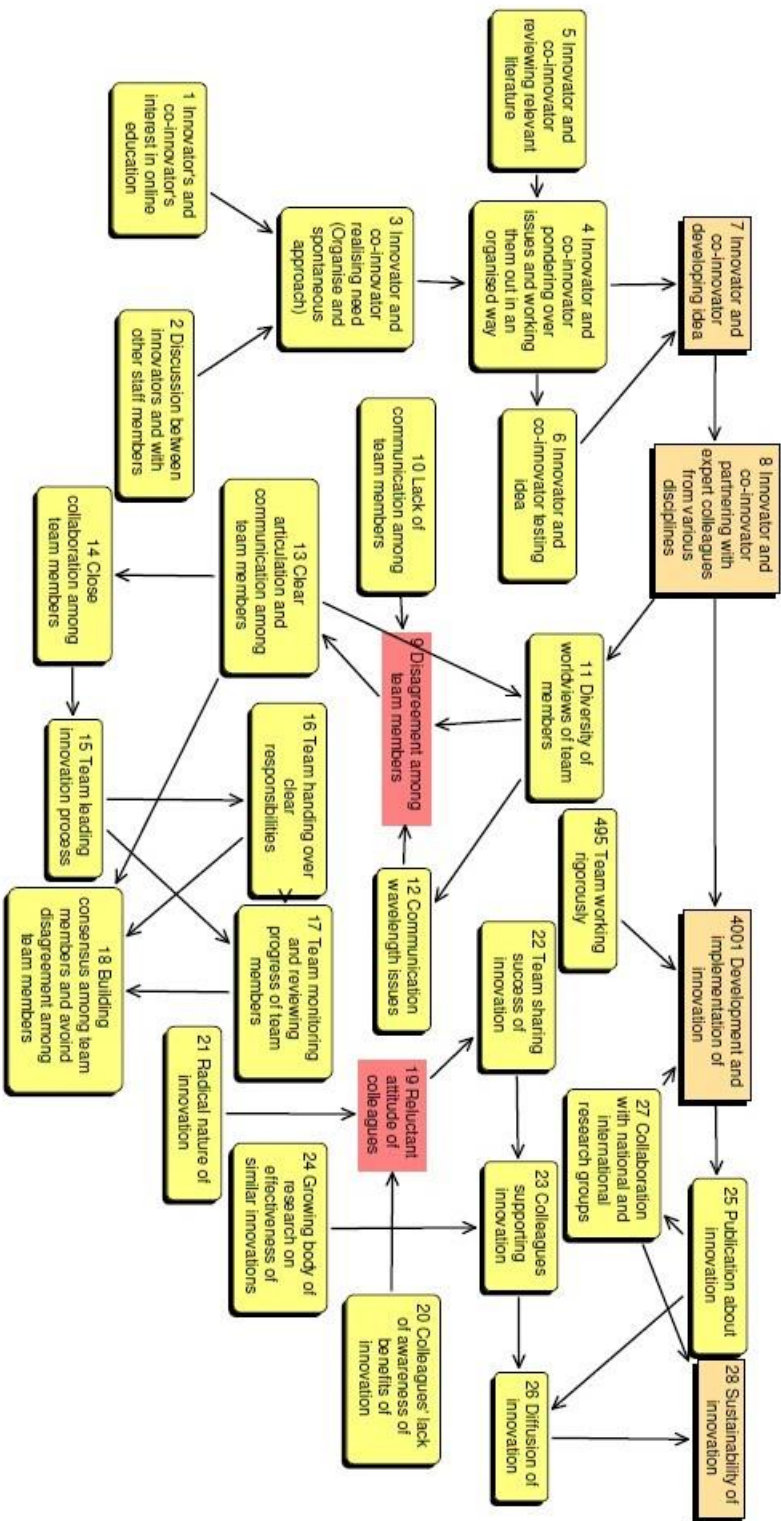


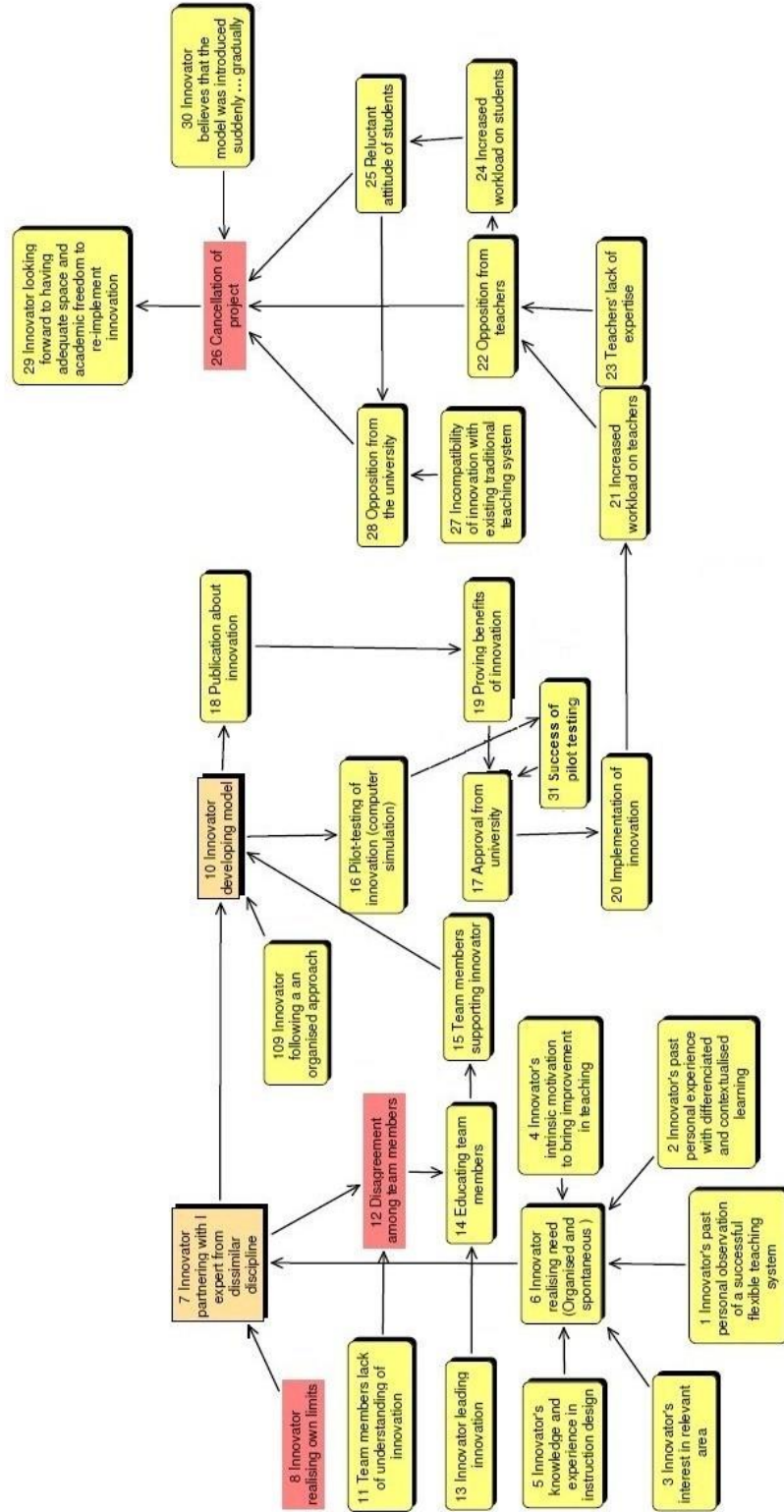


