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Ability, Effort and Control:

Can Attribution Theory Be Valid in the New Zealand Classroom?

A thesis submitted to
the Education Department
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requirements for the degree of
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Sue Anne Watson

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**For my daughters,
Elizabeth, Joanna and Fleur**

Abstract

The validity of basic assumptions of attribution theory, that ability is conceptualised as an internal, stable and uncontrollable cause of success and failure in achievement situations, and effort is an internal, unstable and controllable cause, was investigated in relation to New Zealand school students. Two groups of students, Form One (11 years) and Form Four (14 years) responded within the classroom on three occasions in different school subjects to questionnaires about their ability and effort in regard to the tasks they had just been engaged in. Their achievement, ability and effort levels were rated by their teachers. A subset of students was also interviewed.

Both age groups perceive ability (intelligence) as unstable, capable of being increased by schoolwork, yet rated their ability the same in the three different subject areas. In both age groups most students rated their specific and general effort as stable within subject areas but as unstable over three subject areas. Their general effort ratings correlated significantly with the teachers' ratings for effort. So, students perceive their effort as unstable but their relative effort level was stable.

The controllability dimension was measured by the number of cognitive strategies given to improve ability and to demonstrate effort. The "controllability of ability" variable was a significant contributor for achievement for Form One students and the "controllability of effort" to achievement for the older students. The lowest achievement group had significantly fewer metacognitive statements than the other two groups which suggests that for them effort is not controllable.

The findings suggest that some key principles of attribution theory may not be appropriate for New Zealand school children because their conceptualisations of ability and effort do not fit the constructs of attribution theory.

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CHAPTER ONE

Introduction

Research into achievement motivation over the last twenty years has been stimulated by Weiner's (1972) reformulation of Atkinson's (1957) model of achievement motivation and Heider's (1958) analysis of "commonsense psychology". Over the same period, process models of achievement motivation have centred on conceptualisations of "control" (Rotter, 1966; de Charms, 1976; Skinner, Wellborn & Connell, 1990), "competency" (White, 1959; Thomas, 1980; Harter, 1989) and "self-efficacy" (Bandura, 1986; Schunk, 1983). These models all take a phenomenological and cognitive approach. Behaviour is influenced by an individual's perception of a situation and repertoire of attitudes, expectations and strategies for coping with such situations. So it is an individual's beliefs and understanding of components in a situation that must be classified and measured in research. Attribution theory has had an important impact on theory development and empirical research in achievement motivation and other areas of social cognition. However, the attribution model is beset by problems of the conceptual validity of its components and methodological inadequacies (Fiske & Taylor, 1984). These are often ignored or explained away by researchers who feel that the attribution model uncovers important processes influencing behaviour and so incorporate attribution measures into their research design.

Key constructs within this field of research are "ability" and "effort". Attributions to "ability" and "effort" have been shown to influence engagement in a task, persistence on a task, performance quality and expectations about future successes and failures. Predictions about the influence of particular attributions depend on how the attributions are classified. "Ability" has been widely accepted to be perceived as a stable, uncontrollable, internal cause of success or failure and to produce predictable affective and expectancy consequences depending on whether individuals perceive they have or do not have "ability". "Effort" has generally been classified as an unstable but

controllable, internal causal attribution. Effort attributions have been thought to be adaptive because they allow expectation of future successes despite present failure.

If these descriptions of "ability" and "effort" are examined, fundamental difficulties are exposed. Nicholls (1978; Nicholls & Miller, 1984a,b) investigated the development of the concept of ability in children and found that the "mature" conceptualisation of ability occurs after ten years and becomes established by 12 years. This mature conceptualisation of ability, demonstrated by Covington and Omelich (1984a) as being typical of college students, has been reified and models of achievement motivation predict outcomes on the basis of this conceptualisation. This conceptualisation of ability is the capacity view, equivalent to the "entity" conception of intelligence (Dweck & Bempechat, 1983) which means that people are concerned about whether they have sufficient ability relative to others and behave to protect their self-image. While a capacity view of intelligence or ability is undoubtedly still widespread, alternative conceptualisations of intelligence would now be considered more mature by many experts and laypersons (Sternberg, Conway, Ketron and Bernstein, 1981). Dweck and Bempechat have shown that children's conceptions of intelligence can also be classified as "incremental" and so can be increased by personal agency. It is therefore necessary to consider that "ability" may be stable and uncontrollable for those with a capacity view of intelligence, but may be unstable for those with an incremental view, and controllable if they believe that through their own efforts their ability can increase.

The construct "effort" has been criticised for being an omnibus term and not distinguishing between specific and typical effort which would have different implications for future performances (Weiner, 1983). There seems to have been no attempt to investigate different conceptions of "effort", except in relation to ability (Nicholls & Miller, 1984a,b). Anderson and Jennings (1980) argued for effort to have a "directing component" called "strategy". This notion introduces the impact of information processing in cognitive psychology. Research into the efficacy of cognitive strategies and the value of metacognitive strategies to direct performance has shed light on the control dimension in attribution theory. "Effort" may be seen to be controllable by those with cognitive and metacognitive skills, but not by those who lack them.

If "the basic premise of the attribution approach to motivation has been the

assumption that causal attributions are primary mediators of achievement and achievement related behaviours" (Relich, Debus & Walker, 1986, p.196) before the outcomes can be predicted, it is necessary to know **how** students perceive "ability" and "effort", rather than to assume that the meanings assigned to "ability" and "effort" are those formulated by attribution theory. There is mounting evidence that attributions to a particular cause may not constitute evidence of a stable motivational orientation towards achievement tasks. Within individuals, attributions can vary between different fields, for example, between academic, social and sports performance areas, and between different academic subjects, such as mathematics and language studies (Stipek, 1984a; Ryckman & Peckham, 1987). Within fields, attributions can vary according to perceived task-difficulty or task-value (Phillips, 1984; Williams, 1982). Between individuals, the meanings assigned to attributions may vary according to cultural background (Holloway, 1988; Ryff, 1987). Conceptions about ability, effort, success and failure are constructed within a social and language environment which varies between countries, between socioeconomic groups and even between sexes. In particular, there is evidence to doubt that the attribution model is applicable to children, especially the assumption that the key attributions "ability" and "effort" have distinctly different effects on achievement behaviour of school students under the age of twelve years (Nicholls & Miller, 1984b).

In addition, the methodology used in attribution research can in itself influence the nature of the data (Ames, 1984; Elig & Frieze, 1979; Marsh, Cairns, Relich & Debus, 1984). Focus on one's success or failure relative to others elicits self-defensive attributions which may not operate in task-focused situations (Ames, 1984). The difficulties early researchers found in classifying responses from open-ended questionnaires about the causes of success and failure (Elig & Frieze, 1979), indicates that individual conceptions of the causes are not all accounted for by the attributional model. Measuring instruments that force a choice of attributions may produce patterns that conform to the attribution model, but reasoning about conditions provided in questionnaires may not be the same as reasoning about real life situations, if indeed, people do consciously appraise the elements before engaging in an achievement activity.

The attribution model is in danger of being abandoned by those researchers who accept the difficulty of measuring different conceptions involved in the same

phenomenon. However, it continues to be used in its primitive form by researchers who feel the use of particular measuring instruments is justified on the basis of previous research which has shown criterion validity, but have overlooked the issues of content and construct validity. Because the attribution model does offer an explanation for some motivational processes which may provide the rationale for interventions to modify maladaptive motivational processes, the attribution model should not be abandoned. But the diagnostic and treatment implications of attribution theory will not be served with inadequate measuring instruments and imposed meanings for particular attributions.

Before attribution theory can be used to explain a student's motivational orientation, it is necessary to uncover his or her conceptions about the underlying constructs, such as ability, effort and control, and how stable these conceptions are under different conditions. This research is directed towards investigating whether the basic assumptions of the attribution model apply to New Zealand school students. It is the nature of different conceptions of ability and effort and the manifestations of the stability and control dimensions on achievement that is being explored.

In particular, this research focused on the conceptions of ability and effort held by New Zealand school students at two age levels, 11 years and 14 years, and whether New Zealand school students in ordinary classrooms function as if "ability" is stable and uncontrollable, and "effort" is unstable and controllable. Because the "mature" conception of ability becomes established by age twelve (Nicholls & Miller, 1984a), Form One students (ten to eleven year-olds) were compared with Form 4 students (fourteen to fifteen year-olds). The approach used here differs from previous attribution research in a number of ways. Firstly, to avoid self-protective responses there is no success/failure variable. Secondly, the students' attention is directed towards the performance components of the tasks with comparisons between self and others minimised. A pencil-and-paper response form is used but the situation is unlikely to be interpreted as a test since the early questions and possible responses are discussed and students are encouraged to give their own opinion on the question form, and that there are no right answers. The situation can be described as a learning situation designed to enhance metacognitive awareness. Students are invited to think about their performance behaviour in relation to the nature of the task they have just been engaged in. In

addition, a subset of the students was interviewed using an interview protocol derived from Yussen and Kane (1985). Teachers of each class supplied ratings of the students' ability, effort and achievement so that the relationships between students' perceptions about real time performance and the teachers' summation of students' performance over many situations could be investigated. The perceptions about performance components of students younger and older than twelve, and the relationship of these perceptions to achievement will be evaluated in relation to attribution theory.

CHAPTER 2

Review of Literature

This review looks first at the development of attribution theory and its relationship to other similar cognitive-based theories of achievement motivation. The relative emphasis placed on the three dimensions of internality-externality, stability-instability and controllability-uncontrollability will be discussed. Other issues arise from the assumptions of attribution theory, such as that the meaning and implications of causal attributions are the same for all people regardless of cognitive development and culture. Particular attention will be paid to the specific causal attributions, ability and effort, and to the stability and controllability dimensions. Also discussed will be the relationship between research method and the nature of the data acquired and the effect of postulated attribution theory processes in ordinary classrooms in contrast to more stressful evaluative situations where success and failure are salient. Finally, arising from the many issues discussed in this review, the rationale for this research will be outlined.

Achievement Motivation

In his account of the history of motivational research in education, Weiner (1990) noted the move which occurred during the 1960s from mechanistic, behaviourist, drive theories of motivation to social cognitive, but still mechanistic, expectancy-value theories of motivation. Individual differences in theory-based constructs such as "need for achievement" or "locus of control" became the focus of attention. More recently, constructivist and contextualist theories of cognitive development have added further dimensions to individual differences in motivational constructs.

Cognitive psychology has shown us that behaviour is not simply an automatic response to external stimuli but is the outcome of individual perceptions which themselves depend on mental structures produced by each individual's dynamic interaction with environmental opportunities since conception. The "functional significance" (Deci & Ryan, 1987) to a participant of any situation may not be that expected by an observer. In other words, the affordances (Gibson, 1979) of a situation, perceived by one person, may be quite different to those perceived by another.

Perceptions of the functional significance of situations are mediated by the conceptual and cognitive development of individuals in interaction with the sociocultural environment. Vygotsky (1962) argued that the learning of concepts comes from the language environment. Our understanding of any concept is shaped by the information provided by the language environment in which we are living. Our understanding of the terms "intelligence" or "effort" is shaped by our social world, as is the value we attach to those concepts. Our self-concepts are similarly shaped by feed-back from others. An individual's sense of self is the product of the individual's response to what is offered in the immediate environment.

Motivation comes from an individual's sense of self, to create meaning and to express his or her own innate uniqueness, and to protect this sense of self from perceived threat (Covington, 1991). Behaviours that seem to reflect lack of "motivation" may indeed be motivated by "self"-protection. The difficulty for the researcher is to isolate the components of sense of self and the understanding of particular concepts that are thought to be influential in achievement related behaviours, and to find a method by which these hypothetical components might be revealed without the individual obscuring them by taking evasive, "self"-protective action. Indeed, as McCombs points out (1991), attempts to find a pattern in outcomes from particular causes is a deterministic perspective which fails to account for higher level processes such as creativity, insight and the experience of personal agency and self-determination.

Despite these considerable problems, research into achievement motivation has shown that there are some personal characteristics which though imperfectly conceptualised or measured in research, do appear to contribute to behaviours which produce more desirable outcomes. If the task of educators is to assist people to develop

adaptive rather than maladaptive achievement behaviours, it is necessary to try to understand the cognitive structures and components of a sense of self which can be encouraged to develop, or are amenable to modification in a more positive direction. In particular, the notion of internal control, from locus of control (Rotter, 1966) to self-regulated learning (Zimmerman, 1989) and "authentic agency" (McCombs, 1991), holds the potential to provide a powerful explanatory principle for achievement motivation.

The Development of Attribution Theory

Research into achievement motivation was stimulated by Weiner's (1972) causal attribution theory, a reformulation of Atkinson's (1957) model of achievement motivation and Heider's (1958) analysis of "commonsense psychology". Atkinson proposed that achievement behaviour was influenced by an emotional conflict between hope of success and fear of failure. Heider argued that people need to anticipate and influence events and people in their lives, and that psychology needs a systematic understanding of how people comprehend their own behaviour and that of others. His analysis highlighted two important elements that are fundamental influences on any individual's actions: the locus of causality of an action and the perception of causal responsibility. He also made the basic distinction between factors within the person and factors within the environment which Weiner called the internal-external dimension.

The Internal/External Dimension

From social learning theory came the suggestion that there are dispositional elements in the way behaviour is explained. Rotter's (1966) Locus of Control theory emphasised the importance of locus of causality in behaviour. He was interested in the idea of free-will or determinism in human behaviour and distinguished between outcomes that people perceive as causally related to their own responses and personal

characteristics, and outcomes that people perceive as caused by external forces such as fate or powerful others. Rotter's concept is in behaviourist terms. Some people believe that they can produce rewarding outcomes through their own actions, while others see no contingency between their actions and what happens to them.

De Charms (1968) investigated the observation that some individuals operate as if they perceive themselves as determining their own behaviour, whereas others behave as if they feel they are pawns in the hands of fate.

An origin is a person who perceives his behavior as determined by his own choosing; a pawn is a person who perceives his behavior as determined by external forces beyond his control....Feeling like an Origin has strong effects on behaviour as compared to feeling like a Pawn. The distinction is continuous, not discrete - a person feels more like an Origin under some circumstances and more like a Pawn under others. (de Charms, 1968, p.273)

De Charms expected to find that people who felt themselves to be Origins would exhibit intrinsically motivated behaviour which would be observable as showing more interest and better performance than those who felt themselves to be Pawns. In one large-scale, four year research project to test this proposition (de Charms, 1976), his experimental group consisted of inner-city black students whose teachers participated in a programme designed to instil a belief in themselves as Origins and to treat their students as Origins. Amongst the findings from this study was evidence that students did show superior motivation and achievement on several measures compared to a control group, and this was maintained over three years (de Charms, 1980).

Many instruments have been constructed to measure locus of control, such as the Rotter Internal-External Control Scale (Rotter, 1966), and to measure that dimension in relation to intellectual achievement, the Intellectual Achievement Responsibility Questionnaire (Crandall et al., 1965). These two instruments have been, and are still used, extensively, to explore the internal-external dimension in the behaviour of people in a wide variety of situations, including children at school, prison populations, and the diagnosis of psychopathologies. As a general principle, people who are more internal behave more actively, have more self-esteem and achieve more. The opposite is true of

"externals". Groups in society who would be expected to be less successful or less well-adjusted, such as soldiers in the stockade or prison inmates compared to others in similar groups, see themselves as unlucky or manipulated by powerful external influences, and have more external scores on these tests (Cone, cited in Lefcourt, 1981; Ross & Fabiano, 1985). Bandura's (1977) explanation is that for a person to be an "internal" there must be a sense of competence, and a sense of competence is essential for a well-adjusted, successful human-being.

Deci and Ryan (1987) refine the locus of control further. Citing Connell (1985) and Lefcourt (1976), they suggest that locus of control is better termed locus of perceived control, but that a further distinction is needed. It is possible that people while engaging in some actions can be seen to be intentional, self-determined and within their competency to produce desired results, yet also be seen as externally motivated and externally controlled. They give the example of a person who does not enjoy housework, but chooses to do it "because of a feeling that he or she has to, whether to get the approval of a business associate who will be visiting, to avoid guilt, or to satisfy a compulsion" (Deci & Ryan, 1987, p.1034).

Nonetheless, the broad concept of locus of control was supported by findings that achievement behaviours such as persistence, a sense of personal agency, and intrinsic motivation, were associated with locus of control. The causal attribution model developed by Weiner between 1968 and 1986 addressed some of the problems of the broad concept of locus of control by distinguishing between locus of cause and controllability. The importance of attribution theory is that it has drawn attention to different individual orientations depending on the individual interpretation of a situation and its significant components. Similarly, locus and control concepts are fundamental to other theories of achievement motivation, such as competence motivation theory (White, 1959), effectance motivation (Harter, 1981) and self-efficacy theory (Bandura, 1986, Schunk, 1983).

The Perceived Causes of Success and Failure

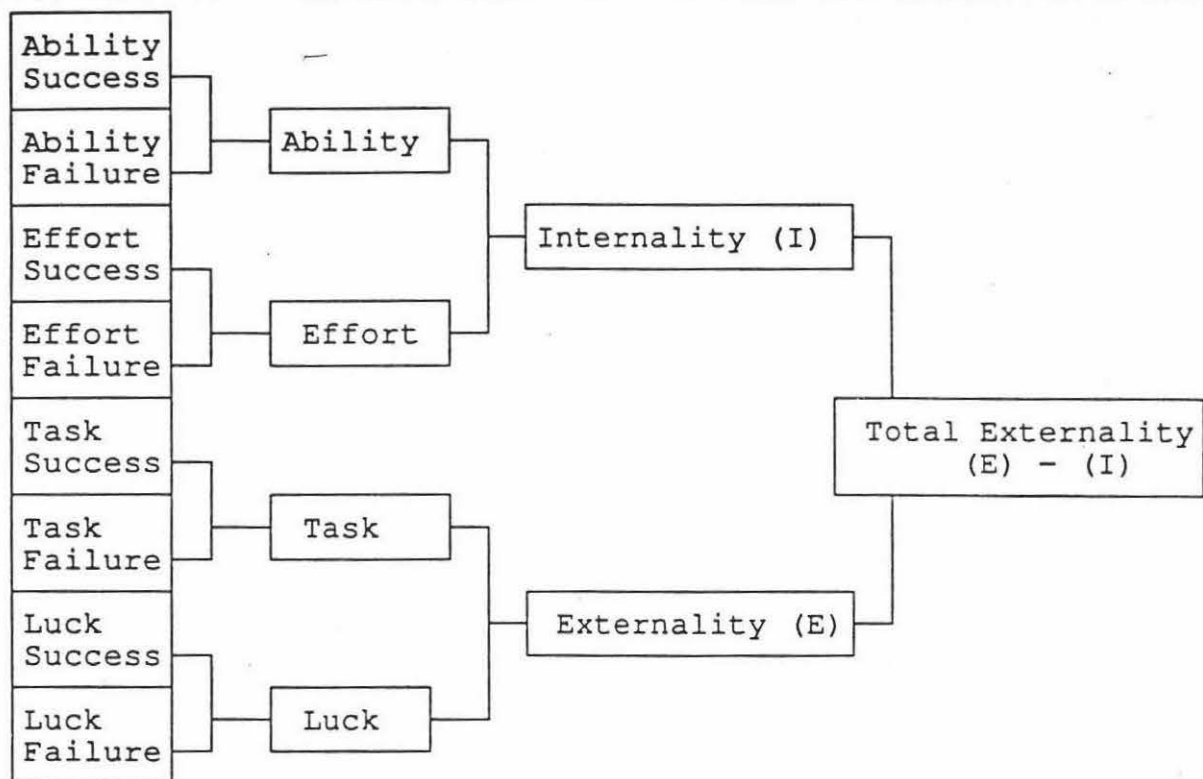
Heider used the term "effective personal force" which came from "power" combined with "motivation". "Power" referred to "ability" or "strength" or any stable personal attribute. "Motivation" meant "intention" and "exertion". Heider used the terms "ability" and "effort", "task-difficulty" and "luck" as examples of variables in a situation that influenced people's decisions about whether they "can" succeed in a task (Heider, 1958, cited in Weiner, 1985). This concept of effective personal force has been further elaborated and called "self-efficacy" by Bandura (1986).

According to attribution theory, in achievement situations the causal attributions used to explain success and failure have performance and affective consequences. Before engaging in a task a person appraises the outcome in the light of his or her perceived "power" to achieve the outcome. These cognitions influence subsequent actions. Similarly, how a person feels in a success or failure situation depends on whether the cause of that success or failure is attributed to internal, personal characteristics, or to events which no-one can be expected to control.

From Heider, through all the work exploring the internal-external dimension, to research published in 1992, the many causal attributions which people might use to explain the behaviour of themselves or others, are usually reduced to four: ability, effort, task difficulty and luck. Ability and effort are internal, task difficulty and luck external. In discussing the reformulation of attribution theory, Weiner (1972) acknowledged that these four causal elements "generalize to all achievement tasks, and account for the major sources of variance when considering the perceived causes of success and failure" (p.355). Nonetheless, he cautioned researchers against assuming that the meanings of these words for causal attributions were the same for different people, or that the underlying dimensions of any attribution was, from the perspective of the individual in a specific situation, the same. For various theoretical, methodological and psychometric reasons, however, Weiner's cautions have frequently been ignored. These four attributions have become widely accepted in educational psychology as givens. Attribution theory has become widely known and applied in research, either in the one-dimensional form, internal-external distinction as in the Rotter or Crandall scales and,

despite its name, the Multidimensional-Multiattributinal Causality Scales (MMCS, Lefcourt, 1981) shown in Figure 1.

Figure 1: Schematic representation of the MMCS Scales.



(from Lefcourt (1981) p.251.)

The Stability Dimension

Weiner's early model proposed a second dimension to causal attributions that had explanatory power to predict different affective outcomes in success and failure situations. The stability dimension had been noted by Heider (1958) to distinguish between dispositional and relatively fixed personal characteristics from variable personal characteristics such as mood, illness and fatigue, or external characteristics such as available help or luck. Weiner (e.g., 1985) argued that the different affective outcomes after success or failure were inadequately accounted for simply with the internal-external dimension. Stable causes mean different future expectancies than unstable causes. Students classified as high in their attribution of success to stable factors (generally meaning "ability") have more positive overall expectancies than individuals who are relatively medium or low in their attribution of success to stable factors (i.e., attribute their success to effort or luck). In another study (Weiner et al., 1971), it was found that depression, apathy and resignation were associated with stable, internal attributions.

"Effort", the other internal attribution, was classified as unstable. This prototypical classification of effort as unstable has persisted, and is given as the reason that effort attributions help to sustain positive future expectations in failure situations, and so, in learning situations effort attributions are adaptive. This logic does not take into account people who believe they have made a big effort or believe that they always work hard yet they do not reach the desired goal. A consequence of this conceptualisation of "effort" in attribution theory was a number of research studies attempting to assist learning disabled children or people showing signs of "learned-helplessness" by providing effort attributional feedback for their performances or teaching them to attribute failure to lack of effort (Andrews & Debus, 1978; Dweck, 1975; Schunk, 1982). While this line of research generally demonstrated some performance improvement, it showed that it was very difficult to change a student's typical attribution, so more than attributional retraining (or more time) is needed for sustained improvement. Other research has shown that similar improvement can be produced with ability attribution feedback (Miller, Brickman & Bolen, 1975, cited in Schunk, 1983). It may be that the improvement shown in attribution retraining is simply response to reinforcement.

The variability of effort from situation to situation indicates that effort is situation specific and therefore unstable. However, a case may also be made that people are characteristically effortful or lazy. In general, it is more common to perceive others as characteristically effortful or lazy but to see oneself as variable. When judging oneself, there is more awareness of degrees of effort and more subjective standards of what constitutes effort (Weiner, 1985). So, considerable differences can be expected between students' self-ratings of typical effort and teachers' ratings of students' effort, in contrast to the usual finding of similarity between teachers' ratings and students' self-rating of ability.

Figure 2 sets out Weiner's two dimensional classification of causal attributions and the basis of a still widely held understanding of causal attribution theory.

Figure 2: Two-dimensional classification scheme for the perceived determinants of achievement behaviour

Locus of Control		
Stability	Internal	External
Stable	Ability	Task Difficulty
Unstable	Effort	Luck

(from Weiner, B. (1972) p.356)

The Controllability Dimension

A third dimension was identified by Rosenbaum (1972, cited in Weiner, 1985) and labelled "intentionality". He categorised the causal attributions "effort" and "teacher bias" as intentional, and "ability", "task difficulty", "mood" and "luck" as unintentional. This distinguished between "mood" and "effort" which were both internal and unstable but could produce different affective outcomes. It also linked to research based on attribution theory which sought to explain the difference in judgments of culpability and appropriate degrees of punishment (Weiner & Peter, 1973). This line of research has shown a clear belief in adults that conscious intent and personal responsibility are vital components in judging reward or punishment. Attribution research has also shown a correspondence between Piagetian levels of moral development and the different conceptualisations of causal attributions by children of different ages and adults (Nicholls & Miller, 1984a).

Research, such as that using the Crandall Intellectual Achievement Responsibility Questionnaire (1965) suggested another aspect of the phenomenology of causal attributions, that there is a difference in the causal attributions given to one's own successes and failures and to the successes and failures of others. In general, others are seen to be more intentional, whereas one's own failures are more likely to be seen as unintentional.

Later, Weiner argued that the "intentionality" dimension should be labelled "controllability", since, for example, "effort differs from mood in that only effort is perceived as subject to volitional control" (Weiner, 1979, p.6). This seemed to complete the parcelling out of the elements within the original concept of "locus of control". The internal-external dimension in attribution theory was then called "locus of cause". With this differentiation, attention could be given to the concept of "controllability" within the internal external dimension.

This third dimension required an extension of the four basic attributions, and highlighted the fact that "effort" and "ability" need not always be "unstable" and "stable" respectively (see Figure 3).

Figure 3: A three-dimensional taxonomy of the perceived causes of success and failure

	Controllable		Uncontrollable	
	Stable	Unstable	Stable	Unstable
Internal	Stable effort of self	Unstable effort of self	Ability of self	Fatigue, mood and fluctuations in skill of self
External	Stable effort of others	Unstable effort of others	Ability of others Task difficulty	Fatigue, mood and fluctuations in skill of others, luck

(Adapted from Rosenbaum, 1972, p.21, in Weiner, B. (1985) p.347)

These three dimensions were derived empirically by Meyer (1978, cited in Weiner, 1985). Although this study is frequently cited in support of three dimensions, Marsh and his colleagues (1984) criticise it on several grounds, and in particular because it does not take into account the difference between outcome effects.

A fourth dimension, globality, is sometimes used when an attribution is considered to affect not only the outcome in a particular situation but to be influential in performances in most areas of a person's life (Abramson, Seligman & Teasdale, 1978). An internal characteristic such as "ability" (I am dumb) may be seen as a permanent, generalised, handicapping condition which meant a person gave up hope of any improvement. Similarly, a perception that outside forces are consistently acting against an individual, such as a dominating or meddling parent or a malevolent fate, will contribute to feelings of "learned helplessness".

Issues Arising From the Assumptions of Attribution Theory

Phenomenological Assumptions

The fundamental assumption in attribution theory is that people seek to make sense of their own and other's behaviour. The relationship between performance and affective outcomes and the ascription of causes depends on how individuals experience events and make sense of them. In a phenomenological approach, researchers try to describe systematically how ordinary people say they experience the world. Attribution research began this process but in the systematising of responses there has been a dislocation. The system is imposing meaning to responses which may not be that of the individual who has provided them.

Measurement

Early attribution research asked open-ended questions to find out what people believed were the causes of their past successes and failures. Several coding systems were developed to classify these verbal responses (Elig & Frieze, 1975, cited in Elig & Frieze, 1979; Cooper & Burger, 1980) but because they are so time-consuming other methods of causal assessment were developed. Elig and Frieze (1979) compared the responses of college students on five different measuring instruments. For the open-ended response they found thirty-five percent of responses were uncodable, half of these because students did not follow instructions. All but a few attributions offered were included in the structured response measures. The open response measure showed generally low communalities compared to the structured measures. As a result of this study, researchers felt justified in developing structured measures, some which were based on exploratory open-ended research (Bar-Tal, Goldberg & Knaani, 1984).

Elig and Frieze (1979) point out that structured methods have advantages and disadvantages. The main disadvantage of structured responses is that subjects are

confined to a limited set of factors defined in advance by the experimenter. This set may not include factors of importance for some subjects. Structured measures also provide the choice of "luck" as an attribution which is rarely given as a cause in open-ended studies (Cooper & Burgess, 1980). In addition, Elig and Frieze noted that different attributional measures yielded different sorts of data and that was in part due to different operational definitions of specific constructs. What was not apparent in 1979 was that assumptions about the factors made by experimenters might not be the same as those made by individual subjects. Structured measures made assumptions about the subject's understanding of the terms given to attributions, and further assumptions about the nature of relationship between particular attributions and outcomes. Any operational definition of a construct may not be valid for some subjects. However, the reliability of structured questionnaires was taken to be established and their use has become the accepted approach. What has too often not been considered is the **validity** of the structured questionnaire, bearing in mind that it is the individual's construction of meaning in a situation, mediated through language, that is crucial to attribution theory, and an outsider's translation may be a misrepresentation.

Rationality

Attribution theory sees "man as a rational animal" and children as "little scientists". Consequently, there is an expectation that subjects will make consistent and logical connections between cause and effect. With this expectation, various researchers have explored the development of children's concepts of ability and effort and their relationship to performance outcomes within a Piagetian framework. Kun (1977), Nicholls and Miller (1984b) and Surber (1980, 1985) investigated whether children use the additive rather than discounting principle when judging ability and effort in relation to success and failure. This led to the investigation of the development of reversible mental operations, specifically a reversible causal schema for achievement concepts. This also required the exploration of the development of the judgment strategy of inverse compensation (Kun, 1977), or the "discounting principle" (Kelley, 1972, cited in Surber,

1985). Despite early work which indicated that cognitive development would lead to the "logical" endpoint, the "mature" understanding of the concepts of "ability" and "effort" (Nicholls & Miller, 1984a), Surber found that it was questionable whether "'fully' reversible causal schemata for achievement concepts exist in adults" (Surber, 1985, p.143). Surber concluded that

Regardless of the way ability and effort are combined, there appears to be little relationship between the pattern of performance predictions and the pattern of ability or effort judgments. This finding questions the widely held assumption that how a person assumes causes combine to produce an event determines how a person makes attributions of the causes (i.e., that attributions are based on reversible causal schemata.) (Surber, 1985, p.180)

Perhaps this research failed to produce the expected results for two reasons. Piagetian theory assumes that if a person has developed a particular mental operation it will be used. There has now been an accumulation of research findings which shows that people do not operate in the rational manner expected. Other variables come in to play to influence which mental operation is used to make judgments. While people may indeed be rational animals, the logic of their judgments may not be apparent to an observer. The second reason that this research produced no clear patterns could have been because of assumptions about the nature of the data, a lack of congruence between a subject's and the researchers' conceptualisations of ability and effort within the experimental situation.

Attribution theory also is based on an assumption of accuracy of memory and interpretation of events in the past. The experience of past situations shapes the expectancy of future outcomes. Some attribution research is based on laboratory-based tasks which have success and failure manipulated and the questions about attributions clearly refer to a specific event. While these do not challenge the memory of subjects, they may be events so removed from usual activities that the interpretations made may have little resemblance to those made in a natural setting. On the other hand, most structured measuring instruments for attributions ask for the causes of success or failure outcomes in the past. Examples, which are typical of many attribution questions, are:

If you did well in your maths test, is it because you

- a) are good at maths b) studied hard for the test.

Think of a time when you felt you had failed in science.

Which of the following contributed most to the outcome

- a) ability b) effort

A subject is free to answer these types of questions in a variety of ways, for example to choose an occasion which may be atypical but easier to answer - or more self-protective. If neither of the alternatives seems appropriate, the subject may discount the entire set of questions as silly and "play" with later responses.

High intertest correlation validities (e.g., three different tests taken at the same time - Elig & Frieze, 1979) and test-retest reliability (e.g., Ryckman, Peckham, Mizokawa & Sprague, 1990) have been reported for structured questionnaires. However, these cannot be accepted as endorsement for the reliability and validity of these particular tests or structured questionnaires in general without consideration of the nature of the samples used. The Elig and Frieze sample came from introductory psychology classes and the exercise was designed to focus class discussion on measurement procedures. The Ryckman sample came from a senior high school psychology class. Under these conditions with these subjects there should be a convergence of subject and researcher expectations about the meaning of terms and the implications of responses, and there would be certain constraints on the subjects to behave compliantly. With other social groups, other age groups and with groups with no interest in the research outcome the validity and reliability of test usage might be very different.

Generalisability

The dimensions of causal attributions, rather than the actual attributions, contain the explanatory power of attribution theory. As the basis of a proto-theory, both the two- and the three-dimensional model have been tested to demonstrate the hypothesized links between attributions and achievement, and between reasons given for success and failure

and affective outcomes. There has been a tendency to accept that attribution theory has been proven, for example, to be given as the explanation for girls' inferior performance to boys' in mathematics (Fennema, 1985). However, there is now a large body of evidence which indicates that attribution theory does not provide a basic explanatory principle for achievement motivation. Limitations to the generalisability of attribution theory will be discussed in the following sections.

