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**THE IMPACT OF
AN AESTHETIC ONLINE COURSE DESIGN TEMPLATE
ON THE LEARNER USER EXPERIENCE**

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ABSTRACT

Online learning is becoming ubiquitous, and increasing numbers of higher education providers use online delivery, usually managed through learning management systems, as part of their core business of education. A substantial body of literature exists in areas of online learning such as theoretical approaches or general principles of course design. However, there is little research that explores the user experience of online learners accessing their learning through learning management systems, and in particular, how the presentation or layout of the online courses impacts the learner user experience. As a result, online courses are often designed according to the preferences of the individuals responsible for their delivery, rather than as the end result of an evidence-based approach. This mixed-methods study sought to evaluate the impact of a course template, designed to create an aesthetic learning experience, on the learner user experience. The study was conducted in one college of a New Zealand university. Data was collected, using an online questionnaire and semi-structured interviews, from staff facilitating and students enrolled in first-year courses. Findings indicate that the use of a template that incorporated evidence-based design principles had a significant positive effect on learner user experience. Narrative was shown to be an important aesthetic construct, and the use of the aesthetic template was found to reduce the extraneous cognitive load of courses, increasing learners' sense of engagement and, motivation, and self-efficacy.

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CHAPTER 1 INTRODUCTION

Introduction

Online teaching and learning is by no means a new phenomenon. The offspring of traditional correspondence courses, offered primarily in print, and later supported by radio and television (Siemens et al., 2015), online courses, in forms that we would recognise today, first emerged on the education scene in the late 1970s and early 1980s. Although technological approaches varied substantially, pioneers focussed on using technology for interaction, rather than content management. Early examples include the collaborative learning model known as computer-mediated communications, offered at the New Jersey Institute of Technology (Hiltz & Turoff, 1978), and the Cyclops system operated by the Open University in the early 1980s, a system which allowed lecturers to interact with online students in real time using 'telewriting', which supplemented traditional teleconferencing with the real-time transmission of writing and drawing by telephone (McConnell & Sharples, 1983).

In the forty years since these early innovations, developments such as the advent of the internet, ubiquitous access to information, the development of mobile technologies, and the massive open online course (MOOC) have all impacted, to a greater or lesser degree, on the nature and delivery of university education (Allen, Seaman, Poulin, & Taylor-Strout, 2016; Gaebel, Kupriyova, Morais, & Colucci, 2014). Learning to teach and manage teaching within this rapidly changing online environment presents a unique set of challenges. Many university teachers learn to teach through an apprenticeship model, and teach as they were taught (Garcia, Arias, Harris Murri, & Serna, 2010). This means that their modes of teaching and the administrative and management processes associated with them, are based on traditional, face-to-face models. Managing the demands of online teaching in the online environment presents a unique set of challenges. In order to support

their staff to manage these demands, many institutions introduced learning management systems (LMSs) (Downes, 2012) such as Blackboard or eCollege, both launched in 1999, or Moodle in 2002. Their original title of *content management system* speaks to their primary purpose: facilitating the efficient delivery of sets of documents to lists of users. This primacy of the repository function contrasts starkly with the aim of those early pioneers of online technologies who sought to use technology to engage with online learners in real time. Although LMSs supported some of these engagement activities through discussion boards and chat rooms their main function was to facilitate the provision of content to students studying at a distance (Downes, 2012).

The use of LMSs has become increasingly widespread, with Moodle alone citing 73.8 million users across more than 87 000 organisations in 2015 (Pappas, 2015). Whilst some LMSs had some built-in aesthetic features such as predetermined layouts for the arrangement of content, and set heading hierarchies, others such as Moodle, relied on end users to develop the structure of the LMS within a particular context. Whilst the latter provides great scope for customisation, it also assumes a level of learning design knowledge and the technical skill to implement it on the part of the end user.

The adoption of LMSs by organisations is often followed by decisions to shift parts of traditional courses into the online environment in order to provide scheduling flexibility and to save costs (Allen et al., 2016). Consequently, even lecturers teaching traditional courses need to develop new skills. In addition to their traditional roles of researchers and educators, university lecturers are thus tasked with being learning materials designers, technology mediators, and online discussion facilitators (Bailey & Card, 2009; Hung & Chou, 2015) without the accompanying guidance and support necessary to do this effectively (Bailey & Card, 2009; Morris & Finnegan, 2008). At the same time, they are also faced with managing the demands of an increasingly diverse student cohort (Zepke & Leach, 2007), one that is time-poor, juggling study with the complexity of work and daily lives, and pragmatic about how they integrate study with these other activities (Baron & Corbin, 2012). This cohort also has increased expectations of interactivity in online learning (Cole, Shelley, Swartz, &

Conrad, 2014), online lecturer engagement (Baron & Corbin, 2012), and equity of experience between internal and online students (Carrol, Terrell, Reynolds, Welch & Merciecca, 2013). When these expectations are not met, the experience of this researcher has been that students frequently use the public fora of social media to discuss their experiences which may have damaging consequences for the institution's reputation. Consequently, teaching in this environment remains for many academics, 'a move into the unfamiliar, entailing risk-taking and challenges to their beliefs' (Gregory & Salmon, 2013, p. 256).

In the context in which this research was undertaken, there were no organisational online-course design guidelines, or minimum standards provided to lecturers. As a result, almost every online course's design was, to a greater or lesser extent, different from the other courses being undertaken by a student, and reflective of the individual lecturer's technical skills, aesthetic preferences and pedagogical understandings, rather than of a coherent and structured organisational approach based on the course design literature. Whilst some lecturers in this institution grasped the pedagogical challenges and opportunities presented by this environment, others struggled to understand how to teach effectively online, and their online courses remained primarily the 'sets of documents' described by Downes (2012).

Comments made by online students on social media, expressing frustration with the variability of the design and layout of their online courses first alerted this researcher to the problem. The issue was confirmed by the annual organisational student experience surveys. Over the course of several years, variability of the design and layout of the online courses were frequently cited by students as problems (Massey University, personal communication, 2013; 2014; 2015). Unsurprisingly, a common design template was frequently suggested for improvement of the online learning environment. Comments such as:

[Courses] need to be more similar to each other in [the LMS]. There is a lot of time wasted at the beginning of semester just finding where everything is for each paper (Massey University, personal communication, 2015);

and

My biggest problem with [the LMS] is the lack of consistency in the way that the [course] coordinators load their materials. It's always different for every [course]. It takes me a good 2 weeks to work out where each paper has stashed all the materials (Massey University, personal communication, 2015);

are typical of student feedback across the university.

In order to address this issue, the Director of Teaching and Learning (DTL) of one college in the university decided, in 2014, to implement an online course 'template', and insisted that all courses within the college be reformatted accordingly. The task of designing the online template fell to this researcher, as the college online consultant. An initial template was developed through consultation with the DTL and the University Accessibility and Disability Advisor. Although the literature was consulted, little research into the design and layout of courses in LMSs was found. As a result, the principles which underpinned the template were adapted from general web usability research.

It was agreed by this group that, to be successful, a template had to be simple for lecturers to implement and maintain, and visually appealing to students. In addition, the course narrative had to be immediately visible to students. This last requirement was particularly strongly argued for by the Disability Advisor. A proposed template was piloted with three courses at the end of 2014.

Although there was no formal evaluation conducted at this point, unsolicited feedback sent to lecturers facilitating the course from students was overwhelmingly positive, and the decision was made to extend the rollout of the course template across the college. However, whilst many academics embraced the template, there was also considerable resistance from some. Anecdotal

feedback to this researcher was that some staff thought that because the efficacy of the template had not been tested or fully demonstrated, it had no more value than their own course designs. Consequently, this project was devised to evaluate formally the impact of the template on the user experience (UX) of students, and to compare the UX of students in courses designed using the template to that of students in courses designed according to the lecturers' individual preferences.

Research aims for the study

This study investigates the UX of learners studying in online courses. It examines the relationship between the presentation and layout of the online course, and learners' UX. In particular, the experiences of learners studying in courses presented using the template are compared to the experiences of those studying in courses designed according to the preferences of individual lecturers, to determine whether the template use improves learner UX. The findings of this research will help inform future approaches to designing online courses.

It should be noted that this research and the review of the literature presented in Chapter 2 focusses specifically on the impact on UX of the way material is arranged and presented in the LMS learning environment, rather than on the UX of the LMS, or of specific learning objects that may be loaded within it. Although many aesthetic principles can be applied to all three of these situations, the use of bespoke learning objects at this institution is extremely limited, whereas the LMS itself is ubiquitous. For many online students, the LMS is the face of the university and all their teachers. In addition, there is already a substantive body of research into the design of learning objects, especially for training purposes (Clark & Meyer, 2011), whereas research into the aesthetic, or non-functional, aspects of LMSs and their impact on students is extremely limited.

This study aims, in part, to address this gap in the literature by answering the question, "What is the impact of a course design template on the UX of learners enrolled in first-year online courses?" In order to determine this, three sub-questions will be addressed:

- Is there a relationship, and if so, what is it, between UX and general demographic factors such as age, gender and previous online learning experience (OLE)?
- Is there a relationship, and if so, what is it, between being enrolled in a course designed according to an aesthetic template, and overall UX?
- Does adapting an aesthetic template have an impact on UX, and if so, what is the impact?

Context and rationale for the study

This study takes place within the context of a New Zealand university providing many online courses using a Moodle-based LMS. However, the college in which this study occurs offers a smaller proportion of online courses than the university average. Consequently, participants are a mix of ‘true’ online students who complete their degrees without physically attending campus, and those who enrol in both fully-online and in traditional face-to-face courses. All respondents access their course resources and learning materials through a Moodle-based LMS.

Participants in this study were, at the time, all enrolled in 100-level (equivalent to first-year undergraduate) courses offered by a single college. Participants are predominantly in the 18-24 age category, and more than two-thirds are female. Just under half are in their first semester of university study.

This study was formulated with two key purposes. Although its primary one, pragmatic in intent, was to evaluate the course design template to provide evidence for its continued use, the study also addresses a gap in the online learning design literature. As LMSs become increasingly ubiquitous, evidence of how to present learning in ways that facilitate positive learner UX will be useful, not just to the organisation in which the study took place, but potentially to a wider Moodle-based LMS user audience.

The background of the researcher

This research is methodologically pragmatic. As the designer of the template being evaluated and an employee of the university in which the research was conducted, the researcher is within the situation under investigation, but her values and beliefs can contribute to the richness of the research (Tashakkori & Teddlie, 2010). Her background is described so her influence on the nature of the study and the interpretation of the data can be considered.

I have always been entranced by the world of the storyteller. As a child I passed my days in imaginary worlds created by others; as an adult, I chose my first career, that of English teacher, in the somewhat naïve belief that it would allow me to share the magical world of the storyteller with my students. However, I soon realised that the structure, rules, and contexts of traditional secondary school systems, combined with my own pedagogical limitations, created barriers. I became more interested in the process of building an educational story than in stories themselves, although it was clear that the fundamental processes of narrative still underpinned everything.

My ten years' work as an educational publisher introduced me to the important role design plays in the communication of educational narrative. Collaborating with expert textbook designers initiated me into the principles of colour, shape, hierarchy and structure, first in book, and then in online learning design. I later learned to develop teaching narratives according to these principles as I authored educational textbooks and children's story books myself.

A move into the tertiary education sector, my third career context, saw me begin the first of a series of roles in instructional design and professional development. This move coincided with a decision to continue my own education, and I completed a postgraduate diploma in education, studying online. My learning experiences were mixed, ranging from courses delivered via pdf with almost no lecturer engagement, to highly-crafted, interactive courses with engaged and connected lecturers. What struck me most, however, was the variation in the appearance of the courses, and how this impacted me as a learner. Some of the best courses in terms of lecturer engagement were the ones

that were most frustrating to me in terms of design: I constantly had to relearn what elements were called and where critical course resources were located.

Joining the online students' Facebook pages showed me that I was not alone in frustration, and I questioned why there was so much variability in course design, and what could be done to fix it. Consequently, when asked as part of my role to suggest strategies to improve student experiences, implementation of a course design template seemed obvious. Students clearly perceived the need, and a template had the potential to offer efficiencies for course design support: course builders would no longer have to negotiate the design and layout of each course with academics. However, as mentioned earlier, some lecturers have not been convinced of the value of such an approach. It is hoped that the findings of this research study will go some way towards answering these questions.

Thesis overview

This thesis is divided into six chapters. The first introduces the aims and rationale for the study, and provides a background against which the research should be interpreted. The second chapter reviews the literature on aesthetics and narrative in the context of UX in the online environment. Chapter three explains the mixed methods methodology which underpins this study, and outlines the approach used to collect the data; and chapter four presents the results of analysis of that data. Chapter five discusses the key findings with reference to the literature. Chapter six ends this study by presenting the conclusions and recommendations for practice and for further research, before outlining the limitations of the study.

CHAPTER 2 LITERATURE REVIEW

Introduction

This chapter presents the literature underpinning this research project. Wherever possible, the review is based on academic texts such as peer-reviewed journals and books. However, the rapidly changing nature of the research area means grey literature such as professional blogs, trade reports, and white papers have been included. Some years will pass before the information in these is reflected in academic literature. All the literature reviewed comes from an English language, western cultural paradigm, with a dominance of publications, both academic and otherwise, from the United States.

The first section of this chapter outlines the review parameters and discusses some of the challenges of reviewing literature in a rapidly evolving area. The second section explores definitions of the aesthetic experience, before the challenges of understanding UX (both generally and in the context of online learning) and the increasing interest in the impact of aesthetics on UX are discussed in section three. The final section focusses on the learner UX, considering both the importance of understanding the context of the online learner, and how cognitive load theory provides guidelines for the design of aesthetic online learning experiences (OLEs).

The nature of the user experience literature

User experience studies and usability testing as areas of research have their roots in ergonomics and Human Factors research, and their origins can be traced back at least as far as military equipment testing in World War II (Ritter, Baxter, & Churchill, 2014). However, the emergence of usability studies in computer hardware and software development began only in the 1980s, marked by the publication of the first book detailing human-computer interactions in 1984 (Rubinstein & Hersh, 1984). The development and spread of the internet in the 1990s catalysed web usability research (Nielsen, 2008). A search for the term 'usability studies' in the Google Scholar online database

reveals over 16,000 publications in this area since 1990, and a search for the term 'user experience' generates almost 90,000 results. The Google Scholar database was chosen as an entry point for this literature review as it includes grey literature in the results list. Although not traditional scholarly sources, much of the work into usability studies and UX is reported on well-regarded blogs and websites such as usability.gov and nngroup.com. Sites such as these are written and followed by industry leaders; report industry trends and research more rapidly than is possible using traditional academic publishing means; and are often vigorously peer reviewed by other industry leaders through the comments section. The inclusion of grey literature in this review is thus essential to a thorough understanding of the field. Although Google Scholar was used for a preliminary overview of the literature, several other databases, in particular EBSCO, ERIC and Scopus, were searched using the same search terms.

Given the enormous and rapidly growing body of research, a systematic review of usability and UX literature presents significant challenges of scale beyond the scope of this project. Consequently, a narrative approach to the review is employed to facilitate an iterative literature search style (Baumeister & Leary, 1997), and 'grey literature' inclusion (Jones, 2004). Much of the foundational work in web-based usability studies, and UX research in particular, from leaders such as Jakob Nielsen and Donald Norman, is published in non-academic formats. The value of including such work in an academic literature review is supported by Jones (2004), who argues that although grey literature "is non-conventional, fugitive, and sometimes ephemeral, [it is] by its nature, often more inclusionary than standard, peer-reviewed and commercially published work" (Jones, 2004, p. 99).

One of the challenges reviewing usability and UX grey and academic literature is the vast range of methodologies, contexts and research foci. Indeed, the blurring of boundaries and the application of research findings from, for example, usability testing into mobile phones (Desmet, et al, 2001, as cited in Hassenzahl & Tractinsky, 2006) to the design of online courses, may seem inappropriate to some. However, Baumeister and Leary (1997) argue that narrative literature reviews are

“particularly valuable when one is attempting to link together many studies on different topics, either for purposes of reinterpretation or interconnection” (Baumeister & Leary, 1997, p. 312). As much of the literature in usability and UX, and in particular, usability and aesthetics, is based on exactly this sort of reinterpretation and interconnection, it is argued that the narrative literature review is appropriate.

For the purposes of this research project, the initial literature search was restricted to English-language material published between 1990 and 2017. Searches were conducted first using the terms ‘user experience’, ‘usability’ and ‘online aesthetics’, and were later extended to include related terms such as ‘UX’, ‘learner usability experience’, ‘learner UX’, ‘narrative’, ‘LX’ (learner experience) and ‘message design’. Articles were reviewed for inclusion based initially on title and abstract, and then on the methodological strength of the original research and its relevance to this research focus: the aesthetics of online learning design. Relevant references in articles retrieved during initial research were also included in this review.

Definitions of aesthetics

The study of aesthetics is not new; discussions of the rules of ordered design can be found in writings as far back as Socrates and Aquinas (Lavie & Tractinsky, 2004). However, definitions vary. Some focus primarily on visual appeal, such as Lavie and Tractinsky’s (2004) explanation of aesthetics as a pleasing appearance or effect, or Thüning and Mahlke’s view of beauty (2007), although the latter authors also address the experiential and subjective aspects. Other definitions focus on emotional or human aspects, such as David and Glore’s (2010) definition of aesthetics as a way of arranging elements (of a web page) to appeal to users’ emotions. Sonderegger and Sauer (2010) offer a more extensive definition, suggesting that aesthetics comprises both objective components such as colour and font, and a subjective component: the degree to which individuals *feel* that a design is pleasing.

The place of aesthetics in learning design originates in the early twentieth century, in the work of Dewey, who describes a learning experience as aesthetic when it is unifying and transformative. He places the focus of aesthetics on the learner's experience and emphasises the link between "What is done and what is undergone" (Dewey, 1934, p. 50). Subsequent research into aesthetics in education focussed on a variety of related topics. Apps and MacDonald (2012) describe the way classroom design and aesthetics contribute overt and hidden signals that influence the process of teaching and learning. For example, classrooms with utilitarian designs and furnishings which may echo those found in industry and supermarkets may warn students that "this is a functional place to work but not necessarily a place to live and thrive" (Apps & MacDonald, 2012, p. 50). Sutherland and Ladkin (2013) note similar findings in adult education, describing the way aesthetics contributes to the development of effective executive learning spaces, noting how the arrangement of a traditional lecture theatre creates a very different power hierarchy from that generated by an informal learning context. These authors also examine the concept of the teacher as an aesthetic agent, facilitating changing strategies and approaches as the learning experience and accompanying social interactions unfold. The teacher as an aesthetic agent is also explored in depth by Girod, Rau, and Schepige (2003) who describe the central role teachers play in connecting students to the 'beauty' of their subject, noting that those teachers who are successful in transferring an aesthetic understanding create compelling learning experiences.

Despite general acceptance of the place of aesthetic experiences in traditional teaching, research into the aesthetics of online learning is still relatively undeveloped (Gray, 2015) and discussions of aesthetics in the specific context of designing learning within an LMS were not found during the course of this literature search. Nevertheless, speaking in general terms of online learning, Parrish (2009) argues that aesthetics includes not only the look and feel of the learning, but also "the rhythms of instructional activities; methods for creating intellectual and emotional tension and revealing unity within content sequences; strategies for providing memorable closure to learning experiences; and the sensory impact of classrooms, computer interfaces, and texts" (p. 513). Miller's

(2007) definition of aesthetics is narrower, focusses on the learner's experience and suggests that aesthetics refers to the aspects of the learning designed to enhance the learner's overall experience rather than those elements simply designed to meet the instructional purpose of the learning. Both Parrish and Miller view the affective aspects of learning as critical to overall learning experience. Despite this link, research into methods of designing for specific learning experiences remains in its infancy. Gray (2015) notes that "learning interventions are defined more by their prescribed learning outcomes than by the kinds of feelings and emotions the designer wishes the learner to feel while experiencing the learning" (p. 200). Gray also notes the challenge of designing for a specific UX, reiterating the earlier work of Boling, Eccarius, Smith, and Frick (2004) who found it impossible to determine definitively in advance a learner's response to a learning intervention. Nevertheless, it is the position of this research study, that whilst it may be impossible to guarantee a specific UX, it is possible to design online learning that is aesthetic; that is, learning that connects users to the beauty of the subject by removing unintended barriers created by learning design and presentation. To understand how this connection can be achieved, it is necessary to examine the UX literature and the contexts of online learners. These topics are explored in the next two sections of this review.