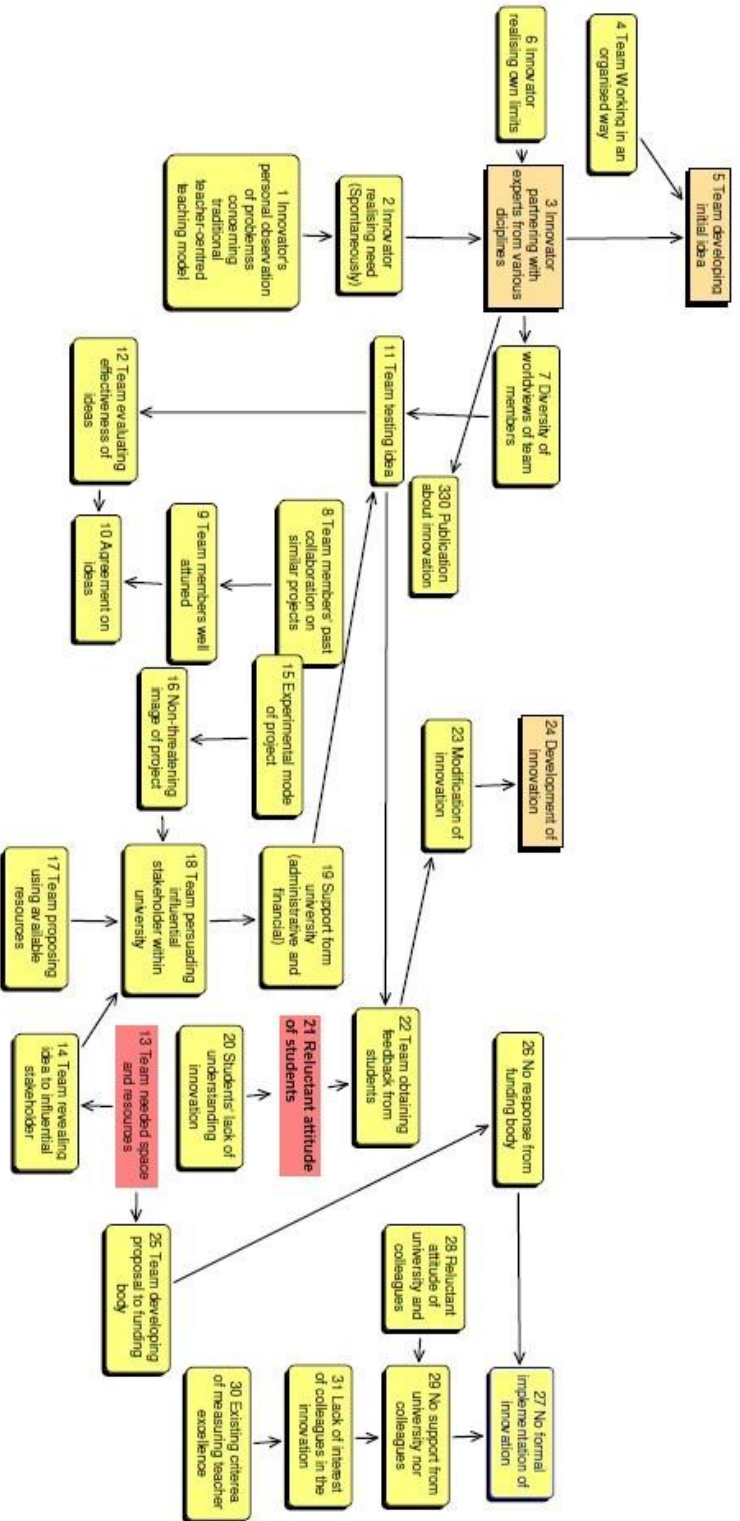