Developmental differences.

Most of the early research which established the usefulness of the attribution model of achievement motivation was done with North American college students. Since this model seemed to uncover some important principle of behaviour it seemed promising to use it with school children. The line of research by Nicholls (1978; Nicholls & Miller, 1984b) within a Piagetian framework, demonstrated four levels in the development of concepts about ability and effort in children. Increasing differentiation of ability and effort were found over the four levels, with the lowest level dominating at five years and the highest at twelve years. At the first level, children centre on effort and see effort or outcome as ability. At the second level, children see effort coming before outcome and see variable effort as the cause of differing outcomes. At the third level, there is some understanding of the concept that some people are smarter or faster than others, but effort is still seen to be the cause of outcomes. At the fourth level, ability is differentiated from effort and seen as capacity, "which, if low, may limit or, if high, may increase the effect of effort on performance. Conversely, the effect of effort is constrained by ability. When achievement is equal, lower effort implies higher ability" (Nicholls & Miller, 1984b, p.1991).

As a result of this study, it would be expected that researchers would not see attributional theory as relevant to children under twelve. Any attributions given by children would be expected to be dominated by effort. They would be expected to relate success to sufficient effort and failure to insufficient effort.

The importance of effort may have been the reason for attempting to change

children's attributions to effort. However, failing children do make attributions to ability ("I'm dumb"). Attribution theorists have assumed that this relates to adult understanding of the concept of intelligence or lack of it, and that such an attribution will have adult consequences of shame or frustration and loss of self-esteem. This may be so, but the evidence is that the term may be an alternative to "effort": Nicholls and Miller (1984a) believe the terms are not differentiated until about 12. Meyer et al., (1979, cited in Brophy, 1983) reported that younger elementary students seem to take inappropriately lavish teacher praise at face value and thus feel reinforced by it. It would be expected that lavish praise of effort would be received similarly. Praise is what is being responded to. Conversely, criticism will also be responded to, and presumably for younger children, criticism of their ability or of their effort will be equally hurtful. Since, adults, especially teachers, usually promote the virtue of effort as a practical response, and are more likely to praise effort, especially for a child they see as less able (Covington & Omelich, 1979), lack of effort may be the most frequently heard explanation for lack of success heard in a schoolroom and so be the easiest for children to use in response to researchers' questions.

Despite the evidence that children's concepts about the factors in achievement are different to the constructs in the attributional model, research reports continue to appear where children's attributions are measured (e.g., Ryckman et al., 1990). So confident are some researchers that the reliability and validity of forced-choice questionnaires has been established, that they feel justified in using shortened versions, even with children under twelve. For example, with nine-year-olds, Carr and Kurtz (1991) used the Krause Attributional Scale (1983) which consists of eight items, half portraying a failure experience and half a success experience. Students had a choice of five possible causes, ability, effort, task difficulty, luck and "help". It seems that Weiner's two-dimensional model has an intuitive truth for some people despite criticisms, modifications and further refinements.

Social-environmental Influences

In addition to developmental differences in conceptual understanding of the terms given to ability attributions, conceptual understanding and the use of terms may also reflect the wider social environment. Parents and teachers provide a context for the development of children's concepts about themselves and performance components involved in achievement (Ames & Archer, 1987). If children under twelve are unlikely to have an adult conception of ability, the reason that this attribution is given by children may be different to an adult's. It may be that children who give poor ability as the reason for failure are victims of labelling. They have been told they must be "dumb" if they cannot do something or learn something and they begin to believe that it must be true. Later research has examined the effects of providing ability attributional feedback for successes. Miller, Brickman and Bolen (1975, cited in Schunk, 1983) found that telling children that they were good at arithmetic or praising them for their hard work were equally effective in improving their performance.

Ability attributions were found to occur more in competitive than individualistic situations (Ames, 1984). Ames noted that the results suggest that "children were thinking about responses to the question "Was I smart?" in the competitive setting but were thinking about "How can I do this task?" in the individual setting." (Ames, 1984, p.478). Observation or evaluation also make people self-conscious which will change motivation from a task-orientation to an ego-orientation (Nicholls, 1989).

Ability beliefs and the effects on children's performance have been well-documented in research on teacher expectancy, since Rosenthal and Jacobson's (1958) landmark experiment. In a recent study, Skinner and her colleagues (1990) found that teachers did make a difference to eight- to twelve-year-olds beliefs about their capacity to do well in school and whether that was due to "ability" or lack of it. So it seems that children are sensitive to the negative connotations associated with lack of ability before they comprehend the significance of it for future performance. On the other hand, feedback from their school and home environments that they are smart, encourages a positive self-image that contributes to continued good performance. In brief, ability attributions of children are likely to be reflections of other people's comments in the

process of being internalised (but not conceptually differentiated from effort) and ability attributions may be more readily elicited in ego-involving situations. Any investigation into attributions requires subjects to become self-conscious. Inherent in attribution theory is success and failure so competition and comparative evaluation are automatically involved in judgments of possible causes.

Harter (1982) points out that children are more interested in the mastery process than a "manifest product". Adults' responses to the product draw attention to outcomes and may weaken the desire of the child to continue in mastery attempts since the child can see little connection between what they have been doing and the feedback from adults. They may learn they have little control over outcomes despite wholehearted engagement in mastering the activity. As children move through grade school they move from intrinsic mastery motivation to extrinsic and from feeling that they caused their successes and failures until in junior high school they are most likely to say they don't know what contingencies govern successes and failures. This reflects the changing learning environment of schools as well as the cognitive development of the children. Phillips (1987) refers to the stability of self-perceptions after age seven and argues that this is mostly the product of parental beliefs about their children. On the other hand, Eccles (Eccles et al. 1984) summarising a number of studies, pointed out that students' achievement expectancies are sensitive to environmental changes, such as in the transition from primary to secondary school.

Gender Differences

That attributions are influenced by socialising processes can also be seen in the frequent reporting of gender differences which are consistent with prevailing gender stereotypes. Males give more ability attributions and females more effort. The clearest and most common differences are reported in Maths and Science (e.g., Ryckman et al., 1990), which are the high status academic subjects and seen as masculine fields. Ryckman and colleagues also report that LD girls give significantly more attributions for failure to ability than boys, even when achievement level was held constant, that the LD

girls reported patterns that were more like learned helplessness than boys - and that "these patterns are similar to the debilitating factors found by Willig et al. (1983) related to various stages of acculturation of ethnic minority children" (Ryckman et al., 1990, p.273). These statistics indicate that a female with learning disabilities - and belonging to an ethnic minority, soon learns to accept the hopelessness of her position, but that being male is some protection to morale.

Attribution research in fields other than academic achievement also have found that females attribute success more externally or more to effort than do males (Beyer, 1990). This may be the product of sex-stereotyping, with women showing less confidence in their abilities, especially in areas traditionally seen as masculine. It may also overlap with an apparent female tendency towards fear of success (Gilligan, 1977). The reasons for gender differences in attributions has been explored particularly in the field of mathematics (Dweck, 1986; Fennema, 1985; Licht & Dweck; Parsons et al., 1982). Gender differences are usually statistically significant. Ryckman et al. (1990) points out that these differences are not large. If gender differences in attributions are produced by socialisation processes, they may disappear as more females demonstrate success in traditionally male achievement areas. Indeed, the process may have already begun: Loveridge (1986) found no significant gender differences in attributions given by 12 and 15 year-old New Zealand students in interviews about their self-defined successes and failures.

Cultural differences

Assumptions about the nature of "ability", "effort" and even "luck" have also been shown to be culturally specific. There is now mounting evidence that the attribution constructs are based on meanings assigned to those terms by the North American cultural environment of the 1960s and 1970s. They do not translate adequately to other cultural environments such as Iran (Salili, Maehr & Gillmore, 1976, cited in Weiner, 1985), India (Gupta & Singh, 1981) and Japan (Holloway, 1988). Different cultures assign different values to ability and effort and evaluate outcomes differently. Clearly the attributional

patterns of North Americans are different to those of Japanese for cultural rather than cognitive reasons. In the field of attributional patterns other than academic achievement, Ryff (1987) points out the need to investigate "how societal values and prior socialization affect attributional styles", intraculturally, such as sex differences in causal attributions of success and failure, and interculturally, such as Miller's (1984) work into the different attributions between Americans and Hindus which Miller viewed as resulting 'from divergent cultural conceptions, not differences in cognitive or experiential factors'" (Ryff, 1987, p.1197).

It is also possible that the assumptions of attribution theory are not sustainable in the current academic climate. Assumptions inherent in the conceptualisation of attributions assigned to the internal dimension, are no longer consistent with more recent views of intelligence and the efficacy of self-directed learning.

Other Issues

Stipek and Weisz (1981) while praising aspects of attribution theory, identified two important criticisms:

1. Attribution researchers have rarely ventured out of experimental settings into real classrooms. Children are typically asked to make attributions about hypothetical people doing hypothetical tasks. Until the relationships found in experimental settings are tested in classrooms, the validity of the findings for natural educational environments will remain in question.

2. In future research, attribution theorists might also examine consistency in children's attributions for success and failure across task situations. An example of the question to be addressed is: Do children consistently make internal attributions for success or failure in some academic areas, and external attributions for success and failure in others?

(Stipek & Weisz, 1981, p.126)

The first of these points does not seem to have been dealt with adequately in subsequent research. No research has been located which specifically focuses on perceptions about attributional constructs relating to naturally-occurring tasks at the same time as they are occurring in ordinary classrooms. Research relating to naturally-

occurring situations seems to centre on specific testing situations (e.g., New Zealand students in relation to success and failure in the School Certificate examination (Chapman & Lawes, 1987) and Covington and Omelich's series of investigations with college students and tests (1984a). Examinations that act as gateways to future opportunities are external motivators of classroom behaviour over a period of time, and have the effect of making the motivational orientation of students more external (Deci & Ryan, 1987), and more concerned with ability appraisals.

A few investigations use interviews to allow subjects greater freedom to express their understanding of attributional concepts and processes (e.g., Loveridge, 1986). Most research requires students to respond to forced-choice questionnaires within the classroom, but about hypothetical situations, or what is typical of them under certain conditions (e.g., Carr & Kurtz, 1991; Marsh et al., 1984). While this can be seen to be tapping the attributional orientations that influence students' classroom motivation, it is compromised by assumptions about the meaning of particular attribution terms that is inherent in attribution theory, an issue which confounds much attributional research. Prior to any attribution research, it seems necessary to establish the conceptual understanding of the students of the terms used so that attributions they give can be assigned to the appropriate dimensions of the attributional model.

Asking students to reflect on the causes in a hypothetical situation is several steps removed from tapping the issues in an ordinary classroom situation that may influence a student's motivation to perform the task. This type of measuring instrument is really asking the student to think about the logic of possible causes and outcome, where they may first appraise the situation as an outsider. As has been noticed previously, judgments of causes for "others" has been shown to be different to self-judgments (Bandura, 1977). Next, they need to relate it to a situation they have personally experienced, and finally, they have to choose which cause of those available in the set of forced-choice responses best fits their case most frequently of all the possible occurrences of a similar situation that they have experienced. At this point, perceptions of public appraisal may induce self-protective responses. This type of methodology is measuring the outcome of mental processing that relates to attribution theory, but this may be somewhat different to the cognitions a person might have when about to engage

in a classroom task. Surber (1984) decided that people do not judge causes with the logic expected even in carefully constructed experimental situations.

Self-report formats are susceptible to error from subject bias. This is more likely in situations where people feel their performance is compared to others. A theme has emerged from attribution research that attributions depend on context, and in particular, that ego-focusing questions tend to elicit ego-defensive responses (Ames, 1984; Nicholls, 1989). So attribution research, even within the classroom, is somewhat removed from a real situation in which a causal attribution might influence task-engagement, and in itself evokes self-consciousness of public appraisal.

Stipek and Weisz' second suggestion, that the consistency of attributions be examined across task situations, has been vigorously pursued, perhaps because it was easily accommodated by the accepted structured questionnaire methodology. Marsh and his colleagues developed a measure, the Sydney Attribution Scale (SAS) (Marsh et al., 1984), to measure attributions in mathematics, reading and school in general, for success and failure, with a choice of causes - ability, effort or external. A more recent instrument is the Survey of Achievement Responsibility (SOAR) (Ryckman et al., 1990) which enables the assessment of causal attributions of success and failure in school situations in maths/science, language arts/social studies and physical education. From these and other measures it has been consistently shown that there are differences in attributions between subject areas and between genders, but these differences, although statistically significant, do not appear to be large (Ryckman et al., 1990). It has been suggested that ability attributions are given more often in subjects such as maths and science than in reading or social studies, because maths and science are perceived as hard subjects which require "ability" (Burroughs, 1991).

If the terms "ability" and "effort" can mean different things to different people, and perhaps different things in different contexts, the variables labelled "ability" and "effort" within one piece of research may be invalid. When results are compared from several research projects, the terms "ability" and "effort" may refer to very different constructs. It is presumptive to consider, for example, that ability judgments and attributions automatically mean that ability is perceived as stable and uncontrollable, and that the stable, uncontrollable, personal characteristics of an ability attribution produces

predictable affective consequences depending on success and failure.

Rather than trying to make attribution theory a theory that has universal applicability, it seems more interesting and potentially valuable to our understanding of people and behaviour if we compare different conceptions of the important components in achievement behaviour and different values attached to perceived causes and outcomes. For example, Holloway's discussion of the different beliefs about attributions by Japanese children and students compared to Americans, may be more enlightening in what it tells us about "intellectual socialisation" (Goodnow, 1980) than if the research had indicated that attribution theory embodied some universal principle.

The Ability/Intelligence Issue

In attribution theory, "ability" is given as the prototypical example of an internal, stable and uncontrollable cause of success and failure. The characteristics of internality, stability and uncontrollability of "ability" are fundamental factors in the attribution model's predictive capacity. Do students inevitably conceive "ability" as being internal, stable and uncontrollable? Is a conception of ability as stable and uncontrollable the same thing as a conception of intelligence as a stable, uncontrollable, innate capacity?

Of relevance in considering conceptions of ability are several studies of children's, adults' and experts' conceptions of intelligence (Goodnow, 1980; Sternberg, Conway, Ketron & Bernstein, 1981; Dweck & Bempechat, 1983; Yussen & Kane, 1985). Goodnow addresses the meaning of intelligence in different cultural contexts and shows how aspects of behaviour that are considered to indicate intelligence in the West can have the reverse value in other cultures. People define intelligence in different ways. Goodnow refers to Heider's (1958) "naive psychology", that "the ordinary person has a great and profound understanding of himself and of other people that, although unformulated or only vaguely conceived, enables him to interact with others in more or less adaptive ways" (Heider, 1958, p.2, cited in Goodnow, 1980). Goodnow, like Heider, believes that the task for psychologists is to make explicit the implicit theory. She suggests that different models of implicit theory should become data in their own right.

These models "form belief systems or assumption systems which can be investigated, both with regard to their internal features (e.g., their consistency) and their relation to external events (e.g., their sources and the degree of shift when an opposing belief system is met)" (Goodnow, 1980, p.211). Attribution theory is a belief system. It has already shifted to some extent. However, the belief system it has come from has moved considerably in recent times and the original model may no longer be appropriate.

In the 1950s and 1960s there was widespread belief in the construct of intelligence as a measurable capacity. This view has been popularised and exists alongside other "naive" views, even in the same people. Sternberg, Conway, Ketron and Bernstein (1981) conducted a series of experiments to investigate experts' and laypersons' conceptions of intelligence. They defined "explicit" theories of intelligence as those constructed by psychologists on the basis of data collected from people doing tasks presumed to measure intellectual functioning. "Implicit" theories of intelligence are those that exist in people's heads (whether they are psychologists or laypersons) which form the basis of their judgment of whether behaviours of themselves or others are "intelligent". They found that people have well-formed concepts of different sorts of intelligence and considerable confidence in their ability to judge intelligence in others. While Sternberg and his colleagues found that experts and laypersons had somewhat different conceptions about the relationship of "intelligence" with "academic intelligence" and "practical intelligence", there was considerable overlap between the different types of intelligence and the conceptions of experts and laypersons. Similar factors emerged as characteristics of intelligence: a problem-solving factor and a verbal-ability factor. Laypersons also had a social-competency factor and experts another that seemed to embrace the notion of motivation. These "implicit" theories, Sternberg argued, are people's understanding of word-usage, in this case, "intelligence". In developing his triarchic theory of intelligence (1985), Sternberg has attempted to incorporate the aspects of "implicit" understanding of the term that had not been included in the "explicit" theories. The triarchic theory recognises that intelligence is not a general capacity but three broad areas of intellectual functioning that are all capable of development depending on opportunity, interest and experience.

Over the last ten years under the influence of cognitive psychology and

information processing approaches, the weight of opinion has moved away from the conception of intelligence as a single factor "g" (Spearman, 1927), as measured on IQ tests. Yet attribution theory still maintains that "ability" is judged as a stable capacity, as elaborated in Nicholls and Miller's analysis of development towards the "mature" conception of ability (1984b). One of the strongest advocates of attribution theory using the four basic attributions has been Martin Covington. Yet, in 1983, he called ability a "monolithic construct" and suggested, with some degree of foresight, that it was slowly giving way to a series of differentiations. He pointed out that "there is a growing recognition of ability as a process that is **by no means fixed or unchanging**" (emphasis added, p.157) and that contemporary cognitive psychologists were demonstrating that learning processes could become more effective through cognitive and metacognitive skill training.

It may be that it is the term "capacity" that has led to the link between "ability" as used in attribution theory, and "intelligence" as a general capacity that sets a ceiling on potential accomplishments. There is considerable confusion inherent in the use of the term "capacity". In general usage the term has several distinct meanings (see Fowler & Fowler, 1956). One of these relates to a material quantity or quality: the cubic capacity of a piece of machinery and the related quality of its output or usefulness. Hence, when talking about ability as capacity, one may be using the machine metaphor and relate ability to intelligence as a general capacity as characterised by IQ test scores and perceived as the mechanical potential of the physical brain. Another common meaning of the term "capacity" is the capability, mental power or opportunity to do something at a particular moment in time. This conception of capacity implies environmental as well as organic factors. Nicholls, in notes at the end of his 1989 book, explains that the capacity concept of ability in attribution theory "refers to present capacity rather than to inherited potential or long-term capacity to acquire knowledge or skill [and] capacity relative to others, not to capacity to do anything or to improve at any task or range of tasks" (p.219). This may have been the concept of ability used in his investigations, but he has not restricted himself to this when relating the effects of ability attributions to different motivational orientations or when predicting effects of ability or effort attributions on subsequent performance. Covington, too, whose research has been

influential in this field also argues as if "ability" must be conceived as a capacity, that is, ability attributions in specific situations are reflections of people's beliefs about their ability in general.

Even if it is assumed that adults believe that ability is a fixed, innate capacity, it seems illogical to use attribution measures on children when there is plenty of evidence that children do not have this conception before ten years and it is not common until age twelve (Nicholls & Miller, 1984b). Yussen and Kane (1985) investigated the conceptions of intelligence in children aged six, eight and twelve. Using an interview approach, they first asked children to say what it means when people are "smart" and what it means when people are "intelligent". They, like Sternberg, recognised that implicit theories are people's understanding of word usage. Yussen and Kane found that while there was increasing differentiation with age, all children saw both "smart" and "intelligent" as containing "amount of knowledge" and older children included more references to academic behaviour and skills than younger ones. Although Yussen and Kane make no comment about it, their tables indicate that at least half of the concepts given about the concept of intelligence by the oldest group, were coded as "Same", that is, the qualities mentioned for "smart" also applied to intelligence. This particular item of information is relevant to this study because it indicates clearly that if "smart" and "intelligent" mean the same thing to many twelve-year-olds, it parallels the assumption in attribution theory that "ability" in academic situations is the same as "intelligence". However, it also parallels Nicholls' (1984b) finding that before twelve years most students do not differentiate clearly between related concepts.

Also relevant to attribution theory's assumption of the stability of ability were the questions Yussen and Kane asked about the constancy or malleability of intelligence. At all ages, the overwhelming response was that intelligence can change in a positive direction. In their results they show that at all ages the children thought that change was caused by "experience" and the most important area of experience that influenced intelligence was the school. Also, in response to the question of where intelligence comes from, all favoured experience as the modal source of intelligence, and older children had a greater tendency to indicate that both nature and nurture were important. These issues will be also examined in the present research project, using similar

questions, with eleven- and fourteen-year-old New Zealand students.

Dweck and Bempechat (1983) examined children's beliefs about intelligence that are unrelated to measures of intelligence but appear to promote or interfere with learning. They argue that there are two different theories of intelligence which they called "incremental" and "entity". An entity conception is the capacity view, that intelligence is a stable and global trait, which leads to judgments that one is or is not intelligent. Someone with an entity view accepts that one can learn more but cannot get smarter or more intelligent. An incremental view is that "intelligence is an ever-expanding repertoire of skills and knowledge that is increased through one's own instrumental behaviour" (p.244). Dweck and Bempechat noted that although their earlier research had indicated "that it is good to have an incremental orientation and bad to have an entity orientation, it is clear that what is good or bad (i.e. adaptive, maladaptive) depends very much on the environment in which the child is asked to perform" (p.253). In schools where the emphasis is on performance and test results, an entity view may be more productive. In such an environment, a child with an incremental view may see little justification for engaging in tasks just for the sake of getting good grades. On the other hand, having an incremental view, they felt, meant a child was better equipped in the future for "pursuits, particularly ones that call for independent choice, long-term planning, perseverance, and the maintenance of confidence in the face of unclear outcomes or actual setbacks" (p.253). This suggests another influence on whether people of any age give "ability" or "effort" attributions. Particular attributions may reflect their learning environment, or indeed, be a response to their interpretation of the research situation. If they perceive the situation as evaluative and comparative their choice of attributions may be different to mastery or cooperative situations.

This "entity" versus "incremental" distinction between conceptions of intelligence seems at least as powerful as the distinction between "external" and "internal" locus of cause or control, and have some degree of overlap, to explain individual characteristics that relate to achievement behaviour. They are important ideas to relate to attribution theory and the existing assumptions about the stability of ability and the instability of effort. In a footnote to their paper (1983), Dweck and Bempechat raised the possibility that having an incremental or entity theory may be fundamental for viewing other aspects

of the self and the world. They suggested that most aspects of self could be viewed either as stable traits or "as dynamic qualities that can be cultivated by actions or **increased effort**" (p.244, emphasis added).

So, it may not be important that children of different ages define intelligence as something to do with having knowledge, academic or social skills in different proportions. What is important, within the school situation, is whether they have acquired an entity orientation and a self-judgment that they are intelligent, or not-intelligent, or an incremental orientation which implies a belief in improvement through self-agency whatever their apparent rating compared to others. In attribution theory terms, attributing success to ability in success situations and to effort or some external factor in failure situations, would indicate an entity orientation with a positive self-judgment of ability and an adaptive self-protective orientation. Attributing success to external factors and failure to internal factors would indicate a negative entity judgment with considerable threat to self-esteem. The reported differences between genders in attributional tendencies might also parallel the incremental/entity distinction. Males may be more typically entity theorists which accounts for their greater tendency to attribute success to ability when they are achieving students and failure to lack of ability when they are failing students. In other words, males suffer more from "the double-edged sword" (Covington & Omelich, 1979). Perhaps girls give more effort attributions because they are more likely to attribute success to effort (Phillips, 1984; Ryckman et al., 1990) because they are more likely to have an incremental concept of intelligence and are less committed to a competitive orientation.

Nicholls'(1989) discussion of the development of the mature conception of ability clearly relates it to the increasing awareness of students of how they compare to others. Students may be protected from the consequences of poor comparison to others by a school environment which encourages task-involvement rather than the ego-involvement produced by testing and grades. They may also be protected because they do not have the mental operations to conceive of ability and effort in the inverse compensation terms required for a capacity view of intelligence.

The apparent anomaly of illusions of incompetence in academically competent children (Phillips, 1984, 1987) occurred in the same proportions for males and females

in two studies, one of third graders and one of fifth graders. Phillips proposed that since the low self-judgments of competence existed despite contrary evidence from school grades, these self-judgments must have been shaped by social influences, in particular, family influences since they were apparent in quite young children. She found in the study of third grade children's perception of academic competence and their parents' judgment of their ability, that parents do have a significant influence on their children's perception of their own competence. From this we can assume that parents may be similarly influential in shaping their children into being entity or an incrementally orientated individuals, perhaps reflecting fundamental orientations to life that are characteristic of the parents. The difference between males and females attributions to ability and effort may also be products of differences in values assigned to behaviours and differences in expectations by parents and other socialising agents.

Therefore, there appears to be little support for "ability" to be uncritically described as a stable causal attribution in adults. It is a culturally specific view and may even be influenced by some more fundamental personality trait. People of any age may perceive ability as subject to change. Present level of ability may be advanced by external factors such as the opportunity to learn more, or internal factors such as practising more or looking for more effective strategies. In children an assumption that ability is stable is even more doubtful. Children may assume that their ability will change simply because they will grow older and that older people have more "ability". If "ability" is perceived as subject to change, it cannot be described as stable.

The Controllability of Ability

If ability is seen as a stable capacity, it must also follow that it is not controllable and outcomes can be "controlled" only by intentional application of effort. When ability is seen to be lacking, the evidence indicates there are important effects on learning and adjustment. For example, Harter (1982) found that bright children who underestimate their abilities strive for less challenging accomplishments than their actual talents would predict. Dweck and Elliott (1983, cited in Dweck & Bempechat, 1983) showed that for girls, especially more able girls, there is sometimes a negative relationship between

measures of actual skill and measures of outcome expectancies. Abramson, Seligman and Teasdale's (1978) description of "learned helplessness" is based on the idea that learned helplessness is the result of a person accepting that there is nothing they can do to produce a desired outcome. Their ability is not only stable it may be global, and so ability may be perceived as utterly uncontrollable. As well, if they have no understanding of self-agency affecting outcomes, they will not understand the efficacy of effort.

Covington (1983) demonstrated the problems connected with a capacity view of ability, and highlighted the dilemma of students ("the double-edged sword"), many of whom avoid situations where they risk failure because failure is seen as evidence of lack of ability.

On the other hand, if ability is seen to be incremental, it is, according to Dweck and Bempechat's definition, continually expanding because of one's own instrumental behaviour. In this view, ability and effort go together. They do not have to be seen as separate aspects of self. Children with this view can see the value of self-directed, active learning. The Japanese view (DeVos, 1986; Holloway, 1988) seems to be that ability is the ability to make an effort, that as one strives to work hard at learning or other aspects of life, ability increases as a product of effort. In contrast to Western attribution theory predictions, with shame associated with lack of ability, Japanese feel greatest shame with attributions to lack of effort.

The issue of the controllability of ability was included in research conducted by Bar-Tal, Goldberg and Knaani (1984). They asked twelve and thirteen year-olds to rank 24 causal attributions for the three dimensions (locus of causality, stability and controllability). Both ability and effort were evaluated as moderately stable. "Studying effort" and "test effort" were moderately controllable. Other causes which might be classified in other research under "effort" (concentration, preparation, attention, will to prove) varied considerably from the most controllable (attention) to tenth for "will to prove". "Ability" ranked alongside "motivation" at about fourteenth place, that is, only moderately uncontrollable.

From this evidence, therefore, ability is not inevitably perceived as being uncontrollable, and, when it is, it may not be perceived as completely uncontrollable.

Metacognition

In the information processing view, the knowledge of and ability to use cognitive and metacognitive strategies would be considered to affect the controllability of ability. Metacognition has been defined as students' awareness of their own cognitive activity and of the methods they use to regulate their own cognitive processes (Brown, 1978). A lack of awareness of metacognitive and cognitive strategies does not preclude metacognitive activities. Even young children can be clearly metacognitive without being aware of it. But as children grow older, they are continually experiencing situations which add to their knowledge about how the "self", the "task" and the "strategies" influence performance (Short & Weissberg-Benchall, 1989). Metacognitive awareness grows as opportunities to develop it allow. Central to the acquisition of metacognitive awareness is the opportunity to learn the contingency between the selection of appropriate strategies for the successful performance of a task and the outcome. Hence, metacognitive activities contribute to the development of self-regulatory and self-management skills as well as a sense of personal agency (Wang, 1983, cited in McCombs, 1988). Metacognitive activities are the processes by which control is applied to performances. The exercise of control processes allows a student to perceive that ability is indeed controllable.

The ability to be self-directed, active and metacognitive is incorporated into Sternberg's triarchic theory of intelligence. More recent research with attribution variables (such as Carr & Kurtz, 1991; Skinner, Wellborn & Connell, 1990) has shown the importance of metacognitive functioning for both motivation and performance. McCombs (1991) stresses Suarez' (1988) view that it is the **function** of metacognitive processes rather than the **content** of particular beliefs, values, expectations, etc., that empowers the individual.

Strategies

Clifford (1987) suggested that the internal dimension of attribution theory should not be described as a line with ability at one end and effort at the other, but as a

continuum, not necessarily linear. Other internal attributions should be included, such as mood and interest, and, in particular, the attribution she called "strategy", should come between ability and effort. Clifford believes that this attribution has been overlooked because too few students and teachers are knowledgeable about cognitive strategies and metacognitive control strategies, and yet these have the potential to enhance learning through the increased ability to control learning more effectively. Also, attributing failure to inadequate strategy use does not have the same negative emotional effects as attributions to lack of ability or lack of effort.

So in this research study, one aspect of the controllability of ability will be explored. If students can state useful ways (strategies) to improve their ability on a task, they give evidence that they are aware that that ability can improve, that is, it is unstable. Such a statement also indicates that they have some notion that they have some control over their ability.

Conceptions of Effort.

Few studies have questioned the oversimplification of the concept of effort. Nicholls (1978) for example, considered effort to be more transparent and obvious than ability. It was a necessary condition to be present when judging ability. The difficulty arises when references to "effort" attributions do not specify whether the effort referred to is in relation to one occasion or is typical effort. In some research, effort has been operationally defined as "time-on-task" and is therefore quantifiable for that particular occasion. In other research designs, amount of effort is measured on responses to questions such as "How hard did you try?" in relation to one activity, or months of activity leading up to a major exam. Within one piece of research the effort construct may be clear, but generalisations about effort findings must be treated with caution. As has been discussed previously, overgeneralisations about effort attributions have led to disappointing results with attempts to make changes in achievement outcomes by training children to make effort attributions (e.g., Schunk, 1983).

Weiner, in later versions of his attribution model (see Fig.3), distinguished between specific and usual effort, and pointed out that the affective consequences of each

would be different. Weiner (1983) drew attention to the fact that in some investigations "the a priori categorization of causes is accepted without considering the situation as perceived by the subject" and "inasmuch as attribution theory deals with the phenomenal causality, such personal interpretations must be taken into account" (p. 535). Weiner explained that "effort may be perceived as stable, inasmuch as personality traits (e.g., "lazy") are perceived as constant and intentions may be consistent over time" (p.535).

Covington and Omelich (1984a), however, in answering Weiner's criticism in respect of their own work, argued on the basis of all the research that had been done on additive or reciprocal schemata for ability and effort, and considered that it had been established that by the time they had reached college age, students had Nicholls' "mature" conception of ability as capacity, "a relatively fixed, immutable entity which is not increased by effort" (p.1203). They cited unpublished research based on semantic differentials (Chandler & Spies, 1983) which "located effort firmly in the unstable, internal quadrant". Because of other problems of interpretation when effort stability is confounded with effort level, Covington and Omelich considered that to interpret "effort as a modifiable **quantity** rather than a fixed traitlike **quality** was consistent with the prevailing evidence" (their emphasis, p.1203).

Stipek and Weisz (1981) suggested that researchers should include dispositional differences as well as situational manipulations when investigating causal attributions, since "cumulative experiences in achievement settings lead children to make generalizations about the causes of outcomes" (p. 127).

Anderson and Jennings (1980) indicate dissatisfaction with the blanket assumption that the controllable factor thought to produce success expectancies in the face of failure is "effort". They disagree with "the presumption that individuals expect success following failure **only** when they believe that they did not 'try hard enough'. For some tasks the analysis of motivation requires a **directing** component as well as the more **energising** component labelled effort" (their emphasis, p.394). Like Clifford (1987), they suggested that "this directing component can be viewed as 'strategy' - the particular approach, tactic or method one uses in attempting to achieve a goal or solve a problem" (p.394). Anderson and Jennings point out that this is a necessary conceptualisation because of its power to explain differing outcomes when the hypothetical amounts of

ability and effort are the same. In everyday terms, the choice of strategy can determine success or failure on numerous tasks and people often attribute failure to using a wrong technique.