The evolution of usability and user experience research

Computer, web page and online learning usability studies first emerged as a unique area of research in the late 1980s and early 1990s. As would be expected in an emergent field, much of the earlier published work in this area focussed on exploratory attempts to define usability (e.g. Davis, 1989; Nielsen, 1994; Subramanian, 1994) and on identifying suitable methodologies for measuring usability (Albion, 1999; Molich & Ballerup, 1990; Nielsen, 1994; Nielsen & Landauer, 1993). Early research was founded in empiricism: the idea that usability could be defined by observation and measurement, without consideration of the broader UX (Hassenzahl & Tractinsky, 2006).

The Technology Acceptance Model (TAM) (Davis, 1989) marked a step towards consideration of the human experience of technology interactions. It proposed two key factors influencing how users

perceive a technology (in this research, 'electronic mail'): perceived usefulness and perceived ease-of-use. The scales developed by Davis were utilitarian in approach and included items such as 'quality of work', 'control over work', 'work more quickly', 'increase productivity', 'accomplish more work', and 'makes job easier' (Davis, 1989, p. 329). The publication of this model led to several subsequent studies (Adams, Nelson, & Todd, 1992; Segars & Grover, 1993; Subramanian, 1994), all of which attempted to provide empirical evidence about the relationship between these functional factors and system designs for a variety of technologies including voicemail, word processing and spreadsheets. These subsequent studies qualified Davis' original findings by identifying factors influencing perceived usefulness and ease-of-use, for example, changing experience with an application or tool over time (Adams et al., 1992), the nature of the task, and the characteristics of the user (Segars & Grover, 1993).

The first consideration of UX, insofar as the role and experience of the user are acknowledged as aspects of usability, can be seen in the work of Shackel and Richardson (1991). Although the primary focus of their research is the need to make information technology easier, faster, and therefore cheaper to use, their measure of usability includes user satisfaction measures as well as effectiveness and efficiency.

The publication of Molich's seminal work examining the reliability of heuristic evaluations as a method of usability analysis (Molich & Ballerup, 1990), and the subsequent work by Nielsen and Landauer (1993), marks a significant development towards the 'democratisation' of usability testing, as processes moved from complicated usability tests towards a set of simple heuristics. Relevant in the context of this research project are the nine heuristics they identify: "simple and natural dialogue; speaks the user's language; minimises user memory load; be consistent; provide feedback; provide clearly marked exits; provide shortcuts; good error messages; and prevent errors" (Molich & Ballerup, 1990, p. 249). Unlike the criteria in previously mentioned studies which focus on aspects related to workplace productivity (pace and quality of work, and most significantly, the shift from

‘usability testing’ to ‘UX research’), Molich and Ballerup’s criteria frame usability in the context of the users’ own experience rather than on its impact on user productivity.

Despite these early developments, usability tests founded on strategies to evaluate usability according to criteria such as error reduction or prevention, navigation speed or numbers of clicks (Albion, 1999; Nielsen, 1994) remained the focus of most research at this time. The research methodologies remained largely quantitative, concentrating on measurement of user interactions through experimental, heuristic evaluation or user observation methods supported by user log analysis (Avouris, Tselios, Fidas, & Papachristos, 2003). The object of the research remained with the tools or infrastructure rather than the user’s *experience* of the interaction (Hassenzahl, 2013).

Despite the limitations of this positivist approach, a great deal of useful research emerged concerning what creates a ‘usable’ design. Nielsen and Loranger (2006) collate research on a wide range of factors including navigation, information architecture, typography and page design and present it in a manner accessible to practitioners. The guidelines they propose identify five measures to consider when evaluating usability: learnability; efficiency; memorability; errors; and satisfaction (Nielsen & Loranger, 2006). Again, although not the central element of their guidelines, the role of user satisfaction in usability is acknowledged:

Usability is a quality attribute relating to how easy something is to use. More specifically, it refers to how quickly people can learn to use something, how efficient they are while using it, how error-prone it is, and how much users like using it (Nielsen & Loranger, 2006, p. xvi).

This reference to ‘how much users like using it’, which appears almost as an afterthought in this definition, nevertheless signals the expanding interest in understanding UX as opposed to usability.

Although Nielsen and Loranger’s (2006) work is probably the most widely known and referenced, two earlier models which attempt to define the broader UX, rather than simply measuring usability,

should be noted. Although both emerge from the 'grey literature', they have been cited and developed in subsequent scholarly work. The first, the Elements of User Experience Model (Garrett, 2000), breaks the UX down into visual design, navigation design, information design, information architecture, content requirements and user needs. The second, the User Experience Honeycomb (Morville, 2004), proposes that UX be seen as the interplay of seven equally important aspects: usefulness, usability, desirability, value, findability, accessibility and credibility. It is worth noting that both models recognise the role played by aesthetics in the user's overall experience of a website, again signalling a change of focus in usability studies: this new focus recognising the importance of non-functional factors to the overall UX. These models marked a change of direction for UX research with an increasing focus on the aesthetic aspects of the UX.

Understanding the aesthetic user experience

The emerging evidence in grey literature of increasing interest in expanding definitions of usability to include UX is mirrored by similar developments in the academic literature. Hassenzahl (2001) argues that the definition of usability should be expanded to recognise non-utilitarian concepts such as the relationship between perceived fun and enjoyment, and user satisfaction and preferences. Unlike the earlier literature focussing on a product's efficacy and efficiency, Hassenzahl found that factors creating a sense of fun or hedonic quality, with no direct relationship to task-oriented goals such as visual appeal, sound and graphics, may have as much impact on usability as perceived usefulness. Subsequent studies found the impact of these so-called hedonic aspects on usability is more significant before actual use, whereas the more pragmatic aspects of usability are found to have a more significant impact after actual use (Hassenzahl, 2004; Lee & Koubek, 2010). However, significant for the purposes of this study, is the recognition that non-task related aspects of design are important to the overall perception of usability and the user experience.

By 2014, a clear trend away from simple definitions and positivist measures of usability is evident. The roles of concepts such as hedonic quality (Hassenzahl, 2001, 2004; Hassenzahl & Tractinsky,

2006), fun (Nielsen, 2005), aesthetics (Lavie & Tractinsky, 2004; Miller, 2007), sociability (Hart, Ridley, Taher, Sas, & Dix, 2008) and usefulness (MacDonald & Atwood, 2014) in usability generate more and increasingly diverse research which explores definitions and concepts encompassed by usability.

Definite reasons for general shifting towards the user's aesthetic experience, and designing to create a specific UX, are unclear. Hassenzahl (2013) suggests that broader definitions of usability result from the competitive nature of the online environment, which is swamped by many products performing the same functions. He argues that in an environment where all else is equal, differentiation and the ability to outperform competitors comes through the experience and stories the products allow users to create: "User Experience is not about good industrial design, multi-touch, or fancy interfaces. It is about transcending the material. It is about creating an experience" (Hassenzahl, 2013, para. 4). Again, the relationship between the concepts of UX and aesthetic experience, with their joint focus on "design beyond done; the essence and the outcome" (Miller, 2011, p. 308), and on transformational experiences, is clear.

Objective aesthetics and the user experience

Despite the shift towards researching the broader UX instead of usability, research into the impact of aesthetics in the online environment remains relatively limited in scope, with aesthetics usually referring only to objectively measurable, largely visual aspects of aesthetics. These aspects include the use of structure and colour, and their impact is measured by task performance or usability rather than by the broader UX (Lavie & Tractinsky, 2004, Sonderegger & Sauer, 2010). Nevertheless, understanding such research is important as the template investigated in this study is based in part on the objective design literature. As the appearance of online learning can predispose students to finding material difficult or easy to use (Lynch, 2009), and as users respond to visual aesthetics in less than 50 milliseconds (Lindgaard, Fernandes, Dudek, & Brown, 2006), understanding what makes effective objective design has particular relevance for educational institutions delivering materials

online. However, exactly what creates visual appeal may vary across cultural groups (Cyr, Head, & Larios, 2010). Equally relevant to higher education providers is the finding of David and Glore (2010b) that aesthetics can significantly influence how users judge credibility of online university courses. They note the link between these judgements and how users assign value to the overall learning experience. The next section will consider three areas of objective aesthetics: the use of colour, structural elements, and narrative.

Colour

The importance of colour in website and online learning design has been widely explored. Garrett (2000) discusses its impact, but only insofar as it assists the user to distinguish different functional elements of the web design. By contrast, Silvennoinen, Candidate, Vogel, and Kujala (2014) found colour is an important aesthetic element independent of functionality, and that the choice of colour strongly influences the pleasure and perceived usability qualities of mobile apps. Colour has been found to influence cognitive load (Wong, Leahy, Marcus, & Sweller, 2012) as well as user trust and satisfaction (Cyr et al., 2010; Cyr, 2013), although Cyr et al. (2010) caution that colour is culturally located, and their findings may not hold true across cultures. The relationship between colour and structure is investigated by Seckler, Opwis and Tuch (2015) and Bonnardel, Piolat, and Le Bigot (2011). Both teams of researchers found that use of colour in online design can attract users to, or distract them from the information structure (Bonnardel et al., 2011) of websites. However, Seckler et al. (2015) show that structural elements such as symmetry and visual complexity have a greater impact on overall aesthetic ratings than colour use, noting that symmetrical, simple websites designed in medium-bright shades of blue, are the most aesthetically pleasing for their Swiss audience.

Structure

Seckler et al.'s (2015) investigation of the impact of structure builds on significant earlier research into the impact of structural features on UX. Garrett (2000) identifies two structural features that

affect UX: ensuring the eye follows a logical path across and down the page, and designs that use contrast to support the navigation. Ngo, Teo, and Byrne (2003) found that balance, order, cohesion, simplicity, and regularity of structure are key factors in the creation of an aesthetically pleasing UX. Their work is extended by Harrington, Naveda, Jones, Roetling, and Thakkar (2004), who propose design rules concentrating entirely on structural elements for online pages. They found that pages regular in appearance, and in which objects such as images are aligned in both size and position, are more aesthetically pleasing. Reinforcing Garret's (2000) earlier work, they also propose uniformity is important to overall aesthetics of a page, and recommend major content elements on the page be organised to correspond to the golden ratio (this is a mathematical principle, used since the Ancient Greeks, to determine perfectly balanced structures). Significantly, a recent study by Lindgaard, Dudek, Sen, Sumegi, and Noonan (2011) found structural factors contribute not only to the visual appeal of a website, but also to judgements about its usability and trustworthiness. In addition to these visual aspects, narrative also plays an important role in the creation of structure.

Narrative

In its broadest sense, narrative refers to organisation of material into a logical (usually chronological) order which arranges content around a central story (Stone, 1979). In the specific context of online learning design, narrative structure provides a framework to create consistency, not only within a course, but between the course and the learning that precedes and follows, and uses a linear system of conventions and signposting to support recall (Laurillard, Stratfold, Luckin, Plowman, & Taylor, 2000). It can influence both intellectual and emotional aspects, and supports learning by helping the user to organise meaning from a variety of texts (Parrish, 2008).

Like aesthetics, the role of narrative and storytelling in literature has been explored since the work of Aristotle. More recently, the field of narratology has also investigated how humans use narrative and stories to structure thinking and learning in general (Bruner, 1996) and more specifically in the online environment (Parrish, 2008; Plowman, 1997; Plowman, 1996; Plowman, n.d.) The importance

of narrative structures as an aid to reconstruction, retrospection, prediction, recall and motivation in online environments is emphasised by Plowman (1997). Laurillard (1998) goes further, arguing that not only is narrative structure “one of the most important ways in which the instructional message comes to be understood” (p. 231), but that the non-linear nature of the online environment undermines narrative structure.

Busselle and Bilandzic (2009) describe how narrative structure leads to what they term ‘narrative engagement’, an aesthetic state created from the experience of flow, presence and perspective-taking. Potential parallels between these components and the cognitive and emotional aspects of learner engagement (Axelson & Flick, 2010; Fredricks, Blumenfeld, & Paris, 2004) should be noted. For example, Kahu (2013) describes cognitive engagement in learning as including the effort learners make to understand, their use of deep learning strategies and self-regulation, as well as their motivation and expectations. This view relates to the narrative concept of flow, which Busselle and Bilandzic (2009) describe as becoming “completely focussed on the act of comprehension” (p. 324). Both flow and cognitive engagement are arguably aesthetic experiences as they involve actions which lead to transformation of understanding. Similarly, the narrative concept of presence, described as transportation into the world of the narrative, can be related to definitions of a learner’s emotional engagement that focuses on the emotional intensity of the learning experience (Askham, 2008), and the learner’s intrinsic motivation and expectations (Jimerson, Campos, & Greif, 2003).

Parrish (2009) extends the link between the objective aspects of narrative structure and aesthetic experiences further, suggesting that by thinking of the learning as story, recognising learners as protagonists, and their needs and emotions during the stages of designing the learning story, we can create transformational experiences. This link between the objective aesthetic aspects of online design and the emotional experiences of the user is reinforced by David and Glore (2010) who describe aesthetics as the ‘bridge’ between the user’s emotions and the learning. Their finding that

visual aesthetics such as course layout, graphics and ease of use are important factors in motivating students to persist with online learning is significant, and not only in terms of validating visually attractive online courses. By showing that visual aesthetic elements can influence online learner behaviour, these authors also reinforce the claim that aesthetic experiences are transformative.

Redzuan, Lokman, Othman and Abdullah (2011) report similar findings, noting that the emotional components of aesthetic design essential to engaging students successfully in their learning.

Recognition of the needs and emotions of learners, or in fact, of their existence as independent protagonists responsible for their own learning, has frequently been ignored in online course design literature. Gray (2015) describes this omission as “a normalization of the learner: a collapsing of unique characteristics into a convenient, generalized description that tells us little about the unique challenges of specific learners” (p. 203). To create effective aesthetic experiences for online learners, Gray argues that we need a better understanding of the learner as a protagonist or actor and of the context in which the learner operates. These aspects of aesthetic UX design are explored in the next section of this literature review.

Understanding the learner user experience

Just as UX has developed out of usability testing, learner user experience (LUX) is a developing field within UX studies. Emerging from a recognised need for more understanding of learner experience, usually (but not exclusively) in the online environment, LUX research is still in its infancy. Despite rapid growth of the online learning industry in the last ten years, there is a paucity of LUX literature, and the little which exists is narrowly focussed. A search was conducted in June 2015 of the Google Scholar online database, to get a sense of the quantum of literature in this area before more traditional academic databases were consulted. Google Scholar was chosen for the initial search because of its more reliable coverage of recent and open-access publications than institutional databases, as well as for its inclusion of grey literature. The search terms ‘online learner’ + ‘UX’ yielded only 140 results. Of these, a significant number were found to be referring either to the prior

experience of learners or to their experience of a particular tool or approach, rather than to the concept of LUX itself. Additional results were located behind paywalls not accessible via this institution's library; in foreign languages; or in links which were no longer current. Only nine of the original articles identified proved to have relevance to this research.

As discussed earlier, one of the challenges facing UX researchers is the question of validity – can UX measures from one context be applied to another (Hornbæk, 2006)? This is a critical question in the field of LUX: do the concepts and processes of UX apply to LUX, and if so, how? Whilst the fundamental design principles of the online learning may appear similar to those of general web design, additional complexities around learning design, instructional strategies (Notess, 2001), and learner motivation (Zaharias, 2006) may have consequences for LUX. Traditional usability testing methods based on a task-oriented approach disregard the range of formal and informal contexts in which learning may take place (Mehlenbacher et al., 2005), and the fact that within online learning, the task is the learning itself, rather than the use of the tool (Zaharias, 2009).

The use of different LMSs, each with particular style and navigation characteristics, further complicates matters, as it is unclear if general usability and UX principles apply to specific LMSs. Hovde (2015) lists a range of additional LMS elements that may impact the UX and thus potentially skew LUX research. These include the many functions of online teaching such as facilitating forum discussions, managing assessment, sharing documents and tracking progress.

The evolution of LUX research, perhaps unsurprisingly, follows a similar pathway to that of UX. The literature reflects researchers grappling with many of the same questions of definition and strategies for measurement that faced those working in general usability testing and UX. As early as 2002, Feldstein's (2002) question, "How can we define 'usability' for e-learning in a way that can be measured?" (Feldstein, 2002, para. 3) shows the same early focus on usability rather than user experience seen in general web design research. Zaharias (2004) extended this discussion, emphasising the importance of understanding how usability impacts on the achievement of learning

goals and recommending that the interaction between pedagogical approach, instructional design and LUX be explored. Zaharias emphasised the inappropriateness for learning contexts of traditional usability and usability-testing definitions, arguing such methods “neglect the intricacies and specificities of e-learning and do not address the user as a learner” (2009, p. 39). He argues that, although ‘knowing the user’ is important in all usability studies, recognition of the user as learner means learner characteristics and cognitive and emotional states, must specifically be focussed on, as they all contribute to increasing learner engagement. To recognise the role of user affect in usability, Zaharias (2009) proposes a usability framework that not only recognises the value of motivation, but also links motivation to learn to several aspects of UX design which underpin this research project, including learnability, consistency, visual design and navigation.

Despite this recognition of the need to investigate LUX, there is little empirical research. “Most of the current usability design and evaluation methods neglect the intricacies and specificities of online learning, and do not address the user as a learner” (Zaharias, 2011, p. 122). Zaharias goes so far as to suggest that a poor understanding of LUX may be one of the factors contributing to generally poor online student retention. The view is supported by Sargent (2015), who argues the UX of the online learner has created a ‘likeability problem’, proposing that this problem will be remediated only by a move towards learner-centric designs. For such a move, a better understanding of the learner and the learning contexts is necessary.

Online learners and their contexts

Any attempt to provide general descriptions of learners runs the risk of what Gray (2015) refers to as the “genericization of context” (p. 202): the assumption that learners and their teachers occupy uniform roles and have predictable experiences. Extensive literature tells us this is not the case. From the perspective of instructional design processes, for example, Boling et al.'s (2004) research into the interpretation of instructional illustrations, there are significant differences between the designer’s intended meaning and the interpretations of the participants. Similarly, in his

consideration of the shift impact from traditional to digital and multimedia forms of representation, Kress (2004) cautions that meaning is often social and culturally specific, and that the end UX may be very different from that intended by the designer. Lave and Wenger (1991) argued that learning is socially and temporally situated and a product of identity (Lave and Wenger, 1991, as cited in Wenger, 2010).

Whilst over-generalising the learners' contexts may be a risk, failure to attend to it may be equally problematic, leading to usability and UX problems (Gray, 2015). International studies have found online study is more attractive to 'non-traditional' students who may be unfamiliar with the expectations of learning in higher education (Wladis, Hachey, & Conway, 2014). Non-traditional students include cultural minorities, mature, and part-time students, although these authors also note that non-traditional students are at higher risk of non-completion. Students may be geographically remote, time-poor, with personal and job responsibilities conflicting with study schedules (Kahu, Stephens, Zepke, & Leach, 2014; Ludwig-Hardman & Dunlap, 2017), and may lack suitable physical and virtual spaces for study (Kahu et al., 2014). Such challenges can contribute to students' sense of separation, anxiety and distance (Stein, Calvin, & Wanstreet, 2009). In addition, students embarking on online study will have varying levels of self-efficacy (DeTure, 2004; Puzziferro, 2008) and self-direction (Cleveland-Innes, Garrison, & Kinsel, 2007). They may need to develop new skills in technology and communication with their online instructors in order to be successful, and to develop these skills in a context of increased transactional distance (Stein et al., 2009).