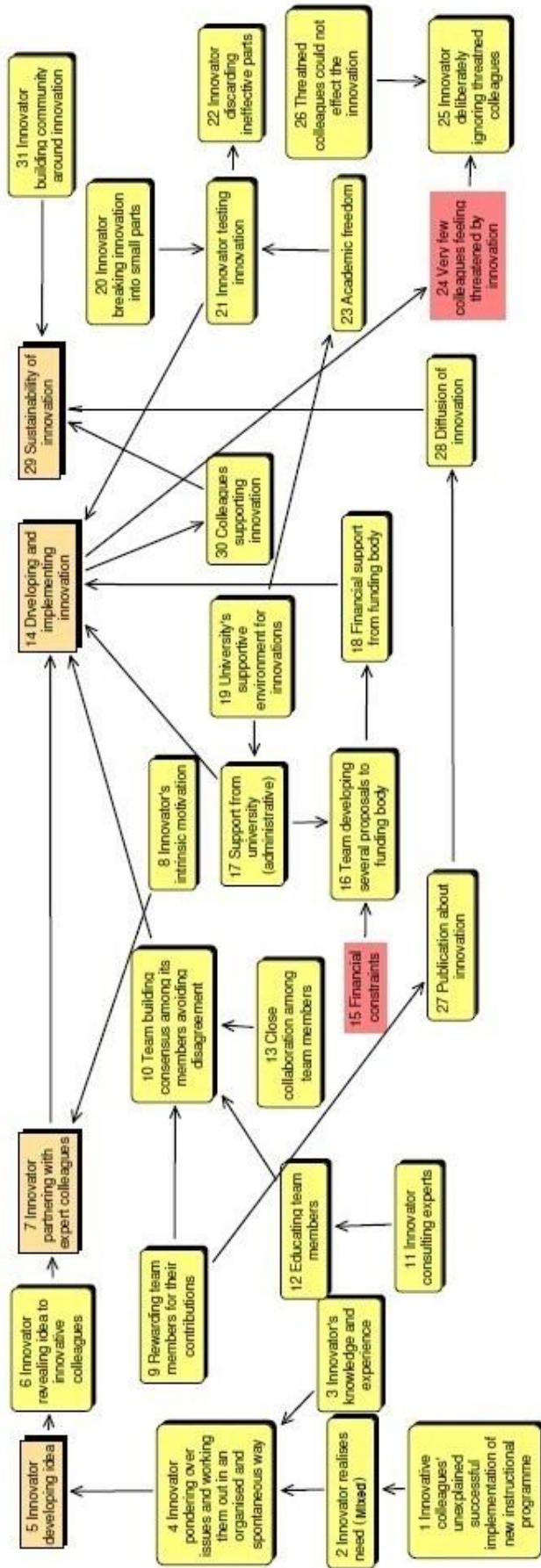


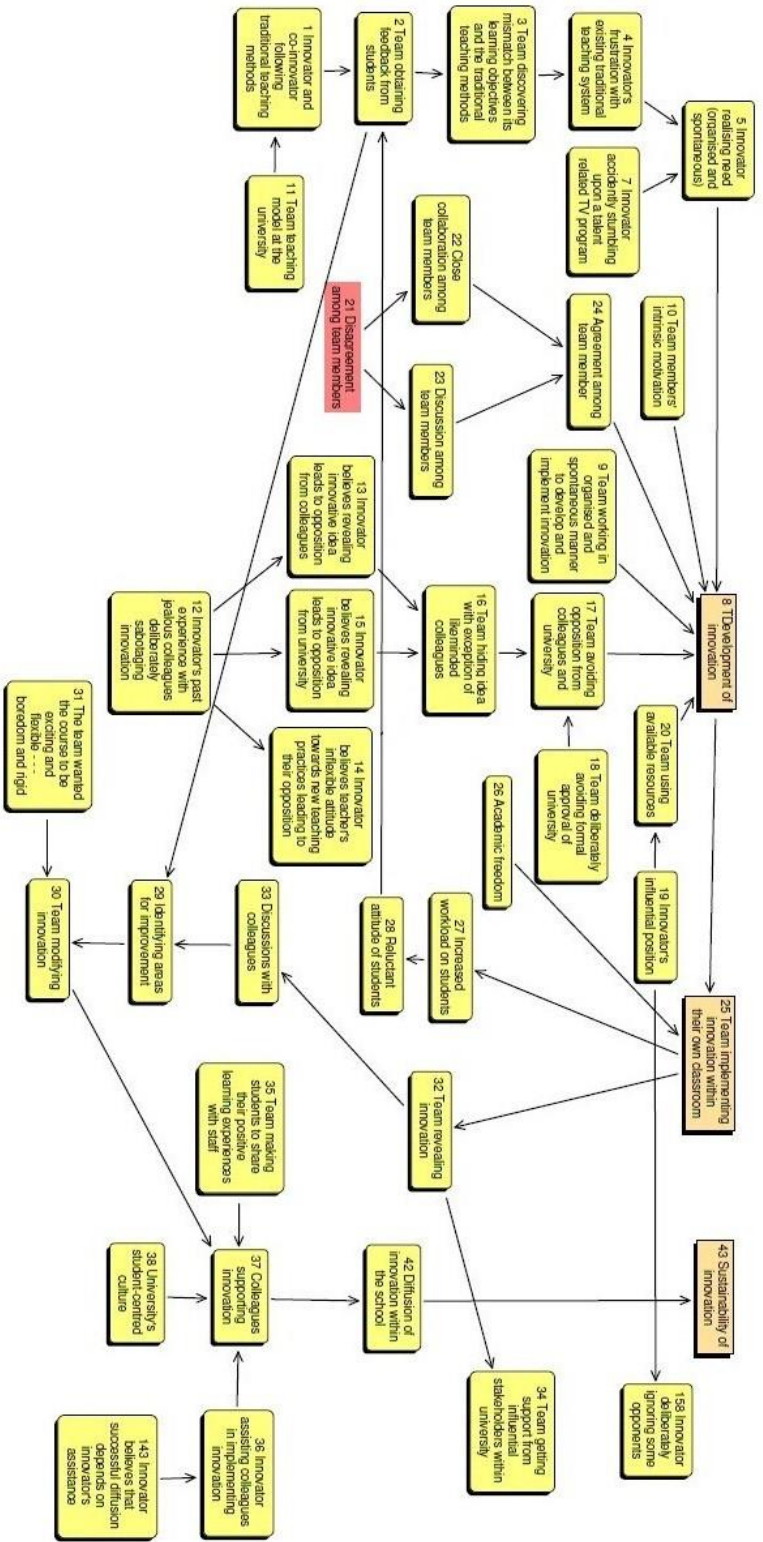