Harter (1982) focuses on similar issues with the view that achievement motivation is the product of the energising capacity of feelings of self-worth which come from the interaction of feelings of competency and perception of control. Her use of the word "energising" is worthy of note also. Both the word "effort" and the word "motivation" have connotations of energy. In common usage of the term "effort" there is usually the underlying suggestion that effort requires a necessary increase in energy expenditure to get action under way and to sustain it. Some tasks require more conscious activating of energy than others. This "energy" aspect of "effort" features in some operational definitions of "effort", for example, the amount of push required to make a lever reach the top of a column (Surber, 1980). In other operational definitions, energy per se does not seem to be a component, such as measurements of time-on-task (persistence) for tasks that vary in difficulty or potential interest but do not allow for sustained effort that expends real energy. The concept of persistence implies the mobilisation of energy to enable the continuation of movement past an obstacle such as loss of concentration or lack of interest, yet time-on-task does not measure whether any obstacle did occur that required extra effort. Williams (1982) also points out the need to distinguish between "intensity" of effort, "degrees of persistence" and "quality aspects of performance.

Harter suggests the energising factor is self-worth which comes from a sense of competency and control. Anderson and Jennings suggest the energising factor is effort but that there must be a directing component called "strategy". Other writers suggest that effort retraining should be accompanied by training in cognitive and metacognitive strategies (e.g. Covington & Omelich, 1981; McCombs, 1988). The "directing component" is the application of metacognitive strategies. The application of appropriate metacognitive strategies is the key to understanding that effort is controllable.

As Clifford points out, "strategy" belongs on the internal dimension of causal attributions. Knowledge of metacognitive strategies is somewhere near "ability" or a component of ability, use of metacognitive strategies must be near "effort" or a component of effort. With this conceptualisation, "ability", "effort" and "strategy" each

may be stable or unstable, controllable or uncontrollable, depending on an individual's perception of the task and the situation.

There are no accounts in the literature of investigations of implicit theories of effort, apart from Nicholls in relation to the concept of ability (1978, Nicholls & Miller, 1984a,b). Exploratory investigations for the research documented here suggests that conceptions of effort, like ability, depend on the cognitive developmental level of an individual, and the opportunities to acquire more highly differentiated concepts in the social environment. Some people, including adults, see "effort" as operating if a person is doing something rather than nothing. Others see "effort" as requiring extra energy or conscious self-management or quality-management in the performance of tasks. Some people are proud of how hard they work, or how they can sustain long periods of effort expenditure, but they are not always aware that with some effort direction or management the outcomes could be better. Attributions to effort are therefore as difficult to make assumptions about as attributions to ability.

Implications for Attribution Theory of Recent Conceptions of Ability, Effort and Control

The criticism of the classification of particular causal attributions in attribution theory does not mean the attribution model is wrong, that it does not have explanatory or predictive potential. The difficulty for research is that it is not easy to find out just which particular conceptions an individual has about any of the relevant components of a situation and how he or she is processing them on that occasion. Some of the principles that have come from attribution research have contributed to a more refined understanding of the many components of motivation. These can be applied usefully to learning situations to encourage better motivation, improved performance and better affective outcomes.

The first is that perceiving that one's ability is responsible for one's successes leads to expectations of future success. This follows with people who have an "entity" conception of ability and have had experiences which demonstrate to them that they have sufficient "capacity" to continue to have successes. It also follows for people who have an "incremental" conception of ability. Whether they have successes or failures they

expect in the future to gain more ability so that should allow further successes. However, if a person has an "entity" view of ability, and believes that failures are due to not having sufficient ability, or believes that so far successes have been due to luck or assistance, they have no confidence in their ability to achieve future successes. Talented students may feel they may have reached their "ceiling" and their limited "capacity" may be revealed at any moment.

The educational implications are profound. Teachers must shake off as quickly as possible the legacy of intelligence testing and classifying children on the basis of a presumed intelligence capacity. Teachers need to reformulate their conception of their students' abilities into perhaps, slower and faster learners, but the overriding attitude must be that whatever knowledge and skills are being offered in the classroom or elsewhere, they are adding to the personal repertoire of each person. Each learner comes with his baggage of past experiences and accumulated learning and makes from this learning opportunity something different to his or her neighbour. The expectation is that most people can learn what they want to know given the opportunity presented in a form that suits existing knowledge and abilities (Bruner, 1966), and active engagement in the learning process.

The second important lesson to learn from the refinement of components of motivation through attribution theory, is in the importance of a sense of control. In the real world we are surrounded by conditions, objects and people that we cannot control. There are aspects of ourselves that we cannot change, and behaviours we have no conscious control over. People can respond to this in various ways, but there is considerable evidence that a feeling of personal agency is fundamental for mental health. This can be reduced to the simple awareness that one has a choice, even in the most restrictive of circumstances, to respond one way or another. Choosing to do even what you are coerced to do maintains a sense of personal agency. In achievement situations, some people are prevented from performing only by a belief that they can't. Students must be given the skills of control - an understanding of cause and effect and effective ways of creating more desirable outcomes. A sense of personal agency and knowing self-management and task-management strategies relate to all the positive characteristics associated with internal locus-of-control, with being an Origin, with causal attributions

to effort in situations of failure and with being a self-directed learner.

So, what educationists should be aiming for is to create the conditions for each child to acquire an incremental view of intelligence with its accompanying emphasis on self-agency. If children have an incremental view of intelligence, they will have acquired an understanding that whatever they do they are adding to their accumulated assets and that future learning is built on what is being acquired now. Such a child, when young, should be effortful, that is, active and busy, curious and purposeful, and praised for being so. Erikson (1968) used the terms "autonomy", "initiative" and "industry" for the positive outcomes of the essential developmental crises for children. These terms fit well with the conception of effort elaborated here. Older children will be encouraged to be more self-directed, to be aware of different cognitive strategies that can be selected. They should be challenged to realise that they can control effort so it is effective and not wasteful of time and energy, and all this should lead to increases in abilities, in competence. Competence motivation, by a variety of names, is seen by many theorists of different philosophical persuasions to be the driving force of well-adjusted humans. The common conception of intelligence as capacity encourages maladaptive responses to learning situations that have widespread and long-term effects.

Summary

Attribution theory has made an important contribution to the study of achievement motivation but is in danger of being seen to be an inadequate model because of serious doubts about the nature of the constructs being measured. The two causal attributions that are seen to be most influential on achievement behaviour, ability and effort, were once thought to be easily classified as stable and uncontrollable and unstable and controllable respectively. In the light of more recent conceptualisations of intelligence and self-directed strategies, and the considerable body of research into concept development and attribution theory itself, it seems that we can assume nothing about individuals' conceptualisations of ability and effort unless they tell us.

It is clear that attribution theory is not useful in explaining children's achievement expectations at least up to the age of ten. Nicholls and Miller, in two studies (1984a,b)

found that the capacity conception of ability did not emerge till after that age. Dweck and Bempechat (1983) found that by "middle to late grade school" children understand both the capacity and the incremental theories of intelligence but tend to focus on one. They also note that "some children may act in accordance with different theories in different skill areas (e.g. physical vs intellectual skills)" (p.244).

Concept development is influenced by the socio-cultural world of the child and the conceptualisation of ability and effort, failure and success, may be a reflection of those held by parents and teachers. Attribution research also finds consistent differences in typical attributions of males and females which may be the products of socialisation processes. Dweck and Bempechat's observation that having "entity" or "incremental" views of intelligence may reflect a fundamental difference in the way people understand the world parallels the locus-of-control findings that people can be characterised as self-agents or puppets. Of the components of achievement motivation addressed by attribution theory, the two most powerful seem to related to conceptions of ability and perceptions of control.

Rationale For This Study

It is necessary to examine the validity of basic assumptions of attribution theory, that ability is conceptualised as an internal, stable and uncontrollable cause of success and failure in achievement situations, and that effort is an internal, unstable and controllable cause, in relation to New Zealand school students. What these conceptions might be will be affected by cognitive developmental level, gender, cultural environment, class environment, nature of the task, and nature of the data-gathering methodology. It is important to explore the conceptions of ability and effort of New Zealand school students, how these conceptions might be influencing their engagement in classroom activities and how these relate to achievement, before the attribution model can be justified to explain achievement behaviour in New Zealand schools.

Developmental level

For this research, two age groups are needed to represent the preadolescent stage, before the age of twelve that Nicholls and Miller suggest is when students acquire the "mature" conception of ability, and a later stage where a more mature conception might be established. Form One students are ten and eleven years, Form Four, fourteen and fifteen years old. Both these groups should have incorporated feedback from parents, teachers and peers into a relatively stable concept of their own ability and effort levels relative to others (Phillips, 1984) and have clear preferences for either an "entity" or incremental" conception of intelligence (Dweck & Bempechat (1983). Form Four students may be developing formal operational thought and becoming more aware of metacognitive processes.

School environment

Intermediate and secondary schools have essentially different school organisation, teaching styles and expectations for students which influence students' perceptions of the causes of success and failure (Eccles et al., 1989). New Zealand schools may provide significantly different environmental influences than equivalent American schools. Educational practices in New Zealand suggest that neither intermediate nor secondary school students are exposed to the frequency of testing that is characteristic of American schools, so may not have had the same pressure to form a capacity view of ability which may shape students towards giving more ability attributions (Ames, 1984). Ability judgements should be more salient to the Fourth Formers who face the "mile-stone" evaluation of School Certificate the following year.

Non-evaluative situations

Previous research has shown that attributions differ, depending on success or failure outcomes. It is important to investigate situations where success or failure are not salient structural features and where students are more likely to be task-focused, in contrast to evaluative or competitive situations which elicit an ego-focused orientation. Attribution theory makes assumptions about the nature of ability and effort judgements in achievement settings, not just in testing situations. Such judgements may not be made

consciously in non-testing situations, but they are thought to be influential none-the-less in the performance of school tasks. Stipek and Weisz (1981) called for the investigation in real classrooms of relationships found in experimental settings. The students in this study should have had seven and ten years experience of school and are likely to have established a relatively stable self-concept about schoolwork and coping style in everyday classroom situations. In creating the situation in which students are asked for their responses, effort is made to integrate the presence of the researcher in the classroom while the activity is taking place, and to have the questions about the activity perceived as a continuation of the lesson.

Different subject areas

Because early attribution research assumed stability of attributional style and later investigation indicates that attributions are different in different subject areas, students will be asked for their responses in three different subject areas.

Response format

The data gathering methodology is a new approach, but combines aspects of other research. Attribution research is commonly collected in questionnaire form, especially structured questionnaires incorporating descriptions of hypothetical academic situations which would be familiar to students. In the present research, the questionnaires are really response forms that can be used to gather students' views about any task that they might have just been engaged in. So the focus of responses is on a real and immediate task.

Direct and indirect inquiry

The response questionnaire asks direct questions about the task and about ability and effort. Yes/no responses and ratings become data directly. Other data are inferred. For example, the controllability of effort is measured by the number of self-directed strategies listed, while the nature of the strategies given offers further qualitative information.

In addition, to gather information about students' views about the meanings of the terms "ability" and "intelligence", an interview protocol was constructed which included

questions from Yussen and Kane (1985) and some probe questions to see if students could articulate self-aware effort-control concepts.

Outcome measures

It has been well-documented that teachers' judgements of students' ability and achievement is as reliable as more objective testing methods (Goldenberg, 1992). Since teachers will be familiar with results of students' performance in a variety of situations over time, including those from objective testing, teachers' ratings of students' achievement, ability and effort will be used as outcome measures. A student's perceptions of the components involved in a single example of a classroom task will be related to the teacher's perception of the student's typical performance. When the relationship of student variables and teacher judgment over three tasks is examined, patterns may emerge to indicate which of the student variables are influential in shaping classroom achievement behaviour.

Research Questions and Hypotheses

Do New Zealand school students function in the classroom as if "ability" is stable and uncontrollable and "effort" is unstable and controllable?

This question is explored from two perspectives:

1. Conceptions of ability and effort
2. How students' perceptions of ability, effort, stability and control are related to achievement in the classroom.

These questions translate into the following hypotheses:

Question 1.1. Are the terms "ability" and "intelligence" semantically differentiated?

Description of the nature of the causal attribution labelled "ability" in the attribution theory model is equivalent to Nicholls' "mature" conception of ability as a

capacity. This capacity conception of ability parallels a capacity conception of intelligence. From the evidence of Yussen and Kane (1985) students are beginning to differentiate between the two terms at age twelve. Therefore:

Hypothesis 1.1. The terms "ability" and "intelligence" will be more semantically differentiated by Form Four students than by Form One students.

Question 1.2. Are the terms "ability" and "intelligence" conceptually differentiated?

Students will be asked to rate their ability and their intelligence for each task. High correlations between students' ratings of their ability and intelligence will indicate that the terms are conceptually very similar.

Hypothesis 1.2. The terms "ability" and "intelligence" will be more conceptually differentiated by Form Four students than by Form One students.

Question 1.3. Is "ability" stable or unstable?

This question is approached in two ways. There is considerable ambiguity in the literature about the stability dimension, what it encompasses and what it implies. If ability is defined as a fixed capacity (an "entity" view), it follows that it is stable, not susceptible to improvement. If, however, intelligence is perceived as "incremental", it is susceptible to improvement through self-agency. If the stability of ability is defined as a self-judgment that one has a particular level of ability in relation to the ability of others, it is conceptually equivalent to a self-concept of ability. There is evidence that this self-concept of ability may vary between school subject areas (Chapman et al., 1986; Marsh & Gouvernet, 1989).

Yussen and Kane found that young students "overwhelmingly" saw intelligence as malleable and that it could be improved in a positive direction by "experience". It is assumed that if students do differentiate between ability and intelligence, it will be intelligence that is perceived as more stable than ability. In the interviews, students will be asked if intelligence can be improved and if so, how. It is hypothesised that Form One students' views will be similar to those reported by Yussen and Kane. If Nicholls

awareness increases with age (McCombs, 1991), it is expected that

Hypothesis 1.6.1. Form Four students will have higher control of effort scores (number of strategies) than Form One students.

In the interviews, students will be asked questions which are opportunities for them to express their awareness of self-agency and control.

Hypothesis 1.6.2. Form Four students will make proportionally more self-management of effort statements than Form One students.

Because ability rather than effort attributions for success are associated with achieving students, ability attributions are assumed to be more personally satisfying and therefore conducive to continued positive motivation - but only for achieving students. For failing students, effort attributions are considered to be more adaptive. However, the tendency for girls to consider effort is the cause of performance outcomes should give girls an advantage when engaging in most school activities. They should pay more attention to the nature of the effort they apply and consequently give themselves more opportunity to differentiate between different amounts of effort and develop more awareness of strategies to improve the quality of their effort. Therefore, it is hypothesised that

Hypothesis 1.6.3. Girls will have higher effort-control scores than boys.

Question 2.1. Is the stability or instability of ability perceptions associated with achievement outcomes?

If the stability of ability represents a stable self-concept of ability it will have clear consequences for classroom achievement. A positive self-concept will be conducive to continued activity motivated to maintaining this positive self-concept. So, such a student is likely to be effortful, and the interaction of effortful activity and the continual accrual of skills will be reinforcing the positive self-concept. Students with a negative self-concept of their ability may be failure-avoidant and consequently try to avoid the engagement in school activities that is necessary for their abilities to increase, because

it may draw attention to their perceived lack of ability. Therefore:

Hypothesis 2.1.1. Students with stable ratings of high ability will be rated higher for achievement than those with unstable ratings of high ability.

Hypothesis 2.1.2. Students with stable ratings of low ability will rate lowest for achievement.

If the stability of ability is taken to mean that ability cannot be improved, that a person either has sufficient or insufficient "capacity", older students will be more affected than younger ones, because "ability" will be seen to be the principal reason for success or failure and so any situation may be perceived as a potential threat to self-esteem or an opportunity to feed self-esteem. If a capacity perception is acquired by students over twelve,

Hypothesis 2.1.3. Proportionally more Form Four students will have stable ability ratings than Form One students.

Question 2.2. Is the stability or instability of effort perceptions associated with achievement outcomes?

Stable general-effort perceptions by students should be predictive of achievement outcomes, with high perceived effort producing higher achievement scores than low perceived effort. Even the similarity of one student's ratings for specific effort may be indicative of stability of effort that has become a personality trait. However, since the naturally occurring classroom tasks sampled here may not be seen by students as being particularly important, students, particularly high ability students may rate their effort level quite low. Therefore, it may be that teachers' ratings of effort may be a better measure of the stability of a students' effort, although teachers' judgments of students' effort may be coloured by knowledge of ability and past performance outcomes.

Hypothesis 2.2. Higher achievement is associated with teachers' ratings of more effortful behaviour.

Question 2.3. Is the controllability of ability associated with achievement outcomes?

If students can state how they can improve their ability they show that they are aware of some methods to control ability. So

Hypothesis 2.3. Students with more control strategies will have higher achievement scores than those with fewer control strategies.

Question 2.4. Is the controllability of effort associated with achievement outcomes?

Awareness of control of effort strategies is a measure of metacognitive awareness. Those students who can provide more strategies should have a greater sense of the controllability of effort than those with fewer strategies, and if effort is controllable, outcomes should be better than when effort is uncontrollable.

Hypothesis 2.4. Students with higher self-directed strategy scores will be rated higher by teachers on achievement.

Question 2.5. Which of the student variables, ability, effort, stability and control contribute most to classroom achievement?

By combining student variables across tasks and teachers' ratings for achievement, multiple regression analyses will be used to explore the intercorrelations of the student variables, the extent to which these student perceptions account for achievement outcomes, and the relative contribution of each of the variables to the shared variance with teachers' achievement, ability and effort ratings.

CHAPTER 3

Methodology

Development of Instruments

This research design was influenced by the need to find out how ability and effort are conceptualised by New Zealand school students and, therefore, the usual types of attribution measuring instruments were not suitable. If attributions are important to academic motivation they should be investigated in the classroom where they are in continual operation (Stipek & Weisz, 1981). As the literature was being examined for possible research methods, it became apparent that attribution measures and principles may not, in fact, be appropriate for use with school students.

Preliminary work.

Nicholls and Miller's Piagetian approach to investigating the development of conceptions of ability suggested that a similar approach to the concept of effort would be appropriate. Two semi-structured Piagetian-type interviews were constructed: (i) Intelligence-Ability (derived from Yussen & Kane, 1985; Sternberg et al., 1981; Scardamalia & Bereiter, 1983; Dweck & Bempechat, 1983) and (ii) Effort. Since conceptions of "effort" have not been investigated, the format of the effort interview paralleled that of the intelligence-ability interview. The intent of these instruments was to uncover how students of different ages conceptualised "ability" and "effort". The interviews were trialled with students aged 10, 14 and 18. This approach produced useful insights into students' conceptions of ability and effort but required long interviews and produced many responses which were difficult to categorise adequately and to quantify. This same problem is reported by others who have used open-ended attribution measures (e.g., Elig & Frieze, 1979).

In an attempt to limit the generality of responses and to give students the

opportunity to exhibit metacognitive awareness, another pair of structured interviews were constructed based on the self-efficacy research of Schunk (e.g., 1983), and the self-regulated research of Zimmerman and Pons (1988). These instruments were centred on specific tasks: (i) The Basketball Task - how you go about throwing a goal, and (ii) The Writing Task - how you go about an extended writing task. They were trialled with students aged eight, 12, 14 and 18. The Writing Task was not very illuminating. Most strategy comments sounded like repetitions of teachers' exhortations and a writing task was viewed as something to get done, not something to do well. The Basketball Task produced numerous positive strategies from those 12 years and above, indicating that the coaching of physical skills draws attention to those things in the task which need to be attended to, learned and practised. Some interesting comments were made about levels of skill, and how an audience or pressure of competition can remove any sense of control, making performance a matter of luck. This trial indicated that in performances of physical skills, the concepts of ability, effort and control, in competitive and non-competitive situations, are particularly pertinent to older children and they are keen to talk about them. However, academic tasks do not draw out salient personal experiences on which students can focus their discussion of the components which lead to success or failure. The trial of this approach indicated that in order to investigate students' conceptions of ability and effort in academic situations, it is necessary that they have a particular school task to focus on when making their judgments. It also became clear that ordinary school tasks did not necessarily contain elements of success and failure, thus weakening the explanatory power of attribution theory for motivation in learning behaviour that contributed to academic performance. These trials also indicated that with success and failure variables removed questions could be framed in such a way that self-defensive or self-enhancing responses would be avoided.

These early investigations made it clear that younger children had difficulty distinguishing the concepts of ability and effort. They could find little to say in response to the questions. The overall impression was that they are completely task-focused, assume improvement with age, and may not consider effort, ability or possible outcomes when they engage in a task. If that is the case, those research investigations which force young children to make judgments on these concepts (e.g., Nicholls, 1978), may assume

that the responses they received were valid for the group, whereas they were possibly attempts by the children to be helpful or to impress by their sophistication. Other researchers discuss the difficulty of getting useful responses from younger children (e.g., Stipek, 1984b). Scardamalia and Bereiter (1983) argue that children need to be taught the language with which to express mentalistic concepts and then they can be very helpful when they are invited to be co-investigators. With encouragement to pay attention to metacognitive strategies, they begin to understand the import of the question and then attempt an answer. However, this has been criticised for influencing the responses. Despite the frequent use of children under ten in related research and the use of attribution instruments to assess their attributional orientation, it was concluded that data from this age group would be very difficult to interpret.

This led to a reconsideration of whether attribution theory might be completely inappropriate for younger children. The attribution model requires that ability and effort can be differentiated.

Although there were only a small number of children used in the trials of these instruments, there seemed to be a strong gender effect in the ability to articulate appropriate strategies. Girls tended to be more self-aware and reflective than boys who sometimes showed discomfort with the questions, perhaps because of the possibility of exposing inadequacies. This is an issue which should be followed up, since gender differences are reported in most of the literature on intelligence, academic learning, self-concept, persistence, risk-taking, and other field related to achievement motivation.

Development of the Students' Response Questionnaire.

The Students' Questionnaire (see Appendix A) was devised to be answered quickly and easily by both Form One and Form Four students and be applicable whatever classroom task was being considered. The questions were designed to focus students' attention on the nature of the task rather than on themselves, and especially on the notion of task-value in the context of future competency. The questionnaire provides the opportunity for students to reflect on their participation in their own education and can be considered a learning opportunity in itself. The fact that the questionnaire is about

the activity in progress has the effect of embedding the questionnaire in the context it is investigating. To answer the questions honestly is in the students' self-interest and there is no reason for them to feel that the questions are intrusive or will expose inadequacies. Any question asked by a student when filling in the form can be used to emphasise how much the information they can give about how they view this classroom task will be valued: it is his or her opinion which is important.

Rationale for Questions in the Questionnaire.

Question One required the naming of the activity the student was doing when interrupted. This was to focus attention on the specific task and cause the student to think about how to classify it. It also served as a check to see if the students were actually doing what they were supposed to be.

Question Two asked "*How well were you concentrating on that task?*" The response required was to circle a number from 1 to 6 with 1 indicating they were fully focused on the task. Critical examination of previous research into attribution theory, achievement motivation and self-worth have concluded that rating scales are more appropriate than forced-choice answers (Elig & Frieze, 1979; Marsh et al., 1984). This also seemed to be the simplest way of asking a meaningful question and getting a response which satisfied the subject's need for face validity. Forced-choice often causes discomfort in respondents who feel that they are forced to be inaccurate when neither alternative feels true of them. To encourage the continued cooperation of students while completing the questionnaire three times, the questions must have face validity, and there should be nothing to suggest that there is some hidden agenda behind the questions.

Question 2 is based on the recognition that the student's perception is more important in this type of enquiry than the accuracy of the rating if compared to some hypothetical objective measure of levels of concentration. Basic to most of this type of research is the view that it is what the individual perceives and believes that is "causal", not what some outside judgment may see to be real.

Question 2, coded CON (Concentration), was used to measure Specific Effort, the

intensity of effort expended on one particular task. In other research, specific effort has been measured by time-on-task (Nicholls, 1978) exertion of more or less power (Heckhausen, 1984; Surber, 1980) and "studied hard" or "didn't study much" (Covington & Omelich, 1981), but more commonly it is a given in research designs in which scenarios are used or attributions are already stated, with effort stated as "didn't study much" or "worked hard" or "tried very hard" (e.g., Nicholls & Miller, 1984; Carr & Kurtz, 1991). Williams (1982) points out the need to distinguish between "intensity" of effort, "degrees of persistence" and "quality aspects" of performance. Question 2 in this questionnaire covers "intensity of effort", Questions 13 and 14 cover "degree of persistence" and "quality aspects".

Question Three asked "*Is this a task you can do easily?*" which required a simple yes/no answer. It was expected that most would state the task was easy considering that this research was in the naturally-occurring context of the classroom and it was unlikely that any class would be engaged in the rare cases of being involved in difficult new skills learning, or in a testing situation, and almost any other situation would have been arranged to be not too difficult for everyone in the classroom.

Question Four - Task Value was assessed by four questions:

(a) *Is this a task which most people your age can do even if they have never been taught how to do it?*

(b) *Is this a task that once it is learned you can't get better at - you will probably do it much the same all your life? (e.g., sitting, counting to 10, riding a bike, folding your arms).*

(c) *Is this a task that you must learn so that you can learn to do other more difficult and important things?*

(d) *Does this task practise a skill which you will need when you are an adult?*

The questions about Task Value were expected to assess Task Value retrospectively. Although Task Value is posited as a motivating component of performance (Bandura, 1982; Williams, 1982), in the natural classroom situation it seems more likely that students would enter each activity with a routinized response rather than

be pushed ("motivated") by a decision about task value. It was anticipated that because there was no suggestion of competition or success or failure, the tasks would be judged as procedural, opportunities to practise or new ways of applying skills already acquired, or perhaps, just a way to pass the time.

However, these questions were based on the assumptions that school tasks would be valued more highly if students recognised that the acquiring of many new skills and knowledge is dependent on the opportunity to be taught and to practise, and that some skills are basic, essential foundations for more complex important skills and knowledge, and as such, they may be regarded as intellectual assets or "cultural capital".

"People do not much care how they perform on tasks that have little or no significance for them. And little effort is expended on devalued activities. It is mainly in areas affecting one's welfare and self-esteem that favorable performance appraisals activate personal consequences."

(Bandura, 1978, citing Simon, 1978)

It was assumed that students would not have consciously assessed the value of these school tasks prior to being asked these questions, although some de facto judgment may have influenced the level of concentration or interest involved in doing the task. It seems unrealistic to assume that the actual level of concentration on the task would be influenced by a simple judgment of task value. Education research has shown how what happens in the classroom, right down to one individual's motivation to engage in learning, is influenced by the complex and multilevel context in which it is embedded. At one level there are teacher characteristics, classroom practices, school systems, at the next level, cultural values, socioeconomic status and other family cultural influences, community characteristics, and from the macro-system (Bronfenbrenner, 1979), there are the influences of the form of government, the economic conditions of the time, and of world affairs. The amount of interest and engagement with the tasks observed here may have also been heavily influenced by the time of the school year and what had happened or was about to happen in the school calendar. Because these classes were visited near the end of the school year, there could have been an easing of the pressure to work at academic tasks.

Nevertheless, these students were long experienced in school expectations and practised at adjusting themselves to the requirements and the possibilities of another day at school. Because tasks are presented one after another, and are usually expected to be

done by all the students with only the most limited opportunity to choose whether to do it, it is expected that the attitude to school tasks shown in this study will show strong group effects, the values assigned by each group to any task will be similar.

Scores that are markedly different to the mode of the group may be indicative of a students' inattention or general lack of conforming behaviour. So, these task-value questions may, in fact, be measuring "acquiescence to schooling" and may indicate student characteristics that contribute to lack of achievement as measured by teachers' ratings.

Question 5: *Can YOU get better at this task?*

YES - How? ... or NO - Why? ...

The intention of this question is to find out whether the student assumes his or her ability is fixed, and this is clearly indicated to be not so if the student can state appropriate ways to acquire more ability. This question allowed for the possibility that some students were engaged in a task which they had mastered, and so it would be invalid to assume that scores on the first part of this question revealed whether or not a student felt some control over his or her ability in this task. Consequently the responses to this question were coded CAN 0 when the student said "Yes" but gave no method, CAN 1 or 2 depending on the number of appropriate methods stated, and CANT.

Question 6: *Does this task require a particular natural ability? (Underline any of the following abilities that are necessary for this task and rate your ability by circling a number.) Memory Strength Physical Co-ordination Intelligence Artistic*

This question was designed to discover what differentiation students might have between abilities. It is recognised that by asking for information in this way, the question suggests to the students that "ability" is not a single entity but is variable and specific. It also may suggest that any ability is innate. Preliminary trials of questions which tried to elicit similar information indicated that students sought clarification in these terms, so it was considered preferable to have the implications of the question standard for all

students.

The abilities specified in Question 6 were selected so that whatever the school-task that students might be engaged in, at least two should be relevant to that task. "Memory" and "Intelligence" were also included because of their conceptual connection to the term "ability" and if they were chosen as relevant to a task the ratings given could be compared. Since no task is likely to include all these abilities, it is concluded that if students rate themselves on all abilities, they were not paying attention to instructions, were rushing heedlessly ahead or did not understand that the focus of the question was a particular task, not a global assessment of each ability. This type of misanswering could be indicative of characteristics which are associated with other performance indicators.

Question 7: If you were a coach or special tutor, what would you suggest to students that they should be doing if they were really making a big effort to do this task well? (You should be able to think of at least three things.)

The form of this question was derived from one of the international comparisons of school levels of achievement, the research into writing performance (Lamb, 1987). In that study, students' knowledge about the processes of writing were elicited by asking them to write to a younger person hints on how to write an essay that the teacher would award high marks.

Question 7 was intended to discover what task-specific manifestations of effort could be articulated by students. Any statement of a component of effort, such as attending to the task, task-appropriate actions or strategies, persistence, awareness of quality considerations would be counted as metacognitive knowledge and coded as SEL - self-initiated strategies. Any reference to externally-initiated strategies or outcome judgments would be coded EXT, non-specific "try" or "effort" statements as TRY and any reference to mood, interest or enjoyment of the task would be coded AFF.

This question was considered critical to this research since other research such as that of Zimmerman and Pons (1988) and indeed the research into writing mentioned above (Lamb, 1987) indicates that students are more likely to mention outcomes as

evidence of effort rather than awareness of effort as a process. The question did not give any invitation to mention "ability". It was hoped that the previous task-focused questions would have the effect of getting students to think specifically about the task under consideration and, even if they could not abstract "effort", they could give clear examples of effort in action in relation to the particular task.

The last three questions were designed to test the general self-concept of effort and ability within the academic domain. Many reasons can be suggested for the questionnaire to be given in three different content areas. Students' ability attributions have been shown to be specific to particular areas of academic content though perhaps not attributions to effort and external causes (Marsh et al, 1984). Since students seem to become more set in their attitudes to, and hence their expectations of, their performance level in different school subjects with increasing age (Kangas & Bradway, 1971, cited in Dweck, 1986) it is expected that there will be age differences in the variability of responses in the three subject areas. Possible sex-differences in attitude to and perceived performance in the different subject areas also can be explored.

Question 8: *If the student in your class who has the most ability AT THIS SUBJECT gets a rating of 1, and the student who has the least ability gets a rating of 6, where would you be?*

Question 9: *How do you rate for this class for working carefully at this subject?*

Question 10: *How do you rate in this class for completing work?*

Nicholls (1979), using a vertical line of faces to represent the students in the class, considered that even young children were remarkably accurate in assessing their position in the class. However, this study is concerned with a student's perception of his or her relative standing in the class, rather than the accuracy of that perception.

Responses to the question about ability can be compared to those about intelligence earlier as well as to responses to the same question in other subject areas. Students' ratings of themselves in relation to their classmates can also be compared with their teachers' ratings.

It is important to operationalise "typical effort" by including the two most important features valued by teachers and parents and implied in any critical discussion of the construct, that is, effort in pursuit of quality outcomes, and perseverance to task completion.

Teachers' Ratings.

Each teacher was asked to rate each child on ability, effort and achievement, either while the researcher was taking the class through the questionnaire or later at his or her convenience. The terms "ability", "effort" and "achievement" are in constant use by teachers to label these assessments of students and are implicit in their everyday dealings with each student. Each teacher was informed that it was his or her assessment that was important: for example, it was not necessary to transcribe actual achievement results. As well, teachers were asked to add to the bottom of the Rating Form a brief outline of the criteria they used to assess "Ability", "Effort" and "Achievement". It is important that the teachers' ratings be purely on the basis of their own conceptualisation of "ability", "effort" and "achievement" so no further instructions or explanations were given to them prior to their responding. Since considerable research has demonstrated how teachers' judgments of their students' abilities can or does influence students' self-concepts and actual performance (for a review, see Brophy, 1983) it is conceptually valid to relate the teachers' judgments to their students' judgments of these constructs. Other research has shown (e.g. Hoge & Butcher, 1984) that teachers generally make accurate judgments of pupil achievement levels, some teachers' achievement judgments are influenced by ability judgments, and there is little evidence of biased judgments of boys' and girls' achievement levels. These findings suggest that using teachers' ratings of achievement is more valid than using marks on tests, especially for Form One students where testing is minimised and rarely standardised.

Student Interviews.