Clearly, the backgrounds of online learners can present significant challenges to their success, even before they have engaged with course content. To increase the likelihood of an aesthetic learning experience, online courses must be designed to minimise unintended learning barriers. Cognitive load theory (Sweller, 1994) describes a framework frequently used by instructional designers to

guide the design of courses to lower barriers to learning engagement. The next section of this review considers this theory and its implications for the design of an aesthetic online course template.

Cognitive load and the aesthetic online learning experience

Cognitive load theory (CLT) is an instructional framework based on an evolutionary approach to understanding human cognitive architecture (Wong, Leahy, Marcus, & Sweller, 2012, Sweller, Ayers, & Kalyuga, 2011). Although CLT is popular amongst instructional designers, it is not uncontested (Ayres & Paas, 2012; Kirschner, Ayres, & Chandler, 2011). Nevertheless, in the context of this research project, it is argued that there is value in considering aesthetic design through the lens of CLT and its subsequent impact on LUX.

CLT proposes that human cognition is based on the interface of a permanent knowledge store in long-term memory (LTM) and the temporary working memory (WM). LTM stores the schemas or patterns that determine how information is synthesised in WM. WM is limited in duration and capacity; if WM is overloaded, learning is inhibited (Kalyuga, 2011).

Sweller (1994) propose three types of cognitive load: *intrinsic*; *germane* and *extraneous*. Intrinsic cognitive load refers to the inherent difficulty of a task. To some extent this may be beyond the ability of the teacher to influence, although breaking complex tasks into smaller chunks or schemas can help. Germane cognitive load refers to the WM resources or schemas required to deal with intrinsic cognitive load. It represents the consequence of processing information that leads to learning (Vandewaetere & Clarebout, 2013). By contrast, extraneous cognitive load is generated by the way information is presented. This aspect of CLT is particularly relevant to the design of an online learning course template. Because the way learning tasks are organised and presented (Kalyuga, 2011) affects extraneous cognitive load, any aesthetic template must take into account literature exploring the relationships between aspects of visual design and structure, and their overall impact on the cognitive load of a design.

Meyer (2014) explains that visual design and complexity as defined by the text style, colour and contrast can increase extraneous cognitive load and decrease retention. Research by both Gillmor, Poggio, and Embretson, (2015) and Miller (2011) showed that improving the aesthetic design of e-assessment items by increasing the contrast, organisation and flow of the assessment elements, reduces cognitive load and improves learner performance. Similarly, Harper, Michailidou and Stevens (2009) found that the visual complexity of commercial web pages may serve as an indicator of cognitive load. Their study proposes a continuum of categories of complexity: simple, neutral and complex. Simple pages contain fewer than 40 links; simple, explanatory text is used to indicate the link; images are small and used to describe subsections or as content separators; and no scrolling is required. Neutral pages have more images and text than simple pages, but do not fit the category of complex pages. Complex pages are long; have many different components such as links, pictures and menus as well as text; and allow the user to perform different tasks. Although it is easy to see how course pages designed in university LMSs would fit the 'complex' category, with the associated potential for high cognitive load and reduced comprehension and retention (Clark & Meyer, 2011; Meyer, 2014), the use of a regular design or template can help users to create patterns and thus reduce complexity (Harper et al., 2009; Richardson, Drexler, & Delparte, 2014) and associated cognitive load.

The online environment offers significant variety in the way information is presented to learners. However, there is also evidence that non-linear structure may have negative consequences for extraneous cognitive load. Wong, Leahy, Marcus and Sweller (2012) found that many of the affordances of the online environment (the use of video or animation in place of text, for example) have the unintended consequence of rendering information 'transient'. They define 'transient' information as elements of information that disappear, to be replaced by new elements, such as the substitution of a static graph by an animation. Transience requires the learner to hold the original elements of information in the WM while processing the new elements, thus increasing WM load (Wong et al., 2012). In addition, the authors note that what they term the 'transient information

effect' also occurs when information is presented in a way that makes it difficult to retrieve rapidly. Moreover, online environments frequently offer icons and symbols to represent information. Whilst some icons have a universal meaning, such as the 'print' icon, many are situation- and designer-dependent. Within the context of higher education, the course pages within the LMS are commonly designed by the individual academics responsible for teaching them, and are reflections of the individual lecturer's culture, personality, design experience and symbology. Consequently, the potential for large transient information effects and increased cognitive load is high.

An important additional finding emerging from Wong et al.'s research (2012) is the impact of dual mode presentations on cognitive load. The authors found that although short dual mode presentations (animations and audio) have no negative impact on WM, and are in fact preferable to the textual equivalent, longer dual mode presentations require significantly more WM than the textual equivalent. It is important to recognise the consequences of transience, development of a narrative structure, and aesthetic design for online learning are clear. Laurillard, Stratfold, Luckin, Plowman, and Taylor (2000) note that because the non-linear online environment does not conform to our traditional narrative expectations, it increases cognitive load.

The value of a visible narrative structure in reducing cognitive load was explored in depth by Plowman in a 1996 article reporting on the findings of a number of experiments with children using interactive educational multimedia. She found that the benefits of the online environment, such as learners' individual control over pace and choice of activity, and the ability to repeat and skip parts of the learning if required, may be double-edged swords, because increasing such flexibility leads to a loss of structure (Plowman, 1996b). In addition, learners bring their own experiences of narrative to the learning. Without clear structural signals, learners make their own assumptions about beginnings, middles and ends, and how to progress through their learning journey. Students must first learn how to find and organise the information before they can begin to understand it, a time-consuming process which increases cognitive load.

Whilst CLT provides useful guidelines for optimal student learning environments, the openness of the modern LMS means it will never be possible to ensure students always experience optimal design and reduced cognitive load. Although learning designers and teachers can mediate the cognitive load over which they have control, student access to web-based resources as well as the innate complexities of tertiary learning means that managing cognitive load and creating truly aesthetic OLEs will always be a challenge.

Chapter summary

The rapid development of the online environment in the last thirty years has been accompanied by the development of a significant body of research around the way users experience that environment. Whilst initially researchers focussed on functional usability, more recent research has explored the importance to the overall UX of non-functional or aesthetic aspects of websites. Websites that are designed according to traditional aesthetic principles such as use of colour, structure and narrative are found (by Western users, at least) to be more usable, and to score higher on UX scales, than those which do not follow these principles. Furthermore, online learning that reflects these principles has been shown to be more engaging and motivational, and has been argued to be transformative.

Despite this body of research, this review of the literature highlights a lack of studies that explore the impact of aesthetic design in the context of learning management systems, or that propose approaches to the layout of online courses in the LMS. This absence of research highlights the relevance of this study. The investigation examines the UX of a course design template based on both objective aesthetic principles and the use of narrative as an aesthetic element. As this template is implemented in a learning management system used in schools and universities around the world findings from this study will be useful for course designers in a variety of contexts.

The next chapter outlines the research questions and the methodology that guide the investigation. The course design template employed for this project is also described.

CHAPTER 3 METHODOLOGY

Introduction

This research project sought to understand the course design factors contributing to the UX of students accessing their learning materials and information via a university LMS. The investigation uses a mixed methods methodology to explore students' UX and takes a pragmatist approach.

This chapter has four sections. The first explores the methodology underpinning this study. The research questions are restated and the research paradigm examined. Then, mixed methods methodology and the implications of its selection are examined, followed by a description of the research context and a discussion of the ethical principles applied in this investigation. The third section describes the research method. The research procedure, the development of a research tool, and the processes of data collection and data generation are described. Lastly, the processes used to code and analyse the collected data are described.

Research questions

This investigation sought to answer the question, "What is the impact of a course design template on the UX of learners enrolled in first-year online courses?" In order to determine this, the following three sub-questions are addressed:

- Is there a relationship, and if so, what is it, between UX and general demographic factors such as age, gender and previous online learning experience (OLE)?
- Is there a relationship, and if so, what is it, between being enrolled in a course designed according to an aesthetic template, and overall UX?
- Does adapting an aesthetic template have an impact on UX, and if so, what is the impact?

Research methodology

The research questions inform the methodology to be used. Methods of enquiry need to match what researchers want to know and to do with the research (Muijs, 2010; Punch, 2009). Quantitative approaches to research have several functions. These include the measurement of a specific construct; comparisons between groups; measuring the strength of association between variables; and the testing of research hypotheses (Gonzalo-Castr, Kellison, Boyd, & Kopak, 2011). By contrast, qualitative research, founded on an interpretivist paradigm, recognises that reality and meaning are socially constructed (Sale, Lohfeld, & Brazil, 2002) and thus may be a more appropriate approach for a research project focussed on understanding human interactions and responses. However, qualitative approaches are often criticised for a lack of well-defined prescriptive procedures, which limits the potential for confirmatory research; and for difficulty in reliably assessing links and associations between cases and observations (Gonzalo-Castr et al., 2011).

This investigation sought to measure the strength of association between UX factors, the use of a course design template, and the self-reported overall UX. It also sought to contextualise the findings within the environment of students studying a first-year course online, and to explore students' explanations for why they respond the way they do. As the research questions sought both to determine the existence of relationships and to explain them, a research methodology which addresses both quantitative and qualitative aspects is deemed appropriate for this research.

Mixed methods

Mixed methods research is a combination of quantitative and qualitative methods designed to exploit the strengths and minimise the limitations of each approach (Gonzalo-Castr et al., 2011). The mixed methods approach also more closely parallels the contexts in which researchers work (Muijs, 2010, Tashakkori & Teddlie, 2010), in this case, evaluating students' experiences of a course design template whilst also measuring the effects of changes.

A mixed methods approach is an appropriate one to address the research questions that form the focus of this study. As the overall purpose of the research is to determine the impact on user experience of a particular design template, qualitative research methods are useful as the use of open-ended survey questions and semi-structured interviews provides the opportunity to learn about the user experience in the words of the users themselves. However, the study also sought to determine the nature and extent of any relationship between various factors such as demographics and the use of a particular course design template, and the user experience. This focus on the identification and measurement of any potential relationships indicates the need for quantitative approaches. As a result, an approach which combines both qualitative and quantitative approaches, or a mixed methods approach, was deemed to be most suitable for this investigation.

This study uses a sequential, explanatory, mixed methods approach (Cresswell, Plano-Clark, Gutmann, & Hanson, 2003). Quantitative data in the form of student responses to a questionnaire is collected first. Qualitative data is gathered in the second stage of the research, through semi-structured interviews. How to weight the quantitative and qualitative data frequently poses a challenge to researchers (Ivankova, 2006), and this investigation is no exception. Whilst the research purpose is to provide design information, the initial audience for the research primarily comprises lecturers from a college within the university in which the study took place.

Pragmatist paradigm

A paradigm is a set of beliefs or a belief system that determines how a problem should be investigated and interpreted (Guba, 1990; Morgan, 2007). This research project emerges from a pragmatist worldview arguing that research should be concerned with solutions to problems (Cresswell et al., 2003) and should, in some way, answer the question: “what is the human experience?” (Morgan, 2014). Operating from the pragmatist paradigm means the researcher assumes that reality, and this research, should be debated and negotiated in terms of their

usefulness in offering solutions to problems (Cresswell et al., 2003; Morgan, 2007). The pragmatist worldview accepts that there may be multiple realities open to inquiry, and concentrates on solving real-world problems (Morgan, 2014; Feilzer, 2010).

As pragmatism is concerned with the practical consequences of actions (Goldkuhl, 2012), it is an appropriate paradigm to underpin an investigation into the consequences of implementing a design template in an LMS. Pragmatism also connects directly to one of the seminal figures of UX research, the pragmatist philosopher John Dewey, who argued that experience is influenced by the environment in which it occurs, and the way the environment is planned and created is central to the creation of the experience (Margolin, 2002).

Research quality

Quality criteria for quantitative research are relatively well-defined, but there is less agreement over the quality criteria for qualitative research, let alone for mixed-methods research (Bryman, Becker, & Sempik, 2008). Quality criteria for quantitative research typically focus on validity, reliability, replicability and generalisability, whereas Lincoln and Guba (1985) identify credibility, transferability, dependability and confirmability for qualitative research. Onwuegbuzie and Johnson (2006) discuss the challenge of obtaining findings and making inferences that are credible, dependable and trustworthy, and argue that legitimation, or a process of continuous audit and evaluation during the process of a mixed methods study will help to ensure the quality of the study. It is generally accepted that quality criteria for mixed methods research will be developed from some combination of both qualitative and quantitative research quality criteria (Bryman et al., 2008). Teddlie and Tashakkori (2009) propose the inference quality as an overall quality criterion for mixed methods research.

Inferences are described by Teddlie and Tashakkori (2009) as the “conclusions and interpretations that are made on the basis of collected data in a study” (p 296). They are not data itself, but the interpretations drawn from it. Because the quality of the interpretation will depend on the quality of the data, inference quality can be broken into two criteria subsets: design quality and interpretive rigour.

Design quality refers to the selection and implementation of appropriate procedures for answering the research question (Teddlie & Tashakkori, 2009). This is determined through design suitability and fidelity, within-design consistency and analytic adequacy. A mixed methods researcher must ensure the methods selected for the investigation are appropriate and rigorously implemented, and that each method within the investigation is integrated purposefully and logically. Data must be credible and rigorously analysed in ways appropriate to the research question (Teddlie & Tashakkori, 2009). In this investigation, the use of questions from existing statistically validated tools, and the piloting of the questionnaire to be used in the study, assist the credibility of the survey data collected.

An existing strategy for the collecting of qualitative UX data, the Product Response Cards (see Appendix A) helps provide a consistent approach to the semi-structured interviews. These interviews were audio recorded and transcripts provided to the participants for checking before analysis was undertaken. Ensuring the transcripts accurately reflected the interviews helps support the design quality by assuring the data quality.

Design quality is also ensured through triangulation: the collection of data from two or more independent sources to help reduce uncertainty of interpretation (Teddlie & Tashakkori, 2009). Data is collected from two sources (students and lecturers) using two different techniques (a survey questionnaire and semi-structured interviews) and across three semesters of the university calendar, reflecting both data and methodological triangulation (Creswell, 2011).

The interpretive rigour of a mixed methods study can be assured by interpretive and theoretical consistency, interpretive agreement and distinctiveness, and integrative efficacy (Teddle & Tashakkori, 2009). Interpretive consistency requires that the conclusions drawn are clearly related to the results, and that there is sufficient data to support the conclusions, whereas theoretical consistency suggests that the research findings should be consistent with existing theory and empirical research. Interpretive agreement requires that the same conclusions are drawn by other researchers using these results, and interpretive distinctiveness requires that the inferences made from the data are the most plausible. Integrative efficacy refers to the level to which the findings and conclusions of each strand of the research are linked, compared, and elaborated upon (Teddle & Tashakkori, 2009).

In this study, a low participation rate in the interview phase creates a challenge for interpretive consistency. To address this, although the data collected from the interviews is thematically analysed, the findings are used illustratively to provide roundness to the quantitative data, and in turn, the quantitative data is used as compensation for the limited qualitative data (Bergman, 2008).

Another challenge to interpretive consistency is that interpretive agreement can be difficult to determine as the researcher cannot predict the contexts in which the findings may be applied. In this study, detailed descriptions of the processes and findings of the research are provided so subsequent researchers can re-examine the findings.

Interpretive distinctiveness refers to the assumption that it is possible to draw different conclusions from the same results. Within quantitative research it refers more specifically to the extent to which the researchers can show that the results obtained are due to the manipulation of the variables within the study, and not the result of confounding variables. Using existing, validated survey and

interview tools with a limited number of independent variables helps to ensure interpretive distinctiveness within this research study.

Integrative efficacy refers to the extent to which the researcher has incorporated the inferences made from the qualitative and quantitative parts of the study (Bergman, 2008). Within this project, integrative efficacy is assured by addressing the quantitative and qualitative data separately before drawing conclusions based on their combination.

Context of the study

Online education at this university is provided through courses housed in a Moodle-based learning environment. The design of these courses and their presentation within the learning environment was traditionally left to the individual lecturer, but problems with this approach led the college involved in this study to mandate a design template (see Appendix B). At the time this study commenced, approximately 40 online courses had been redesigned according to the template.

The courses included in this study are all 100-level science courses, in a range of subjects from the fundamental sciences of maths and statistics to the more applied environmental sciences. The majority of students enrolled were in their first year of study, but some were students nearing completion of an undergraduate degree who either needed to meet a compulsory degree requirement, or who were simply addressing a credit shortfall to graduate.

Researcher bias

Positivist approaches to research uphold the principle that inquiry should be value-free, whereas qualitative research is based on the belief that research is value-bound (Teddle & Tashakkori, 2009).

The pragmatist paradigm underpinning this study acknowledges the role the researcher's own values play in designing studies and interpreting data, but rather than viewing this as a weakness, acknowledges that researchers naturally base their inquiry choices on what they value, and that their value systems determine their study methods (Teddle & Tashakkori, 2009). Nevertheless, in

recognition of the potential audiences for this investigation, and to ensure an ethical approach to recruitment, bias reduction strategies included an intermediary to invite participation in the study, and an anonymised survey to minimise the chance of participants being influenced by the researcher. Likewise, during the interview phase, participants were not informed of the researcher's role in the design and development of online course sites or the template. The use of the product response cards also assisted in providing a framework for the interview participants to review the online course before any discussion of it with the researcher, reducing the opportunity for the researcher to lead the discussion.

Ethics

This study was conducted in accordance with general ethical principles and the code of conduct of Massey University. These principles include respect for persons, minimisation of risk for harm to both participants and researchers, informed consent, and respect for privacy and confidentiality.

Respect for individuals

Respect for individuals is regarded as the overarching ethical principle (Kelman, 1977), and requires that people are valued for themselves, treated as autonomous, and are free to make their own decisions about participation at all points in the study. To avoid any appearance of influence, an intermediary invited participation in the study. Participation was voluntary, and all subjects were reminded at the beginning of the online survey, and at the start of the interview, of their right to withdraw from the study at any point.

Informed consent

The principle of informed consent relates closely to that of respect for individuals and autonomy. It requires that participants are provided with explicit information about the nature of the study and any potential personal risks before they consent to take part (Kelman, 1977).

To ensure potential participants received information in an accessible and easily understood manner, information sheets were written in 'plain English' and peer reviewed by the study supervisors before use. The information sheets for students were also reviewed for clarity by a university learning consultant. Information about the nature of the study was provided to all participants at several points in the investigation: in the invitation to students to participate (see Appendix C), at the start of the survey (see Appendix D), and again in written and oral form at the start of the interview phase. It was especially important to ensure students understood the research was independent of their study programme, and their decision to participate (or not) would have no effect on their academic results.

Informed consent was recorded differently at different stages of the project. In the online survey, the first screen informed students that their decision to continue beyond that screen outlining the purpose of the survey indicated their consent. Students who did not wish to participate further could simply close the survey.

Participants in the interviews were provided with an information sheet to read (see Appendix E), the nature of the study was described by the interviewer, and any questions the participants raised were discussed. Participants signed that they had consented to participate (see Appendix F). As all participants in the study were either enrolled in or facilitating courses delivered in English, all information was provided in this language.

Privacy, anonymity and confidentiality

Concerns about privacy can be divided into three groups: concern that the research may intrude into areas the participant views as private space; concerns that research procedures may deprive participants of control over how they present themselves; and concern that dissemination of information gathered in the research may have damaging consequences for participants (Kelman, 1977). The relatively structured nature of this research meant that intrusion into private spaces was unlikely. However, to ensure anonymity of survey participants, the survey was designed using

software that did not record participant data, and was distributed using a single, anonymised survey link. Survey submissions were downloaded from the survey company server and numbered in the order they were submitted. The original submissions were deleted from the survey company server, and so the potential for identification of individual survey participants was eliminated.