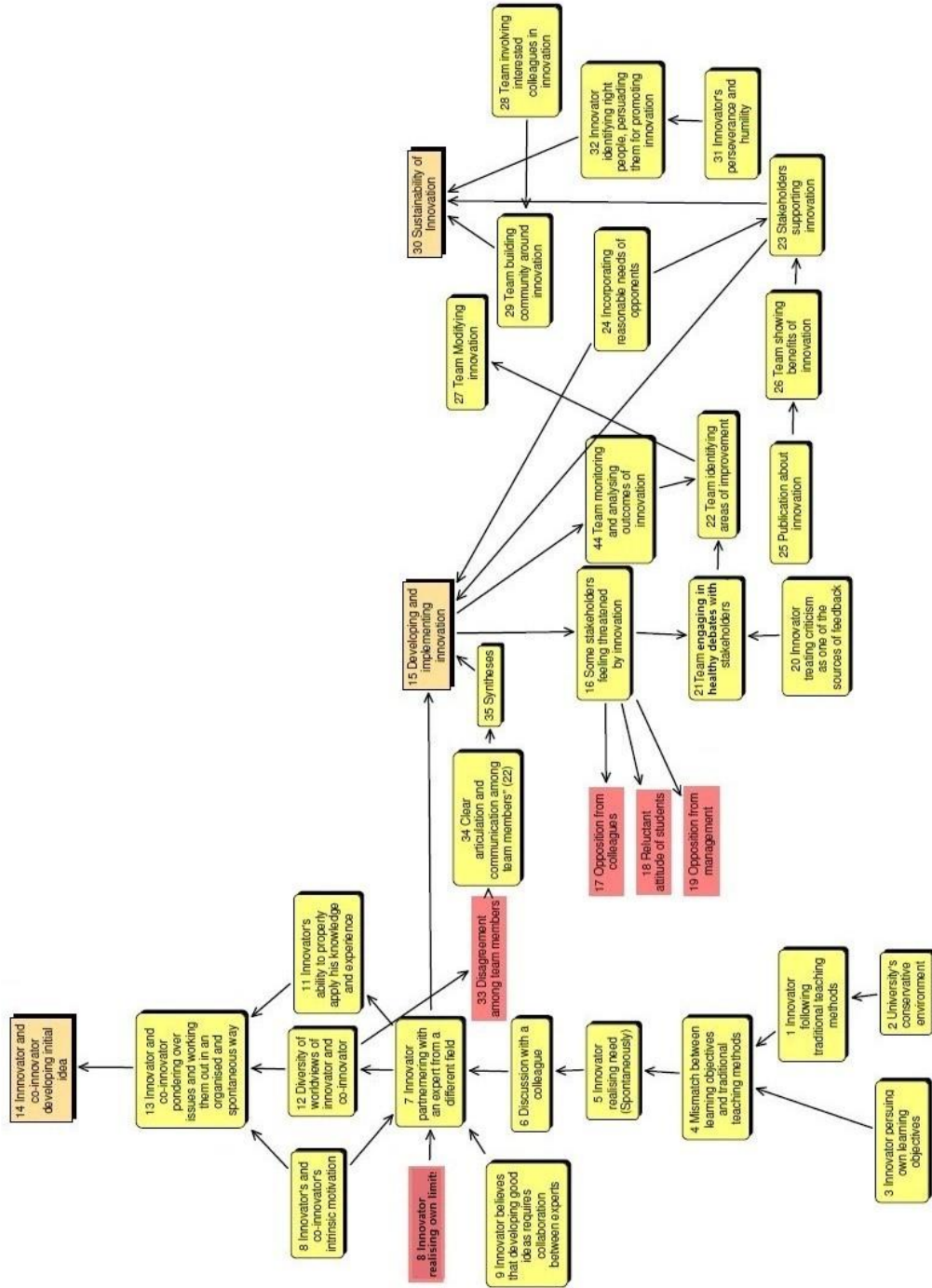


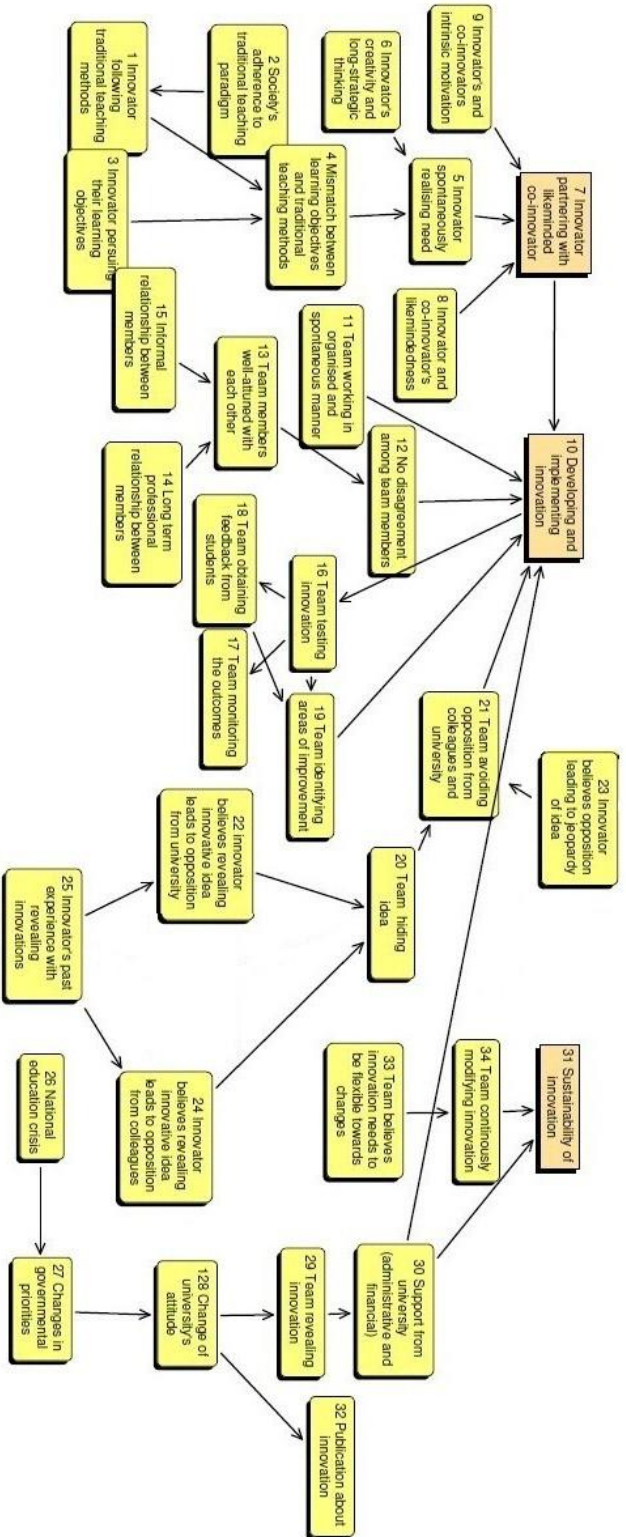