The interview schedule (See Appendix B) was designed to gain some understanding of students' conceptions of the terms "ability", "intelligence", "effort", whether they had an "incremental" or "entity" view of intelligence, and whether they saw themselves as being responsible for their own learning. They were asked whether they would prefer to have the interview recorded on the tape-recorder or by writing. Most chose to be recorded.

The schedule was to be used as a guide. If a student, in answering one question, seemed to have covered the answer to a subsequent question, that question could be omitted. Prompts or rephrasing the question should be used where necessary to allow the student to clarify or explore the concept being probed.

Trial of Instruments

The Students' Questionnaire was trialled on one First Form and one Fourth Form class during English, Maths and Science classes. Teachers were supportive and interested and could see no problem with rating the students in their classes on ability, effort and achievement. Subsequently, minor adjustments were made to the administration of the questionnaire. It was clearly necessary to have the questionnaire read to each class as they were completing their answers to prevent students from racing ahead and foreclosing on the requirements of each question. It was also clear that students would wish to discuss the nature of the task, first when classifying the task on Question 1, and then when considering task-value on Question 4. On reflection, it seemed appropriate to allow questions and discussion for these questions since it allowed all members of the class to focus their attention on the specific task so that the responses they gave for the following questions that required a personal judgment could be assumed to be in relation to a similar categorisation of the task by all. With the priming that occurred from discussing the task-value questions, students seemed better able to answer Question 5 with the naming of specific strategies. However, the discussion of the task-value questions meant

that these could no longer be used as valid data for a task-value variable. Although task-value is important to many models of achievement motivation, it was felt that the tasks that students were engaged in at the end of the school year were unlikely to be considered very important, so as a variable, under these conditions there would not be very much variability and so would be unlikely to show an important influence on students' behaviour.

Students appeared to enjoy answering the questionnaire and it stimulated considerable discussion later about what is learned at school and why. There seemed to be no resistance, in fact, positive enthusiasm, about completing the questionnaire three times.

The trial of the interview schedule indicated that students of both ages had difficulty articulating their views about intelligence and effort but that they could be encouraged to explain further which usually had the effect of them making statements that gave useful information for categorising responses. It was clear, though, that students seemed to have a response set of "I don't know" which would mean that further questions to encourage thought would be necessary, and that the interviews would need to be leisurely and relaxed. In general, the students interviewed indicated difficulty with the questions because they had never thought about these issues rather than that they felt they were being judged on their answers. Some students suddenly gained insight into the ambiguity of teachers' or external judgement of effort and it was difficult to resist the urge to enter into a teaching dialogue.

Sample

The principals of two co-educational secondary schools and two intermediate schools in a provincial city, Palmerston North, in New Zealand, were approached to request their schools' participation in this research. Two schools were already participating in research at the time but the others were willing to help. The principals were given a written account of the nature of the research, its instrumentation and operational requirements (see Appendix 3). Ethical considerations were discussed and

it was decided that the nature of this enquiry meant student participation was well within parental expectations of classroom practices so no special parental permission was necessary. The research was scheduled very close to the end of the academic year, after examinations for fourth formers and after "camps" for first formers. This meant that actual classroom tasks were not as academically focused as they might have been earlier in the year, but also that the teachers had been involved with the students for at least a full academic year and should know them well.

Three fourth form and three first form classes were selected to provide the range of ability levels of students aged 10 to 11 and 14 to 15, before and after the age of 12 when Nicholls (1978, Nicholls & Miller, 1984b) found the mature concept of ability becomes established. Form One students were chosen to represent students in the later years of the primary school system who would be accustomed to a teaching programme focused on teaching skills rather than content and be unaffected by the competitive and public pressures produced by evaluative testing.

Form Four students were selected because most of them would have reached puberty and be subjected to the inevitable reconstruction of their personal and public selves, and the prospect of preparing themselves for public evaluation in the examinations at the end of the following year may have caused them to appraise their own achievement prospects. They would have experienced teaching of content requiring the development of memory skills and would have been challenged to develop formal operational thought in some areas, though few would be likely to have reached that level.

Although both schools do not have a policy of streaming, in fact there was an element of selection in the composition of the classes. One Fourth Form class consisted of students with a variety of learning problems but the other two had a range of average to bright students. The First Form classes formed a "syndicate" containing a cross-section of the students at that level, who worked together for some purposes. These classes individually may well have had a slightly different range of pupils but any difference was not due to selection according to ability criteria but based on teachers' assessments of which pupils would be best placed together and whether their needs would be best served by one teacher rather than the others. In the judgment of the principals and teachers from each school the students in the classes selected provided a distribution

of ability typical of the school population of that form level. There were five female and four male teachers for the fourth form group, and two female and one male for the first form group.

Social class and ethnic background were not variables in this study and not examined, but were judged by the teachers involved and the researcher to be a reasonable small sample of the distribution of social class and ethnic background in New Zealand schools. One Pacific Island and two Asian students who were recent immigrants and whose grasp of English meant the questionnaires were too difficult to answer adequately, were omitted from the study.

Seventy-three fourth formers and 90 first formers took part. Not all students were present for all tasks although some classes were visited three times on the same day and all within two consecutive days. Using the data obtained from students who were present for all three tasks resulted in a First Form group of 41 (22 girls, mean age = 11.85, $SD = .44$; 19 boys, mean age = 11.95, $SD = .53$) and a Fourth Form group of 54 (30 girls, mean age = 15.0, $SD = .40$; 24 boys, mean age = 14.95, $SD = .39$). Missing data reduced the sample numbers to 39 and 51.

The proportion of first form students who were not present for the three tasks was considerably higher than that of the fourth form. This was mainly due to the flexibility of the intermediate school programme at the end of the school year. In the fourth form group at least three students were missing because of special remedial assistance. The researcher had made a commitment to be as unobtrusive as possible in the schools and felt that it was important that a whole class be interrupted (perhaps inconvenienced) equally, so there was no point in retaining students in class to answer the questionnaire when they knew they were being kept from doing something more attractive.

Comparing the means of Teachers' Ratings for Ability, Effort and Achievement for those who were present for three tasks and those who were not, the incomplete groups are rated slightly less highly by teachers in all groups for ability, effort and achievement. In Form One, the differences are significant for ability ratings (Task 1: $t(73) = -2.73$, $p < .01$; Task 2: $t(58) = -3.24$, $p < .01$), for effort ratings (Task 1: $t(73) = -2.21$, $p < .05$; Task 2: $t(58) = -2.25$, $p < .05$) and for achievement ratings on the first task ($t(73) = -2.05$, $p < .05$). In Form Four, only two comparisons show a difference between

the complete and incomplete groups, effort in English ($t(58) = 2.82, p < .01$) and achievement in Social Studies ($t(64) = 2.40, p < .05$). Since these calculations were made on the scores of the students when they were present in class, it is likely that the students would have been rated even lower in the classes from which they were missing. It is therefore reasonable to assume that the less able and less motivated students are under-represented in the sample.

Student Interviews

Twenty students from each group were to be interviewed from a random sample of thirty. Difficulties, because students were absent or otherwise unavailable at the time, meant that only twenty fourth formers and ten first formers were interviewed. Problems with the tape-recording meant one interview from each group could not be used. However within this small sample there is a spread of ability as judged by teachers' ratings.

Table 1 shows the number of students with complete data on three questionnaires, and the subgroup who were interviewed, according to gender and form level.

Table 1

Sample Size

	Males	Females	Total
Questionnaire Study			
Form 1	18	21	39
Form 4	24	27	51
Interview Study			
Form 1	4	5	9
Form 4	11	8	19

Procedure

Every effort was made to disrupt classes as little possible. Each teacher had been prepared for the researcher's presence in the classroom that particular period and knew how much time to allow for the questionnaire. The researcher was introduced simply as a teacher who was spending some time "with us" and who would be asking them some questions later in the lesson. The researcher sat in the class until the appropriate time for interrupting the class. In some classes, especially in Form One, the researcher became an assistant and became part of the class experience of the task. In two classes there was also a trainee teacher assisting. The impression was that the students' behaviour was minimally affected by the presence of the researcher, and although the teachers may have been a little more self-conscious, this was rarely discernible.

Since each class was participating in the same activity in the same setting, research such as that of Barker and Wright (1955, cited by Ross in Murray Thomas, p.100) would suggest that the different children would behave quite similarly. Because they had also been members of the same class sharing much the same experiences for at least one school year it would also be expected that many of their concepts and attitudes would have been shaped by shared influences, such as teacher characteristics (Skinner et al., 1990), which would make the sample variability less than it would be in a larger population.

For the first administration of the questionnaire in each class, students were told that the purpose of the exercise was to obtain students' views about the things they do in different classes and how and why they do them. They were then invited to complete the first part of the Questionnaire. Next they were invited to think about how we could label the activity they had just been engaged in. Usually the class quickly came to an agreement. Occasionally a student indicated that he or she had been doing something other than what had been decided on, and was told to state what in fact he or she had been doing.

For each administration of the questionnaire, the questions were read aloud by the researcher, and if a student queried the question it was clarified. This should have the effect of "shaping" the answers which is not usually considered desirable in testing

procedures. In the context of the classroom, seeking clarification is a common activity and is often an important condition for understanding and thought to take place. This open method of clarifying the questions was a deliberate trade-off between assumed "individual" responses, unprompted and perhaps misunderstood, and better considered responses that may have been influenced by others' overt or implied opinions. Any discussion was also a deliberate device to focus students' minds on the characteristics of the task rather than on the more usual considerations of their interest in it or their perceived competency level. It was assumed that looking at a school task this way would be a novel task in itself. Task characteristics may be obvious to teachers trained in task analysis or skill hierarchies but are not always obvious to students. The most important information this study seeks to obtain from the students is their metacognitive knowledge in relation to these individual tasks so it was considered important that students be clear about the nature of the task they were focusing on prior to being asked questions that required individualistic responses. If students queried Questions 5 and 7, they were told that only they could answer that question since everyone is different.

The second and third administrations took less time because explanations were not required. Students' comments indicated that they had acquired a heightened metacognitive awareness which they found interesting.

Task order was not controlled. Fourth Form classes were visited as dictated by the school timetable. First Form teachers tried to provide the opportunity to visit each class for language, mathematics and social studies but some lessons were difficult to classify in that way and it was necessary in the end to include "practical" classes in order that there be a clear difference in teacher/subject/classroom ambience which presumably affects student motivation.

Although the teachers in the trial chose to complete their ratings of the students at the same time as the students were doing the questionnaire, all the teachers in this research chose to do their ratings in their own time.

Interviews were conducted over several days following the administration of the questionnaires, on days that suited the schools involved. As the end of the school year was fast approaching, there were limited opportunities to interview the randomly generated list of students who had completed three questionnaires. As a result, the

planned ten girls, ten boys from each age level was not achieved.

Classroom Tasks Sampled

Fourth Form classes were given the questionnaire in naturally occurring Science, English and Social Studies classes. The actual tasks sampled were:

Science:	Reviewing examination results
	Copying notes
	Learning about electrical circuits
English:	Preparing a debate
	Reading - writing - comprehension
	Reading - thinking - writing
Social Studies:	Poster - presentation of ideas
	Reading to mapping
	Following written instructions

First Form classes were intended to be Language, Mathematics and Social Studies. In the event, some classroom activities were not easy to categorise into individual subject areas. In the end, the grouping of tasks followed the order in which they were done, since no three tasks clearly represented one subject area or skill area.

Task 1:	Writing and following written instructions. (How to get to school - filling in a form containing a trap for the unwary.)
	Drawing a map of the library
	Giving directions verbally. (Writing directions to be followed by a person blindfolded.)
Task 2:	Orienteering
	Writing and following written instructions (similar to above)
	Cooking/Sewing

- Task 3: Making and using a pin-hole camera/ flowchart
 Making and using geometric shapes
 Painting papier mache sculpture

In general Form Four tasks are more academic in that they rely on reading, writing and verbal skills for acquiring and using knowledge. Two of the Science classes were engaged in activities which could be interpreted in quite different ways, for example, copying notes could be seen as being easy because it requires well-practised skills, or rather difficult, because it contained new words or was concerned with novel ideas. Form One tasks seem to be focused on practical skills with reading and writing skills used but not central to most tasks. An underlying theme of most of these activities is the development of spacial skills.

Data Management and Analysis

Data from the questionnaires consisted of dichotomous nominal data (yes/no, male/female), ordinal data (ratings), and statements that had to be categorised and counted (self-directed strategies). Data from the interviews was managed with Quattro.Pro, Version 3 and with Apple Macintosh Works, 1.1. All statistics on data from the questionnaires were calculated using SPSSX Data Analysis System, Release 4.0.

Questions 5 and 7 were the only questions requiring translation of statements into categories. The coding criteria are in Appendix E. Two coders agreed on 809 responses. Of the 20 that were difficult to categorise, 12 were coded by agreement and 8 were omitted. To simplify reporting, the 16 categories for Question 5 were reduced to 8 (see Appendix III).

The interviews were transcribed. With assistance from a colleague with an understanding of metacognitive awareness of students, several coding schemes were formulated to classify responses, such as into "entity" or "incremental" and "self-agent" or "non-self-agent". The nature of the data meant that too frequently the evidence was

not there to make a clear classification. "Intelligence" responses indicated that self-agency as conceptualised by the researcher was unlikely to be equivalent to students' ideas about improving intelligence by doing schoolwork. In the end, the interview data were summarised into four variables:

1. "Intelligence" and "ability" defined - the ability to articulate a meaning for these terms as compared to using the term to define the term or "Don't know". If students define one clearly and say the other is the same, it is coded as "Yes".

2. Personal control of ability - coded "Yes" if there is some statement that he or she can improve by self-directed learning - not because of family, school or being taught.

3. Level of conception of effort articulated - coded "Yes" if more than time-on-task, outcome or strength of wish to succeed.

4. Control of effort - coded "Yes" if metacognitive awareness demonstrated by self- rather than other- management strategies, in class, or to get homework done.

Interjudge agreement for these categories was 78%, 78%, 82.1% and 85.7%. Differences were resolved by discussion and agreement or the data was left out of the calculations.

Teachers' ratings of students' ability, effort and achievement were added to the datafile. Form One teachers who taught the same students for each task had difficulty making clear discriminations between tasks for the same students, so the third set of ratings for Form One was abandoned. This meant that the ability to make comparisons between Form Four and Form One was reduced, but for a good reason.

The teachers' statements of their criteria for judging ability, effort and achievement were too idiosyncratic for useful classification with such a small number of cases. They included reliance on previous teachers' judgments or the evidence of the recent examinations, as well as awareness of the multiple sources of information that might contribute to one's judgment.

For the analysis of the nature of students' conceptions about ability and effort, descriptive statistics, correlation coefficients and analysis of variance were calculated. Repeated measures MANOVA with a 2 x 3 design, within-subjects (variable score on 3 tasks) and between groups (2, Age or Sex), were calculated to test the consistency of across-tasks with-in subjects scores and the difference of this consistency between age

or sex groups. Other between-group statistics calculated were t tests and chi-square where appropriate. To explore the relationship of student variables and achievement, a series of multiple regression analyses was conducted. The eight student variables, specific and general ability and effort, control of ability and effort, and stability of ability and effort, plus gender, were regressed against teachers' ratings of achievement, ability and effort, and against each other. Using the method of stepwise regression backwards, with the SPSSX default values of 2.71 for FOUT and .10 for PIN, variables are removed from each equation until those variables which contribute significantly to the shared variance with the dependent variable are left in the equation.

CHAPTER 4

Results

Results will be presented in the order of main questions: first, students' conceptions of ability and effort, and secondly, how students' conceptions relate to their classroom achievement.

1. Conceptions of ability and effort

It is appropriate to begin with the question whether the terms "ability" and "intelligence" are conceptually close enough in the minds of these students, to be made interchangeable, as they are in most discussions of the construct of the causal attribution "ability".

Question 1.1. Are the terms "ability" and "intelligence" semantically differentiated?

In the interview, students were asked directly whether "intelligence" is the same as "ability". Most students, 6 out of 9 (67%) in Form 1 and 14 out of 19 (74%) in Form 4 students, said that the words mean different things. At both levels, these students saw "intelligence" as mental activity, "brainy" or connected with academic work, and "ability" as practical skills in areas other than academic, or simply the capability to do something. Almost all the rest of the students said that ability and intelligence were different but could not articulate the difference.

The number of cases interviewed is too small and disproportional between girls and boys to make generalisations about gender differences (four boys and five girls in Form 1 and 11 boys and eight girls in Form 4). There is a reasonable distribution of ability level according to teachers' ratings with seven high, 13 medium and eight low

ability. Ability level is relevant, as is age, when considering concept development or semantic distinctions.

Contrary to expectation that the cognitive development of the older students would mean that they were better able to make a distinction between the two terms, there was no significant difference between the age groups in the proportions stating that ability and intelligence are different ($\chi^2(1) = 0.16, p > .05$), so:

Hypothesis 1.1. that the terms "ability" and "intelligence" will be more differentiated by Form Four than Form One students, is not supported.

However, that 71% of the group overall could articulate a semantic difference between "ability" and "intelligence", indicates that they should also make a conceptual distinction between the two terms.

Question 1.2. Are the terms "ability" and "intelligence" conceptually differentiated?

In the questionnaires, students were asked to rate their intelligence if intelligence was an important factor in the task they were engaged in, and also to rate their ability in that subject area. Students completed questionnaires three times in different subject classes. Not all students considered intelligence necessary for all tasks, so students with three scores for intelligence were selected for these data analyses.

It can be seen from Table 2 that there are moderately significant positive correlations between intelligence ratings (INT) and ability ratings (SAB) over three tasks, but not sufficient consistency to infer that ability and intelligence are perceived to be the same. In First Form, the strongest correlation is in Task 1 ($r = .76, p < .001$), with a very strong correlation for the boys ($r = .84, p < .001$). Girls in Form 1 have quite strong correlations between intelligence and ability in both Tasks 1 and 2. In Form Four, the correlations between ability and intelligence are positive but non-significant for girls, but quite strong and significant for boys for all three tasks. Intercorrelations between tasks are also more often significant for boys of both ages. This suggests that older students when judging their ability and their intelligence differentiate conceptually between the terms more than younger students. However, the difference between the older boys and

girls especially, suggests that the gender effect requires further investigation.

Table 2

Correlations Between Intelligence, Ability and Teachers' Rating of Ability on Three Tasks

Form 4 (n = 43) by Form 1 (n = 38)¹

	INT1	INT2	INT3	SAB1	SAB2	SAB3	TAB1	TAB2	TAB3
INT1	-	.50*	.35*	.39*	.20	.23	.34*	.24	.38*
INT2	.50**	-	.39*	.00	.48*	.22	.08	-.02	.00
INT3	.49**	.63**	-	.15	.25	.41*	.20	.10	-.04
SAB1	.76**	.39*	.31	-	.16	.16	.23	-.07	.21
SAB2	.41*	.57**	.34*	.50**	-	.43*	-.13	-.10	-.16
SAB3	.24	.04	.32*	.19	.22	-	-.20	.01	-.08
TAB1	.44**	.22	.36*	.37*	.11	.09	-	.56*	.60*
TAB2	.45**	.13	.35*	.43**	.18	.03	.61**	-	.53*

INT1: Student Rating of Intelligence, Task 1; SAB1: Student Rating of Ability in Subject 1; TAB1: Teacher Rating of Student Ability in Subject 1.

¹ Form 4 above diagonal, Form 1 below diagonal.

Form 4 Boys (n = 22) by Form 4 Girls (n = 21)²

	INT1	INT2	INT3	SAB1	SAB2	SAB3	TAB1	TAB2	TAB3
INT1	-	.47*	.31	.51*	.34	.22	.40	.39	.42
INT2	.56**	-	.46	-.01	.62**	.35	.13	.02	-.10
INT3	.48*	.27	-	.17	.43	.64**	.10	.12	-.08
SAB1	.33	.09	-.05	-	.03	.11	.47*	.33	.31
SAB2	.00	.28	-.10	.27	-	.45*	.04	.13	-.26
SAB3	.24	.04	.04	.27	.43	-	-.21	.09	-.16
TAB1	.26	-.01	.45*	.04	-.36	-.19	-	.69**	.65**
TAB2	.11	-.14	.26	-.14	-.37	-.11	.45*	-	.41
TAB3	.34	.13	.10	.31	-.02	.00	.54*	.64**	-

² Boys' scores above diagonal, girls' below diagonal.

** $p < .01$, * $p < .05$

Table 2 continues

Form 1 Boys (n = 19) by Form 1 Girls (n = 19)²

	INT1	INT2	INT3	SAB1	SAB2	SAB3	TAB1	TAB2	TAB3
INT1	-	.48*	.42	.84**	.43	.26	.45	.56	
INT2	.62**	-	.52*	.41	.58**	-.16	.22	.47**	
INT3	.58**	.81**	-	.44	.30	.39	.55*	.70**	
SAB1	.64**	.45	.18	-	.54*	.36	.36	.47*	
SAB2	.38	.68**	.44	.43	-	.26	.04	.32	
SAB3	.21	.24	.27	-.03	.16	-	.05	.15	
TAB1	.42	.31	.16	.37	.23	.14	-	.46*	
TAB2	.30	-.04	.01	.35	-.05	-.11	.75**	-	

² Boys' scores above diagonal, girls' below diagonal.

** $p < .01$, * $p < .05$

Specific ability (EAS) showed even less overlap with intelligence than subject ability ratings. There were few significant correlations between specific ability and intelligence: Form 1 girls for Task 1 ($r = .54$, $p < .05$), Form 4 boys for Social Studies (Task 3) ($r = .39$, $p < .05$). Specific ability ratings had no meaningful correlations with ability ratings in the same subject or with other specific ability ratings (see Table 3).

Table 3

Correlations Between Specific Ability and Subject Ability

	EAS1	EAS2	EAS3	SAB1	SAB2	SAB3
Form Four (n = 54)						
EAS1	-	-.02	.07	-.16	-.09	-.05
EAS2		-	-.06	.10	.22	.38**
EAS3			-	.09	.19	.21
Form One (n = 41)						
EAS1	-	-.09	.22	.01	-.03	-.11
EAS2		-	.23	-.02	-.05	.05
EAS3			-	-.03	.03	-.20

** $p < .01$

Teachers' ratings of students' ability show some agreement with students' intelligence and ability ratings only for Science (Task 1) in Fourth Form (see Table 2). It is interesting to note that boys' judgment of their intelligence in Science reflects their teachers' judgments of their ability level in three subjects (correlations between .39 and .42, $p < .05$), whereas for girls the only significant correlation is between their ratings of intelligence in Social Studies and their Science teachers' ratings of ability. Form One teachers' ratings are closer to those of their male students, but show little relationship to the ratings of the girls. If agreement between teachers' and students' ratings of ability reflect accuracy of judgment, it seems that boys' judgments are more consistent than girls' at both age levels.

Clearly, the majority of students make a semantic distinction between the terms "ability" and "intelligence". In making judgments about their intelligence level and their ability rating in a subject area, there is some overlap, especially for boys, but the results indicate that they are judging two different things when judging their intelligence and ability.

Hypothesis 1.2. The correlations between ability and intelligence ratings on each task will

be higher for Form One than Form Four was not supported.

Question 1.3. Is ability stable or unstable?

The first approach to this question relates the concept of stability to the fixed capacity conception of intelligence as distinct from an incremental conception.

In the interview, half the students (44% in Form One and 54% in Form Four) indicated that they understand **intelligence** to be modifiable. To be scored as perceiving intelligence to be modifiable, students had to state clearly how intelligence could be increased or decreased by self-agency, not simply that it could, for instance, by going to school. Only two, both Fourth Form students, stated that intelligence could not be increased. Most students did not think that what you were born with was important in regard to intelligence (see Table 4), but that experience was important in the development of intelligence (see Table 5).

Table 4

Responses to Interview Question: If a person is very intelligent, was he or she born that way?

	Yes	No
Form 1	3	6
Form 4	6	13

Table 5

Responses to Interview Question: What is most important for intelligence, what you are born with or what you have done in your life?

	Innate	Acquired	Both
Form 1	0	9	0
Form 4	1	16	2

The interview responses show that not only the 11-year-olds but also the 15-year-olds see intelligence as being modifiable by experience, if not necessarily by self-agency. Responses to the questionnaire item "Can you get better on this task?" show that most students think they can improve, and in the cases where they said they cannot, they were generally referring to the performance of tasks which it is possible they had indeed mastered.

Hypothesis 1.3.1, that Form One students will see intelligence as more unstable than Form Four students, cannot be supported from this evidence.

The second approach to the issue of the stability of ability relates to the similarity or difference of ability ratings by each individual across three different tasks. Using a series of MANOVA with a within-subjects repeated measures design with a between-groups factor (2 x 3, Age or sex x task) it was shown that there were no significant within-subjects (individual students) differences for their ratings of intelligence ($F(2, 186) = .54, p > .05$) or general ability (SAB) ($F(2, 188) = 1.68, p > .05$) in three subject areas and no significant differences between boys and girls ($F(1) = 2.40, p > .05$). However, there was a significant difference between age groups for general ability scores ($F(1) = 5.95, p < .05$), with Form 4 rating themselves lower than Form 1 (see Table 6).

Table 6

Means and Standard Deviations for Self Ability Ratings (SAB) and Specific Ability (EAS) by Gender and Form Level

	Form 1	Boys (n = 18)	Girls (n = 21)	Form 4	Boys (n = 24)	Girls (n = 27)
SAB1	2.615	2.667	2.571	3.020	2.667	3.333
	(.75)	(.84)	(.68)	(.86)	(.70)	(.88)
SAB2	2.615	2.667	2.571	2.765	2.583	2.926
	(.71)	(.84)	(.60)	(.79)	(.77)	(.78)
SAB2	2.538	2.500	2.571	2.961	2.792	3.111
	(.72)	(.79)	(.68)	(.80)	(.83)	(.75)
EAS1	0.359	0.333	0.381	0.059	0.083	0.037
	(.49)	(.49)	(.50)	(.24)	(.28)	(.19)
EAS2	0.487	0.389	0.571	0.294	0.083	0.481
	(.51)	(.50)	(.51)	(.50)	(.28)	(.58)
EAS3	0.308	0.222	0.381	0.059	0.083	0.037
	(.47)	(.43)	(.50)	(.24)	(.28)	(.19)

SAB 1=hi 6=lo, EAS 0=hi 1=lo

Intelligence ratings would be expected to be more consistent than ability ratings across subjects if intelligence is seen to be a fixed capacity, assuming that ability is perceived to be more modifiable than intelligence. However, these students showed that their ratings for both their intelligence and their ability were not significantly different over three tasks.

Hypothesis 1.3.2, that students' self ability ratings will vary significantly across three subjects is not supported.

Further 2 x 3 (Age or Sex x Task) repeated measures MANOVA showed there were significant differences in within-subjects specific ability ratings (EAS) for the three tasks ($F(2, 188) = 5.76, p < .01$), a significant age difference ($F(1) = 24.39, p < .001$),

with Form 4 more likely to state that the task was easy (see Tables 6 and 7) and no significant gender difference ($F(1) = 2.52, p > .05$).

Hypothesis 1.3.3: Students' specific ability ratings will vary significantly across three subjects, is therefore supported.

Table 7

Distribution of Specific Ability Scores on Three Tasks

	Form 1 (n = 40)	Form 4 (n = 50)
Easy	82 (69%)	133 (89%)
Not easy	38 (31%)	17 (11%)

Specific ability scores parallel the early attribution inquiries relating to performances on a laboratory task in success and failure situations where the giving of an attribution was considered to be predictive of general attributional orientation with generalised consequences. Since specific ability scores are so unstable, it is clear that one ability attribution will not necessarily carry general consequences. Asking students if the task was easy implies asking if they had the ability to do it at that time, regardless of task difficulty, interest or desire to do it. This is equivalent to Nicholls' definition (Nicholls, 1989, p.20) or Heider's (1958) "power". Asking them to rate their ability compared to others in the class introduces another dimension - comparative power. In this case, it is not surprising that there is a flattening effect. Students' judgments of their ability in a subject may be influenced by their generalised self-concept of ability which has developed over time as the product of their perception of their overall level of ability compared to others in the class. Attribution theory's description of ability as stable, therefore, relates to students' self-concept of ability, not to their perception of their ability to perform in any specific task. Assumptions of general consequences for attributions on specific tasks is therefore unwarranted.

The results so far have indicated that Fourth Form boys are more likely to see intelligence and ability as more closely related than Fourth Form girls, so ability attributions may have different implications for girls and boys at this form level. Intelligence ratings in Fourth Form Science (Task 1), especially the boys', appears to be the best predictor of other intelligence ratings, self-ability ratings and teachers' ability ratings (see Table 2). This is consistent with Burrough's (1991) observation that subjects that are perceived to be hard influence attributions more than easy ones. If Science is perceived as a hard subject, ability in this subject might well be seen more as a reflection of intelligence than ability in English or Social Studies.

Similar observations cannot be made about the First Form tasks because they could not be classified as being in clear subject areas. Also the tasks varied from practical tasks with considerable teacher direction (cooking, sewing) to problem-solving tasks which required either individual engagement (writing directions) or interactive, cooperative skills (orienteeing). The numerous significant intercorrelations between intelligence, ability and teachers' rating of ability, especially for boys in Form 1, indicates a concept of ability that is more stable than in Form 4, with Form Four girls having the least stable concept of ability.

Nonetheless, Hypothesis 1.3.4: Boys' self-ability ratings will be significantly higher than girls', is not supported ($F(1) = 2.40, p > .05$)

In a later section (2.1), whether students with stable ability are different to those with unstable ability will be explored.

Question 1.4. Is ability controllable or uncontrollable?

The number of appropriate strategies by which ability in a task could be improved was the measure of controllability of ability. Those students who said that they cannot improve were mostly in one Fourth Form Science class and their interpretation of the nature of the task indicated that this judgment was not a reflection of their ability or the controllability of their ability. The task, teacher feedback on their answers to examination questions, might well be seen as a task that required an already mastered

ability. There were only four cases where First Form students said they could not improve on the task.

The amount of variance in the number of strategies mentioned, despite the limits implied by the way the question was asked, permits the exploration of the relationship between the number of ability modification strategies, other student variables and achievement outcomes. To investigate whether the number of strategies given was related to other performance variables, ad hoc groups were formed. The group that said they can't improve (CANT) were compared with those who gave some improvement strategies (CAN1 and CAN2) and those who said they could improve but gave no strategies (CAN0) on the variables of subject ability, effort and effort strategies, and teachers' ratings of ability, effort and achievement. Appendix D.1 lists the variables which show significant differences on ANOVA between the three groups (CANT, CAN0 and CAN1/2).

In Science, the CANT students formed a bigger group than those who gave no strategies (CAN0). The CANT group had the lowest scores on self-effort (SEF) and teachers' effort (TEF) but the highest number of self-directed effort strategies (SEL), which indicates at least a subject specific lack of general effort but that they did have a good awareness of the task requirements. In English, the CANT group had the lowest scores for specific effort, general effort and teacher's effort but again the highest number of self-directed strategies. In Social Studies there is no pattern. Teachers scored the CANT group lowest on effort, but the students rated themselves above the CAN0 group for general effort and highest for specific effort. They had the lowest mean for self-directed strategies, but there is a huge standard deviation compared to the mean. The small size of this group (3) suggests that these results should be disregarded. To summarize, it seems that the CANT group may be students who are dispositionally not effortful as indicated by the teachers' ratings and their own ratings for effort, but may be quite capable.

The scores of the other two groups, CAN0 and CAN1/2, indicate that the controllability of ability may be subject specific. In Science, the CAN1/2 group were rated higher by teachers for ability and effort, but the CAN0 group was rated higher for achievement. In English, the CAN1/2 group rated themselves higher for specific effort,

general ability and effort, and were rated by their teachers higher for effort but not for ability and achievement. In Social Studies, it was the CAN0 group, rather than the CAN1/2 group, who were higher on the relevant variables.

To investigate further the relationship of the ability to state useful methods by which ability can improve and the other variables of performance that were measured in this research, the CANT group was joined with the CAN0 group, and the CAN1/2 group was separated into CAN1 and CAN2. The way the questionnaire was worded suggested that one statement of how ability on the task could be improved would be sufficient, so it is possible that those students who mentioned two might have a stronger perception of the possibilities of improvement through self-agency. This had the effect of producing very small groups for CAN2 but allowed a more detailed investigation of Form One responses.

The form levels must be kept separate since the subject distinction is not valid for Form One. Not all Form One teachers supplied ratings for the third task because they teach the same students different subjects. On close inspection of those teacher ratings that were given it was apparent that although teacher ratings for one child were very similar, there were differences, so that it would not be valid to replace the missing data with averages of the ratings of the same child by the same teacher. As a consequence, many statistical comparisons do not include Task 3 in Form One.