Survey participants willing to be interviewed were required to enter their contact details so the researcher could arrange the interview. Although participant contact data was entered separately from their survey responses through the creation of a second, linked survey, there was still potential for those participants to be identified. Consequently, to ensure their confidentiality, access to all data was restricted to the researcher, and stored in a password-protected folder. Each participant was given a pseudonym, and the information linking individuals to their pseudonyms was stored separately in a password-protected folder.

Protecting the identity of the institution in which this study was conducted is problematic, given the study focusses on a unique aspect of the institution. The risk was outlined in the letters seeking permission to conduct the research sent to the relevant individuals in the university concerned.

Research procedure

Following research proposal development, an ethics application was submitted to, and approved by the ethics committee of the university concerned (see Appendix G). Following ethical approval, permission to conduct the research was sought and obtained from the Pro-Vice Chancellor of the relevant college, and the researcher's line manager. Permission to use the university's IT systems was sought and obtained from the relevant manager.

The development of the template

As noted in Chapter 1, the development of the template itself was part of the researcher's work as an online consultant in a university. It was developed and implemented on a small scale prior to the initiation of this research study, and sits outside of the study. The principles which underpinned the

template and the process by which it was initially rolled out are nevertheless included below for narrative completeness.

Following a review of the literature, and in consultation with the university accessibility and disability advisor, a set of eight criteria for a course template was developed:

1. The template should present the overall course narrative at a glance. This essential characteristic complies with the work of Lindgaard et al, (2006) which emphasises the speed at which users make judgements about a site, and Laurillard's (1998) work on the importance of narrative in online learning.
2. The course narrative would be based on Parrish's principles for instructional design (2009) and would include both visual and textual indicators of time and difficulty of each part of the course.
3. The course layout or structure should support the course narrative. Information architecture must be consistent within and across courses, including all sites' ontology (the rules of communication; navigation, hierarchy, and wayfinding) and taxonomy (what things are called; where and how they are stored). In addition, to reduce the time it takes to learn to use a course, course navigation methods should reflect those with which students are likely to be familiar, such as those used by social media sites like Facebook, Twitter and Instagram.
4. The initial course navigation should be scrolling, rather than paging, due to the requirements of criteria one to three.
5. The layout should be reduced from a three-column to a two-column format to reduce cognitive load and the potential for variance between courses. A consistent design and information architecture allows students to understand sites quickly and focus on the learning. Students' existing mental models of websites should be considered, so both attention-splitting (presenting information in multiple formats, none of which is useful in

isolation), and redundancy (having several resources presenting the same information), should be avoided.

6. Icons, indexes and symbols should be restricted to those intrinsic to the LMS, to consider the multicultural student cohort, and to reduce cognitive load.
7. The template should reflect established aesthetic features such as regularity, alignment, balance, graphics and use of white space (Garrett, 2000; Harrington et al., 2004).
8. The template must be sustainable with a minimum of time and effort. It should be easy to maintain by a lecturer with basic course design skills, and it should not require adjustment when the course is rolled over (made available for a new cohort of students).

A proposed template (see Appendix B) was designed and informally piloted during 2014, prior to initiation of this research project. As responsibility for maintenance of courses adopting the template rested with individual lecturers responsible for course coordination, it was likely that some would change the original template. Although these changes usually involved the addition of more graphics and icons, and increasing numbers of resources, the narrative framework of topics, dates, and teaching narrative was always retained.

Anecdotal evidence from the researcher's experience working in the field suggests that many lecturers feel compelled to personalise a course site to 'make it their own'. They may do this by changing the appearance and layout. Consequently, it was deemed necessary to determine what impact these adaptations to the visual aesthetic would have on overall student experience.

The development of the Aesthetic Experience Questionnaire

The use of questionnaires in this study is supported by Wilkinson and Birmingham (2003) who say because questionnaires provide data from the viewpoint of participants, they have value in addition to being cheap, simple, and quick to use. However, the authors caution that some issues can undermine questionnaire usefulness. These include low response rates, and the challenge of

designing questions which accurately measure what they are supposed to measure without being unnecessarily complicated or leading (Muijs, 2010, Wilkinson & Birmingham 2003).

The questionnaire developed for this research, the Aesthetic Experience Questionnaire (AEQ), contains 45 statements derived and adapted from existing research tools. Because this investigation focuses on how the use of a design template affects a range of UX constructs already identified in the literature, it was necessary to create a composite questionnaire to ensure all aspects were incorporated. Tools available at the time of this investigation focussed on particular aspects, but none combined all the required aspects.

Questionnaire item construction and selection

Statements about usefulness, usability, learnability/findability, and desirability, are derived from existing and widely used survey tools, the USE (Usefulness, Satisfaction and Ease-of-use) Questionnaire (Lund, 2001), and the System Usability Scale (SUS) (Tullis & Stetson, 2004). The Stanford Guidelines for Web Credibility inform the credibility statements included in the questionnaire (Stanford, Tauber, Fogg, & Marable, 2002). As the questions in these existing tools were themselves developed following a process of testing, factor analysis and validation, it was deemed unnecessary to repeat these processes for this study, given that the intention for use in this research was the same as the original intention of each tool.

The Narrative Scoring Scheme (NSS) (Heilmann, Miller, Nockerts & Dunaway, 2010) and the Narrative Engagement Scale (NES) (Busselle & Bilandzic, 2009) form the basis of the statements designed to measure course narrative. As these tools were originally designed to evaluate aspects of narrative in slightly different contexts (in the case of the NSS, a speaker's production of a coherent narrative; and in the case of the NES, an individual's engagement with a narrative) pilot testing was necessary to ensure the validity and reliability of this aspect of the questionnaire, and thus of the questionnaire as a whole. The process of pilot testing and validation is outlined later in this chapter.

Items in the AEQ are constructed on a seven-point Likert scale, ranging from Strongly disagree to Strongly agree, with a mid-point of Neither agree nor disagree. Although Tullis & Albert, (2013) note that creating scales without a neutral point is an effective way of reducing the influence of social desirability bias, the anonymous online nature of the AEQ should minimise the potential for this bias. This refers to the possibility that survey respondents may misrepresent themselves in order to appear to comply with socially acceptable behaviours or norms (King & Bruner, 2000). Kreute, Presser, and Tourangeau (2008) note that the risk of social desirability bias is increased when respondents are asked personal, sensitive or intrusive questions and decreased when surveys are self-administered rather than interviewer administered. As items in the AEQ are unlikely to be regarded as personal or sensitive, and as the survey is anonymous and online, it is argued that the risk of social desirability bias confounding the results is low.

Validation of the questionnaire

As all questions in the AEQ originate from existing and widely accepted tools, the face validity of the questions was assumed for this research project. Nevertheless, a researcher with expertise in survey construction checked the questionnaire to ensure that no errors had been made collating those questions into a new survey. Once the face validity of the questionnaire was established, a pilot was run to test the survey.

Pilot testing the questionnaire

An electronic version of the questionnaire was built using Qualtrics Research Software for online delivery. The coordinator of a course recently re-designed according to the aesthetic template was emailed, and permission to use the course to validate the questionnaire sought and received. The coordinator used the course News forum to explain the purpose of the questionnaire and introduce the researcher. Then the researcher posted the questionnaire information and the link to the survey

to the forum. Two reminder posts were made at weekly intervals. The pilot questionnaire was closed after three weeks, and responses downloaded from the online survey database.

Determining sample size

A brief examination of the literature reveals several different perspectives on an appropriate sample size for the pilot test. Whereas Connelly (2008) recommends a sample of approximately 10% of the size of the full project, Hill (1998) argues that between 10 and thirty participants is sufficient. Teddlie and Tashakkori (2009) do not attempt to quantify the size of the sample for a pilot test, but refer to earlier research showing a pilot study does not need to be large to be useful (Chebbi, 2005, cited in Teddlie & Tashakkori, 2009). Sample size requirements for statistical validation of questionnaires, however, tend to be much larger. Kline (1986) recommends a sample of no less than 300, and Nunnally and Bernstein (1994) state there should be fewer items in the questionnaire than in the sample.

To provide the best opportunity for a reasonable sample size from the target population, the largest of the first-year online courses offered by the college (242 students) was targeted for the pilot. The fact that this course had just been redesigned using the template provided further opportunity to check the validity of the narrative questions in the questionnaire. Given that the template focussed on creating a course narrative, the expectation was that if the questions in that section of the questionnaire indeed measured the presence of narrative, respondents would score these aspects highly.

Fifteen students responded to the pilot questionnaire. Two respondents completed only the first section so their responses were removed before the data was analysed. This small sample size limited the statistical validation that could be conducted on the data, and excluded the possibility of definitive principle component or factor analysis on the sample. As the statements making up five of the six constructs being measured in the survey originated from widely used and validated surveys, this limitation was regarded as acceptable.

A Cronbach's Alpha was run to measure the internal consistency of the questionnaire, generating a score of $\alpha = .941$, showing high internal consistency. There was no item which, if deleted from the survey, would substantially alter the Alpha score.

Although analysis of the data collected showed that no changes should be made to the questionnaire itself, the need to survey the opinions of lecturers was identified. An amendment to the ethics application in this regard was submitted to and approved by the university ethics committee.

The semi-structured interview

In order to facilitate triangulation and the collection of qualitative data, participants in the AEQ were also offered the opportunity to participate in an interview. An interview is a suitable research method when a study is focussed on developing understanding of an individual's experience (Gillham, 2000). Interviews can generate rich data and provide the researcher with insights into the experiences, contexts and values of the participants (Edwards & Holland, 2013). As the purpose of this research study was to investigate users' experiences of the design of their online courses, the use of interviews was deemed appropriate.

An existing user experience research tool, the Microsoft Product Reaction Cards (MPRC) (see Appendix G) was selected as the basis for the semi-structured interview. The cards are well-known in usability and user-experience studies, and are regarded as an effective way of eliciting information about how users feel about their experiences of an online interaction (Barnum & Palmer, 2011), and in particular, to the aesthetic qualities of a site (Benedeck & Miner, 2002). Using the cards provides an additional benefit in that it limits the vocabulary used for initial descriptions of an online site, helping to reduce the variability of word choice that occurs during qualitative interviews (Meyer, 2016).

Whilst the MPRC were initially designed to facilitate quantitative analysis, in this research study they were used simply as an initial trigger for the qualitative interview. Participants were asked to choose five words from the list that they felt best described the online course site they were evaluating. They were then asked to explain what each word meant to them, and why they had chosen that word to describe the online course site.

Conducting the research

Following the receipt of all necessary approvals, invitations to include courses in the study were emailed to the course coordinators of the 32 courses eligible for inclusion (see Appendix C). These invitations were sent through an intermediary to avoid any perception of coercion by the researcher. The twelve coordinators who agreed to include their courses in the study responded via email, thus confirming their participation in writing. The two coordinators who agreed to participate in the surveys and interviews themselves, completed the informed consent process described above (see Appendix E).

Once courses had been nominated for the study, permission was sought from each coordinator to use the course News forum to email the students and invite them to participate in the study. Coordinators were also asked to introduce the researcher to the students. Once this had been done, the researcher posted a description of the research and a link to the first page of the online questionnaire containing the relevant information for consent to the forum for each course (see Appendix C).

The online questionnaire asked participants to enter basic demographic information about age, gender and their experience of studying online. They were also asked to name the course they were evaluating. They were then asked to rate both their overall experience of the course, and a number of more specific aspects of the course, and answer two open questions about the best and worst

aspects of the course design. Finally, participants interested in taking part in an interview were asked to indicate their willingness and enter their contact details (see Appendix D).

Because only one student agreed to participate in an interview following this initial process, permission was sought from the two coordinators of courses which had on-campus sessions as part of the course, to address students in person. Permission was granted, and the researcher attended a session of each on-campus course to explain the purpose of the study and to invite students again to participate in the interview. A coffee voucher was offered as a token of appreciation for participation in an interview. To avoid any perception of coercion, students were not asked to sign up there and then. Instead, they were provided with the researcher's email address on a piece of paper, and asked to send an email if they were willing to participate. Three students agreed and suitable times and venues were arranged via email, however one student cancelled shortly before the interview was scheduled to take place.

All interviews occurred at a time and location nominated by the participants. Interviews were recorded using an iPad audio recorder, and the files were downloaded to a password-protected folder on the researcher's computer. The original audio files were then deleted from the iPad. Once all interviews were completed, the audio files were transcribed by the researcher. Copies of the transcripts were sent to participants for checking and editing if necessary. No participants amended their transcripts.

Questionnaire data was downloaded as an Excel spreadsheet from the online survey tool, and saved in a folder on the researcher's computer. Once this data had been downloaded, the responses were deleted from the online survey tool.

Data analysis

The decision to use parametric analysis of Likert scales may be debated (Sauro & Lewis, 2012).

Clearly, although responses on a Likert scale can be rated, the differences between points on a Likert

scale are not necessarily equal. Treating ordinal data in the same way as interval data has long been regarded by some as questionable practice (Sauro & Lewis, 2012) and has even been described as one of the deadly statistical sins (Kuzon, Urbanchek, & McCabe, 1996). Nevertheless, there is increasingly strongly argued support for the use of methods such as the analysis of variance (ANOVA) in the processing of Likert scale data (Norman, 2010; Sauro & Lewis, 2012; Sullivan & Artino, 2013) as these methods are generally more robust than non-parametric methods, even when the assumptions of a method are violated (Norman, 2010). Parametric methods are also less dependent on sample size. In adopting these methods for this analysis, the researcher acknowledges that although parametric analysis will identify differences between iterations of a construct, it will not measure the size of that difference (Sauro & Lewis, 2012).

Quantitative analysis

The Statistical Package for the Social Sciences (SPSS) software was used for all quantitative analyses of the data. Initial data exploration included computing descriptive statistics for each of the dependent variables. Statistical tests included mean, standard deviation and skewness, and tests for normality. Frequencies for each of the categorical variables were considered. The data was then explored to identify any relationships between dependent and independent variables. Graphical exploration using boxplots was followed by ANOVA tests for each of the independent variables of age, gender, OLE and template.

Qualitative data analysis

Qualitative data was obtained from two sources: the open response sections of the AEQ and from the semi-structured interviews. The qualitative data analysis software, NVivo, was used to examine the qualitative data. A project was set up with six initial nodes representing the six constructs examined in the AEQ: usability, usefulness, learnability and findability, desirability, credibility, and narrative. Students' open-ended comments from the AEQ were organised within these nodes.

The five transcripts from the interviews were then imported into the project and examined for themes. Where themes aligned with the six initial codes emerged, the transcripts were coded accordingly. The transcripts were also examined for themes not covered by the original six nodes.

Chapter summary

This chapter has presented the mixed methods methodology which underpins this research project, and outlined the methods used to generate and analyse the data. The research questions, the mixed methods methodology and the pragmatist paradigm were discussed. The context of the study, researcher bias potential, and ethical issues were considered, after which the procedure for conducting the research was described. Finally, an overview of the data analysis tools and methods was provided.

The next chapter presents the research findings, followed by a detailed discussion of these findings in Chapter five.

CHAPTER 4 RESULTS

Introduction

This chapter presents the analysis of the data collected in response to the research questions identified in the previous chapter and describes the findings of the study. The research hypothesises that online courses presented using an aesthetic template provide a better UX than those designed without a template. To answer this, each of the following sub-questions is addressed in turn.

- Is there a relationship between UX and general demographic factors such as age, gender and OLE?
- Is there a relationship between overall UX and being enrolled in a course designed according to an aesthetic template?
- Is there an impact on UX if an aesthetic template is adapted?

The chapter starts with a demographic overview and general exploration of the quantitative data collected through the AEQ. Qualitative data from the AEQ is used to illustrate the data analysis. After this, data collected from the semi-structured interviews is examined.

Initial quantitative data preparation

The online survey received 86 responses. Initial examination of the raw data showed seven respondents had completed the demographic section of the survey, but had not continued to the UX evaluation in Section two. These responses were removed from the data before analysis. One respondent who completed the survey, indicated at the end: *“Sorry - I've answered the questions based on all the courses available to me, not just this one.”* All responses from this respondent were also removed before further data analysis leaving a total of 78 completed responses for further analysis.

Demographic information

Section one of the survey asks students basic demographic information including age, gender, OLE, and programme and course of enrolment.

A total of 563 students were enrolled in the courses included in this study. Of these, 78 agreed to participate in the online questionnaire. The highest number of respondents fell into the 18-24-year age group whereas the 50-55-year group only had two respondents. Because the low numbers of respondents in the higher age groups limit the statistical analysis that could be conducted, the 35-40- and 40-45-year groups were collapsed into one new group, 35-45 years. The 45-50-year and 50-55-year groups were also collapsed into one new group, 45 and older. The group of respondents comprised 51 who identified as female, 26 who identified as male and one who did not indicate gender. A summary of demographic information is provided in Table 1.

Table 1: Participants' demographic details

Gender	Age					
	Total	18-24	25-30	30-35	35-45	45 and older
Female	51	19	8	10	7	7
Male	26	12	4	4	3	3
Unidentified	1	1				

The majority of respondents were enrolled in their first semester of online study, followed by those in their second semester. The remainder were in their second year or more of studying online.

Participants' OLE is summarised in Table 2.

Table 2: Participants' experience of online learning

Online learning experience		
First semester of study	Second semester	Second year or more
35	28	15

The courses used in this study were coded as either 'templated', 'adapted template' or 'no template'. Based on this categorisation, 31 students were enrolled in a templated course, 40 in a course designed using an adapted template, and seven in a course designed without the template. Students were enrolled in a range of science programmes, summarised in Table 3, below. A relatively large proportion (15%, n=12) did not specify their programme of enrolment. Because of the high proportion of unspecified programmes, no further analysis was undertaken to determine whether programme of enrolment had any relationship to UX.

Table 3: Participants' programme of study

Bachelor of Science	Bachelor of Information Sciences	Bachelor of Agri-Science	Bachelor of Agri-Commerce	Bachelor of Construction	Unspecified
28	17	14	4	3	12

The relationship between demographic variables and aesthetic experience

constructs

Section two of the survey (see Appendix D) requires respondents to evaluate 42 aspects of UX using a seven-point scale (1: Strongly Disagree – 7: Strongly Agree). As discussed in the previous chapter, these UX aspects are derived from existing evaluation tools, and appraise six key UX constructs: usability, usefulness, learnability, desirability, credibility and narrative. Participants are also asked in this section to rate their overall experience of the course on the same seven-point Likert scale.

This section presents the analysis of the AEQ data in relation to the demographic factors of age, gender and online learning experience. The relationship between template and each of the UX constructs is examined in the next section.

Data preparation

A set of composite variables related to the UX constructs identified in the AEQ (usefulness, usability, learnability, desirability, credibility, and narrative) is created from the mean of the Likert scores for each construct. As discussed in the previous chapter, these constructs had been identified through factor analysis undertaken when the source tools (from which the AEQ questions were extracted) were formed. An additional dependent variable was created from the mean of all survey questions. This process was done using the 'Transform' function in SPSS.

Cronbach's Alpha tests were conducted using SPSS to ensure the process was valid for this study. The results, in Table 4 below, show that each composite variable, created from the means, is an excellent measure of the underlying construct as $\alpha \geq 0.9$ in each case.

Table 4: Cronbach's Alpha results for new dependent variables based on means of constructs

Construct	Number of Questions	Cronbach's Alpha
Usefulness	7	0.952
Usability	9	0.959
Learnability	4	0.911
Desirability	5	0.958
Credibility	7	0.934
Narrative	15	0.975
Total	47	0.989

The data was then analysed to determine normality. Although skew or kurtosis scores of 0 represents a normal population, it is generally accepted that scores falling between -1 and +1 meets

the normality assumption (Sauro & Lewis, 2012). Table 5 shows the skew and kurtosis scores for each of the new dependent variables.

Table 5: Skewness and kurtosis

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Useful	-.910	.272	.273	.541
Usable	-.827	.272	-.115	.541
Learnable	-.766	.272	-.519	.541
Desirable	-.790	.272	-.452	.541
Credible	-.663	.272	-.495	.541
Narrative	-.918	.272	-.115	.541

One-way ANOVA tests were run to determine relationships between each of the dependent variables and each of the independent variables. The results of each ANOVA are arranged in Table 6, below.