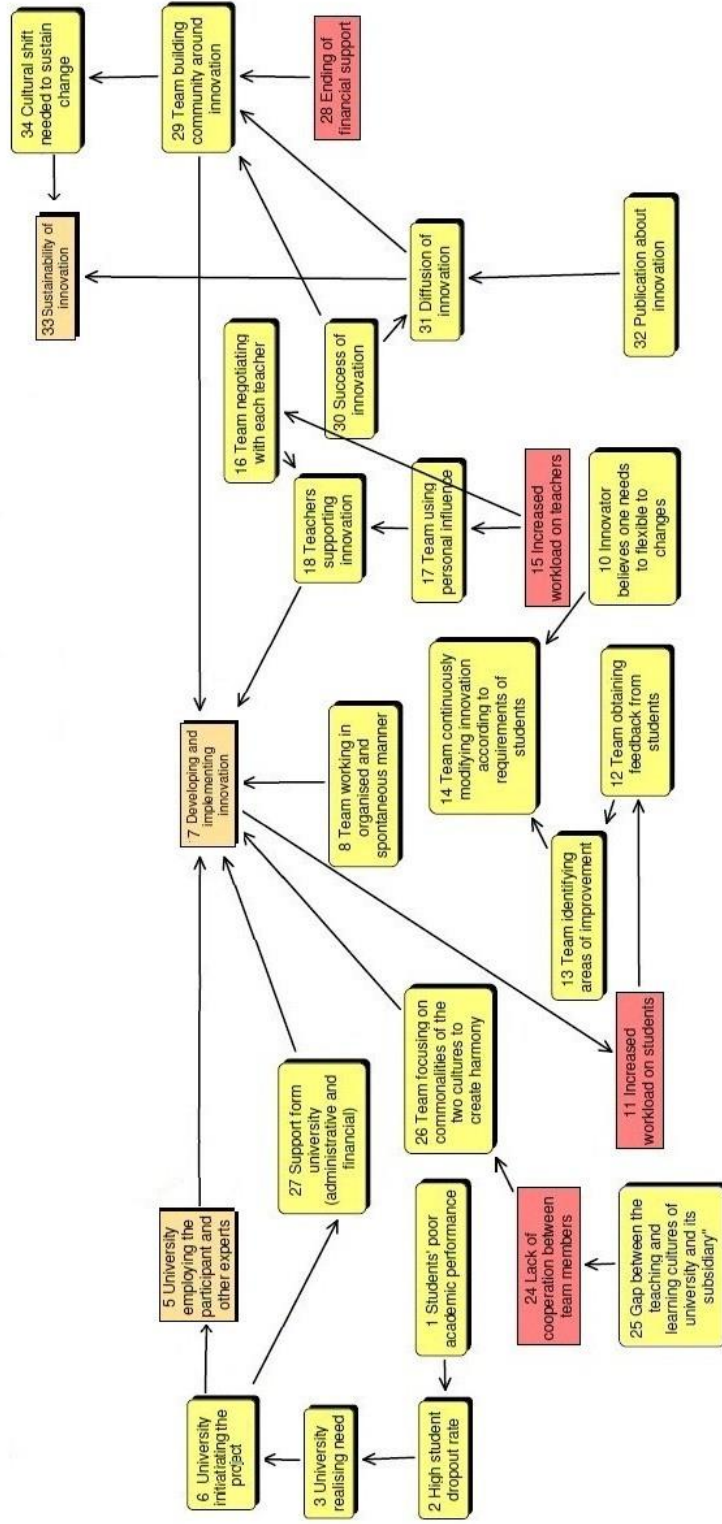