Appendix D.2 lists the variables which produced significant between-groups (3) differences on ANOVA for each school task grouping. There were no significant differences between groups on any variables in Form One. However, Table 8 shows the means on the variables for each of the CAN groups. If CAN has any validity as a measure of control over ability, and if control enhances performance through a sense of competency or self-efficacy, CAN2 should rate higher on all the variables than CAN1, and CAN1 higher than CAN0. In Fourth Form, in Science, there is a clear pattern for the CAN2 to score higher than CAN1, which in turn scored higher than CAN0 on almost all variables, although the group differences did not often reach significance. In English, this pattern occurred for specific effort and general effort with significant between group differences but the CAN1 group scored higher for self-ability and all the teachers' ratings, though the group differences were not significant. In Social Studies, the expected

pattern did not occur. In general, the CAN0 group scored the highest. In Form One, the pattern is clear, especially in Task 1. The construct being measured here may be tapping something specific to students' perceptions rather than the effect of those perceptions on behaviours that have led to the teachers' judgments. On the whole, teachers' ratings do not reflect the pattern as expected; CAN responses seem to have no relationship to teachers' ratings.

Table 8

Mean Scores for Performance Variables for Each Task by CAN Groups

	Form 1 Task 1			Form 4 Science			
	CAN0	CAN1	CAN2	CAN0	CAN1	CAN2	
	n = 10	n = 27	n = 4	n = 17	n = 33	n = 4	
SAB1	2.70	2.63	2.50	3.00	3.09	2.00	
CON1	2.50	2.30	1.75	3.06	2.70	1.75	
SEF1	5.60	5.60	5.25	5.47	5.45	4.25	
SEL1	1.70	2.04	2.50	1.94	1.73	1.75	
TAB1	1.60	1.85	1.50	1.88	1.94	1.75	
TEF1	1.60	1.63	2.00	2.53	1.70	1.25	***
TAC1	1.80	1.85	1.25	2.47	2.00	1.75	
	Form 1 Task 2			Form 4 English			
	CAN0	CAN1	CAN2	CAN0	CAN1	CAN2	
	n = 2	n = 33	n = 6	n = 11	n = 32	n = 7	
SAB2	3.00	2.52	2.50	3.36	2.56	2.64	**
CON2	3.00	1.88	1.50	3.55	2.47	1.45	**
SEF2	5.00	4.55	4.50	6.55	5.09	4.18	**
SEL2	0.50	1.58	1.67	1.64	1.88	1.90	
TAB2	2.0	1.53	1.70	2.27	1.88	2.09	
TEF2	1.50	1.36	1.67	2.27	1.72	1.82	
TAC2	2.50	1.52	1.50	1.36	2.06	2.36	

Table 8 continued

	Form 1 Task 3			Form 4 Social Studies			
	CAN0	CAN1	CAN2	CAN0	CAN1	CAN2	
	n = 7	n = 28	n = 6	n = 11	n = 36	n = 7	
SAB3	2.86	2.43	2.67	2.55	3.03	2.86	
CON3	2.29	2.36	1.67	2.27	3.22	3.14	*
SEF3	5.57	4.57	4.83	4.00	5.69	5.57	*
SEL3	1.57	1.79	2.33	2.18	1.92	2.57	
TAB3				2.36	1.78	1.86	
TEF3				1.90	2.14	2.00	
TAC3				2.09	2.17	1.86	

Note: Smaller scores means higher ratings, except for Self-Directed Strategies (SEL) which is a count of the strategies mentioned.

Significant between-groups difference: * <.05, ** <.01, *** <.001.

Two 2 x 3 (Age or Sex x Task) repeated measures MANOVA were used to test the within-subjects and between groups differences for CAN scores. There was a significant within-subjects difference on CAN scores for the three tasks ($F(2, 186) = 5.52, p < .01$) but no significant differences between groups by age ($F(1) = 2.10, p > .05$) and gender ($F(1) = .02, p > .05$). Using a 3 x 3 repeated measures design (Achievement group x task), there were no significant differences between achievement groups in Form 4 or Form 1 (see Table 22) but when age groups were combined, there was a significant difference between achievement groups ($F(2, 92) = 3.45, p < .05$, see Table 21). Later, CAN is used as the ability control variable, in conjunction with other variables, in the multivariate analyses of the student variables that contribute to achievement.

The expectation that older students would have acquired more metacognitive awareness than younger students is not supported in this data from the questionnaire. Table 9 shows that Form 1 students gave an average of 2.98 strategies, whereas Form 4 gave 2.65. However, this can be explained by the larger number of Form 4 students who said they could not improve. It seems that there is little difference between the groups

on their ability to provide control strategies, so Hypothesis 1.4: Form 4 students will have higher control of ability scores, is not supported.

An examination of the strategies suggested as methods to improve ability indicates some developmental differences. Table 9 lists the categories of strategy suggestions. The strategy "Practise" is so obvious it does nothing to illuminate the issue. What is interesting are the differences in the emphasis of the other strategies mentioned by the different age groups. Form Four emphasised Listen, Revise/Study, Learn/Memorise, Learn More Difficult Version far more than Form One, who mentioned Concentrate and Improve Quality more. This may reflect the difference between perceptions about the nature of school tasks in general, with Form Four tasks being seen as more academic. From the observer's point of view, some of the Form One tasks were at least as intellectually challenging as any in Form Four. However, most of the Form One tasks allowed students out of their seats, even out of the classroom, and permitted students to work together and talk. So the Form One tasks can be perceived as being concerned with acquiring skills and perfecting them, rather than requiring memorising or the application and development of previously learned skills. In short, Form Four classrooms are seen to be requiring the learning of facts and Form One the learning of skills, and the students' strategies reflect that difference.

Table 9

Categories of Ability Improvement Strategies

Strategies	Form 1 (n = 40)		Form 4 (n = 54)	
	per student	%	per student	%
Practise	1.28	42.86	1.09	41.26
Listen	0.03	0.84	0.24	9.09
Concentrate	0.35	11.76	0.24	9.09
Revise/study	0.00	0.00	0.09	3.50
Learn/memorise	0.40	13.45	0.46	17.48
Learn more difficult	0.10	3.36	0.30	11.19
Improve quality	0.35	11.76	0.00	0.00
Remainder	0.47	15.97	0.22	8.39

Total	2.98	100.00	2.65	100.00

Modifiability of Intelligence

The interviews provide another perspective on students' ideas about the controllability of ability. As noted in Section 1.1, half the students in both age groups could state ways that intelligence could be increased. The questions used the term "intelligence" rather than "ability" because if students distinguished between the two terms, "ability" was seen as being more a practical skill which would imply that it was primarily learned. We want to find out whether the conception of "ability" includes a capacity conception of intelligence, so intelligence was focused on.

Most of the students in both age groups overwhelmingly endorsed the idea that intelligence comes from experience or is learned. Indeed, several students made it

apparent that they thought intelligence is the product of parents' actions, the quality of the school or simply what they might have been taught. These students at least are unlikely to feel responsible if they feel they lack intelligence. If they really perceive "ability" as coming from the actions of parents, whether they have been to a pre-school or whether they have had good teachers, "ability" as a causal attribution is external, as well as unstable, which, in attribution theory, gives it the same dimensions and implications for the future as "fate".

These illuminating statements came from both Form One and Form Four students.

-It's - um - how they've been educated...you've got to be born with the ability to learn, but you've got to be taught. (Form One girl)

-I think it depends if they've, um, had a good schooling, good teachers, schooling when you're at primary school or when you were younger, whether you went to kindergarten or not or whether you just didn't get to kindergarten. Um, I just think it is whether you had good schooling, good teachers, from the beginning. (Form Four girl)

-Yes. How, I mean, if you get born in a country, like maybe a third world country and if you come over and try to get to another country where you can get an education... (I: Is education important for intelligence?) Not necessarily, but for some things it is. (I: So what is more important, how you are born or what you have learned as far as getting intelligence is concerned?) Probably what you've learned and also where you're born. (Form Four boy)

In answer to the question: Can a person do anything to make him/herself more intelligent? most said "read books" or "do their schoolwork", but there were some interesting variations.

-Depends on if they had really good schooling when they were younger - don't worry about going to school, but with good upbringing that would make a difference. (Form One girl)

-They can try. I don't think it would work but they could read more and make themselves more aware of things going on around them...and they could make more effort in class to learn about things and basically try to understand what people are thinking and why they think and do certain

things.

(Form Four girl)

The next question was: *Can a person do anything to make him/herself less intelligent?* The girl just quoted elaborated a typical view:

-No, I don't think. Once you've got something in your brain not many people can wipe it. It's always there. I don't see how anybody can become less intelligent unless they have amnesia or something like that. I think it is always there. (Form Four girl)

It seems that most students were equating intelligence with having a lot of knowledge, even the articulate student quoted. A slightly different version was that increasing intelligence meant doing your homework and conversely, you could make yourself less intelligent by:

-(Giggle) Not work when the teacher says or something like that. (Form Four boy)

-Fooling around in class and not working - um - what about when you're not working you get low marks in exams and - um - muck around in every class and not work hard enough. (Form Four boy)

-Not complete your work. When doing things just write it all down without remembering and learning it. (Form One boy)

-Yep. Don't go to school. (Form One boy)

An attempt was made to classify students' conceptions of intelligence as "entity" or "incremental" from the views given, but this proved to be impossible.

These results from the questionnaires and the explanations from the interviews indicate that most of these eleven and fourteen year olds see intelligence as something that can be learned or that they can be taught.

Question 1.5. Is there a difference in the stability of specific and general effort?

Specific effort (or "effort level"; Covington & Omelich, 1983) is measured by responses to the question: How well were you concentrating on that task? Students were required to rate themselves on a scale of one to six. A rating of 1 meant that the person felt they were concentrating at the highest level possible, and 6, that they were not concentrating at all.

Since most students said the task was easy (see Table 7) it might be expected that low levels of concentration would be sufficient to get the task done. Also, since this was a natural setting with no unusual pressures or incentives to make concentration important, students had no reason to give self-enhancing scores. As can be seen in Table 10, Form One students reported higher levels of concentration than Form Four students, and overall they rated themselves as concentrating quite well.

In Form One, there were no significant differences between means for Specific Effort between tasks. In Form Four the difference between the Science and Social Studies means was significant ($t(50) = -2.05, p < .05$) and between English and Social Studies ($t(50) = 2.75, p < .01$).

Table 10

Mean Specific Effort (CON) Levels on Three Tasks

	Task 1	Task 2	Task 3
Form 1	2.282	1.897	2.231
	Science	English	Social Studies
Form 4	2.706	2.490	3.078

MANOVA with a 2 x 3 (Age x Task) repeated measures design using the entire sample showed there is a significant difference in Specific Effort scores ($F(2, 188) = 5.25, p < .01$) and a significant difference between age groups ($F(1) = 12.68, p = .001$) (see Table 11), thus confirming

Hypothesis 1.5.1. that Specific Effort scores will be unstable.

However, there were significant positive correlations between all Fourth Form Specific Effort scores: Science/English ($r = .29, p < .05$), Science/Social Studies ($r = .47, p < .001$), English/Social Studies ($r = .29, p < .05$). The boys had the stronger correlations; the girls only one significant correlation, Science/Social Studies ($r = .36, p < .05$). In Form One overall there were no significant correlations but the boys showed a significant positive correlation between Tasks 2 and 3 ($r = .61, p < .01$).

Table 11

Repeated Measures MANOVA Within-Subjects Effects for Specific Effort (CON) and General Effort (SEF) and Between Groups Effects for Age and Sex

Source of variation	SS	df	MS	F	Sign. F	
CON/1/2/3						
Within cells	192.58	188	1.02			
Task	10.76	2	5.38	5.25	.006	*
CON by SEX						
Sex	1.27	1	1.27	.55	.460	ns
Sex x Task	4.86	2	2.43	2.41	.093	ns
CON by AGE						
Age	25.91	1	25.91	12.68	.001	*
Age x Task	1.24	2	.62	.60	.547	ns
SEF 1/2/3						
Within cells	322.27	188	1.71			
Task	13.73	2	6.86	4.00	.020	*
SEF by SEX						
Sex	0.19	1	0.19	.03	.862	ns
Sex x Task	2.33	2	1.17	1.68	.509	ns
SEF by AGE						
Age	7.85	1	7.85	1.30	.257	ns
Age by Task	9.75	2	4.88	2.90	.057	ns

General Effort (SEF) for each subject area was the variable relating to "effort stability" (Covington & Omelich, 1983). This was measured by two questions asking the students to rate themselves in the class at "working carefully" and "completing work" in this subject. Hypothesis 1.5.2. was that general self-effort is unstable. The repeated measures MANOVA calculations supported this; there was a significant difference between the three scores ($F(2, 88) = 4.00, p < .05$). There were no significant differences between groups by age and gender.

Table 12

Correlations Between Students' Ratings of Completion and Carefulness of Work in Three Subject Areas

	Form Four (n = 51)					
	General Effort			Carefulness		
	Completion		S.S.	Carefulness		S.S.
Sc.	Eng.	Sc.		Eng.		
Comp.Sc.		.65**	.51**	.47**	.50**	.24
Comp.Eng.	—		.30	.30	.68**	.18
Comp.S.S.				.21	.17	.57**
Care.Sc.					.44**	.53**
Care.Eng.						.21
Care.S.S.						

	Form One (n = 39)					
	Completion			Carefulness		
	1	2	3	1	2	3
Comp.1		.57**	.73**	.56**	.55**	.26
Comp.2			.60**	.51**	.69**	.39*
Comp.3				.56**	.48**	.40*
Care.1					.61**	.56**
Care.2						.56**
Care.3						

* $p < .01$ ** $p < .001$

However, other statistics indicate there is a some consistency in students' rating of their own effort and their teachers' judgments. Table 12 shows significant intercorrelations between the components of the general effort scores. Table 13 shows moderate intercorrelations between the general effort scores of students and the ratings their teachers give them for effort. Teachers' ratings of effort may reflect whether

students appear to be consistently effortful, variable or consistently not effortful. However, teachers' conceptions of effort may be different to those of students. A later section will explore whether there is a difference between those students who have stable effort and unstable effort scores.

Table 13

Significant Correlations of General Effort Scores (SEF) and Teachers' Effort Ratings (TEF).

Form Four			
(n = 54)	TEF-Sc	TEF-Eng	TEF-SS
SEF-Sc	.28	.35*	.24
SEF-Eng	.21	.38**	.24
SEF-SS	.12	.36**	.37**
SEF	.26	.47**	.38**
Form One			
(n = 41)	TEF-1	TEF-2	TEF
SEF-1	.50**	.38*	.52**
SEF-2	.39*	.45*	.49**
SEF-3	.45*	.37*	.49**
SEF	.52**	.48*	.59**

* $p = .01$ Note: Teachers' Ratings missing for Task 3.

** $p = .001$ SEF, TEF: Combined scores on three tasks

There is some indication of consistency of effort within a subject area. Fourth Form girls have a quite high correlation between specific and general effort in English ($r = .67$, $p < .001$) and Fourth Form boys in Science ($r = .70$, $p < .001$). This supports the view that English is a subject that girls relate to more than boys and Science

is perceived more as a male domain. In Form One, the boys have a reasonable correlation between effort scores for Task 1 ($r = .61, p < .01$) and Task 3 ($r = .44, p < .05$). Other significant correlations are quite low. Form One girls have no significant correlations between their effort scores in the same task grouping. As far as effort is concerned, Form One girls seem to be the most inconsistent (unstable) and Form Four boys the most consistent (stable). The higher correlations between teachers' and students effort ratings in Form One may reflect the impact of teachers' beliefs about the student. These may be more pervasive when the student is with the same teacher for most classes for the entire year. However, it may not be the stability of effort that is important in achievement so much as the ability to control effort to satisfy competency needs.

Table 14

Correlations Between Specific Effort (CON) and General Effort (SEF) in Age and Gender GroupsForm Four - Girls (n = 30), Boys (n = 24)¹

	CON-S	CON-E	CON-SS	SEF-S	SEF-E	SEF-SS
CON-S	-	.21	.34	.11	.11	.31
CON-E	.56**	-	.26	.09	.63**	.44*
CON-SS	.42*	.46*	-	.54**	.34	.47**
SEF-S	.70**	.47*	.45*	-	.45*	.24
SEF-E	.55**	.43*	.18	.63**	-	.45*
SEF-SS	.43*	.17	.37	.54**	.11	-

Form One - Girls (n = 21), Boys (n = 18)¹

	CON1	CON2	CON3	SEF1	SEF2	SEF3
CON1	-	-.24	-.02	.02	.42	.19
CON2	-.28	-	.19	.03	.01	.12
CON3	-.30	.61*	-	-.02	-.06	-.01
SEF1	.61*	.04	.26	-	.71**	.74**
SEF2	.25	.39	.42*	.63*	-	.78**
SEF3	.46*	.42*	.44*	.74**	.50*	-

¹ Girls above diagonal, boys below diagonal.

* p < .05, ** p < .01

Question 1.6. Is "effort" controllable or uncontrollable?

In this research, it is proposed that if students can articulate an awareness of behaviours that are appropriate to performing a task well, those behaviours may be in their repertoire of strategies which can be applied to control effort. Because the students can formulate them without assistance from others, or hints from the questionnaire, they demonstrate some knowledge about control strategies. If they cannot articulate self-directable behaviours, they may not have the ability to control effort.

In Question 7, it was suggested that they should be able to think of at least three things that students should be doing if they were doing the task well. Answers were classified as Self-Directed Strategies (SEL), Externally-Directed Strategies (EXT), Try or Effort statements (TRY) and Affect (AFF), for example, showing enjoyment. There were so few External, Try or Affect statements (only nine altogether) that they were not included in further analyses. In the trial of the questionnaire, these statements appeared, and it was expected that Try statements would be used to cover a variety of poorly differentiated concepts about effort behaviour.

The number of different types of strategies mentioned was quite small considering the variety of tasks. The nature of the task influenced the number and type of strategies mentioned. What is of interest is the difference in the number of strategies given by each class and the differences in the frequencies that particular strategies were mentioned between classes. Table 16 shows that there was little difference between Form Four and Form One in the average number of strategy statements, but that one Fourth Form class had a much lower mean than the other classes (Table 15). This class was different in that it was a lower stream class, used in this research to provide the range of ability present in the school. The strategies most often mentioned by the students in this class were classified as "Think About How" (to do the task). In this category were statements such as "Remember to use a ruler" or "Don't do messy work", which although concerned with quality control, were generally related to the appearance of the work rather than the competence of the execution of the task. This category was also most often mentioned by First Formers. Perhaps these are the aspects of a task that

are perceived by younger and less able students to be the things that they do have some control over in their schoolwork. That the lower ability class stands out in the paucity of effort statements adds support to the view that a lack of awareness of effort strategies is an indication of lack of control of effort.

Table 15

Number and Percentages of Self-Directed Effort Strategies Mentioned By Classes in Form Four and Form One.

Form Four	Class 1 (n = 22)		Class 2 (n = 20)		Class 3 (n = 12)	
	Raw	%	Raw	%	Raw	%
Listen	20	18	2	2	10	26
Concentration	22	20	38	34	5	13
Avoid distractions	5	4	19	17	3	8
Remember	3	3	5	5	0	0
Think What	15	13	17	15	5	13
Think about How	23	21	13	12	12	32
Be on Task	3	3	5	5	0	0
Manage Time	0	0	3	3	2	5
Do More	18	16	8	7	1	3
Other	3	3	1	1	0	0
Total	112		111		38	
Average per student	5.1		5.55		3.16	

Table 15 continued

Form One	Class 1		Class 2		Class 3	
	(n = 17)		(n = 11)		(n = 13)	
	Raw	%	Raw	%	Raw	%
Listen	2	2	2	3	3	4
Concentration	14	16	11	18	22	29
Avoid distractions	7	8	3	5	7	9
Remember	4	5	1	2	1	1
Think What	11	12	4	7	12	16
Think about How	38	43	25	41	19	26
Be on Task	5	6	8	13	8	11
Manage Time	4	5	6	10	3	4
Do More	1	1	1	5	0	0
Other	3	3	0	0	0	0
Total	89		61		75	
Average per student	5.25		5.54		5.77	

Differences between Fourth and First Form students' perceptions of effort, or the difference between the requirements of school tasks, are also apparent in the comparisons in Tables 16 and 17. Fourth formers put more weight on "Listen", "Concentrate", "Avoid distractions" and "Do more" than First formers. First formers put more weight on "Think about how", "Be on-task" and "Manage time" than the older students. Again, this shows a perception that Fourth Form tasks require more mental effort and focused attention, and First Form tasks require attention to getting the task done according to the expectations of the classroom.

Table 16

Comparison of Form Four and Form One Strategy Suggestions, Average per Student and Percentage of Strategies.

	Form4 (n = 54)		Form1 (n = 41)	
	Av.	%	Av.	%
Listen	0.59	12.26	0.17	3.11
Concentrate	1.20	24.90	1.15	20.89
Avoid distractions	0.50	10.34	0.41	7.56
Remember	0.15	3.06	0.15	2.67
Think about What	0.69	14.18	0.66	12.00
Think about How	0.89	18.39	2.00	36.44
Be on Task	0.15	3.06	0.51	9.33
Manage Time	0.09	1.92	0.32	5.78
Do More	0.50	10.34	0.10	1.78
Other	0.07	1.50	0.02	0.44
Total	4.83	99.95	5.49	100.00

Table 17

Comparison of Order of Emphasis of Strategies between Form Four and Form One.

Form 4		Form 1	
Strategy	%	Strategy	%
Concentrate	24.90	Think about How	36.44
Think about How	18.39	Concentrate	20.89
Think about What	14.18	Think about What	12.00
Listen	12.26		
			70%
Avoid distractions	10.34	Be on Task	9.33
Do more	10.34	Avoid distractions	7.56
Be on Task	3.06	Manage Time	5.78
Remember	3.06	Listen	3.1
			26%
Manage time	1.92	Remember	2.67
Other	1.50	Do more	1.78
		Other	0.44
			4%

The two 2 x 3 (Age or Sex x Task) repeated measures MANOVA indicated that there were no significant differences in the numbers of strategies given for the three tasks ($F(2, 188) = .20, p > .05$) or between age groups ($F(1, 93) = .05, p > .05$) but there was a difference between genders ($F(1, 93) = 9.18, p < .01$). The gender differences can be seen in Figure 4. Whereas there is no significant difference between the mean number of strategies for Form One and Form Four, or between the boys and between the girls, there is a significant difference between girls and boys, with girls giving more strategies. Therefore, Hypothesis 1.6.1: Form Four students will have higher control of effort scores than Form One students is not supported, but Hypothesis 1.6.3: Girls will have higher effort-control scores than boys is supported.

Figure 4: (a) Distribution of Self-Regulated Strategies for Fourth Form Boys.

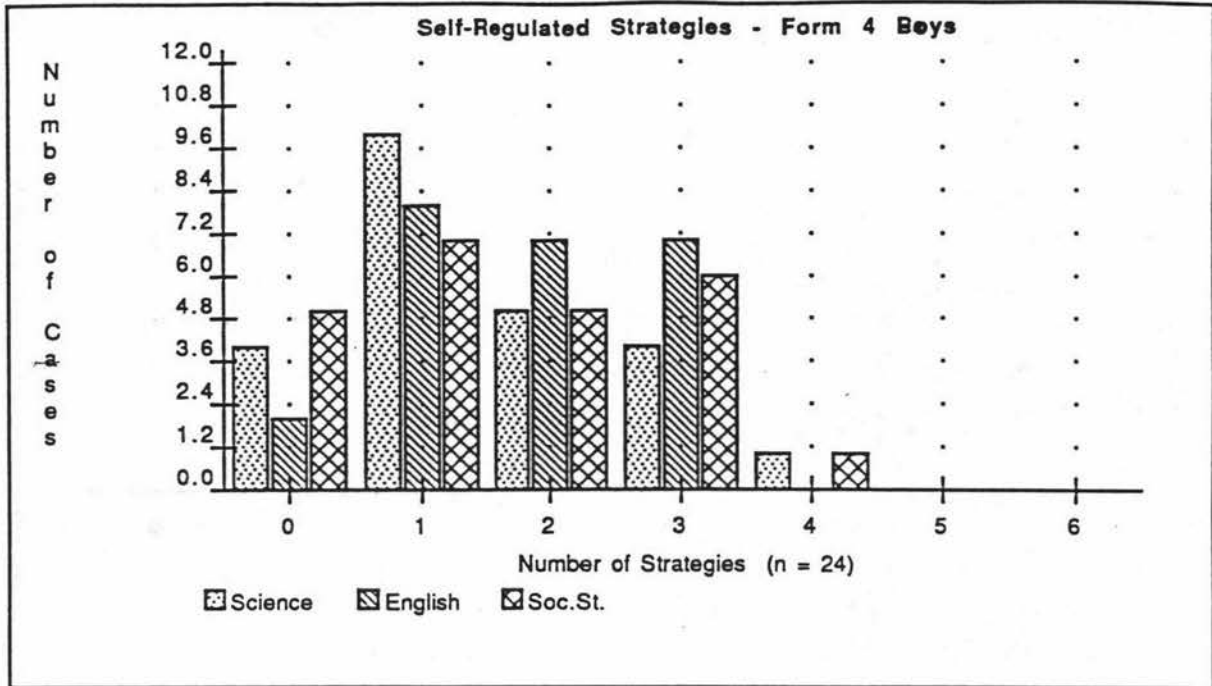


Figure 4: (b) Distribution of Self-Regulated Strategies for Fourth Form Girls.

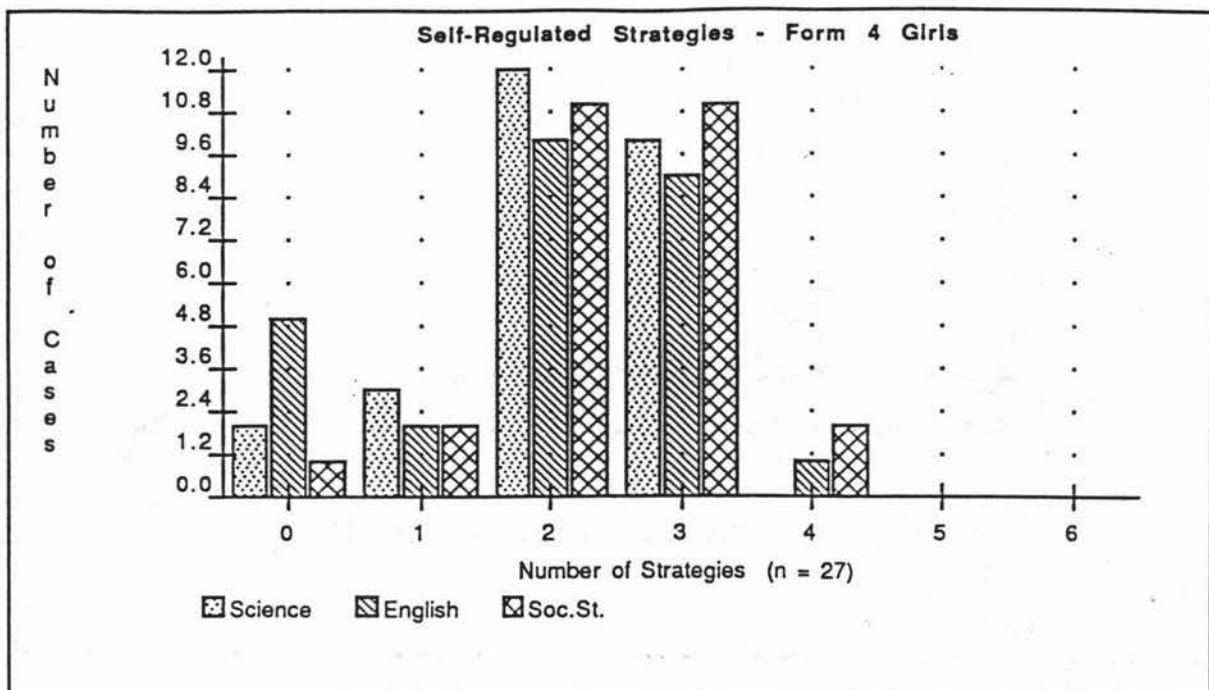


Figure 4: (c) Distribution of Self-Regulated Strategies for First Form Boys.

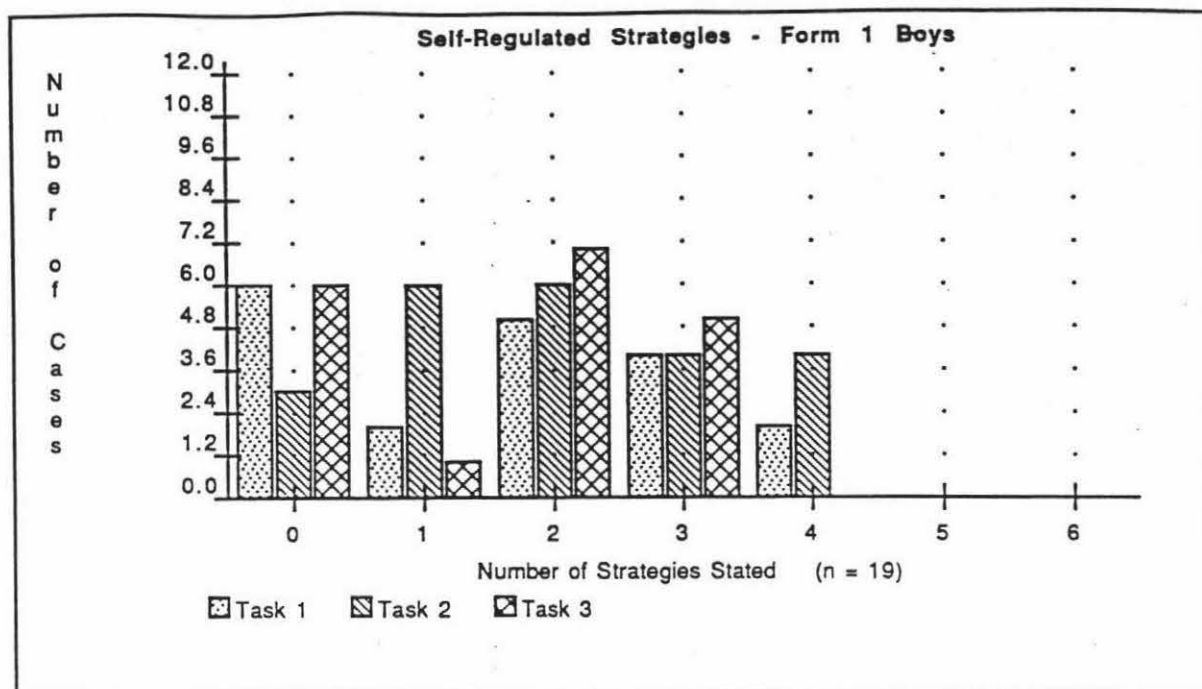
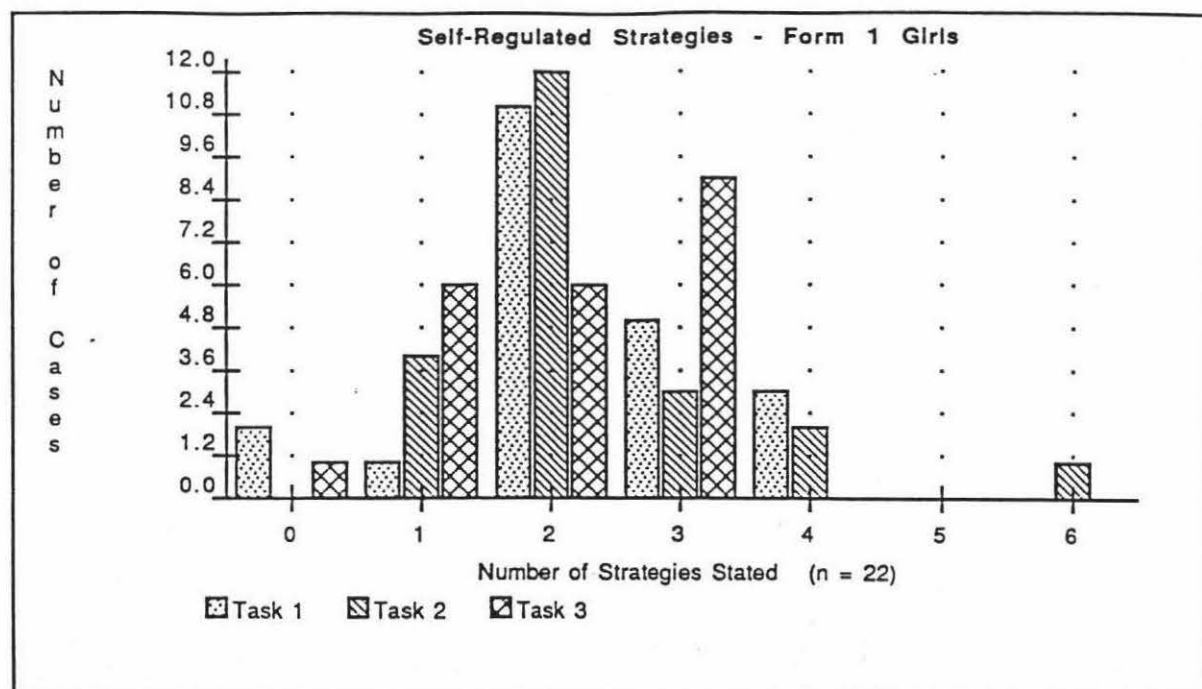


Figure 4: (d) Distribution of Self-Regulated Strategies for First Form Girls.