Table 6: One-way ANOVA results summary

	Usefulness	Usability	Learnability	Desirability	Credibility	Narrative
Age	f=2.335 p=.041	f=1.118 p=.361	f=1.941 p=.086	f=1.441 p=.211	f=0.544 p=.773	f=1.919 p=.090
Gender	f=2.139 p=.148	f=2.642 p=.108	f=5.133 p=.026	f=4.750 p=.032	f=5.943 p=.017	f=.025 p=.876
OLE	f = .229 p=.796	f=.226 p=.799	f=.067 p=.935	f=.091 p=.913	f=.910 p=.404	f=.331 p=.719

Age

The results of the ANOVA tests identified a significant relationship between age and perceived usefulness ($p=0.41$). Post hoc comparisons using the Tukey HSD test indicated that the mean score for the 25-30 age group ($M = 4.93$, $SD = 1.45$) was significantly different to the 18-24, 35-45 and the 45-55 groups. These results suggest that students in the 25-30 group found the design of their course less useful than those in other age groups.

Gender

The results of the ANOVA also identified statistically significant relationships between gender and learnability ($p=0.026$), desirability ($p=0.032$) and credibility ($p=0.017$). Comparison of the means of males and females showed that females scored each of these constructs more highly than males. The difference between means, calculated using a one-way ANOVA, was statistically significant for both learnability ($P=0.029$) and credibility ($p=0.029$) suggesting that females rated the learnability and credibility of their courses higher than did males.

Online learning experience

The results of the ANOVA showed no statistically significant relationship between the respondents' OLE and any of the UX constructs. This finding suggests previous experience of online learning does not influence the way respondents rate their UX.

The relationship between demographic variables and overall user experience

In addition to their experience of the various UX constructs, students were also asked to respond to a single statement evaluating their overall experience of their identified online course using a seven-point Likert scale ranging from 1: Strongly Disagree to 7: Strongly Agree (See Appendix D). As shown in Figure 1 below, 87.2% of the respondents ($n=68$) rated their overall experience as positive ('Somewhat Agree', 'Agree' and 'Strongly Agree').

Age and overall user experience

Cross-tabulation of age with overall UX shows that across all age groups, more respondents rated their overall UX as positive ('Somewhat Agree', 'Agree' and 'Strongly Agree'). Although the highest number (29) of positive responses occurs in the 18-24-year group, the highest proportion of positive user experiences occurs in the 45 and older group, where 90% of the respondents rated their overall experience as positive (Figure 2).

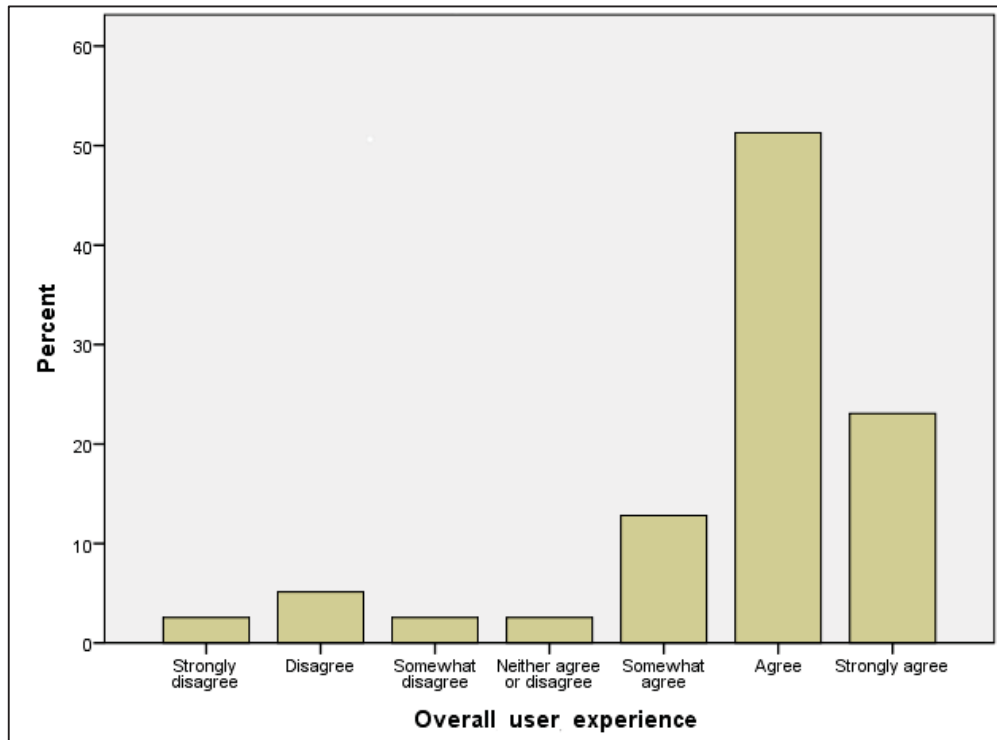


Figure 1: Overall user experience

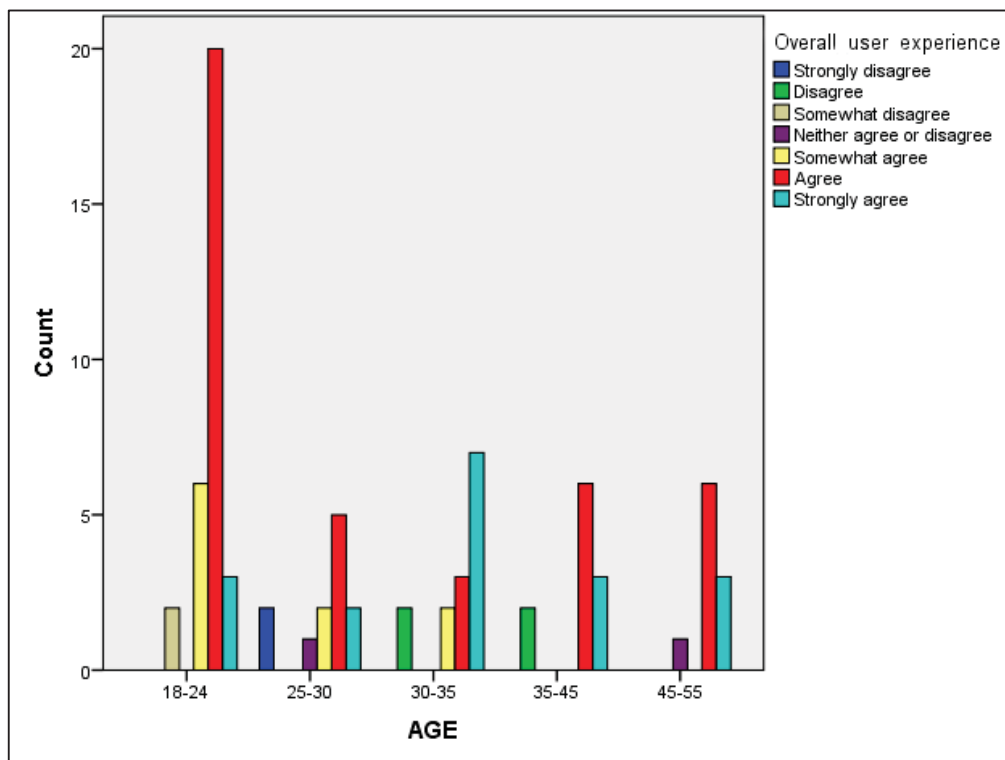


Figure 2: Cross-tabulation of age and overall user experience

A box-and-whisker graph for overall UX by age shows that the medians for most age groups are similar. However, there is a negative skew for the 25-30- and 30-35-age groups. In most age groups there is also a cluster of negative outliers who scored their overall experience lower than any of the others in their group. The exception to this is in the 18-24 group, where there is also a small cluster of positive outliers.

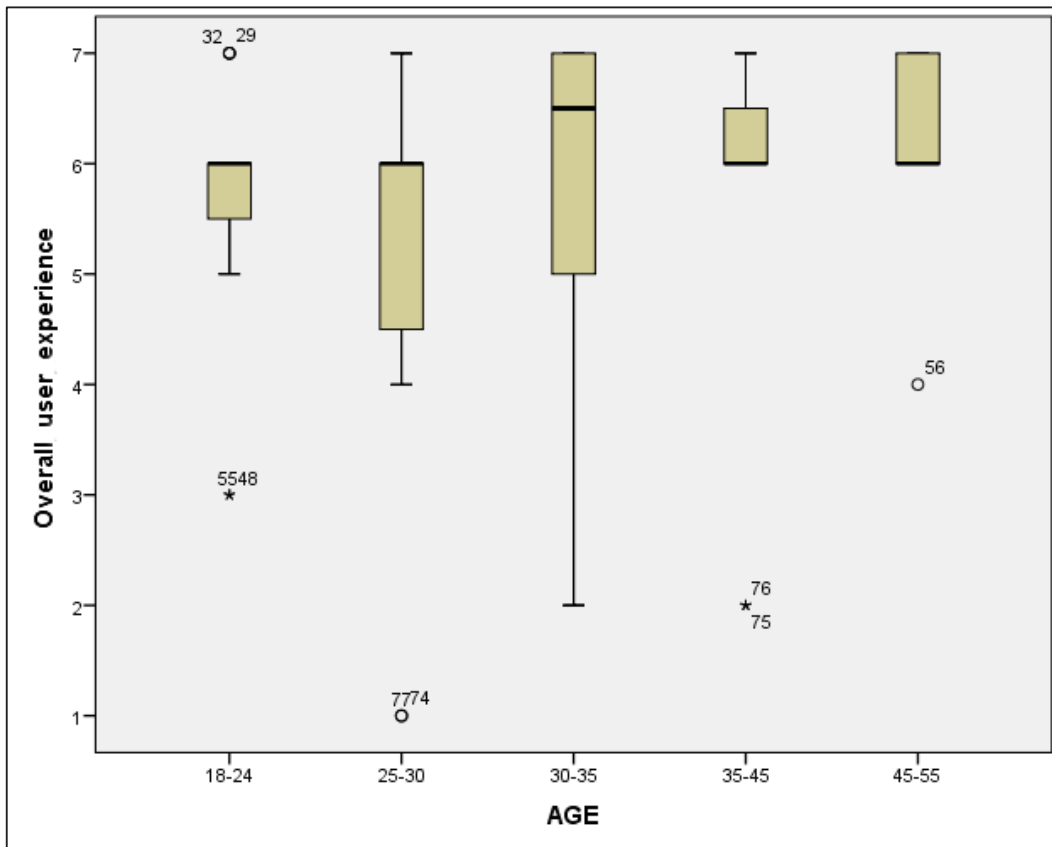


Figure 3: Box and whiskers plot of age and overall user experience

Examination of the outliers showed that all but one (respondent number 48) of the negative outliers was in a non-templated course. A Pearson's product moment correlation was run to determine the relationship between age and overall UX. The results showed a very weak positive correlation ($r=.05$, $n=77$, $p=.6$) indicating that there is no significant relationship between age and overall UX.

Gender and overall user experience

Cross-tabulation of gender and overall UX shows that in both male and female groups, most respondents had a positive UX.

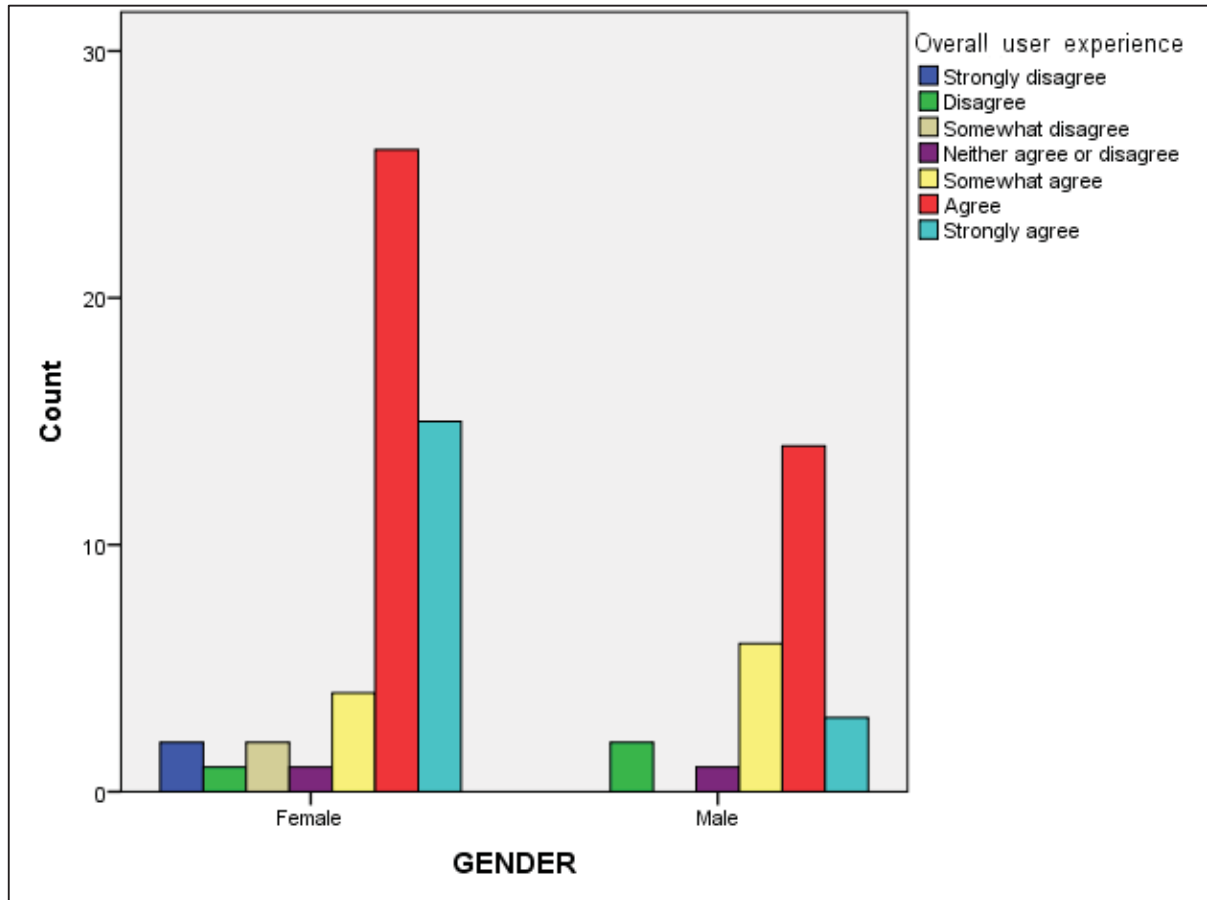


Figure 4: Cross-tabulation of gender and overall user experience

Of the female respondents, 88% (n=45) rated their overall user experience as positive, and a similar proportion of male respondents (88%, n= 23) of the male respondents reported a positive overall user experience. Generation of a boxplot for gender and overall UX shows the medians of the two groups are identical and very high, with respondents from the non-templated course being negative outliers.

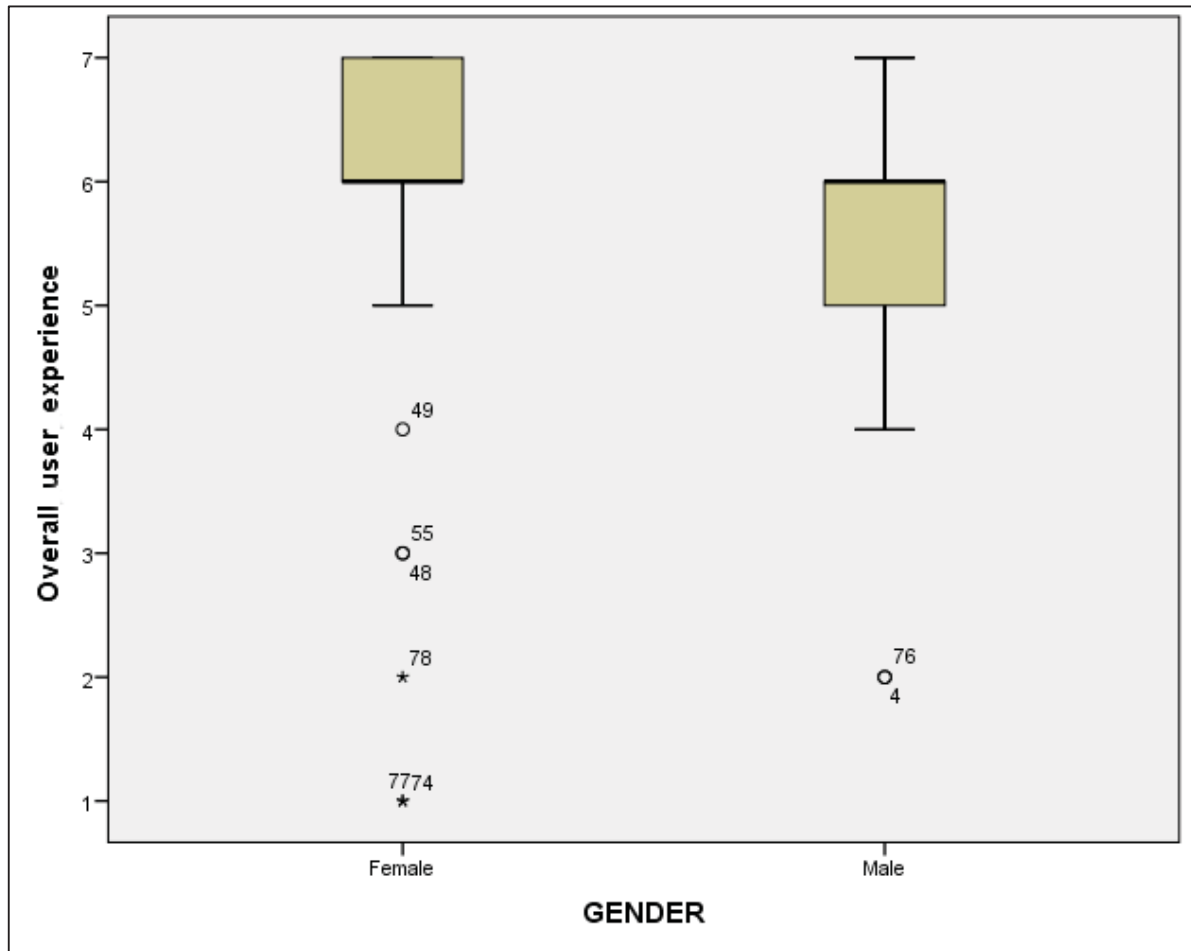


Figure 5: Box-and-whiskers graph of gender and overall user experience

A Pearson's product moment was run to determine the relationship between gender and overall UX. The results showed a very weak correlation between gender and overall UX that was not statistically significant ($r=.141$, $n=77$, $p=.222$) suggesting that gender did not have an impact on the overall UX.

Online learning experience and overall user experience

Cross-tabulation of OLE and overall UX shows that across all categories of OLE, most respondents had a positive UX.