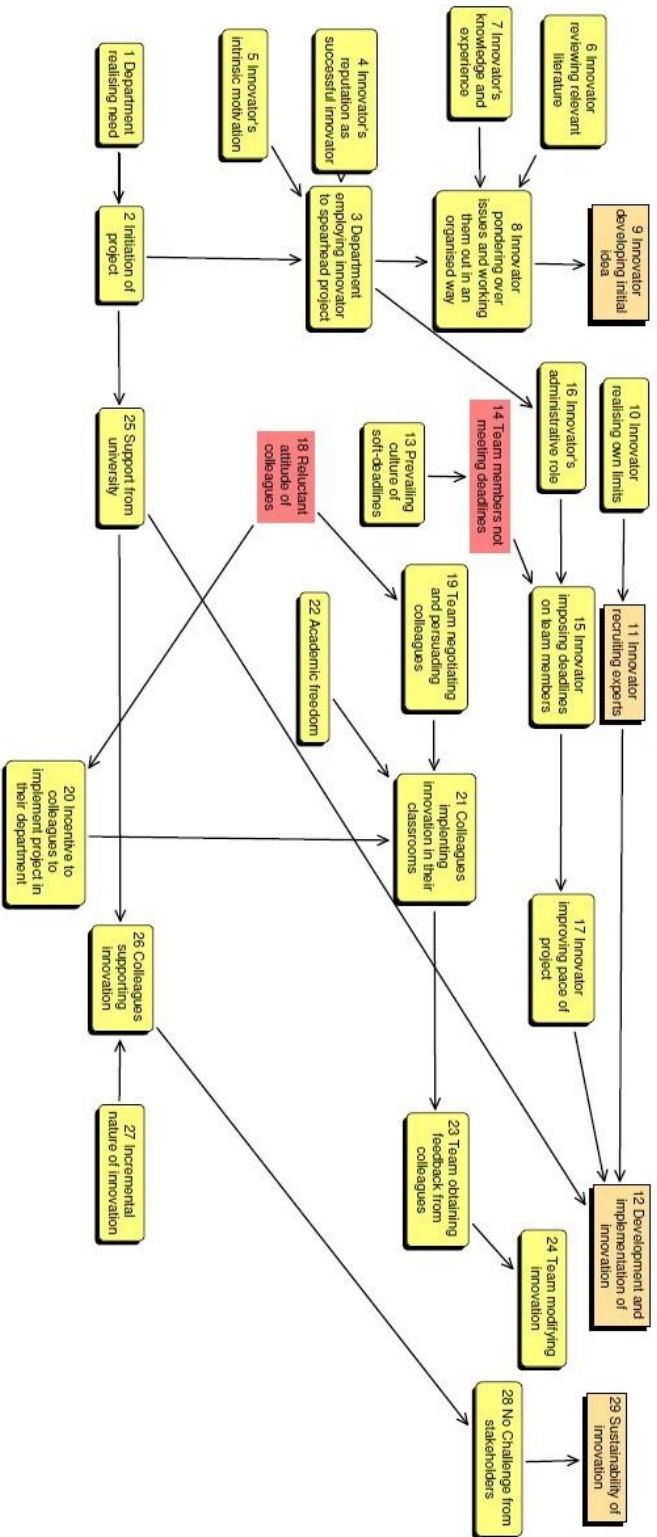


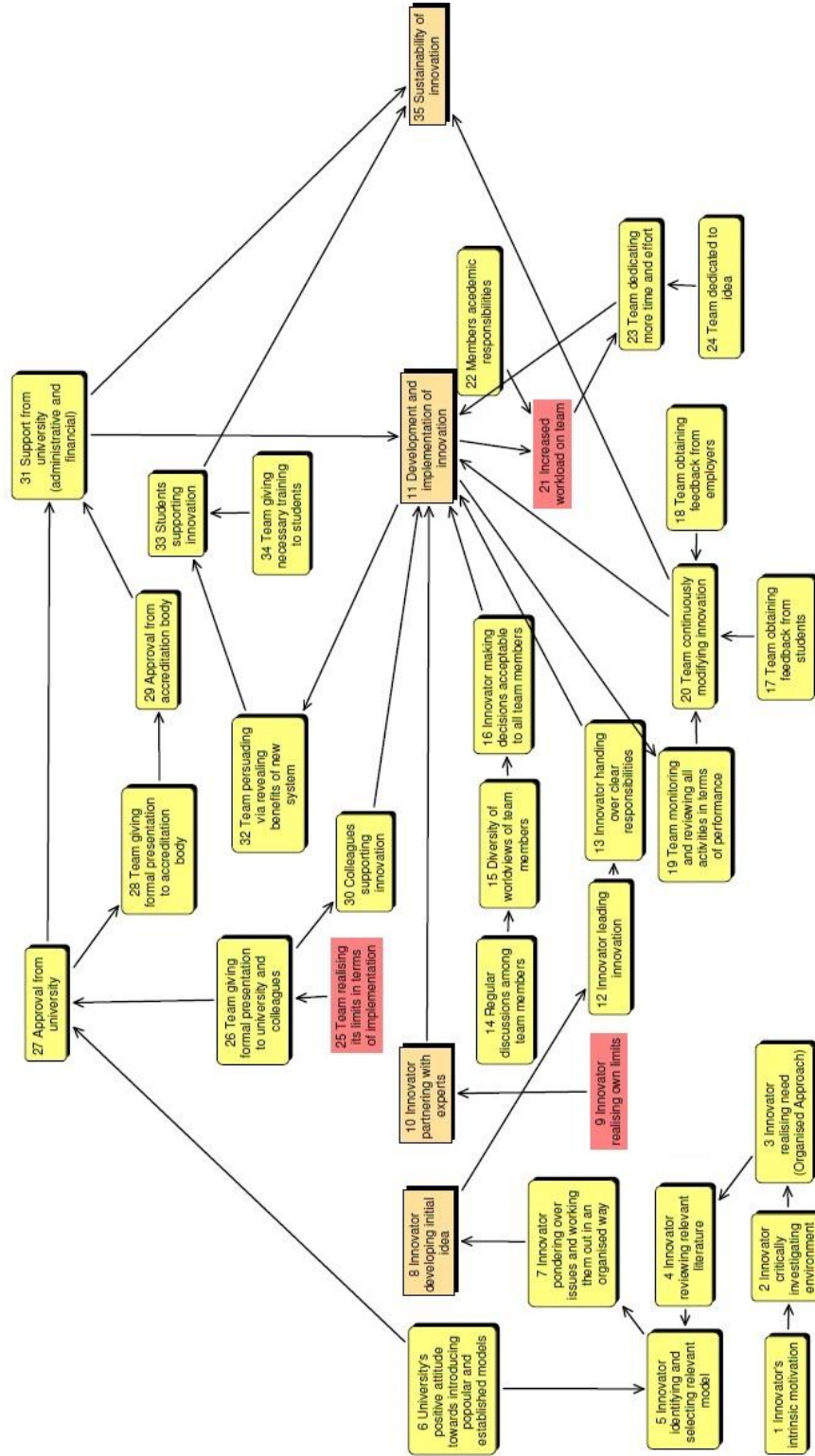