In the interviews, students were asked what people mean when they say you should make more effort or try harder. Two thirds of students at both age levels did not give an explanation of effort that included any suggestion of performance control except in terms of similar expressions, such as:

Do the best you can.. try your hardest and do the best you can. (Fourth Form girl)

Try and get better. (First Form girl)

Four students indicated that they see exhortations to effort simply as an expression of criticism or encouragement, that a person has not achieved as well as another person expected. "Effort" itself does not seem to be conceptualised.

Oh, they just like to see you get ahead in life, at school and things like that, so it's sort of a way of encouragement. (Fourth Form boy)

You could do better. They know you better. (First Form girl)

I think there are two different ways. Your mother could say you've got to try harder, make a good impression and that, just because they want you to look good. On the other hand, they might want to say that because they know you can do better but are not putting the effort in and they know if they (sic) did put in the effort they would be proud of themselves and learn a lot. (First Form girl)

You might be feeling a bit down playing sport because you think you are not playing very good, and then they say give it a little bit more effort into it and then you might feel real good and start doing better. (First Form boy)

Students who were credited with articulating effort usually mentioned

"concentration":

They mean buck up your ideas, don't talk, just listen, things like that. Concentrate on your work not anything else. (Fourth Form girl)

Sort of work harder at what they're doing, like they're just mucking around - not concentrating on what they are supposed to be doing - should try and concentrate really hard. (Fourth Form boy)

Students were then asked how they got themselves to do their homework if they didn't feel like doing it. Several said they had a regular time set aside for their homework and just did it. Although students were encouraged to elaborate their answers, none of the Form One and only six (32%) of the Form Four students gave any indication that they were self-initiating and were aware that effort was controllable. These six were in the high or medium achievement groups. It is possible that the ability to articulate clear metacognitive control strategies requires a higher cognitive developmental level.

Most students only made statements that they were externally controlled, they had to do their homework or they would get into trouble, and gave the impression that they saw no value in the work apart from complying with demands. While it might be said that Hypothesis 1.6.2: Form Four students will make proportionately more self-management of effort statements than Form One, is supported in a simplistic sense, the nature of the data is not clear enough to say more than that.

The variability in the numbers of effort strategies given in the questionnaires suggests that there may be a difference in students' capacity to control effort. It would be expected that those students with a higher number of strategies would be those who are rated more highly by the teachers. The difference in the quality of effort strategies given by some Fourth formers as compared to other Fourth formers and most of Form One students, also suggests that being more or less metacognitive will be more important to achievement outcomes in Fourth Form. This is explored in the next section.

2. How students' perceptions of ability, effort, stability and control are related to classroom achievement.

Question 2.1. Is the stability or instability of ability perceptions associated with achievement levels?

The stability of ability measure was computed from the students' general ability score in each subject. If a student's ratings deviated by only one unit of the rating scale from each other, that student would be classified as having a stable perception of ability. Those whose ratings varied by more than one would be considered to have an unstable perception of ability. Rating one's ability the same or differently on three tasks is not sufficient evidence of an entity or an incremental view of intelligence respectively, but the relationship between the two sets of constructs is no different to that assumed by attribution theorists (i.e., Nicholls & Miller, 1984a,b; Covington & Omelich, 1984;

Fennema, 1985). They assume that ability is stable and that outcomes from attributions depend on whether ability is perceived to be high or low and whether the situation is one of success or failure. If students' self-concepts of ability become more stable throughout childhood (Nicholls, 1989; Phillips, 1982), it would be expected that both Form One and Form Four students should have formed a stable and fairly accurate concept of their own ability. However, recent research (e.g., Ryckman, 1990) suggests that the stability of their ability ratings will be connected to a particular performance area rather than be perceived as typical of the person. This means that one of the most important generalisations of attribution theory must be stated relative to a performance area. Attributions to ability are described as maladaptive when a student believes his or her ability is low, and adaptive when the student believes ability is high, or at least sufficient. So, in investigating the association between stability of ability, it is also necessary to consider whether the ability judgment is high or low, and whether it varies across areas or has become a generalised self-concept.

In Section 1.3, it was reported that most students do not rate themselves significantly differently in different subject areas but there is a significant age difference. Table 18 shows that a larger proportion of older students rate themselves differently over different subjects, in fact, Form One students were very consistent. There is a significant difference between-groups according to age for stability of ability scores ($F(1, 93) = 6.07, p = .027$). Hypothesis 2.1.3 Proportionally more Form Four students will have stable ability ratings than Form One students, is supported.

Table 18
Distribution of Cases According to Stability of Ability Scores.

		Ability Unstable	Ability Stable
Form 1.			
	Boys	2	17
	Girls	1	21
Form 4.			
	Boys	5	19
	Girls	8	22

Analysis of variance of means, shown in Table 19, indicates that there are significant linear relationships between mean scores on stability for achievement ($F(2) = 7.32, p < .05$), and ability ($F(2) = 3.32, p < .05$), with those in the lowest group less likely to have consistent scores. On the other hand, the relationship between stability of ability and effort groups ($F(2) = 2.78, p = .07$) is not so clear. From these results, stability of ability seems to be associated with higher rather than lower ability and achievement.

Table 19

Means and Standard Deviations for Combined Age Groups of Teachers' Achievement (TAC), Ability (TAB) and Effort (TEF) Ratings for Stable and Unstable Ability Groups

	Mean	S.D.	Cases	F	d.f.	Sig.	
STABLE/UNSTABLE (1,2)							
TAC = High	1.04	0.20	25				
TAC = Medium	1.16	0.37	45				
TAC = Low	1.32	0.48	25	7.324	2	0.03	Significant linearity
TAC = Teachers' Achievement Rating (1 = high, 3 = low)							
STABLE/UNSTABLE (1,2)							
TAB = 1	1.05	0.22	20				
TAB = 2	1.14	0.35	50				
TAB = 3	1.32	0.48	25	3.319	2	0.04	Significant linearity
TAB = Teachers' Ability Rating (1 = high, 3 = low)							
STABLE/UNSTABLE (1,2)							
TEF = 1	1.58	0.50	26				
TEF = 2	1.41	0.35	50				
TEF = 3	1.78	0.44	9	2.78	2	0.07	Not linear
TEF = Teachers' Effort Rating (1 = high, 3 = low)							

Since Form Four students rate themselves less highly on ability than Form One students (Table 6) and have a greater proportion rating themselves differently in different subject areas (Table 2), it seems that "ability" becomes less of a global, capacity self-concept of ability, but that having a generalised self-concept of ability is more typical of well-performing students than of those whom teachers rate less highly. In summary, the stability of ability is associated with better achievement and ability scores than instability of ability.

Hypothesis 2.1.1. Students with stable ratings of high ability will be rated higher for achievement than those with unstable ratings of high ability, is therefore supported.

Looking another way at the issue of achievement outcomes associated with the stability of ability, taking those in the sample whose ability scores were stable and forming them into ad hoc groups of high, medium and low self-rating of ability, there are significant differences between the high and low group, and between the medium and the low group, on their achievement scores (Student-Newman-Keuls procedure, $p < .05$) at the Form One level, but no difference between means at the Form Four level (ANOVA $F(2, 38) = .03, p > .05$). Therefore,

Hypothesis 2.1.2 Students with stable ratings of low ability will rate lowest for achievement, is supported for the younger students only. That the same effect is not present in the Fourth Form results could be because of the Fourth Form girls' self-ratings of ability being so unrealistic.

Question 2.2. Is the stability or instability of effort perceptions associated with achievement outcomes?

In Section 1.5.2 it was reported that there was a significant within-subjects difference in general effort scores ($F(2, 88) = 4.00, p < .05$) from repeated measures, 2 x 3 (Age or Sex x Task) MANOVA, but no significant differences between groups by age and gender. Table 20, showing the distribution of stability of effort scores, indicates that although overall group scores are not significantly different, Fourth Form girls are

more stable in their effort ratings than Fourth Form boys ($\chi^2(1) = 2.93, p > .05$).

Table 20

Distribution of Cases According to Stability of Effort Scores

		Effort Stable	Effort Unstable	Total
<hr/>				
Form 1				
	Boys	10	9	19
	Girls	13	9	22
	<hr/>			
	Total	23	18	41
Form 4				
	Boys	8	16	24
	Girls	17	13	30
	<hr/>			
	Total	25	29	54
<hr/>				

Table 21 records the results of a series of univariate analyses of variance of the means of each variable by each other variable divided into ad hoc groups, two or three as appropriate. Table 21 has each variable listed down the vertical, and across the horizontal are the groups, EAS, STa, STe and SEX, for example, are dichotomous so has only two groups, CAN, SAB, CON, SEF and SEL have three groups. As can be seen in Table 21, Stable Effort (STe) shows a significant between groups difference only with Control of Ability (CAN) ($F(2, 92) = 3.61, p < .05$) and Stable Ability (STa) ($F(1, 93) = 5.18, p < .05$). Stability or instability of effort are not different between achievement or ability levels (see also Table 22), so stability of effort is not related to achievement outcomes.

On the other hand, Hypothesis 2.2 Higher achievement is associated with teachers' ratings of more effortful behaviour, is supported by the analysis of variance in

teachers' effort scores by 3 achievement groups (see Table 22). At the Fourth Form level there is a significant difference ($p < .05$, Student-Newman-Keuls) between each achievement group, and at the First Form level between the low group and the other two groups in their mean teachers' effort ratings.

Table 21

ANOVA Between Groups Differences on Performance Variables, F Values and Degrees of Probability

	EAS	CAN	SAB	STa	CON	SEF	SEL	STe	SEX
EAS	-	3.50*	3.31*	.09	.49	2.82	.36	.01	2.52
CAN	.83	-	.68	.63	.19	.72	.23	8.97**	.02
SAB	.10	1.10	-	.11	1.97	12.47***	.27	.75	2.40
STa	.79	.60	1.97	-	.30	1.47	1.00	4.39*	.02
CON	4.62*	.81	14.80***	1.79	-	10.34***	.03	.05	.55
SEF	.01	1.93	35.60***	.74	5.64*	-	1.82	.24	.03
SEL	.59	.97	.42	.16	.01	2.15	-	.07	9.18**
STe	.14	3.61*	1.75	5.18*	.06	.24	.38	-	2.37
SEX	.02	.09	.25	.02	.00	.06	5.55**	2.37	-
TAB	.02	2.31	1.95	7.91**	.07	2.39	5.83*	.29	3.27
TEF	.08	2.60	5.93**	12.75***	1.95	15.07***	3.15*	.90	.72
TAC	.47	3.45*	3.76*	12.21***	1.08	4.97**	3.65*	.11	1.98
df	1, 93	2, 92	2, 92	1, 93	2, 92	2, 92	2, 92	1, 93	1, 93

Note: EAS = Specific Ability, CAN = Control of Ability, SAB = General Ability, STa = Stable Ability, CON = Specific Effort, SEF = General Effort, SEL = Control of Effort, STe = Stable Effort, TAC = Teachers' Achievement Rating, TAB = Teachers' Ability Rating, TEF = Teachers' Effort Rating

* $< .05$, ** $< .01$, *** $< .001$

Question 2.3. Is the controllability of ability associated with higher achievement?

In Section 1.4. the relationship of the controllability of ability (CAN) scores was explored. The evidence was that this construct appears promising as an important component of achievement behaviour but, in this research, was inadequately measured. When all tasks for all students are combined, groups formed from the controllability of ability (CAN) scores (3 groups, High, Medium and Low) emerge from ANOVA calculations (see Table 21) as significantly different for achievement levels ($F(2, 92) = 3.45, p < .05$). Exploring this further, it can be seen in Table 22 that mean CAN scores are highest for the high achievement group and lowest for the low achievement group in both Form One and Form Four, but the between group differences are not significant with the smaller number of cases. This construct, the controllability of ability, may indeed be important as a causal factor of achievement and/or a result of achievement. Hypothesis 2.3. Students with more ability control strategies will have higher achievement scores than those with fewer strategies, is therefore supported.

Table 22

Means and Standard Deviations of Variable Scores for Fourth Form and First Form Achievement Groups

Fourth Form	High		Medium		Low	
	$\bar{n} = 9$		$\bar{n} = 27$		$\bar{n} = 18$	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
EAS	2.67	.50	2.67	.55	2.61	.70
SAB	7.67	.87	8.93	1.75	8.67	2.45
CAN	3.00	1.00	2.81	1.30	2.33	1.14
STa	1.00	.00	1.22	.42	1.39	.50
CON	7.67	3.00	8.78	2.67	7.72	3.25
SEF	12.56 ^{ab}	2.60	16.37 ^a	3.10	16.89 ^b	5.11*
SEL	7.00 ^e	2.29	6.30 ^d	2.48	4.11 ^{e,d}	2.35**
STe	1.44	.53	1.48	.51	1.44	.51
TAB	3.56 ^e	.53	5.22 ^e	1.15	7.83 ^e	1.29***
TEF	3.89 ^f	.78	5.70 ^f	1.38	7.06 ^f	1.76***
SEX	.67	.50	.63	.49	.39	.50

First Form	High		Medium		Low	
	n = 15		n = 19		n = 7	
EAS	1.87	.99	1.89	.81	1.86	1.21
SAB	6.73 ^{g,h}	1.44	8.16 ^g	1.61	8.57 ^h	1.40*
CAN	3.27	.88	3.05	1.13	2.43	.79
STa	1.07 ⁱ	.26	1.00 ⁱ	.00	1.29 ^j	.49*
CON	6.40	1.45	6.32	1.95	6.71	1.80
SEF	12.93 ^k	3.10	15.11 ^l	4.94	18.57 ^{k,l}	3.64*
SEL	6.53 ^m	2.07	6.11 ⁿ	2.49	3.43 ^{m,n}	2.88*
STe	1.40	.51	1.53	.51	1.29	.49
TAB	3.00 ^o	1.20	4.05 ^o	1.51	6.86 ^o	1.35***
TEF	3.13 ^p	1.77	3.95 ^q	1.61	5.14 ^{p,q}	1.95*
SEX	.53	.50	.63	.50	.29	.50

Note: EAS = Specific Ability, CAN = Control of Ability, SAB = General Ability, STa = Stable Ability, CON = Specific Effort, SEF = General Effort, SEL = Control of Effort, STe = Stable Effort, TAB = Teachers' Achievement Rating, TAB = Teachers' Ability Rating, TEF = Teachers' Effort Rating

Significant difference between groups with same superscript letter (Student-Neumann-Keuls $p < .05$)

* $< .05$, ** $< .01$, *** $< .001$

Question 2.4. Is controllability of effort associated with higher achievement?

To investigate the relationship between awareness of self-directed strategies and the other performance variables in this research, several analyses were conducted. Correlations between control of effort (self-directed strategies, SEL) scores for individual tasks and teachers' effort rating for the students in each subject area were small and significant only for Task 1 in Form One ($r = .34, p < .05$) and Form Four Social Studies ($r = .39, p < .01$). Similarly it was only in Fourth Form Social Studies where the SEL score correlated significantly with teachers' achievement ratings ($r = .40, p < .01$). Yet when scores for the three tasks are combined controllability of effort (SEL) is the only student variable that correlates significantly with all three teacher ratings in both Form One and Form Four (see Table 23). Control of effort (SEL) also correlates significantly with general effort in Form One ($r = .36, p < .01$) and is more typical of girls ($F(1, 93) = 9.18, p < .01$).

Using the means table (Table 22), a strong and significant linear effect for the effort control variable (SEL) can be seen, and a linear but non-significant effect for the ability control variable (CAN) in both Form Four and Form One. These scores do not differentiate between students who may have been giving higher or lower level control strategies, but do indicate that control of effort is important to academic performance. Awareness of effort strategies is related to performance indicators and that students who have the apparent ability to better control effort are those who are perceived by teachers as of higher ability, more effortful and achieving more.

Therefore, Hypothesis 2.4.: Students with higher self-directed strategy scores will be rated higher by teachers on achievement, is supported.

Question 2.5. Which of the student variables, ability, effort, stability and control contribute most to classroom achievement?

Up to this point, the relationships between variables have been analyzed univariately, except when the consistency of students' scores across three task areas have been tested for group differences. Multiple regression analysis is a method for analysing the variability of a dependent variable by using the information contained in several independent variables. A squared multiple correlation is calculated which indicates the proportion of the variance of the dependent variable that is explainable or predictable on the basis of the independent variables. Ideally, the independent variables should not be intercorrelated at all, but that is rare in non-experimental research (Pedhazur, 1982). The higher the intercorrelation among variables the more redundant the information they provide, and therefore the less useful each of them is in the presence of the others. The extent of the redundancy by intercorrelation between these independent variables can be gauged from Table 23.

Table 23 shows the correlations between the teachers' ratings of achievement (TAC), ability (TAB) and effort (TEF) and the student variables for Form Four and Form One separately. The variables, Specific Ability (EAS), General Ability (SAB), Controllability of Ability (CAN), Specific Effort (CON), General Effort (SEF) and Controllability of Effort (SEL) are derived from the aggregation of students' scores from the three different subject areas. In this way the differences due to attitudes about the subject area are minimised and the underlying effects of students' perceptions about aspects of their performance may become evident. Effects due to individual teacher difference are also minimised by combining their ratings for students so that, for example, Teachers' Achievement Rating (TAC) is recoded so that those in Fourth Form who have a total score of 4 or less are in the highest achievement group and those with 8 or more are in the lowest achievement group. Form One ratings are also recoded to account for only two ratings per student. The stability variables are derived from scores on General Ability and General Effort over three tasks. Those students whose SAB scores on each task vary by no more than one from each other are scored as stable on their perception of ability (STa). Similarly, Stable Effort (STe) is derived from the

similarity of their SEF scores. The reliability of these measures is not known, but they have face validity which is often missing in more conventional approaches to attribution research. These variables will not have the psychometric properties which come from long questionnaires with many items contributing to the measurement of each variable. However, this approach may be more reliable and valid because the students were not required to be persistent and patient through a large number of questions, and they liked doing the exercise inherent in the questionnaire.

As can be seen in Table 23, there are strong intercorrelations between the three teacher variables. There are also strong correlations between self-ability (SAB) and effort (SEF) judgments, a point which is important to consider in relation to the findings of attribution research where attributions to ability or effort are thought to have significant motivational consequences. Of particular interest, too, is the size of the significant correlations appearing for the controllability variables, especially that for effort (SEL), with the teacher variables, in both Form Four and Form One. The stability variables and sex also appear in both Form Four and Form One correlating significantly with at least one of the other independent variables.

Table 23

Correlation Coefficients of Combined Student and Teacher Variables for Fourth Form and First Form¹

	TAC	TAB	TEF	EAS	SAB	CAN	STa	STe	SEL	SEF	CON	SEX
TAC	-	.79**	.73*	-.02	.09	.20	.26	-.05	.40*	.31	-.07	-.25
TAB	.65**	-	.31	.02	-.04	.17	.17	-.19	.36**	.02	-.18	-.25
TEF	.38*	.51**	-	-.12	.21	.23	.32*	.15	.29*	.47**	.14	-.12
EAS	-.01	.09	.01	-	-.33*	-.16	-.11	-.05	.13	-.20	-.28*	-.16
SAB	.49**	.32*	.45**	-.06	-	.10	0.00	-.14	-.19	.68**	.55**	.27*
CAN	.31	-.04	-.07	.08	.10	-	-.07	.28*	.02	-.09	-.16	.02
STa	.29	.16	.07	-.06	-.06	.01	-	.26	-.03	.07	.01	.07
STe	-.04	.02	-.11	.17	-.08	-.37*	.13	-	.11	.02	.05	-.23
SEL	.37*	.58**	.36*	-.00	.19	.27	-.20	-.22	-	-.13	.10	.26
SEF	.46**	.36*	.59**	-.22	.70**	.10	.07	-.17	.36*	-	.62**	.08
CON	.07	-.07	.38*	.19	.31	.15	.26	-.16	.18	.40*	-	.23
SEX	-.17	-.22	-.08	-.23	-.02	.07	-.11	-.06	-.35*	-.14	-.26	-

¹Fourth Form above diagonal, First Form Below diagonal.

Note: EAS = Specific Ability, CAN = Control of Ability, SAB = General Ability, STa = Stable Ability, CON = Specific Effort, SEF = General Effort, SEL = Control of Effort, STe = Stable Effort, TAC = Teachers' Achievement Rating, TAB = Teachers' Ability Rating, TEF = Teachers' Effort Rating

* $p < .05$, ** $p < .01$

Four variables are dichotomous, Specific Ability (EAS), Stability of Ability (STa), Stability of Effort (STe) and Sex. Specific Ability (EAS) has heavy weighting to the positive (easy) which makes it a weak indicator. EAS was left in the regression equations for conceptual reasons. Three outliers were left in the data because there was no reason to suppose they were not valid responses, and this is exploratory research. A residual scatterplot indicated that Specific Effort (CON) and Control of Effort (SEL) in Fourth Form may not have a linear relationship but transformation was not attempted

because of the small sample size, because interpretation would not be enhanced and increasing R is not necessarily desirable. Examination of residuals indicate that assumptions of normality, linearity and homoscedacity for the other independent variables can be met.

Multiple regression procedures were used to examine which of the nine variables show significant unique and joint contributions to teachers' ratings of achievement. Stepwise regression backwards was the method used, with Teacher Achievement (TAC), Teacher Ability (TAB) or Teacher Effort (TEF) the dependent variable, and the nine independent variables entered together and then individually removed in order of least contribution to the shared variance with the dependent variable. The SPSSX default values of 2.71 for FOUT and .10 for PIN were used.

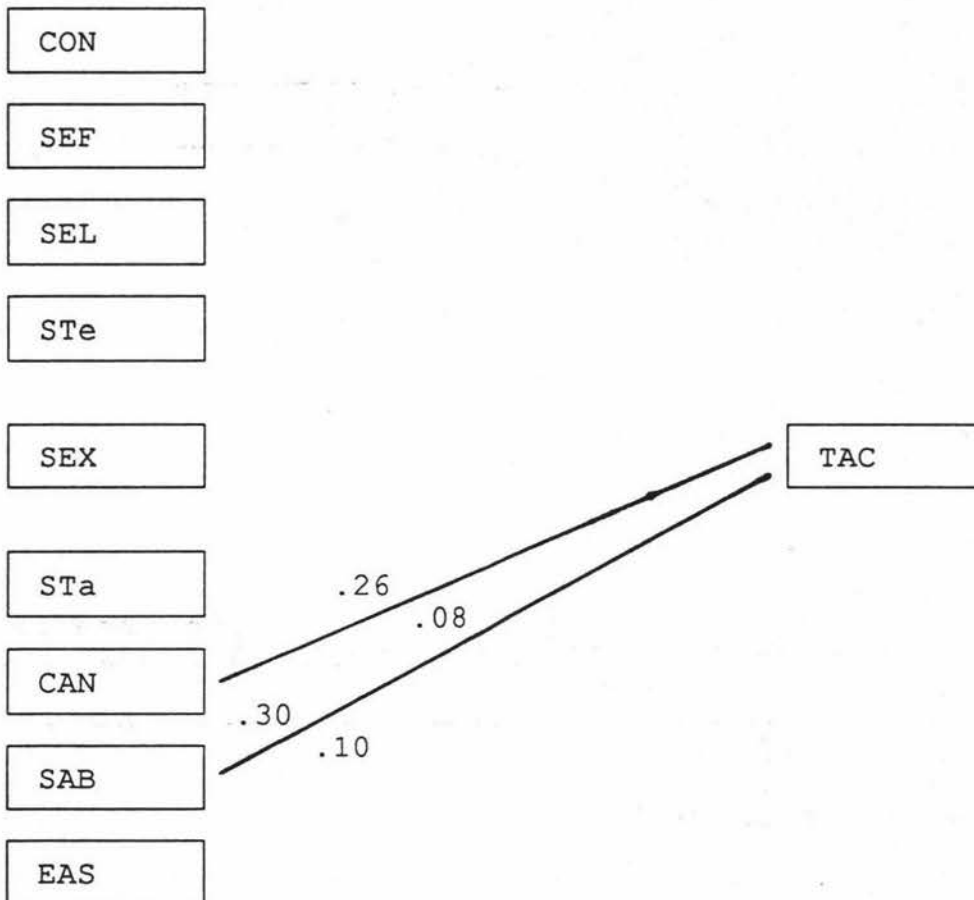
The results for the regression analyses are reported first for the individual subject groupings in Fourth Form so that any influencing effect of the different subject areas can be observed. The grouping of tasks in Form One is ad hoc; they are simply grouped in the order they were taken by each class. In addition, because there are no teachers' variables for the third tasks, the student variables for the third tasks are regressed on the means of teachers' scores for the other two tasks. Therefore, it is more informative to compare the contributions of the different variables to achievement three times, to ability three times and effort three times, than look for effects arising from school subjects as with the Fourth Form. Finally the combined results for each form level will be compared so that any age differences might be observed.

Fourth Form Regressions

In Fourth Form Science, the students' ability variables are the important contributors to all the teacher ratings. The two variables that contributed independently and significantly to achievement (TAC) (Figure 5a) were positive general ability judgments (SAB) (beta = 0.30) and positive controllability of ability (CAN) (beta = 0.26). Stable ability (STa) was the only significant independent contributor to teachers' judgments of their ability (TAB) in Science (beta = 0.30; Figure 5b). Teacher judgments of effort in Science (TEF) (Figure 5c) was associated with students' perceptions of ability

(SAB) (beta = 0.27) and stable ability (STa) (beta = 0.22), but most of all, with controllability of ability (CAN) (beta = 0.49). Students apparently rate their effort in ways that are not consistent with the teachers' views. Do Science teachers see only the able students as being effortful.

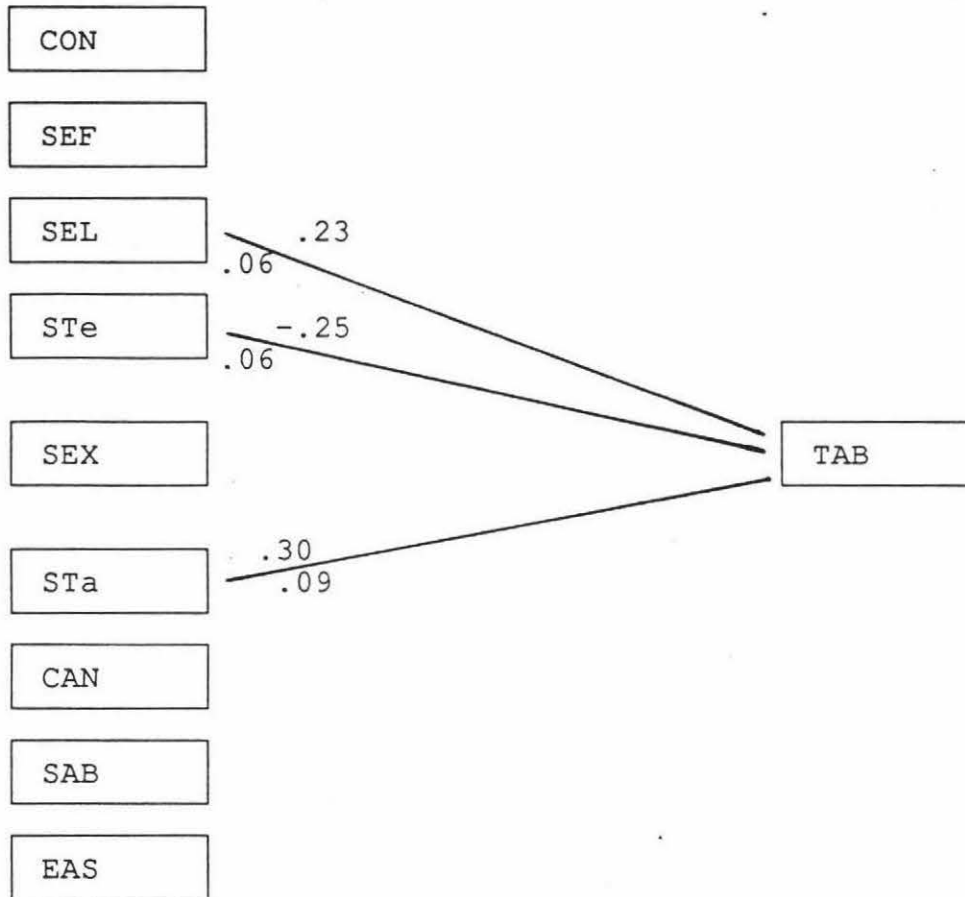
Figure 5: (a) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement:- Fourth Form Science



Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .28$, $F(9, 44) = 1.94$, $p = .07$.
 2 variables: $R^2 = .18$, $F(2, 51) = 5.65$, $p = .006$

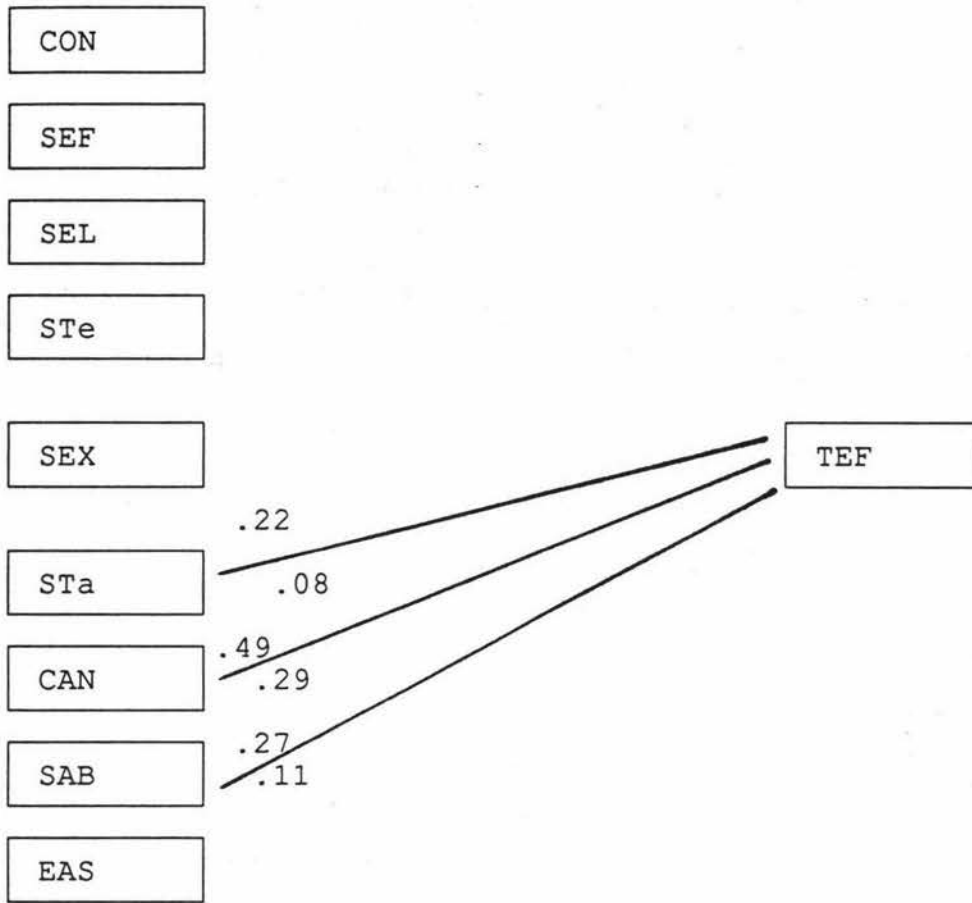
Figure 5: (b) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: Fourth Form Science



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .20$, $F(9, 44) = 1.19$, $p = .33$.
 3 variables: $R^2 = .15$, $F(3, 50) = 2.98$, $p = .04$
 (STe and SEL have t values significant at $<.07$)

Figure 5: (c) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: Fourth Form Science



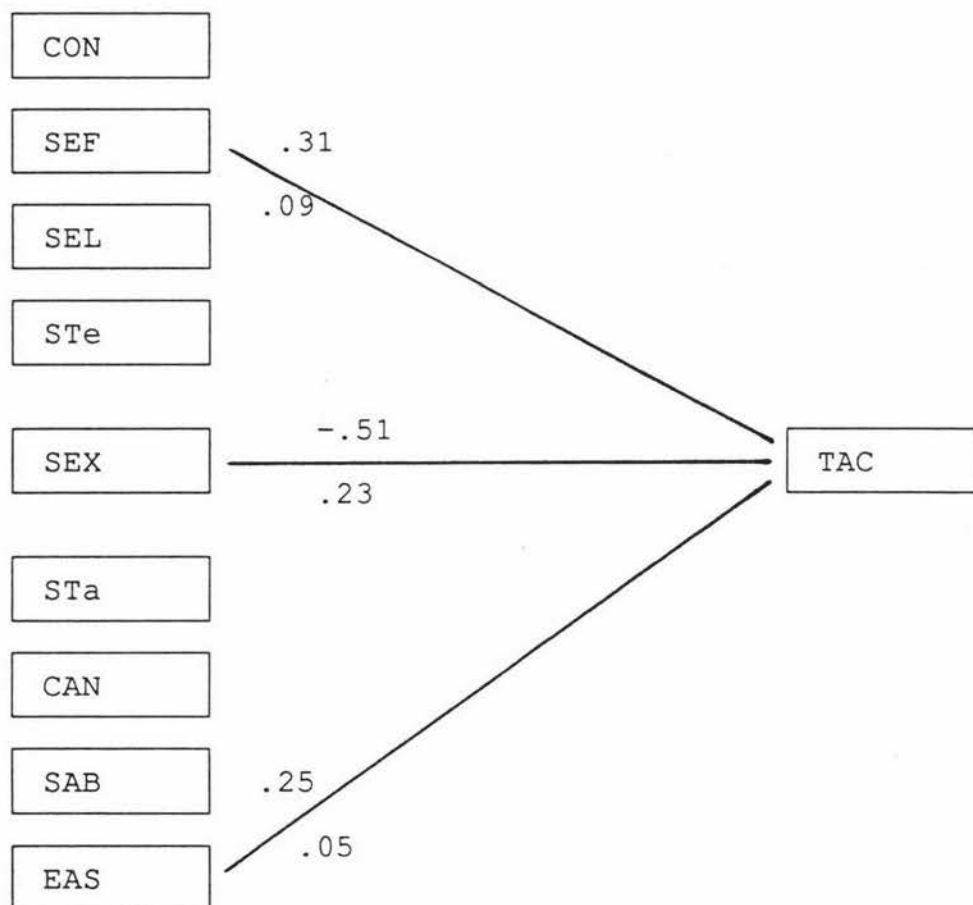
Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .45$, $F(9, 44) = 3.95$, $p = .001$.
 3 variables: $R^2 = .43$, $F(3, 50) = 12.34$, $p < .001$

In English, Fourth Form teachers' achievement ratings (TAC) were best predicted by gender (Figure 5d). All nine variables together accounted for 46% of the variance with teachers' achievement. Half of the shared variance of the independent variables with achievement, was contributed independently by gender (beta = -.51, $sr^2 = .23$). As expected, girls were considered higher achievers. Positive effort ratings (SEF) also

contributed significantly and independently ($\beta = .31, sr^2 = .09$), as did specific ability (EAS - students who said the tasks were not easy) ($\beta = .25, sr^2 = .05$). Ability (TAB) and effort (TEF) in English, too, were both associated with positive effort (SEF) and girls (see Figures 5e and 5f).