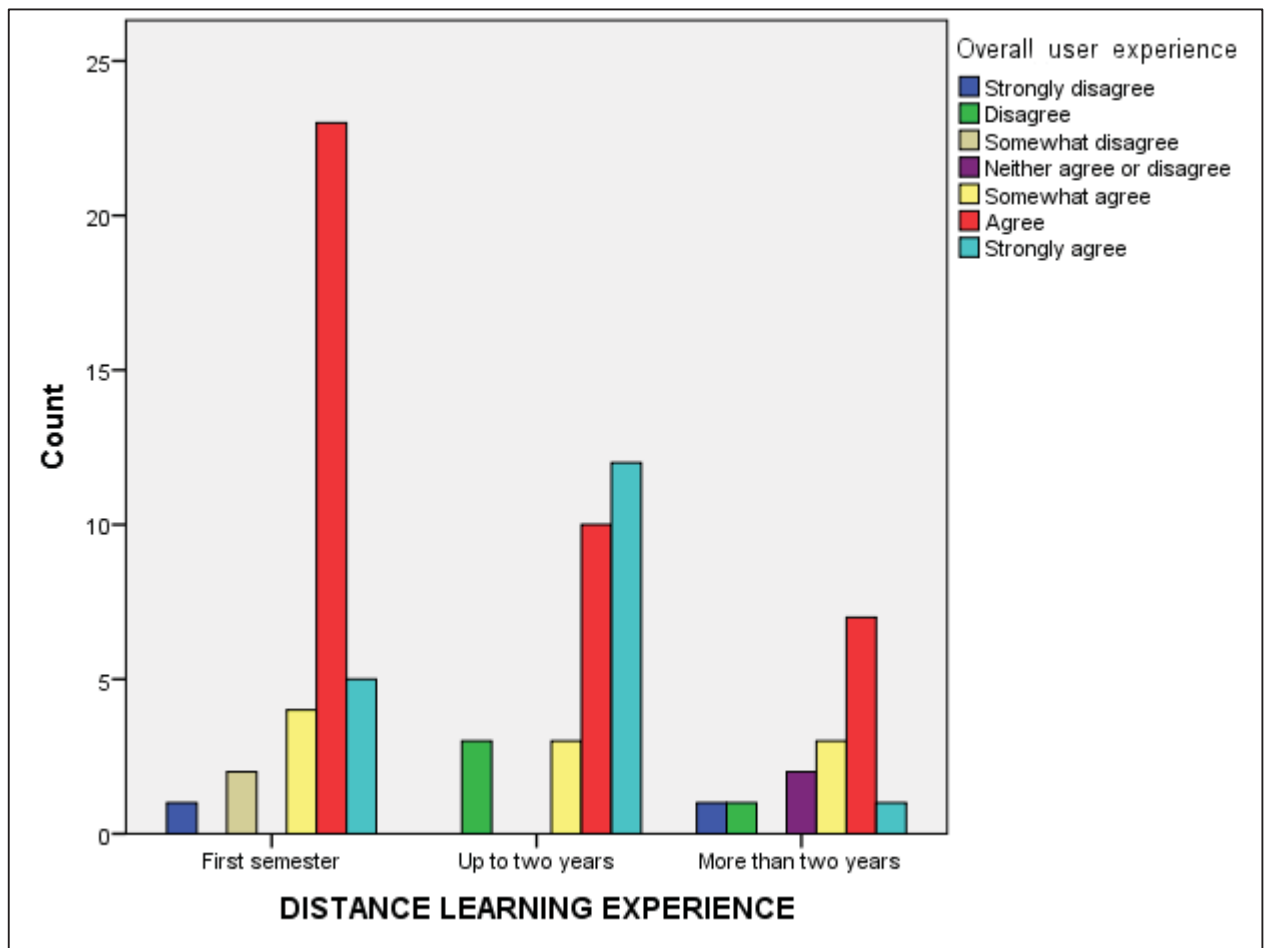


Figure 6: Cross-tabulation of online learning experience and overall user experience

A box plot shows that the median scores of each OLE category are the same and very high.

Responses in the 'up to two years' category show a positive skew, whereas those from students with more than two years' experience display a negative skew and a wider interquartile range.

Examination of the outliers who scored their overall experience less than 4 reveals they are in non-templated courses, except respondent number 4, who is in a templated course.



Figure 7: Box-and-whiskers graph of online learning experience and overall user experience

A Pearson's product moment correlation was run to determine the relationship between OLE and overall UX. A very weak relationship was found ($r=-.1$, $n=77$) which was not statistically significant ($p=.38$), suggesting that previous experience of online learning did not have a significant impact on overall user experience ratings.

The relationship between use of the template and user experience constructs

One-way ANOVA were conducted to examine the relationship between the use of a template and each of the UX constructs. The results of these ANOVA are summarised in Table 9, below.

Table 7 One-way ANOVA results for template

	Usefulness	Usability	Learnability	Desirability	Credibility	Narrative
Template	f= 16.692 p=.000	f=.6.517 p=.002	f=8.556 p=.000	f=8.106 p=.001	f= 4.487 p=.014	f=12.493 p=.000

Statistically significant relationships were identified between template and all UX constructs. Post hoc testing using Tukey's-b test for all instances revealed two subsets where $\alpha=0.005$. Subset 1 is No template, and Subset 2 is adapted and templated. The results of the post hoc tests are summarised in Table 8, below. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the non-templated group ($M = 2.14$, $SD = .631$) was significantly different to the templated and adapted templated groups.

Table 8: Summary of template post hoc tests

		Usefulness		Usability		Learnability		Desirability		Credibility		Narrative	
Template	N	Subset		Subset		Subset		Subset		Subset		Subset	
		1	2	1	2	1	2	1	2	1	2	1	2
None	6	2.83		3.50		3.17		3.00		4.67		2.67	
Adapted	31		5.06		5.00		5.32		4.93		5.74		4.74
Templated	40		5.75		5.58		5.82		5.47		5.98		5.47

This tells us templated and adapted-template courses are rated higher than non-templated courses for all UX constructs, showing that the use of a template, even if adapted, provides a better UX than a course without a template.

The relationship between template and overall user experience

Initial cross-tabulation of template and overall UX shows that within both the templated and adapted template groups, respondents tended to rate their overall UX positive. However, within the non-templated group, no respondents rated their overall UX positive.

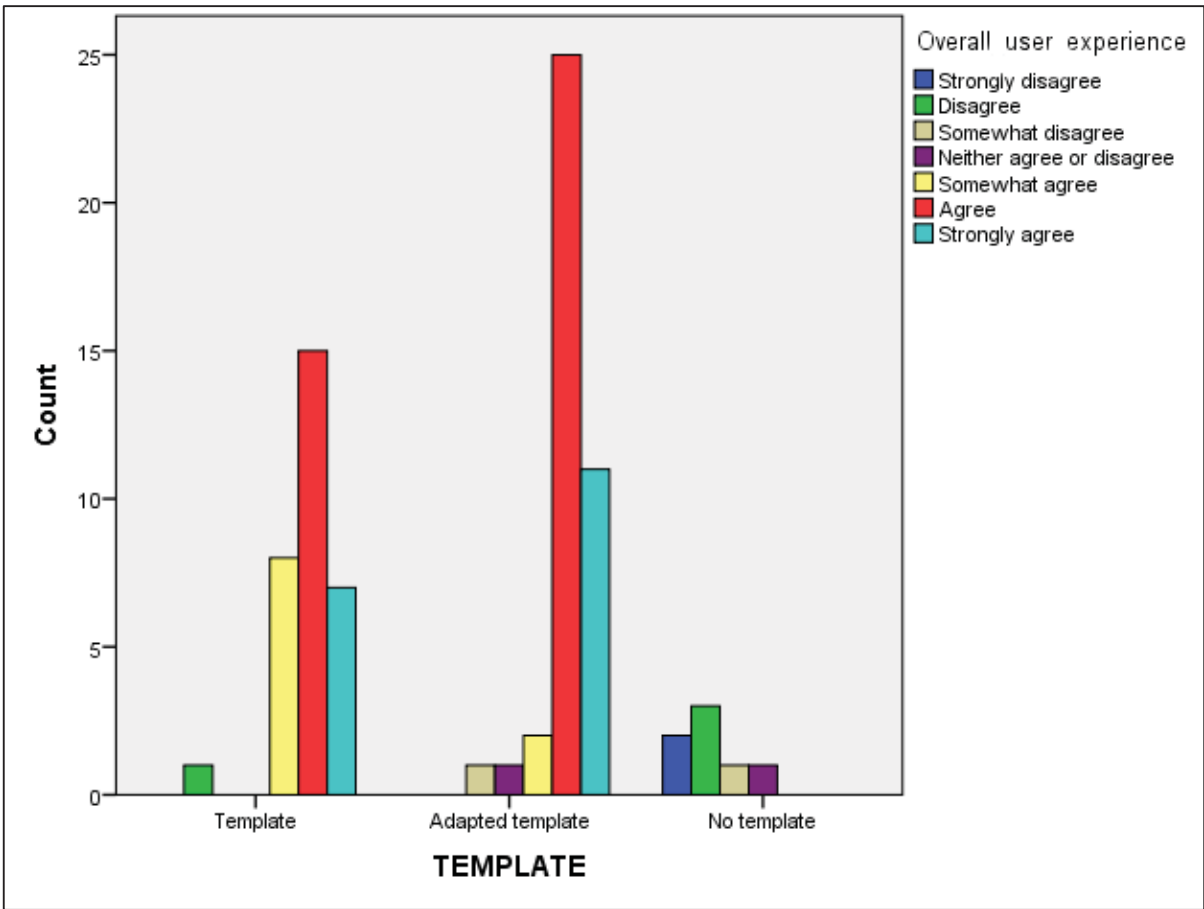


Figure 8: Cross-tabulation of template and overall user experience

Examination of the boxplot for template and overall UX shows no difference in the median scores for the template and adapted template groups, but the median score for the non-template group is low.

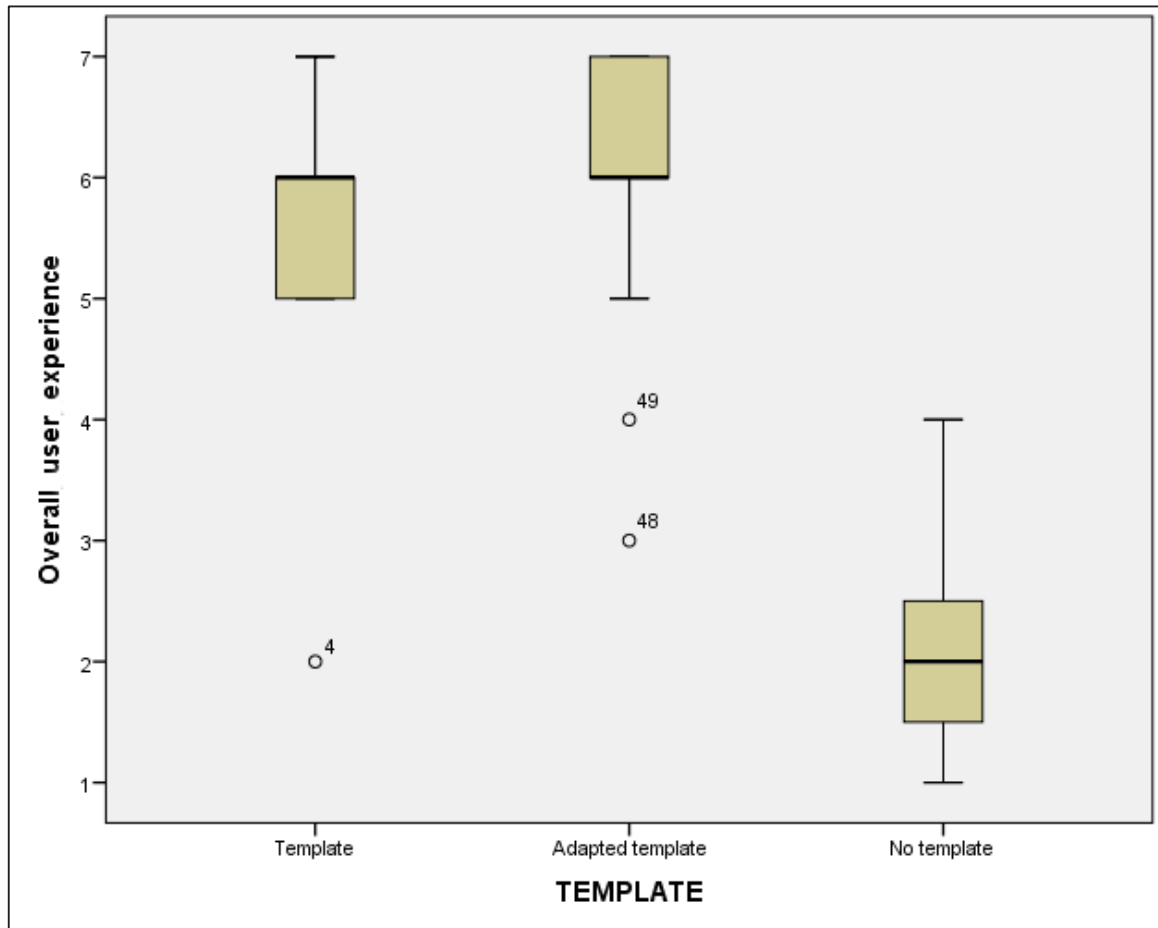


Figure 9: Box-and-whiskers graph of template and overall user experience

To determine whether the difference in scores is significant, a Chi-square analysis was conducted.

The results show a highly significant relationship between template and overall UX ($p=.000$)

suggesting that respondents in template and adapted-template courses rated their overall UX

significantly higher than those in non-templated courses.

Quantitative results summary

Quantitative analysis of the AEQ data shows there is a highly significant relationship between the use of a template, even if adapted, and the overall UX, where respondents from courses that used a template rated their overall UX significantly higher than those from non-templated courses. In addition, respondents in templated courses also rated their experience of each of the UX constructs

measured (usability, usefulness, learnability, findability desirability, credibility and narrative) significantly higher than those in non-templated courses.

Although no significant relationship was found between respondents' OLE and any individual UX constructs, the data shows students with more OLE rate their overall UX more highly. A statistically significant relationship was found between gender and the UX constructs of learnability, desirability and credibility, with females rating each of these three constructs more highly than males. There was no significant difference in the overall UX ratings of males and females.

Describing the user experience

Qualitative information about UX comes from two sources: comments made by respondents to the AEQ, and from the semi-structured interviews. Fifty-nine students provided comments in the AEQ, and three participated in the semi-structured interviews. Two lecturers also participated in the interviews.

Comments obtained from the AEQ are indicated with a number in brackets corresponding to the number of the student's questionnaire. Responses from the interview are indicated by the pseudonym allocated to the participant, followed by S or L indicating student or lecturer.

Describing the relationship between the course template and user experience

Qualitative comments illustrating the relationship between the use of a template and the various UX constructs were made by 73% (n=57) of the AEQ respondents.

Describing usefulness

Three themes emerged under the usefulness construct: time, learner effectiveness, and lecturer effectiveness.

Time

The theme of time has three components: the time required to access learning materials, the

cognitive load of the online course design, and the limited time online students have for study. Students commenting on non-templated courses noted that finding what they needed was slow, “navigating through [the online course] can be time consuming” (Student 74) and “it takes forever to find anything” (Student 77). By contrast, a student commenting on a templated course noted “the design makes a big difference to how fast you can access the information. “This particular course is easy it's all on one page you can scroll down” (Student 4). Another student commenting on a course designed using an adapted template, noted not only that the clear structure saved her time, but also that it reduced extraneous cognitive load, by

...focussing my study week by week on what is required (in comparison to others where it is all dumped in one place and you need to flick between the admin guide and [course site] to ascertain what you're meant to be looking at). (Student 22)

The link between speed to access resources and the time-poor situation of many online students was contextualised by Mike, who said during his interview:

I've got a family and a full time job and full time study and I need to make the most of my time. I don't come into [the university] because it's a half an hour drive in and a half an hour drive home and that's an hour I've lost where I could be at home studying for that hour that's how I maximize my time I don't want to spend 15 minutes trying to find a lecture recording and that's just the lecture recordings [laughs]. (Mike - Interview S3)

Another student, Sue, reinforced this perspective in her interview:

[for] someone who is working full time getting involved in the online environment is just busy work.... time is very important to me so and you know, I do want to get this course done in the minimum amount of time and that I wouldn't be...um...yeah doing things like forums and that. (Sue, S2)

The importance of time was also noted by an interviewed lecturer who commented on his adapted template course:

yeah it wasn't time saving for me...that wasn't the question [laughs] it's totally time saving for them [the students], um, it's so they don't need to click through lots of things to find that

information, if the site is set up properly, they can find that information quickly. (Gordon)

Learner effectiveness

Another aspect of the usefulness construct expanded on by respondents' comments was how the online site helps them to be effective learners. One student in her first semester of study and commenting on a templated course said:

The layout and content helps me to easily evaluate what I need to be doing each day to accomplish my goals for the week. (Student 16)

In contrast, a student with more than two years' OLE said the design of her (non-templated) course meant that she had to develop coping strategies to use her course site:

The site is okay when you get used to it, it's really hard to work out what needs to be done when. To stay on top of this I have written everything in a diary. (Student 78)

The use of completion tracking in the template was regarded as helpful to his effectiveness by an experienced student who claimed:

being able to 'tick' off tasks/documents is also very useful for keeping track of where you are up to. (Student 5)

Another, referring to his adapted template site, commented:

great site, currently have another [online] paper but find this structure more user friendly, easy to follow and I don't get lost remembering what I had and had not completed thanks to the tick boxes. (Student 42)

How the online site helped students to control their studies was commended by a student of an adapted template course:

The course overview provides a useful summary, the forum is useful for communication and the main page for the course is informative and shows me everything I need to do for each week. (Student 62)

Lecturer effectiveness

The importance of the LMS's role in supporting students to be effective learners was noted by both interviewed lecturers. Gordon commented:

It's valuable if students can get the information they want quickly and it's in a form which they can remember. I'd like to think this site is valuable – the information is there, there are useful bits that you can't get from the textbooks. (Gordon)

However, he also pointed out that it was difficult for lecturers to know exactly what they should do to help students become effective learners:

I don't think we can do everything and I'm not sure that we should be doing everything but on the other hand not knowing which of those is most effective means that if we could only choose one [student support strategy] are we choosing the right one? (Gordon)

This dichotomy was echoed by another lecturer, Mary:

...we've tried to make sure that there's one way to get to information so.... Well...things are connected, they're not all over the place.

At the same time, Mary recognises that course design may reflect the lecturers' own preferences:

...that probably tells you something about the people involved in this...we're...all very organised-systems-picking-list people...I suppose if you're a person who didn't like that we'd be in trouble [laughs].

Describing usability

The AEQ examines issues of ease of use, simplicity of use, error recovery and successful use under the overall construct of usability.

Aspects of usability featured in all the interviews. A lecturer said:

It should be easy for them, for the student to find the information they want. There should be no barrier for them...they shouldn't sort of come across it and go right, I want to know this

*but I can't find it in however many seconds or minutes or whatever their threshold is.
(Gordon).*

Qualitative feedback from a student on a templated site was: "Structure of [online course] site and precise naming of links/documents makes the site extremely useable" (Student 5). Interview participant, Dave, describing the usability of an adapted template site, claims:

I find the simplicity of the design a lot better than...uh...a pop-out menu or a dropdown menu or things like that because I know everything I need to know is right here, is upfront, um...I don't need to...um dig down, drill down to find anything. You know, if I want assignment 2, there's assignment 2. (Dave, S1)

Sue's verdict on her templated course was:

*I mean yeah it's basically a big list isn't it? Um...the way it goes through the weeks of the course when you scroll down, um, makes sense...[it's] straight forward and usable in the way it's all a sort of progression...it's basically a list and all the functionality is down the centre.
(Sue, S1)*

Describing learnability

The AEQ evaluates how quickly students feel they learned to use an online course site, how easily they learn, and how easy it is to find and remember where resources are on the site. One participant, enrolled in her first semester of study, said navigating her adapted template course "isn't easy for first time users" (Student 32), but another, referring to the same course, felt it was "easy to navigate and find things one is looking for." (Student 35)

A participant commenting on the learnability of a non-templated course felt in his third week of study that that he was "still learning to use it properly and focus on the really important material on it" (Student 75). Another described difficulty locating things she needed in a non-templated course: "finding links, assignments information is not always straightforward" (Student 76). In contrast, a student described her templated course: "fantastic - simple, straightforward, not over-crowded, but

still providing everything we require". (Student 48)

Learnability factors related to the template were also cited in response to the AEQ question, 'What is the best aspect of this [LMS] site?'

The structure! (Student 42, adapted template course).

Logical order... (Student 49, adapted template course).

The layout and the accessibility of course information (Student 4, templated course).

easy to follow (Student 58, adapted template course).