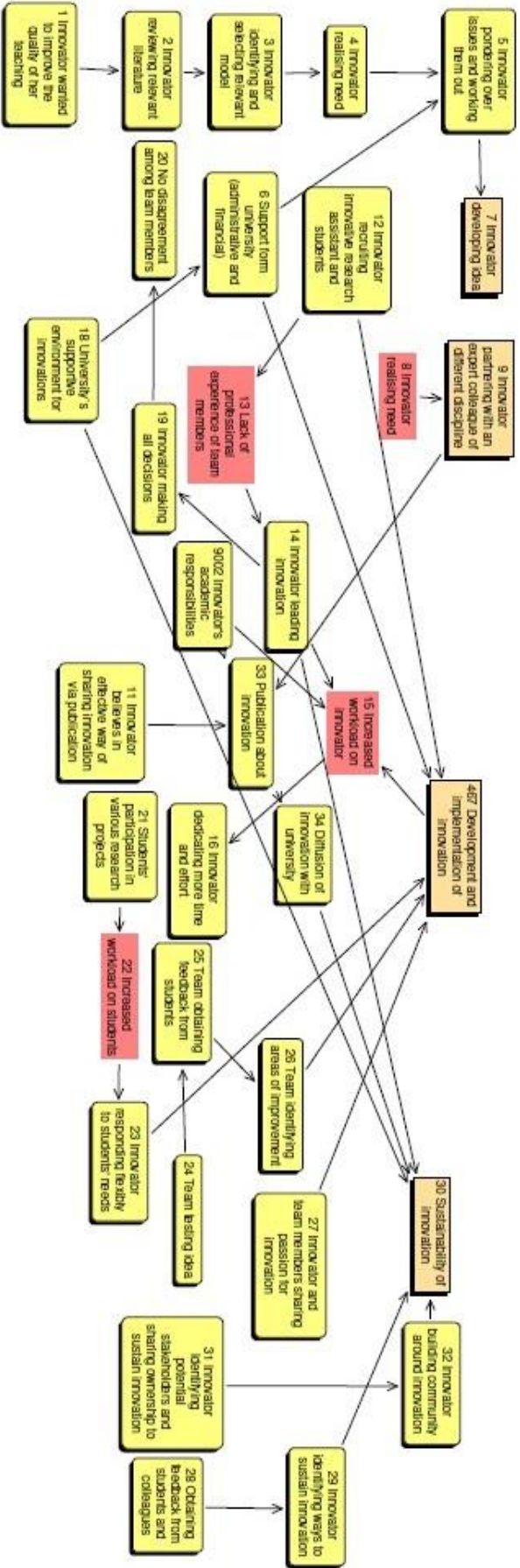




Participant 29

Cognitive Map

01 Sep 16



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