Figure 5: (d) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: Fourth Form English

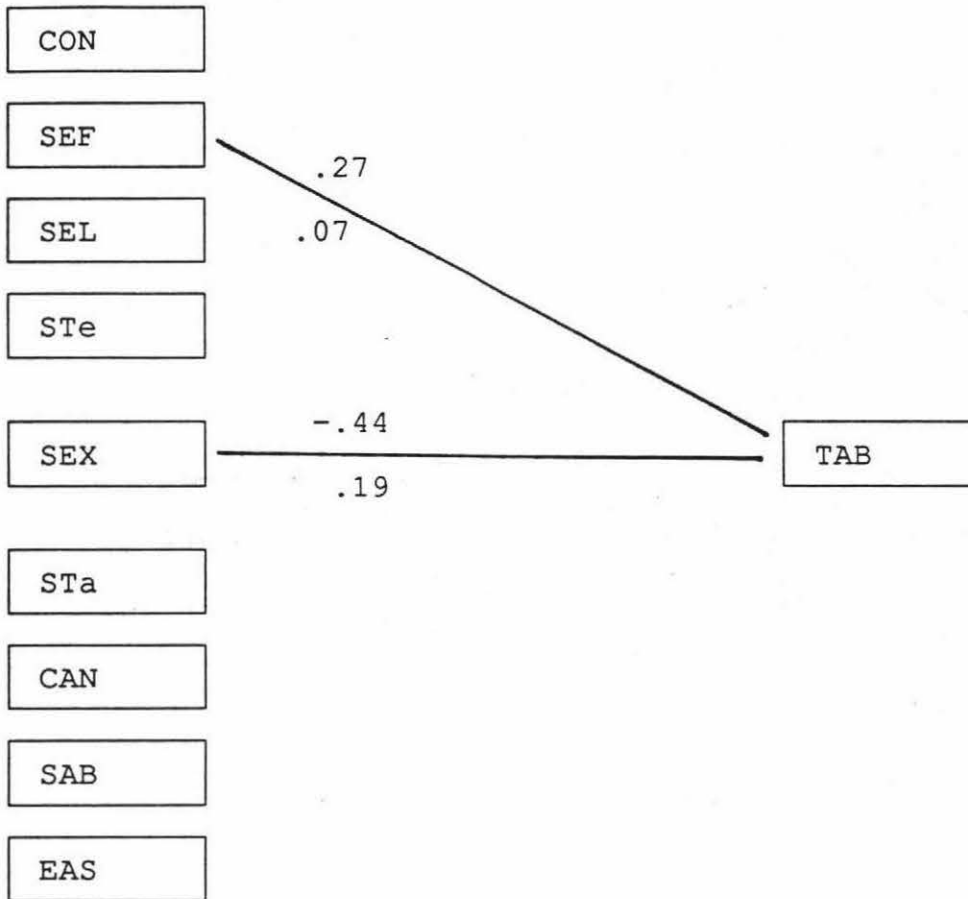


Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .46, F(9, 44) = 4.19, p < .001$

3 variables: $R^2 = .39, F(3, 50) = 10.87, p < .001$

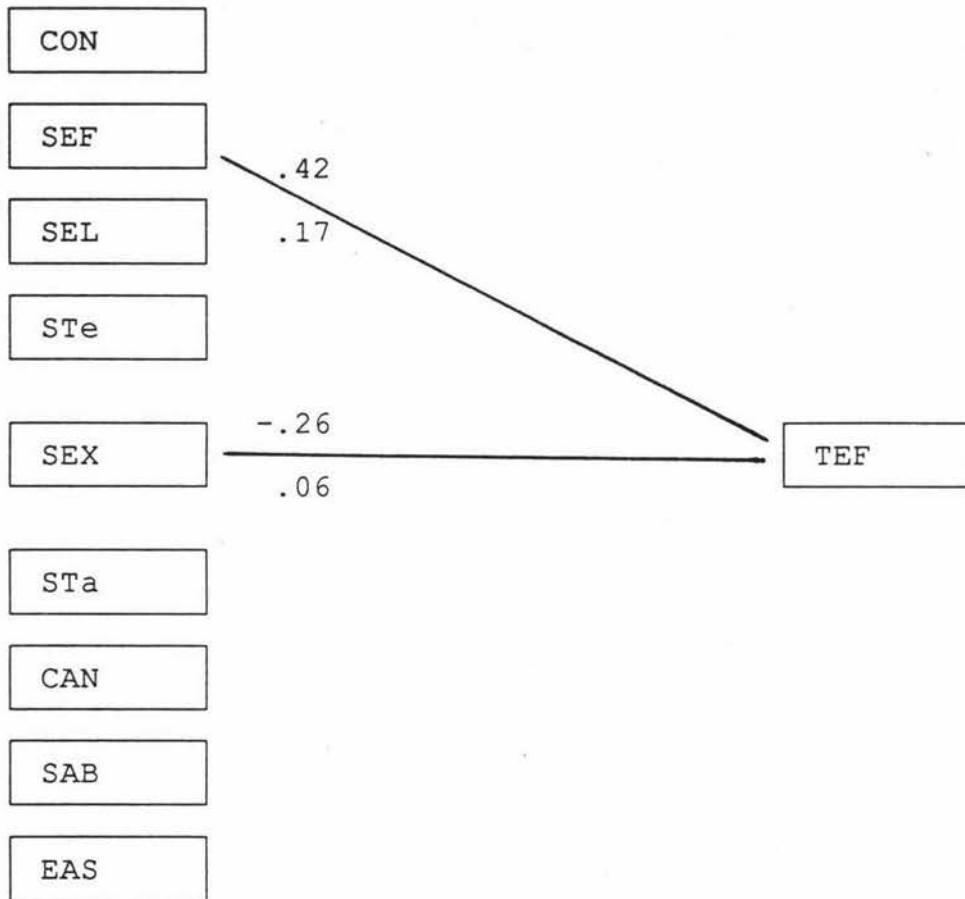
Figure 5: (e) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: Fourth Form English



Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .31$, $F(9, 44) = 2.22$, $p = .04$.
 2 variables: $R^2 = .23$, $F(2, 51) = 7.71$, $p = .001$

Figure 5: (f) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: Fourth Form English



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

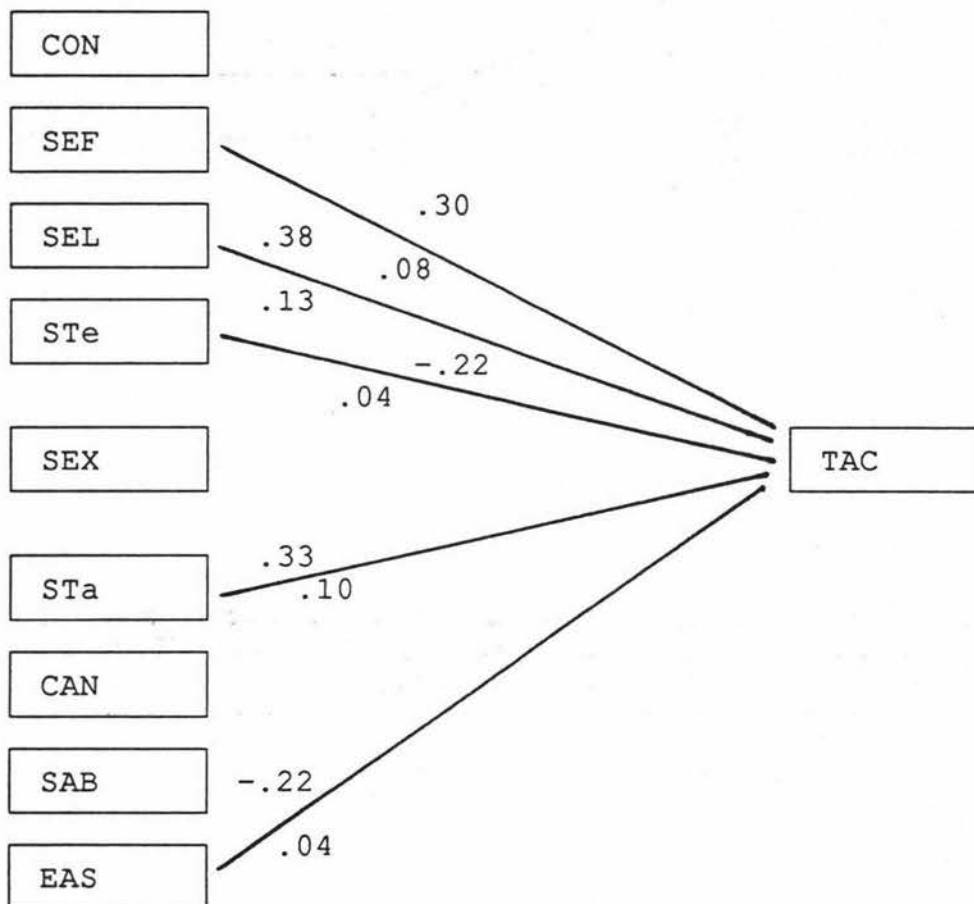
9 variables: $\underline{R}^2 = .27$, $\underline{F} (9, 44) = 2.79$, $\underline{p} = .10$.

2 variables: $\underline{R}^2 = .21$, $\underline{F} (2, 51) = 6.64$, $\underline{p} = .003$

In Social Studies, 45% of the variance of the teachers' achievement ratings (TAC) were shared by the combined variables ($\underline{F} (9, 44) = 4.03$, $\underline{p} < .001$, see Figure 5g). Here, controllability of effort (SEL) ($\beta = .38$, $\underline{sr}^2 = .13$), stability of ability (STa) ($\beta = .33$, $\underline{sr}^2 = .10$) and self-effort (SEF) ($\beta = .30$, $\underline{sr}^2 = .08$) are shown to be important independent contributors to teacher ratings of achievement (TAC). The variance in the

teachers' ability ratings (TAB) was not significantly accounted for by the student variables until self-ability (SAB) and self-effort (SEF) were removed from the equation. The significant predictors of teachers' ability ratings (TAB) came down to controllability of effort (SEL) (beta = .27, $sr^2 = .07$) and stable effort (STe) (beta = .36, $sr^2 = .13$, see Figure 5h).

Figure 5: (g) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: Fourth Form Social Studies



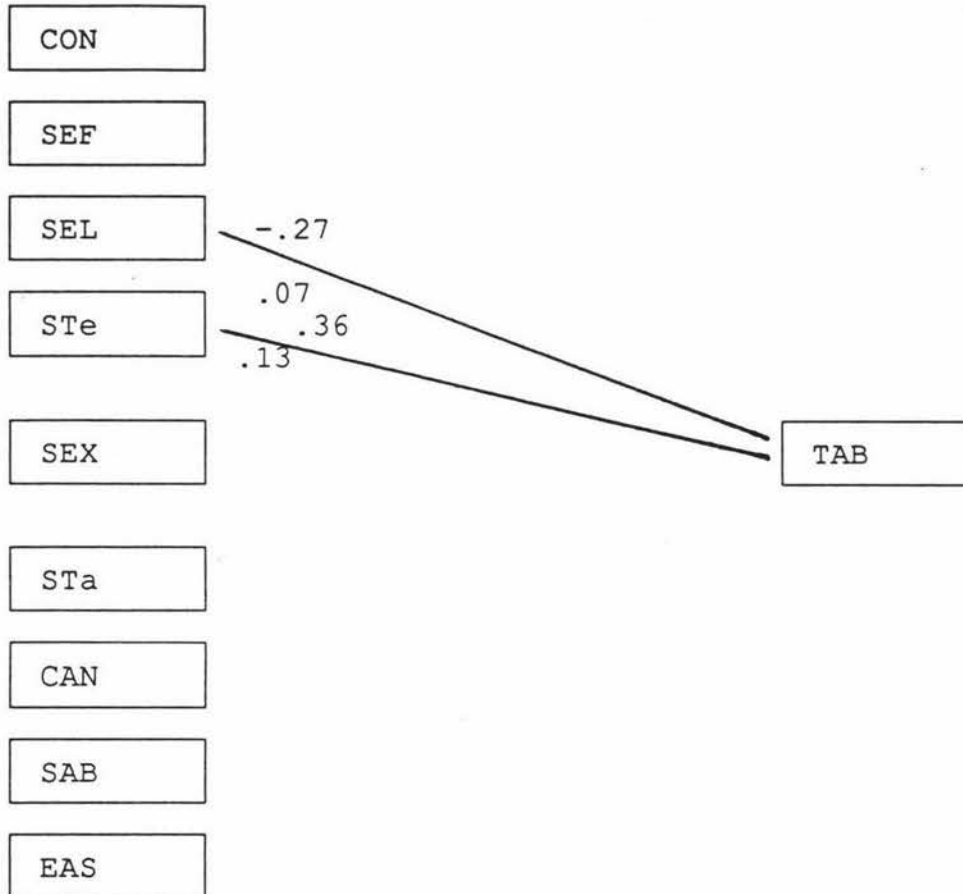
Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .45$, $F(9, 44) = 4.03$, $p < .001$

5 variables: $R^2 = .40$, $F(5, 48) = 6.31$, $p < .001$

(STe and EAS have t values significant at .07)

Figure 5: (h) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: Fourth Form Social Studies



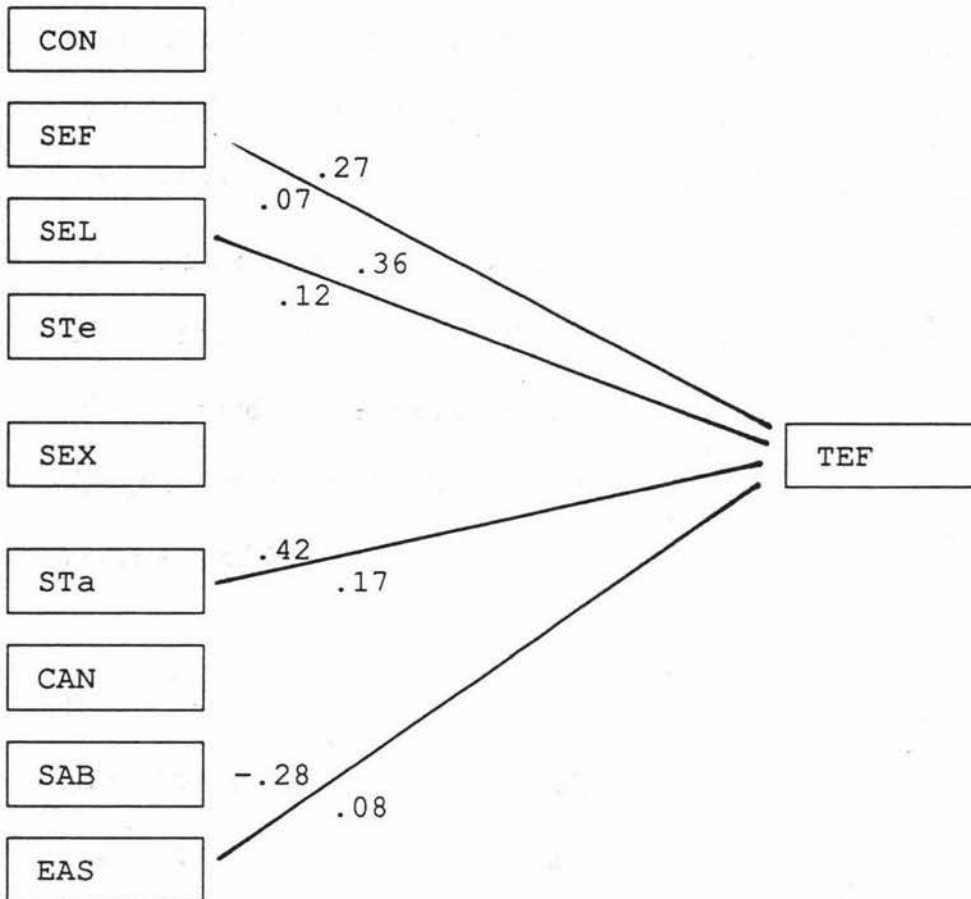
Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .26$, $F(9, 44) = 1.68$, $p = .12$.

2 variables: $R^2 = .18$, $F(2, 51) = 5.68$, $p < .01$

Fifty percent of teachers' effort ratings (TEF) were accounted for by all variables ($F(9, 44) = 4.87$, $p < .001$) with four variables, stable ability (STa) (beta = .42, $sr^2 = .17$), controllability of effort (SEL) (beta = .36, $sr^2 = .12$), specific ability (EAS) (beta = -.28, $sr^2 = .08$) and self-effort (SEF) (beta = .27, $sr^2 = .07$) contributing significantly and independently (see Figure 5i).

Figure 5: (i) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: Fourth Form Social Studies



Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .50$, $F(9, 44) = 4.87$, $p < .001$.

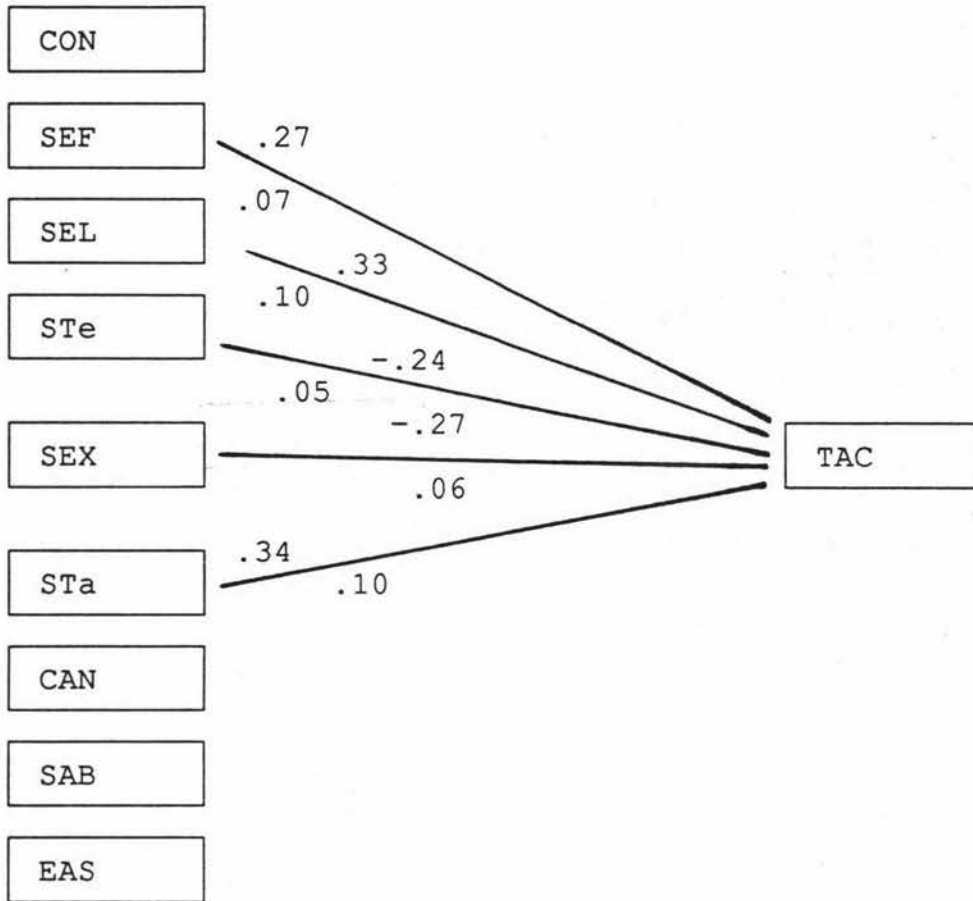
4 variables: $R^2 = .46$, $F(4, 49) = 10.43$, $p < .001$

Although students were not asked whether Science, English or Social Studies (or the different activity groups in Form One) were more or less difficult or valuable than one another, prior observation in New Zealand classrooms suggests that Social Studies

in New Zealand has a lower status than Science or English (see also, Burroughs, 1991). In the subject that has the lowest perceived status, able students may not try and effortful students may not be able, so those who are achieving seem to be those who have a stable self-concept of ability, are generally effortful and have acquired greater metacognitive awareness. The controllability of effort variable comes through as measuring an important facet of achievement behaviour that may be the result of self-concept of ability and effortfulness but has become an extra component of achievement behaviour. In a subject area where the tasks are not seen to be as difficult as in Science, or the skills gender-specific as in English, the students who have acquired a sense of control may be those with a sense of competency, may be those with intrinsic motivation (Biggs & Telfer, 1987) or have task rather than ego-orientation to motivation (Nicholls et al., 1985).

When the subject variables for Fourth Form were combined, the relative power of the student variables selected as important for achievement become clearer. Rather than the variables being reduced by the effects of combination, four or five variables remain independently significant. Teachers' achievement ratings were predicted by five variables with significant contributions, positive, controllable and unstable effort, gender (girls) and stable ability (see Figure 5j). Teachers' ability ratings reflected stability of ability, instability of effort, controllability of effort and gender (Figure 5k). Teachers' effort ratings were predicted by students' judgment of positive effort, controllability of effort and stability of ability (Figure 5l). Clearly the three performance variables contributed to by nine teachers reflect that successful students perceive themselves as effortful, they have the ability to control effort, they rate themselves similarly for ability in different subjects and they tend to be girls.

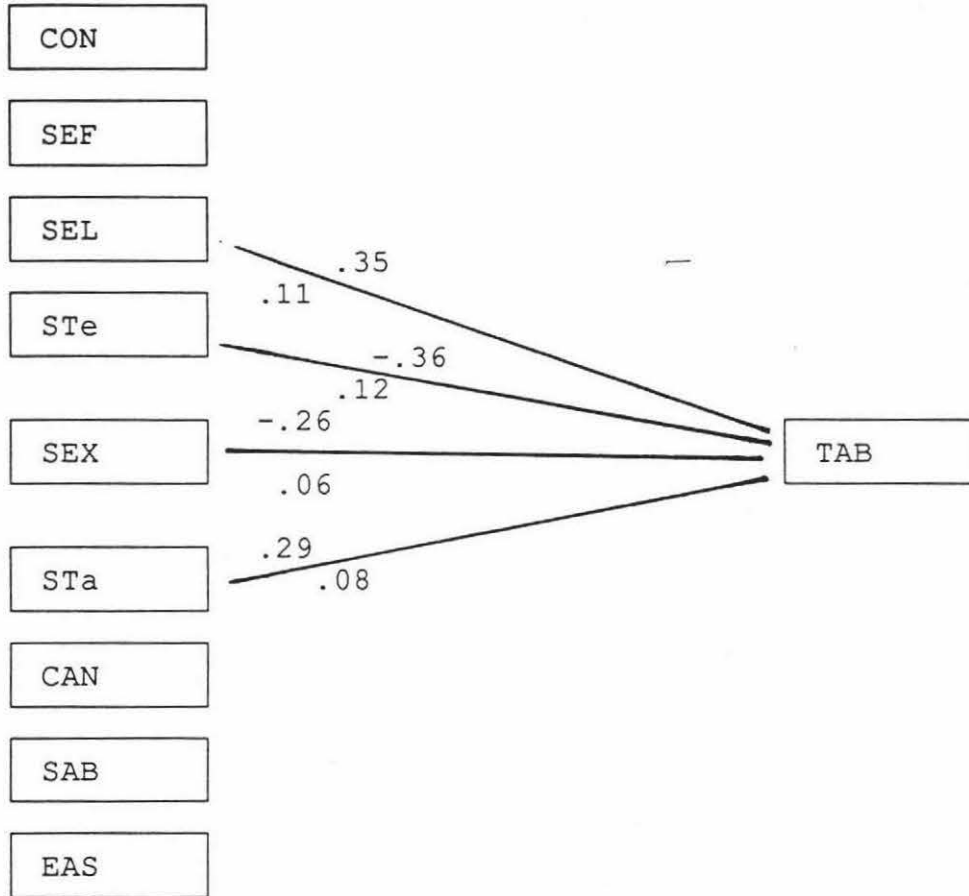
Figure 5: (j) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: Fourth Form Combined Subjects



Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .43$, $F(9, 44) = 3.70$, $p = .002$
 5 variables: $R^2 = .38$, $F(5, 48) = 5.86$, $p < .001$

Figure 5: (k) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: Fourth Form Combined Subjects

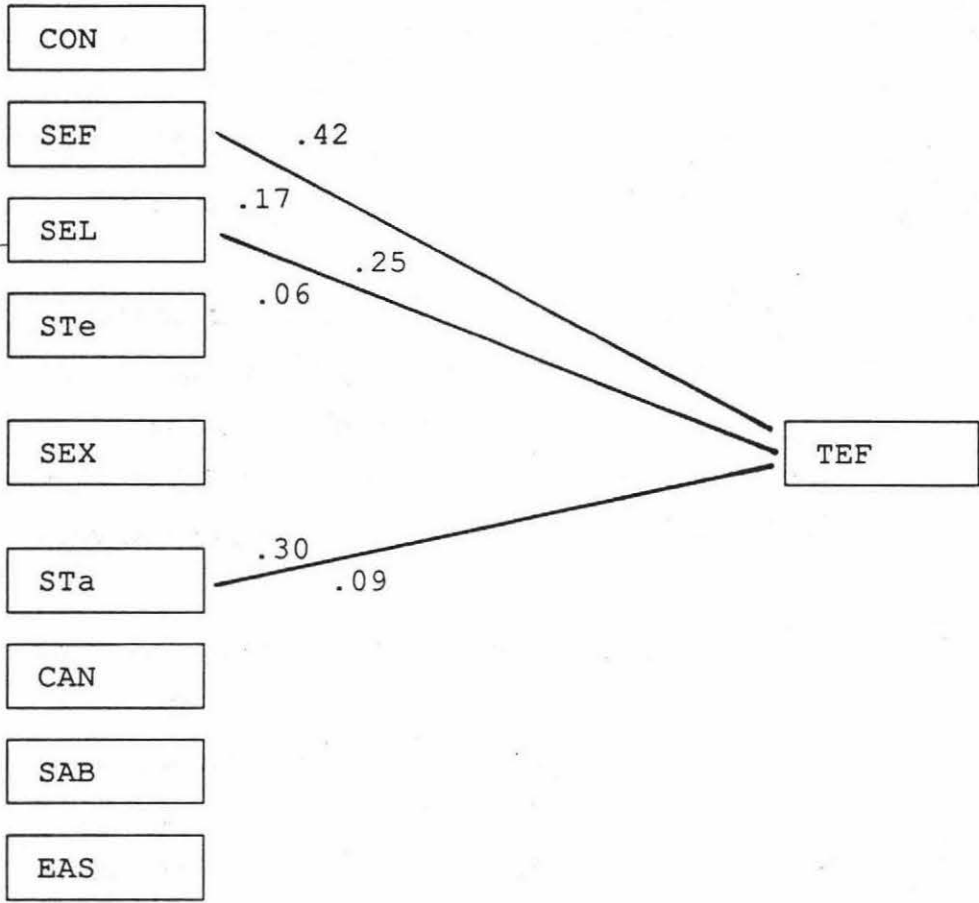


Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .33$, $F(9, 44) = 2.42$, $p = .02$.

4 variables: $R^2 = .31$, $F(4, 49) = 5.46$, $p = .001$

Figure 5: (1) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: Fourth Form Combined Subjects



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .43$, $F(9, 44) = 3.65$, $p = .002$.

3 variable: $R^2 = .36$, $F(3, 50) = 9.25$, $p < .001$

First Form Regressions

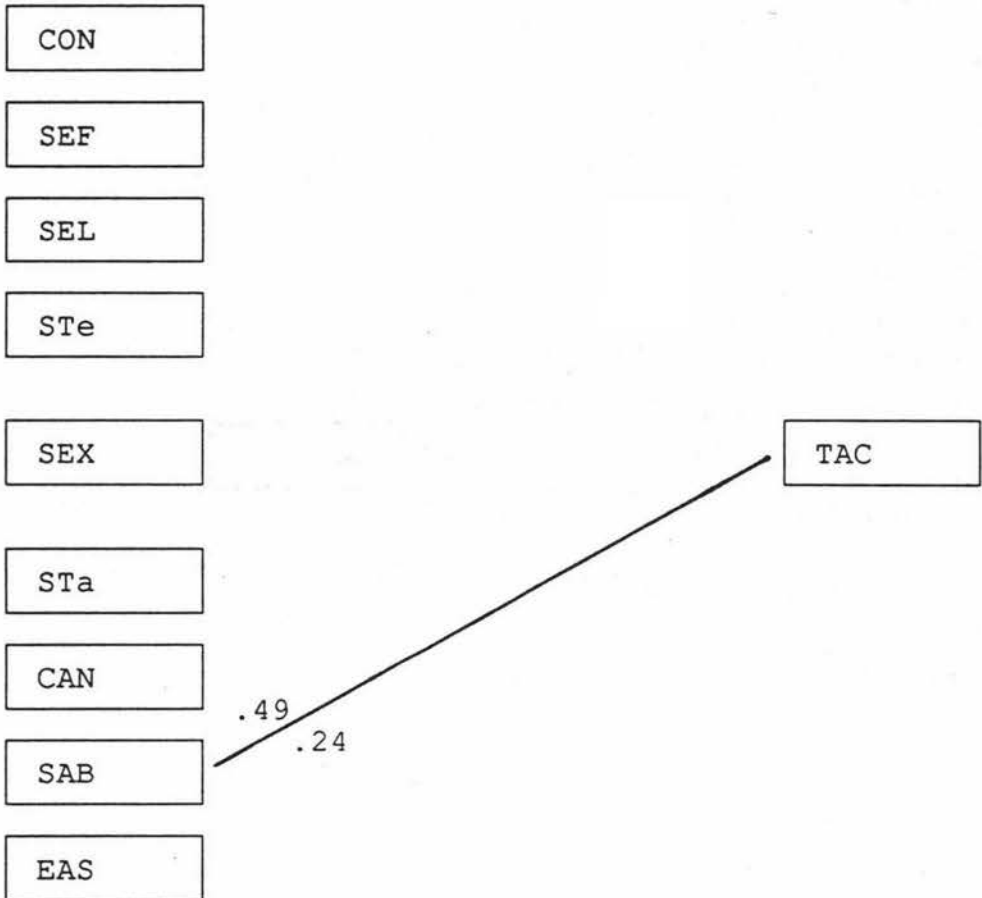
The overall impression from Form One results is that students' ability judgments are central to teachers' judgments of achievement. In the first group of tasks, positive ability judgments are the single significant predictor of achievement ratings (beta = .49, see Figure 6a).

In the second group of tasks, positive and stable ability (beta = .32 and .36 respectively) and controllability of effort (beta = .28) are the important variables (Figure 6b).

In the third task, four variables contributed significantly and independently to the shared variance with teachers' achievement ratings: teachers judged as achievers those students who thought they were effortful (SEF) (beta = .47) but did not concentrate very much on these tasks (CON) (beta = -.41), those who had a stable concept of ability (STa) (beta = .26) AND controllability of ability (CAN) (beta = .37), and who probably were girls (beta = -.21, see Figure 6c).