Similarly, learnability factors were identified by several students when listing the worst aspects of the non-templated course sites they were evaluating:

learning where everything is (Student 69).

Sometimes you can get lost and its can be overwhelming (Student 77).

Several students also made general observations about the variation of layout and design between course sites. Whilst not commenting on specific courses, they noted that the variety of course designs generally, rather than specific faults with a particular course, led to learnability problems:

Often course lecturers set out their pages differently. There's no consistency in that area and you have to adapt to different courses set up. (Student 17, adapted template course)

From the two papers I am doing the [online course] layout is completely different, this means that I had to work out the layout twice, it would have made more sense if they were all laid out the same. (Student 36, templated course)

From my personal experience, the layout does change from paper to paper and that takes a bit of getting used to. (Student 5, adapted template course)

Describing desirability

Students' comments on the desirability of the course they were evaluating addressed several different issues. Two students mentioned the visual aesthetics of the same templated course. Both

noted the primary purpose of their course as a learning platform was evident. One student (female, with one year's online study experience) said in her survey feedback:

The sites layout is satisfying to view and use. Most of the fonts and colours are attractive to view, however, at first glance you can tell it is a learning tool and the presentation/appearance has gone no further than to fulfil that criteria. (Student 34)

Sue, enrolled in her first online course, commented on the same online course site in her interview:

you know if you look at websites in general that would be a really dated old website now that you wouldn't, you just wouldn't want ... um ... to engage people um...I have been involved in marketing in the last few years ... there's a lot of effort that goes into now making websites very engaging, that one certainly wouldn't be on the list.

She did add, however:

I'd say its efficient, it does what its meant to do, I've never found any issues with how it works, you know, it is easy to navigate ... I've never had any problems with the functionality of it. (Sue, S2)

A male student with more than two years' online study experience described the visual appearance of the same online course site:

The simplistic nature of the layout is a welcome relief. I loathe having to search around graphically overladen sites, just because some arts person or educators thought to splash their graphical preferences all over my screen. (Student 71)

Another student enrolled in her first online course, said of her templated course site:

Ease of use makes this a very desirable site. If I'm tired/not really feeling like studying this is the paper I will choose (which is surprising considering it's my hardest) as I know that it is set out in a way that is conducive to ease of learning and won't be complicated to navigate. (Student 11)

Mike echoed this comment in his interview. In describing a non-templated course in passing during the discussion, he pointed out:

the [online course] site makes it difficult, makes me not want to go into it. If you had...you've got two papers that need to be ... that you've gotta work on and one easy to access and one's not you're going to do the easy one. (Mike, S3)

A male student with more than two years' experience, commenting on an adapted templated course, addressed the impact of desirability of some of the in-built LMS features:

Seriously, getting rid of the previously committed assignments/quiz would go a long way to desirability as well - the redundant information amongst 'noise' is like being in a restaurant with food packaging lying about the floor. (Student 71)

Describing credibility

Although the AEQ questions measuring credibility focussed on the accuracy of the information on the sites and only one question focussed on the authors of the site, students' qualitative comments focussed equally on the lecturers' behaviour and the professional appearance of their course. One student noted that, "*It comes down to the people that are running the site...the most important part is the people*", although another student, Mike, said in his interview that engaging lecturer behaviour was not enough to overcome a poorly designed online course site:

he's [the lecturer] good he is easy to contact, the class is not...the class is not hard to me this is a level 100 paper I mean I've been doing computers for 15 years now so the class isn't overly...but it's just the [online course] site makes it difficult, makes me not want to go into it. (Mike, S3)

In contrast to this, another survey respondent noted the absence of lecturer engagement meant, "*it's hard to tell if the authors are credible because they never respond to anything*". (Student 27, adapted template course)

The importance to overall credibility of technical aspects of resources included in the online template was identified by one survey respondent: *"All of the resources I have used are up to date and appear to be regularly updated."* (Student 48, templated course). Another commented:

Much of the content and way it is present[ed] can be a bit questionable, whether the site itself is credible?...technical stuff isn't technically correct which is a challenge to deal with credibility wise; things like getting the [software name] software installed due to Google not keeping Chrome compatible with the Java in [software name] again made things a little less credible. (Student 25, adapted template course)

One survey respondent drew attention to the challenge students face when evaluating the credibility of a course website. Because they are not experts, they are required to trust that the information in the course is credible: *"One would assume that the knowledge is accurate as it is what is being taught and assessed for the paper". (Student 34, templated course)*

Describing narrative

Students' qualitative feedback that a visible course narrative in the online course site offers structure to support progress through the course. Although students mentioned more traditional sources of teaching narrative, such as text or videos describing the learning for the week, the key device students used to determine course narrative was the layout itself. Students on templated sites said the chronological order of the template helped create the narrative, particularly when dates were associated with topics. Students were then able to determine which topics were going to be more difficult or time-consuming, and plan their study accordingly. During his interview, one explained it as

[Mike] You know... you're supposed to do three topics this week and when next week there's only one, then you know next week is going to be a bit harder.

[Interviewer] Oh yes, I hadn't thought about that. Ok, so is the structure actually giving you cues about other things?

[Mike] Yes like how hard the work will be. (Mike, S3)

Chapter summary

This chapter presented evidence of the relationship between the use of an aesthetic course design template and UX. The role of gender, age and OLE in determining overall UX was also considered, and the factors that comprise UX were examined. Although age and gender were both shown to have some relationship to different UX constructs, these relationships were not found to be significant. Students' previous experience of studying online had no relationship to their rating of any of the UX constructs. By contrast, a strong positive relationship was found between the use of the aesthetic template, even if it had been adapted, and all aspects of the UX.

Whilst examination of the quantitative data confirmed the existence of a relationship between the use of a template and all aspects of the user experience, the qualitative data provided more detail about the nature of that relationship and how it was perceived by the respondents.

Courses that were designed using a template were perceived to be more useful than those which did not incorporate the template. Students found that the template saved them time, and improved their effectiveness by enabling them to focus on their learning tasks, a comment echoed by the lecturers who participated in the interviews.

The use of a template was also found to improve the learnability, credibility and usability of the online course, which in turn made the course more desirable. The presence of an overt course narrative was regarded by students as an important part of the course design.

These findings and their implications are discussed in the next chapter.

CHAPTER 5 DISCUSSION

Introduction

The previous chapter presented the findings from both the quantitative and qualitative stages of this research study. This chapter discusses these findings with reference to the literature, and evaluates the merits of implementing an aesthetic design template for all online courses.

The purpose of this mixed methods research study was to examine the impact of an online course template on the overall UX of students *enrolled* in an online course. The impact of template use on six aspects of the UX as well as on the overall UX was considered, and the consequences of adapting the template were evaluated. The most notable finding was that online courses incorporating the template had significantly higher ratings for all UX constructs. The overall UX rating of courses designed using the template was also significantly higher than UX rating of courses designed without the template. This chapter discusses the significance of these findings and their relevance for online course design. It will also show how these findings relate to other research in the area.

The impact of aesthetic design on the overall user experience

Quantitative analysis of the relationship between the use of a template and the UX constructs showed statistically significant relationships between each of the constructs and the template. In addition, analysis showed that there were only two sub-groups, one containing both templated and adapted template courses, the other containing courses that had not used the template at all. As the key design difference between these two subgroups was the presence (template and adapted-template groups) or absence (non-templated group) of an explicit course narrative, this finding suggests that the presence of course narrative is important to a satisfying UX. In qualitative feedback, students commented in both the survey and the interviews on how the course narrative allowed them to focus on the learning as they did not need to waste time figuring out what was expected of them. This finding supports the earlier work of Laurillard, (1998), who found that

students working in contexts without a clear narrative structure show unfocussed learning behaviours, and Parrish (2008), who found that narrative structure assisted the learner to create meaning.

The role the teacher (or course designer) plays in the narrative was discussed by both lecturer participants. Participants' comments about the place of the course narrative in providing information that students cannot obtain from textbooks, and the role of the lecturer in assisting students to navigate the course, align strongly with Parrish's (2009) fifth principle of aesthetic design, that of teacher as author, model protagonist and supporting character. Qualitative feedback, in this study, suggesting that engaging lecturer behaviour on its own is insufficient to overcome a poor course structure, reinforces the interdependent nature of the narrative principles: they do not stand effectively in isolation. This finding is supported by Anderson, Rourke, Garrison and Archer (2001), who see the teacher's narrative role as a one of three parts: a grand designer of the course, a facilitator of discourse, and a scholarly leader. The grand designer role includes making explicit the curriculum, and methods of engaging with content and time parameters; whilst the facilitator establishes the climate for learning, identifies areas of difficulty or conflict, and encourages and reinforces student engagement. The scholarly leader provides direct instruction, and helps students to focus on specific areas of content and confirming understanding.

Described in this way, the complexity of the role played by lecturers facilitating online courses is clear. They not only have to help students engage with content in ways that increase students' comprehension, they also require design skills to construct and present the learning effectively. This complexity was confirmed by interviewed lecturers. As well as expressing uncertainty that they had done enough, and that what they had done was correct, they indicated awareness that their personal preferences influenced their course design decisions.

In addition to reinforcing narrative importance in course design, the findings of this study support the role of aesthetic design to reduce extraneous cognitive load and improve learner engagement.

Analysis of the quantitative data showed students rated their experience of courses using the template, either in its original form or with some variations, significantly higher than courses that did not use the template. Courses using the template in some form saved students time by making learning tasks explicit. This finding aligns with the earlier work of both Gillmor, Poggio, and Embretson (2015) and Miller (2011), who found that improving the aesthetic design of a course reduced extraneous cognitive load.

The impact of template use on cognitive load, and hence on motivation and engagement, was commented on by students, suggesting that aesthetic design made courses conducive to learning, independent from content difficulty or lecturer efforts to engage students. This finding is supported by the earlier work of Miller (2011), Sonderegger and Sauer (2010), and Zaharias (2006) all of whom discovered that aesthetic designs had motivational effects on students, and that participants in a high aesthetic environment expressed a greater willingness to continue. In addition, the finding that an aesthetic template leads to higher usefulness, usability, and learnability ratings, suggests this template may support students with aspects of learner self-efficacy such as being effective, productive and in control of their studies (Zaharias, 2009). However, as self-efficacy was not measured in this study, further investigation is required before firm conclusions can be drawn.

Analysis of the relationship between the use of a template and perceived usefulness showed that a significant relationship existed, and demonstrated two sub-groups in the connection, one containing courses that used the template and the other containing courses designed without a template. Clearly, respondents found templated courses more useful than non-templated ones.

There appear to be no studies on the relationship between aesthetics and usefulness, although the exploratory laboratory study by MacDonald and Atwood (2014) showed that usefulness may contain both pragmatic and hedonic qualities, relating to the broader definition of aesthetics as 'aesthetic experience'.

Although usefulness is frequently cited as a UX construct and has been part of the widely regarded Technology Acceptance Model (TAM) (Davis, 1989) since its origins, few studies examine the relationship between usefulness and UX. It should also be noted that the TAM definition of usefulness remains utilitarian, focussing on performance and effectiveness, whereas this study has broadened the definition to a more UX focus by including statements such as ‘helps me to be in control’, and ‘meets my needs’, within the usefulness construct. Nevertheless, despite the narrower definition of usefulness in earlier TAM model research, several studies are worth considering here. Bhattacharjee and Sanford, (2006) and Shih (2004) both found that perceived usefulness has a direct positive relationship with attitude, and Sun, Tsai, Finger, Chen, and Yeh (2008) found that perceived usefulness greatly improves satisfaction in learners. In addition, usefulness can influence the intention to continue of more experienced users (Lin, 2011). In line with this research, it seems reasonable to speculate that template use may create a more positive attitude in learners, improve their satisfaction, and, at least in the more experienced students, positively influence their intention to persist with their learning, although further focussed investigation is needed. Whilst the limitations of this research project clearly prevent the drawing of definitive conclusions, these early indications are positive.

Participants in this study responded to the statements about usefulness in two ways: they commented on how templated and adapted templated sites allowed them to work more quickly or efficiently, and also on how these sites enabled them to work more effectively. By contrast, students enrolled in the courses not designed following a template, said that they wasted time learning where things were located. Some resorted to strategies such as creating course diaries to help them to organise their learning, whereas students in templated and adapted template courses perceived the aesthetic design of the course as time-saving.

Similarly, students enrolled in courses that used the template said the course design enabled them to focus on the learning, thus making the course more useful. A lecturer agreed, confirming that a

course designed according to the template allows students to find information easily and in a memorable form. This finding reinforces the work of Laurillard, Stratfold, Luckin, Plowman and Taylor (2000), who found that a linear system of design in which courses are designed using a clear, progressive series of resources and activities rather than a network of hyperlinks, supported recall.

Aesthetic design improves perceived usability

Just as the use of an aesthetic template corresponds positively in this study with the perceived usefulness of students' online course sites, so too does the use of the template, even if in an adapted format, correspond with the perceived usability of the course. This finding is unsurprising, as the relationship between aesthetics and perceived usability has been well documented in the literature (Tractinsky, Katz, & Ikar, 2000; Hassenzahl & Tractinsky, 2006; Lavie & Tractinsky, 2004; Ngo, Teo, & Byrne, 2000; Sonderegger & Sauer, 2010) although it contrasts with Miller's (2011) findings that aesthetic design correlated only moderately with improved task performance.

Usability was a primary focus of the lecturers interviewed for this study. One lecturer described it as removing barriers; students unpacked what this meant for them, referring to simple, straightforward designs, precise naming of resources and links, and a navigation approach putting all key resources up front, rather than requiring a 'drill-down' tactic. The link between these criteria and the fundamental concept expressed above of clear and effective communication of ideas is apparent. Importantly, it seems that this study confirms earlier findings that there is a relationship between aesthetics, usability and cognitive load. According to Miller (2011), learners in courses with high aesthetic values exerted significantly less mental effort, experienced significantly less stress, and perceived significantly fewer task demands than did learners in courses with low aesthetic values. These perceptions applied even to the course assessments, as learners in courses with high aesthetic values perceived the assessment tasks to be less demanding than those in low aesthetic value courses. Miller's findings, suggesting courses with high aesthetic values have lower extraneous

cognitive loads, allowing learners to focus on the intrinsic learning, are reinforced by the qualitative comments made by both student and lecturer respondents in this study.

Aesthetic design improves perceived credibility

Analysis of the results of the AEQ shows that means for statements in the credibility construct were consistently higher for both templated and adapted template courses than for courses designed without an aesthetic template. A significant relationship between the use of a template and perceived credibility was found and further analysis showed two sub-groups in the relationship, one containing courses that used the template, and the other, courses that did not. The relationship indicates respondents consider templated courses more credible than courses designed without the template. It is an important finding, paralleling that of David and Glore (2010), who discovered perceptions of credibility influence users' perceptions of the overall value of their online course.

The findings of the current study supporting the relationship between aesthetics and credibility echo several earlier studies. Both David and Glore (2010) and Robins and Holmes (2008) found that online content with higher aesthetic values is regarded as having higher credibility, and that this judgement is made within a few seconds of visiting a site.

Although the quantitative analysis suggested a strong correlation between the aesthetics and the credibility of an online course, qualitative comments about credibility focussed strongly on the more objective qualities: particularly, currency of the resources and technical functioning of the course.

The absence of comments on the relationship between the look of the site and its overall credibility contrasts with the findings of Fogg et al. (2003), which determined that the 'design look' was the single most important factor in the evaluation of a website's credibility. Functionality of the site was twelfth in the list of factors, and suggests credibility evaluations may be subconscious. Consideration must be given to the fact that students in this study were evaluating sites with which they were already reasonably familiar. Robins and Holmes (2008) found that the more time people spend on a web page, the more credible they would find it. Given that students in an online course don't really

have the option of finding their information elsewhere, it is possible enforced familiarity with the site had either skewed conscious perceptions of credibility, or the criteria by which students judged credibility had changed with use. Certainly Michailidou, Harper and Bechhofer's (2008) finding, that both clear, and organised' sites and familiarity with the site increase credibility ratings, support this conclusion.

The context in which this study was conducted may have a confounding effect. First-year students may assume the credibility of their lecturers, and thus also the online course content, without question. This possibility needs further investigation before any conclusions can be drawn.

Aesthetic design improves learnability

As with all the other UX constructs examined in this study, a significant positive correlation was found between templated courses and learnability. Students enrolled in templated courses rated their sites significantly more learnable than those enrolled in non-templated ones. Exactly why, is difficult to determine. The halo effect in UX is discussed in a number of studies (Lindgaard et al., 2011; Sonderegger & Sauer, 2010; Tuch, Roth, Hornbæk, Opwis, & Bargas-Avila, 2012). It is possible the overall positive experiences of a high aesthetic site mean respondents simply rate all aspects of the site more highly. However, the impact of an aesthetic design on reducing cognitive load, and the consequent improvement of learnability could also be reasons.

As discussed in Chapters two and three, in aesthetic template development, consideration was given to four strategies reducing cognitive load: mental models, patterns, avoiding attention splitting, and avoiding redundancy. Designing a course which corresponded to commonly used sites such as Facebook (i.e. based on a 'flat' design, using scrolling, key information in the centre of the screen, and following a chronological order) meant students could apply these mental models to their course, rather than learning new strategies for locating information. Repeating patterns within the course meant when new learning about location of and navigation to resources had to take place, it

could be applied to repeated instances within the course, so pattern reduced the number of new learning instances required of users.

A key principle of the aesthetic design, and one which may relate to the earlier discussion on the importance of course narrative as well as to the learnability of the site, is reducing attention-splitting. By ensuring course narrative was coherent, visible and located in one place, students no longer had to refer to up to three different sources (a course guide, a study guide and an assessment guide) to plot their learning.

The positive result of reduced attention-splitting was seen in student comments about how easily they learned to use templated courses, frequently listing structure as the best aspect.

The merits of an aesthetic design template for all online courses

It is clear from the preceding discussion that the use of an aesthetic template had a positive impact on all aspects of UX, even if lecturers made some changes to the way the template was implemented. Quantitative data analysis shows a strong positive correlation between use of the template and all aspects of UX. Students enrolled in templated courses described their courses as enjoyable and easy to use, findings well-supported by earlier research into the impact of aesthetics on UX (Derntl, Parrish, & Botturi, 2010; Diana Laurillard et al., 2000; Lavie & Tractinsky, 2004; Noam Tractinsky, 2012).

The finding that the template reduced extraneous cognitive load and increased learner motivation and efficiency becomes particularly relevant when one considers possibly applying a template to all online courses. Whilst this study focused on the use of an aesthetic design to decrease extraneous cognitive load within individual courses, applying the template to more courses will reduce students' time learning to navigate new courses at the start of each semester. Creating a cross-course reduction in extraneous cognitive load would significantly benefit students. Certainly, feedback from student participants indicated they thought a universal template, or at the least, some universal

design principles, would be beneficial. In addition to the impact on cognitive load, the advantages of the template to learner efficacy and motivation would be extended, with potentially positive impacts on learner outcomes.

Conclusion

This study has found a strong, positive relationship between UX and the use of an aesthetic course design template. The findings reinforce those of numerous previous studies into the impact of aesthetics on UX, and extend these by situating the research in the context of online course design using the Moodle LMS. As this system is one of the most widely used LMSs globally, identification of a way to design courses to improve LUX could have a significant impact.

Chapter summary

This chapter considered the results of the research study in the light of the research literature, and considered the merits of an aesthetic template for all online courses at this university. The relationship found between the use of a course design template, based on aesthetic principles, and the perceived usability, usefulness, credibility and learnability of an online course confirms the findings of several earlier studies that document similar relationships between aesthetics and the user experience.

The incorporation of a clear narrative structure into the course design was a key aspect of the template investigated in this study. The results confirm several earlier studies which found that a clear narrative structure is indeed important in online learning, as it can reduce the extraneous cognitive load of an online course whilst increasing learner efficiency and motivation. Whilst these learner characteristics were not the focus of this investigation, the findings suggest a need for further investigation.

The identification of a simple template for presenting online courses which creates a positive user experience for students has the potential to be extremely useful for course designers and academics

teaching in online courses. The template used in this study represents an evidence-based approach to the presentation of online courses that can take the guesswork out of the task for those who design these courses. This has the potential to save time and money as well as to improve the satisfaction of students enrolled in these courses.

The final chapter of this study presents a summary of the research. It identifies key contributions as well as the limitations of the research, and proposes future research directions. Implications and recommendations for practice are considered.

CHAPTER 6 CONCLUSION

This chapter presents the conclusions of this study. It summarises the research by revisiting the research questions and then highlighting the key contributions. Limitations of the study and directions for future research are outlined, and implications for practice are considered.

Summary

Situated in the pragmatist paradigm, this mixed methods research study investigated the impact of the use of an aesthetic course design template on the UX of learners enrolled in a first-year online course at a New Zealand university. The research evaluated three groups of online courses: those designed according to an aesthetic template, those which used an adapted form of the template, and those which had not been designed according to the template.

The primary aim of this research was to explore the relationship between the use of an aesthetic course design template and UX. It was found that courses which had been designed using an aesthetic template, even if somewhat adapted by lecturers, had significantly higher UX ratings than those which were designed without the template. Quantitative analysis of the data showed template use correlated strongly with positive overall UX, as well as with perceptions of usefulness, usability, learnability, desirability, credibility and course narrative.

Qualitative feedback from students in both the open-ended questions of the questionnaire, and from participants in the semi-structured interviews, illustrated and extended these findings. It was apparent template use was particularly valued since students felt it allowed them to work more efficiently, and that consequently they were more effective learners. These findings are supported by the existing literature documenting the importance of aesthetics in UX, and the role of aesthetics in reducing extraneous cognitive load. This study extends the earlier literature by situating the research in the context of a university LMS.

Key contributions of this study

The results of this study provide strong evidence of the importance of aesthetic design to creating a positive UX for students accessing learning through an online LMS. The study shows that using the particular template evaluated in this study correlates with a positive UX in six key constructs. In addition, students enrolled in courses using the template reported significantly more positive UXs than those in courses that did not use the template. Analysis of the students' qualitative feedback suggests the most important benefit of the template was that it reduced the time it took students to learn what they needed to do, thus allowing them to focus on the learning task itself. This benefit in turn had an impact on learners' satisfaction. As a result, this study also provides justification for the implementation of an aesthetic template as a standard across a college or university.

Implications for practice

This research has shown the positive consequences for students, in one university college, of implementing an aesthetic course template. Nevertheless, and despite repeated expressions of student preferences, a whole-of-organisation approach has not been implemented. Whilst anecdotal evidence suggests some colleges are implementing their own templates, it is unclear if these are being selected according to any specific design heuristics, or if they are simply reflections of the preferences of the individuals tasked with the decision making.

This study provides evidence to support one approach to course design. The evidence could be used to inform organisational-level decisions about how online learning could be presented to students to improve their UX, and thus has value to university managers and decision makers. Identification of an evidence-based approach also offers potential economies of scale, as following a pattern or template, course designers would be able to design courses more quickly, and with the confidence of knowing the template will have a positive impact on LUX. Most importantly, the identification of a way of designing courses to create positive UX has the potential to impact significantly on students: reducing extraneous cognitive load and time navigating online courses, as well as increasing satisfaction.

Limitations of the study

Limitations of this research study stem from participant selection, low response rates, and acknowledgment that there may be more than one way to design an aesthetic template. They include:

- Participants for this study were recruited from a relatively discrete pool of online students, enrolled in 100-level courses offered by one college in a single university. Participants from different groups and institutions may have responded differently.
- Overall response rates for this research were low.
- Only two academics from one college participated in this research. Whilst their comments are interesting and included for illustrative purposes, substantial further research is required to determine whether they are representative of a wider group.
- Student respondents were asked to refer to one particular online course site when completing the AEQ, and participating in the interview stage. However, responses from both stages of the research showed students found it difficult to comment on one course only, and their responses may have been coloured by their experiences on other courses. Students enrolled in different sets of courses may thus respond differently to the questionnaire.
- Participants self-selected for this research. Students willing to participate in research on their online course sites may have different interests and values from those who chose not to respond.

Future research directions

As discussed in the preceding sections, this study has substantial limitations, all of which should be addressed by further research. It would be interesting to examine whether the findings are generalisable to students in different disciplines, and whether other aesthetic templates could be created. This study paid no attention to the cultural aspects of aesthetics; further study is needed to determine what an aesthetic template would look like for Māori and Pasifika students, and for students from other cultural backgrounds, such as Asia and the sub-continent.

The research has also not investigated the impact of the template on lecturers. Although one lecturer respondent mentioned in passing his discomfort at the thought of a template being imposed upon lecturers, the potential time-saving nature of a template for lecturers, and the potential economy of scale for course builders, needs to be balanced against this caveat. Considerable work remains to be done to address the academics' reluctance to embrace the concept of a template or templates, and to ensure that such decisions are based on clear, empirical evidence, rather than on personal taste. The findings of this study represent a step towards the development of this evidence-based approach.

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APPENDICES

Appendix A – Semi-structured interview product reaction cards

The complete set of 118 Product Reaction Cards				
Accessible	Creative	Fast	Meaningful	Slow
Advanced	Customizable	Flexible	Motivating	Sophisticated
Annoying	Cutting edge	Fragile	Not Secure	Stable
Appealing	Dated	Fresh	Not Valuable	Sterile
Approachable	Desirable	Friendly	Novel	Stimulating
Attractive	Difficult	Frustrating	Old	Straightforward
Boring	Disconnected	Fun	Optimistic	Stressful
Business-like	Disruptive	Gets in the way	Ordinary	Time-consuming
Busy	Distracting	Hard to Use	Organized	Time-Saving
Calm	Dull	Helpful	Overbearing	Too Technical
Clean	Easy to use	High quality	Overwhelming	Trustworthy
Clear	Effective	Impersonal	Patronizing	Unapproachable
Collaborative	Efficient	Impressive	Personal	Unattractive
Comfortable	Effortless	Incomprehensible	Poor quality	Uncontrollable
Compatible	Empowering	Inconsistent	Powerful	Unconventional
Compelling	Energetic	Ineffective	Predictable	Understandable
Complex	Engaging	Innovative	Professional	Undesirable
Comprehensive	Entertaining	Inspiring	Relevant	Unpredictable
Confident	Enthusiastic	Integrated	Reliable	Unrefined
Confusing	Essential	Intimidating	Responsive	Usable
Connected	Exceptional	Intuitive	Rigid	Useful
Consistent	Exciting	Inviting	Satisfying	Valuable

Appendix B – Aesthetic template

All blocks are moved to the left to create two column format (better for mobile and just less 'busy' altogether).

Course welcome set to hide automatically after late enrolments date so that students don't have to keep reading it all semester. Be welcoming here... don't just dump the prescription from the website!

Use the News forum for all announcements... NEVER simply post a notice directly into a topic.

Use 'Topics' Stream format. Make sure the week number, date and topic is provided so navigation is easy.

Critical course information here. Paper and assessment guide (see accompanying template), main forums, etc. We generally navigate left to right, top to bottom, so put important information at the top.

Ensure that 'Core' resources are clearly labelled and available for printing if necessary.

Generally, the folders are

1. Lecture slides and resources
2. Core readings. (Check copyright.)

Make sure files are clearly labelled so that the names will make sense to students. Files display in alphabetical order, and capitalisation makes a difference. Use a leading 0 for numbers 0-9.

Provide the narrative... this one says "Lecture 1 introduces the context for studying Physical Geography. Physical Geography is as a series of interconnected 'earth systems'. We define what is meant by a 'system' in this sense, illustrating it and considering how systems work within the landscape. Lecture 2 considers the influence of the earth's orbit, rotation and ..." This helps students to orient themselves through the course and also helps to tell the 'story' of your teaching – especially valuable on distance papers.

Make sure that students know what is essential and what is nice-to-know. Use a label to separate the core (on top) from the supplementary resources. (Please use the same terminology so students get to know it.)

Use media rich resources where you can. This is especially helpful for distance students. For example, make short videos discussing the topics for the week using MyMediasite.

You may be surprised by the scrolling. Web navigation has changed significantly in the mobile era, and scrolling has now been shown to be more user-friendly than clicking. The most important thing is to establish a logical pattern and to stick to it, within individual papers, and across the programme. And, believe it or not, aesthetics are important too!

Appendix C – Invitation to students to participate

Hello

My name is Jean Jacoby. I am a Master's student in the Institute of Education at Massey University, and I also work at the university as a teaching consultant. I would like to invite you to participate in my research study about the impact of course design on student satisfaction and engagement. All students enrolled in first-year, distance papers offered by the College of Sciences this semester are eligible to participate in this survey.

If you decide to participate in this study, you will be asked to fill in a simple, anonymous, online questionnaire that will take you about 20 minutes to complete. You will also be invited to take part in an interview that will allow me to find out more about your opinions. This interview will take about 45 minutes, and will be scheduled at a time that suits you, either via Skype or in person on Palmerston North campus.

I would like to audio record the interview. Information from the interviews will be transcribed and analysed to identify any common themes. You will receive a copy of the transcript for checking unless you choose not to.

Remember, this is completely voluntary. You can choose to be in the study or not. If you'd like to participate in the first stage, the online questionnaire, please click the link below. This will take you to the questionnaire.

[LINK TO SURVEY WILL COME HERE]

If you have any questions about the study, please email me at j.m.jacoby@massey.ac.nz or contact my supervisors,

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Appendix D – Aesthetic Experience Questionnaire

This online questionnaire has been developed as part of a Master of Education research project. It has been designed to help the researcher to find out more about how students experience the design of [online course] sites, and how this impacts on your engagement and satisfaction. The questionnaire is made up of three sections. All questions are voluntary. Section one contains some general/demographic questions. Section two contains a series of rating questions. These will ask you to rate various aspects of the [online course] site using a scale where 1 – Strongly disagree and 7 – Strongly agree. After each group of questions, you have the opportunity to provide more information about the ratings you have given. Section three gives you the opportunity to answer some more open-ended questions about the [online course] site. Your participation in this questionnaire is anonymous, and your name is not recorded. The questionnaire will take 15-20 minutes to complete. You might like to have the relevant [online course] site open at the same time and to refer to it as you go. Remember, completing this questionnaire is voluntary. Completing the questionnaire will indicate that you have consented to take part.

SECTION ONE

What is your age?

- ☐ 18-24 yrs
- ☐ 25-30 yrs
- ☐ 30-35 yrs
- ☐ 35-40 yrs
- ☐ 40-45 yrs
- ☐ 45-50 yrs
- ☐ 50-55 yrs
- ☐ 55 and older

What is your gender?

What is your distance learning experience?

- ☐ This is the first time I have studied via distance
- ☐ I'm in my first year
- ☐ I've in my second year or more

What programme are you currently enrolled in?

- ☐ Bachelor of AgriCommerce
- ☐ Bachelor of AgriScience
- ☐ Bachelor of Construction
- ☐ Bachelor of Engineering with Honours
- ☐ Bachelor of Food Technology with Honours

- ☐ Bachelor of Information Sciences
- ☐ Bachelor of Natural Sciences
- ☐ Bachelor of Science
- ☐ Bachelor of Veterinary Science
- ☐ Bachelor of Veterinary Technology
- ☐ Other _____

Paper number / name of [online course] site you are evaluating

SECTION TWO

Please rate each of the following aspects of the [online course] site using the statements below

Overall user experience

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
My overall experience of using this [online course] site is positive	☐	☐	☐	☐	☐	☐	☐

Usefulness

	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
This [online course] site helps me be an effective student	☐	☐	☐	☐	☐	☐	☐
This [online course] site helps me be a productive student	☐	☐	☐	☐	☐	☐	☐
It helps me to be in control of my studies	☐	☐	☐	☐	☐	☐	☐
It makes it easy to accomplish my studies	☐	☐	☐	☐	☐	☐	☐

This [online course] site saves me time when I use it	☐	☐	☐	☐	☐	☐	☐
This [online course] site meets my needs	☐	☐	☐	☐	☐	☐	☐
It does everything I expect it to do	☐	☐	☐	☐	☐	☐	☐

Please provide any further information about the usefulness of the site that might help us to better understand your responses in this section.

Usability

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
This [online course] site is easy to use	☐	☐	☐	☐	☐	☐	☐
It is simple to use	☐	☐	☐	☐	☐	☐	☐
This [online course] site is user friendly	☐	☐	☐	☐	☐	☐	☐
Using this [online course] site is effortless	☐	☐	☐	☐	☐	☐	☐
I can use it without instructions	☐	☐	☐	☐	☐	☐	☐
I don't notice inconsistencie s as I use this [online course] site	☐	☐	☐	☐	☐	☐	☐
Both occasional and regular users of [online	☐	☐	☐	☐	☐	☐	☐

course] would like it							
I can recover from mistakes easily and quickly	☐	☐	☐	☐	☐	☐	☐
I can use this [online course] site successfully every time	☐	☐	☐	☐	☐	☐	☐

Please provide any further information about the usability of the site that might help us to better understand your responses in this section.

Learnability and findability

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I learned to use this [online course] site quickly I easily remember how to use this [online course] site	☐	☐	☐	☐	☐	☐	☐
It is easy to learn how to use this [online course] site	☐	☐	☐	☐	☐	☐	☐
It is easy to find what I am looking	☐	☐	☐	☐	☐	☐	☐

for on this [online course] site							
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Please provide any further information about the learnability / findability of the site that might help us to better understand your responses in this section.

Desirability

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
It is pleasant to use this site	☐	☐	☐	☐	☐	☐	☐
I feel other sites should be like this one	☐	☐	☐	☐	☐	☐	☐
I am satisfied with this [online course] site	☐	☐	☐	☐	☐	☐	☐
I look forward to using this [online course]	☐	☐	☐	☐	☐	☐	☐

site							
This site looks attractive	☐	☐	☐	☐	☐	☐	☐

Please provide any further information about the desirability of the site that might help us to better understand your responses in this section.

Credibility

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I am confident in the information on this [online course] site	☐	☐	☐	☐	☐	☐	☐
The information on this [online course] site is valuable	☐	☐	☐	☐	☐	☐	☐
The information on this site is accurate	☐	☐	☐	☐	☐	☐	☐
This [online course] site looks professional	☐	☐	☐	☐	☐	☐	☐

The information on this site is current	☐	☐	☐	☐	☐	☐	☐
There are no errors on this [online course] site	☐	☐	☐	☐	☐	☐	☐
I can tell that the authors of this site are credible	☐	☐	☐	☐	☐	☐	☐

Please provide any further information about the credibility of the site that might help us to better understand your responses in this section.

Course narrative

Course narrative	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I was welcomed into the [online course] site	☐	☐	☐	☐	☐	☐	☐
I was given an orientation to the [online course] site	☐	☐	☐	☐	☐	☐	☐
I understood what I needed to do from the	☐	☐	☐	☐	☐	☐	☐

beginning of the course							
I could easily follow the order of events of the course	☐	☐	☐	☐	☐	☐	☐
It is easy to stay focussed on the content of the course	☐	☐	☐	☐	☐	☐	☐
The structure of the [online course]	☐	☐	☐	☐	☐	☐	☐
site is logical							
I understand why the site is structured	☐	☐	☐	☐	☐	☐	☐

the way it is							
The links between different parts of the site are clear	○	○	○	○	○	○	○

It is easy to recognise the important parts of the course	☐	☐	☐	☐	☐	☐	☐
I am guided through difficult sections of content	☐	☐	☐	☐	☐	☐	☐
The structure of the [online course] site allows me to focus on my learning	☐	☐	☐	☐	☐	☐	☐
I can see how all the parts of the course are linked at	☐	☐	☐	☐	☐	☐	☐

the end							
I feel that							
the							
instructor							
is present	☐	☐	☐	☐	☐	☐	☐
in the							
course							
The							
instructor							
shows an							
awareness	☐	☐	☐	☐	☐	☐	☐
of my							
needs							
The							
instructor							
provides							
relevant							
motivation	☐	☐	☐	☐	☐	☐	☐
at different							
parts of the							
course							

Please provide any further information about the course narrative that might help us to better understand your responses in this section.

SECTION THREE

The best things about this [online course] site are:

The worst things about this [online course] site are:

Anything else you think we should know about this [online course] site?

I am willing to take part in an interview (in person or via Skype) to discuss my experiences further.

☐ Yes

☐ No

Thank you for agreeing to participate in an interview. Please enter your name and preferred contact details (e.g. mobile number or email). You will be contacted within 2 weeks of submitting this questionnaire to arrange an interview time that is suitable for you.

Appendix E – Participant information sheet

Student information sheet

The role of aesthetic design in student engagement and satisfaction with Stream INFORMATION SHEET

Hello

My name is Jean Jacoby – I am a Master's student within the Institute of Education at Massey University. I am conducting research on a project that aims to design Stream so that it is pleasant and easy for students to use. I would like to know your views about Stream design, and if there is a link between the design and appearance of Stream, and your engagement with your learning.

Participant Identification and Recruitment

All paper coordinators of first year distance papers were invited to participate in this research. Your paper coordinator has chosen to include this paper in the research. It will be great if you decide take part. However your decision to participate or not will have no effect on your course work or results.

The process

The study takes place in two main sections. First you'll be asked to complete an online questionnaire. This will take you about 20 minutes to complete. Secondly, you will also be invited to participate in an interview with me to discuss your experience in more detail. Of course, you can also choose to do the questionnaire but not the interview.

Data Management

The data from the study will be used to advise staff on how to design Stream sites. The data will be stored in a password protected file on my computer for the duration of the study. No individuals will be able to be identified in the database, nor in any of the reports or other publications from the study.

Your Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to: ask any questions about the study at any time during participation; refuse to answer any question; withdraw from the study before the start of the data analysis; and be given access to a summary of the project findings when it is concluded. No individuals or papers will be identified in the study. As the researcher, I will make sure that names are removed from the research data.

If you have any questions or concerns about this research, you are welcome to contact me, my supervisors. All the contact details you need are at the end of this information sheet.

Many thanks for your help.

Jean Jacoby (Researcher)
Telephone: 06 324 0206 (a/h)
Email: jeanjacoby@gmail.com

Dr Maggie Hartnett Senior Lecturer Institute of Education Telephone: +64 (06) 356 9099 ext. 84409 Email: M.Hartnett@massey.ac.nz	Dr Peter Rawlins Senior Lecturer Institute of Education Telephone: +64 (06) 356 9099 ext. 84403 Email: P.Rawlins@massey.ac.nz
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This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 15/44. If you have any concerns about the conduct of this research, please contact Prof Julie Boddy, Chair, Massey University Human Ethics Committee: Southern B, telephone 06 350 5799 x 86055, email humanethicsouthb@massey.ac.nz

***The role of aesthetic design in student engagement and
satisfaction with [online course]***

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interview being sound recorded.

I wish/do not wish to have my recordings returned to me.

I wish/do not wish to have data placed in an official archive.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature:

Date:

.....

.....

Full Name - printed

.....

Appendix G – Massey University Human Ethics Approval



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

8 October 2015

Jean Jacoby
16 Keith Elliott Street
FEILDING

Dear Jean

Re: HEC: Southern B Application – 15/44
The role of aesthetic design in student engagement and satisfaction with Stream

Thank you for your letter dated 5 October 2015 outlining the changes you wish to make to the above application.

The changes have been approved and noted.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee. If over time, more than one request to change the application is received, the Chair may request a new application.

Yours sincerely

Dr Rochelle Stewart-Withers, Chair
Massey University Human Ethics Committee: Southern B

cc Dr Maggie Hartnett
Institute of Education
PN500

Dr Peter Rawlins
Institute of Education
PN500

Prof John O'Neill, Director
Institute of Education
PN500

Massey University Human Ethics Committee
Accredited by the Health Research Council

Research Ethics, Research and Enterprise

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