When the Form One tasks were combined, the analysis shows that positive (beta = .57), stable (beta = .39) and controllable ability (beta = .29) was reflected in the teachers' ratings for achievement (Figure 6d). The high correlation between students' ratings of their ability and effort ($r = .70$, $p < .001$) and the higher correlation of self-ability (SAB) with teachers' achievement (TAC) than that of self-effort (SEF) meant that most of the variance shared by self-effort and teachers' achievement overlapped with that of self-ability thus making effort a non-significant independent contributor to teachers' achievement ratings.

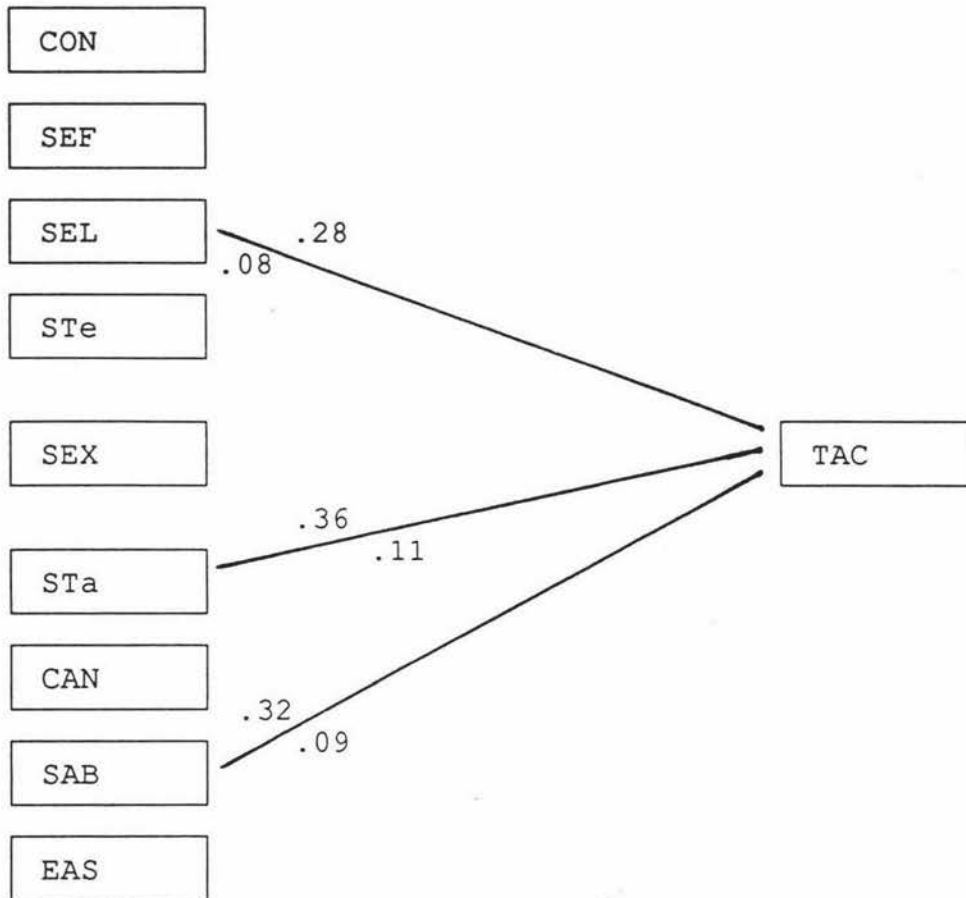
Figure 6: (a) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: First Form Task One



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .37$, $F(9, 31) = 2.00$, $p = .07$
 1 variable: $R^2 = .24$, $F(1, 39) = 12.03$, $p = .001$

Figure 6: (b) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: First Form Task Two

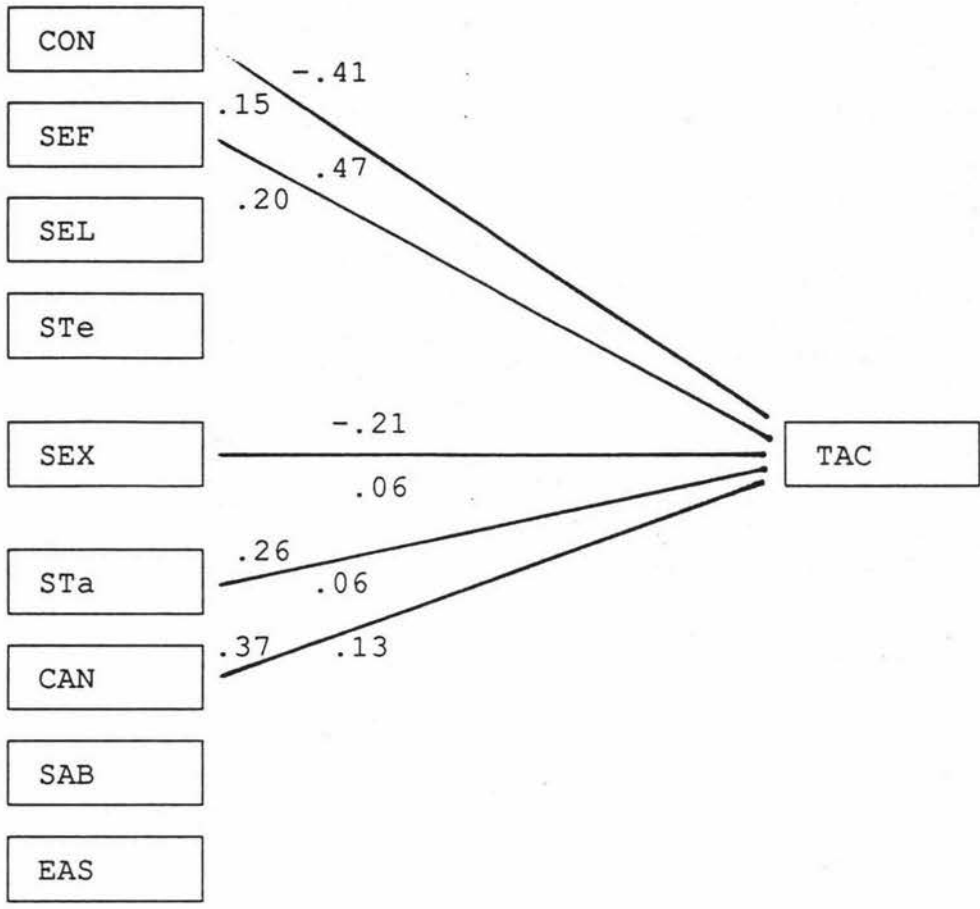


Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .34$, $F(9, 31) = 1.76$, $p = .11$

3 variables: $R^2 = .30$, $F(3, 37) = 5.31$, $p = .004$

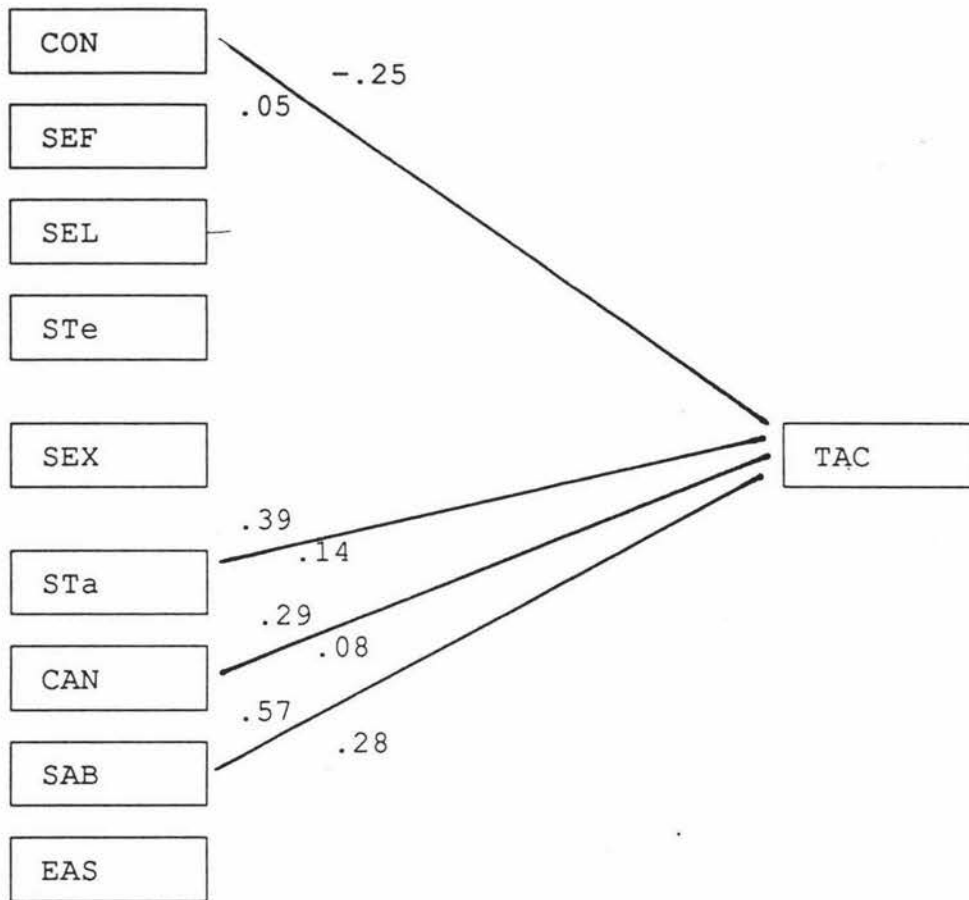
Figure 6: (c) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: First Form Task Three



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .56$, $F(9, 31) = 4.35$, $p = .001$
 5 variables: $R^2 = .53$, $F(5, 35) = 7.87$, $p < .001$
 (SEX: $t = 1.77$, $p = .09$)

Figure 6: (d) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Achievement: First Form Combined Tasks



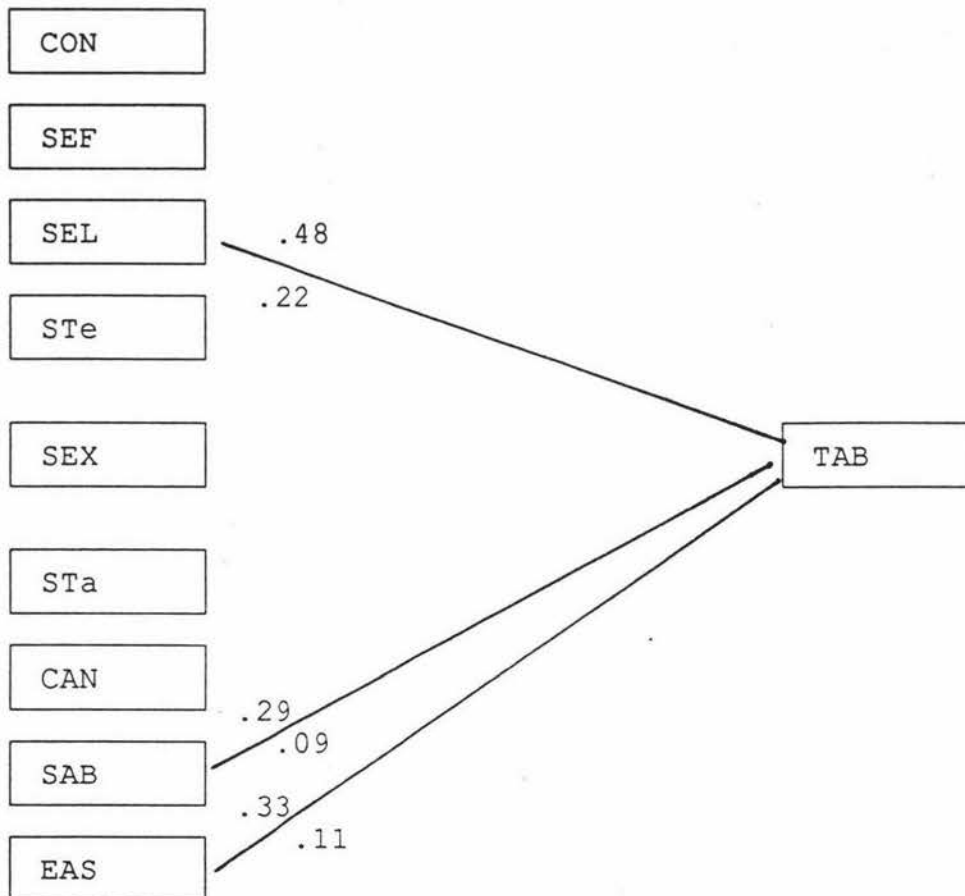
Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .54$, $F(9, 31) = 4.65$, $p < .001$
 4 variables: $R^2 = .46$, $F(4, 36) = 7.66$, $p < .001$
 (CON: $t = -1.83$, $p = .08$)

The relationship between teachers' ability judgments and the student variables vary between task groups. On Task 1 and Task 2 controllability of effort is the most important contributor (beta = .48 and .58 respectively) (see Figures 6e and 6f). The third task has thrown up an odd combination - negative specific effort (low concentration, beta = -.48), specific ability (not easy, beta = .38), considerable general effort (beta = .42), and stability of ability (beta = .26) (Figure 6g). It seems the bright students were not performing on these tasks to the best of their ability.

Overall, it was effort judgments by the students that best predicted teachers' ability ratings, with controllability of effort the most important independent contributor. It seems that students' ability ratings are reflecting their self-concept of ability and that the self-concept relates to the amount of effort they generally make. Students' self-concept of ability is perhaps paralleled by their effort level, and, as shown here, self-rating of ability is highly correlated with rating for effort, so effort level is perceived by teachers as reflecting ability. In particular, those students who can articulate appropriate ability control strategies are those students who are perceived by teachers as both able and effortful. This gives support to the contention that the controllability of ability, as operationalised here, albeit somewhat inadequately, is measuring a dimension of achievement motivation that is significant.

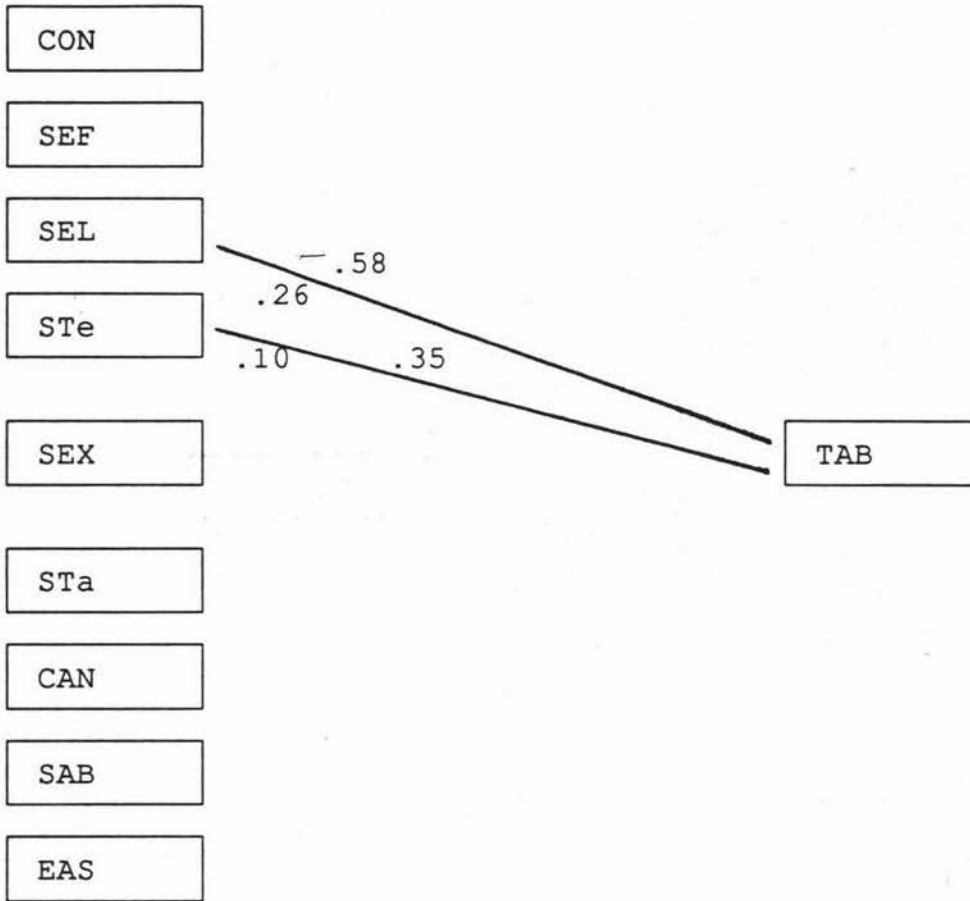
Figure 6: (e) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: First Form Task One



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .54$, $F(9, 31) = 4.07$, $p = .002$.
 3 variables: $R^2 = .48$, $F(3, 37) = 8.18$, $p < .001$

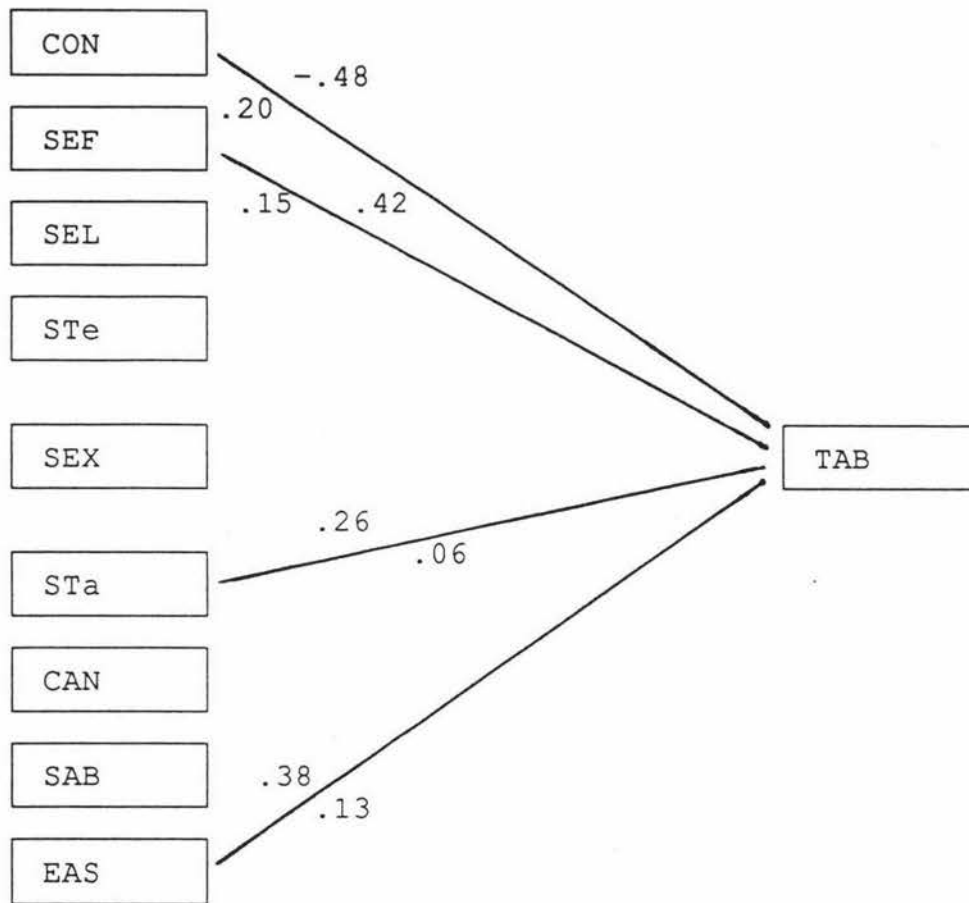
Figure 6: (f) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: First Form Task Two



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .35$, $F(9, 31) = 1.82$, $p = .10$.
 2 variables: $R^2 = .27$, $F(2, 38) = 7.14$, $p = .002$

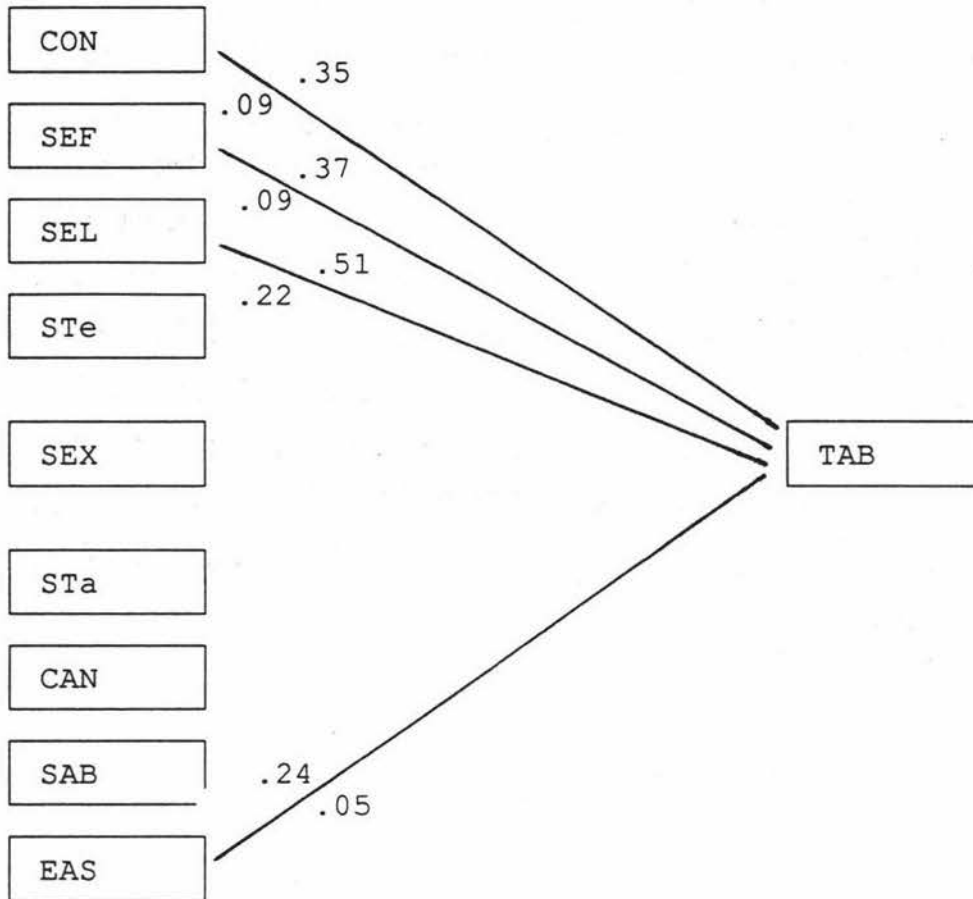
Figure 6: (g) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: First Form Task Three



Beta weights are shown on the top of each path and squared partial correlations are shown beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .41$, $F(9, 31) = 2.40$, $p = .03$.
 4 variables: $R^2 = .34$, $F(4, 36) = 4.61$, $p = .004$
 (STa: $t = 1.84$, $p = .07$)

Figure 6: (h) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Ability: First Form Combined Tasks



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

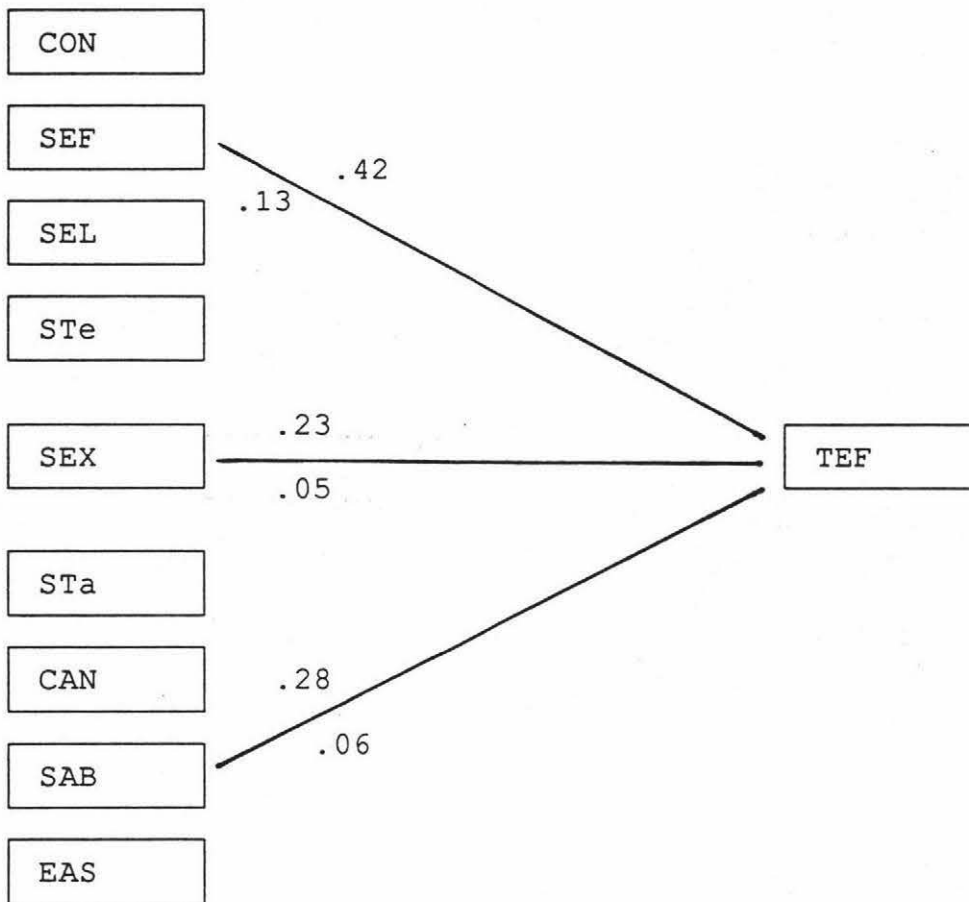
9 variables: $R^2 = .54$, $F(9, 31) = 4.07$, $p = .002$.

4 variables: $R^2 = .48$, $F(4, 36) = 8.18$, $p < .001$

(EAS: $t = 1.85$, $p = .07$)

Form One teachers' effort judgments were fairly well predicted by students' effort ratings. In the first group of tasks, (see Figure 6i) effort judgments were highly correlated (beta = .42) and it seems boys are generally more effortful than girls (beta = .23), especially if they consider themselves quite able (SAB)(beta = .28). In the second group of tasks (see Figure 6j), the less confident were distinguished as effortful by teachers - negative controllability of ability (beta = -.29), task was not easy (beta = .27), as well as positive effort judgments (SEF) (beta = .52). In the third collection of tasks, 24% of the teachers' ratings were accounted for by the students' own general effort ratings (SEF) (beta = .49). When the variables for the task were combined, general effort (SEF) was the sole predictor ($R^2 = .35$, $F(1, 39) = 20.88$, $p < .001$) (see Figure 6k). However, there is difference in the relationship of the student ability and effort variables with each other and with teacher variables, depending on the task, which is consistent with previous research into students' motivation to learn in different subject areas (e.g., Eccles et al., 1989). Students and teachers, therefore, show considerable agreement about who is generally effortful or not.

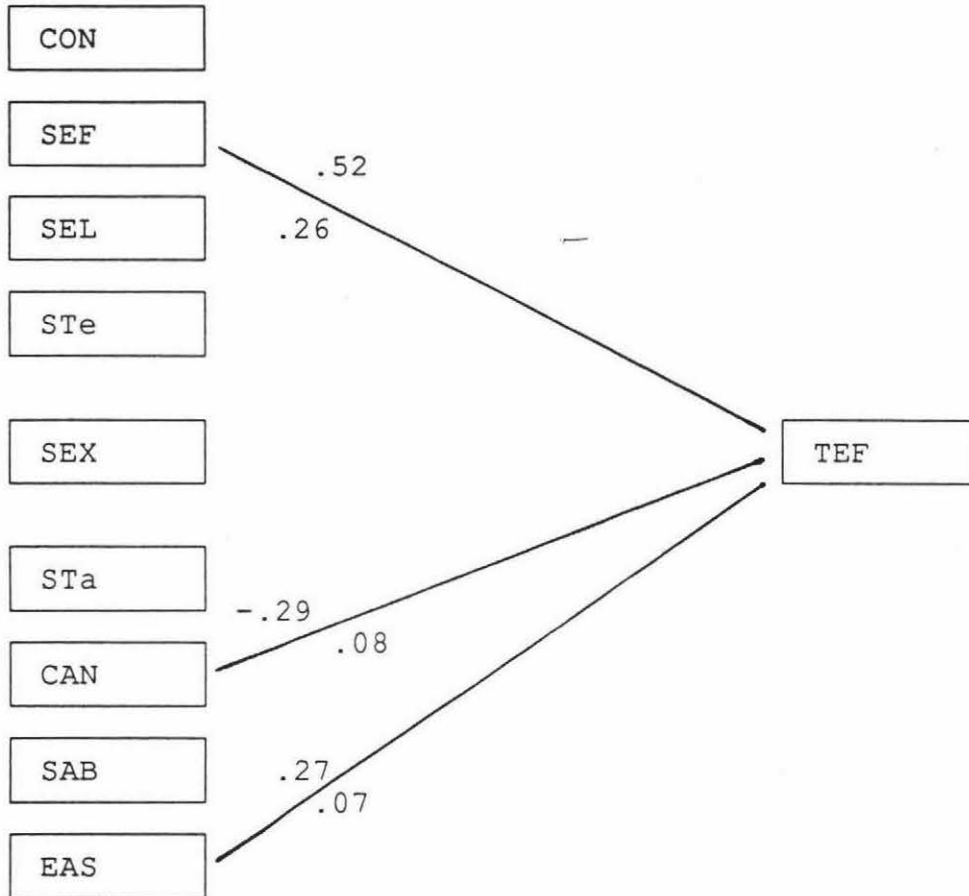
Figure 6: (i) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: First Form Task One



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .46$, $F(9, 31) = 2.91$, $p = .01$.
 3 variables: $R^2 = .37$, $F(3, 37) = 7.17$, $p < .001$
 (SAB: $t = 1.92$, $p = .06$; SEX: $t = 1.70$, $p = .10$)

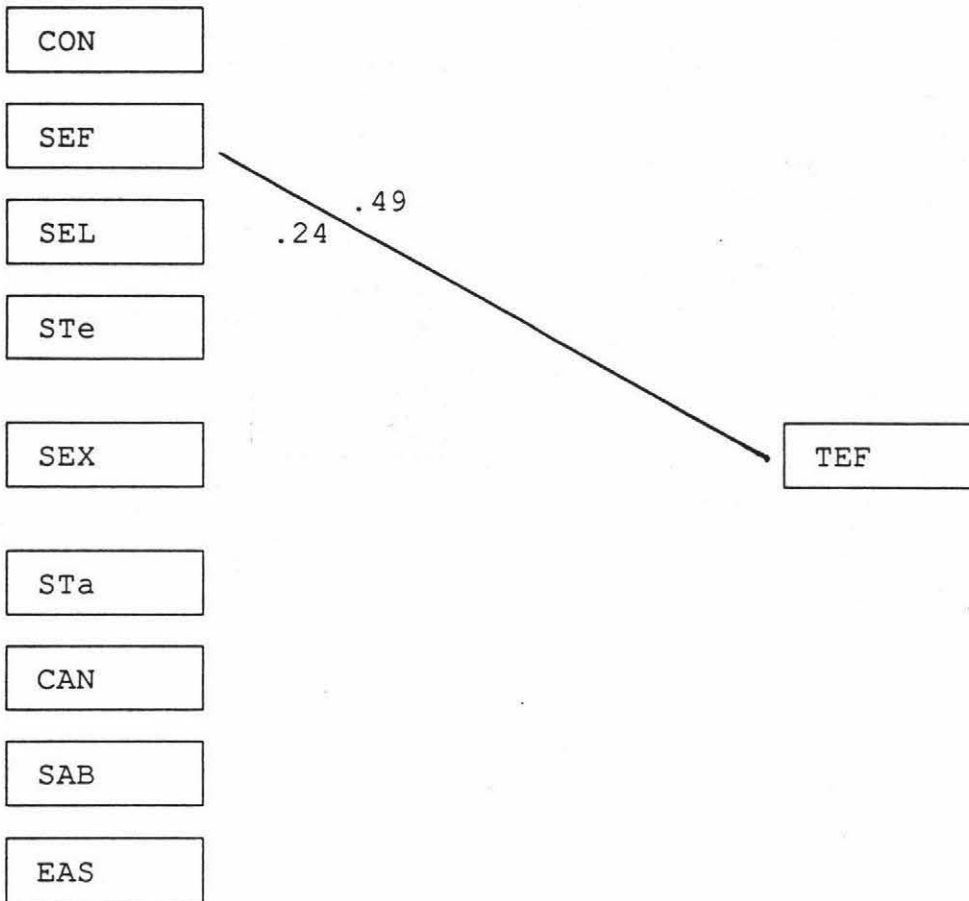
Figure 6: (j) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: First Form Task Two



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .41$, $F(9, 31) = 2.35$, $p = .04$.
 3 variable: $R^2 = .34$, $F(3, 37) = 6.49$, $p = .001$

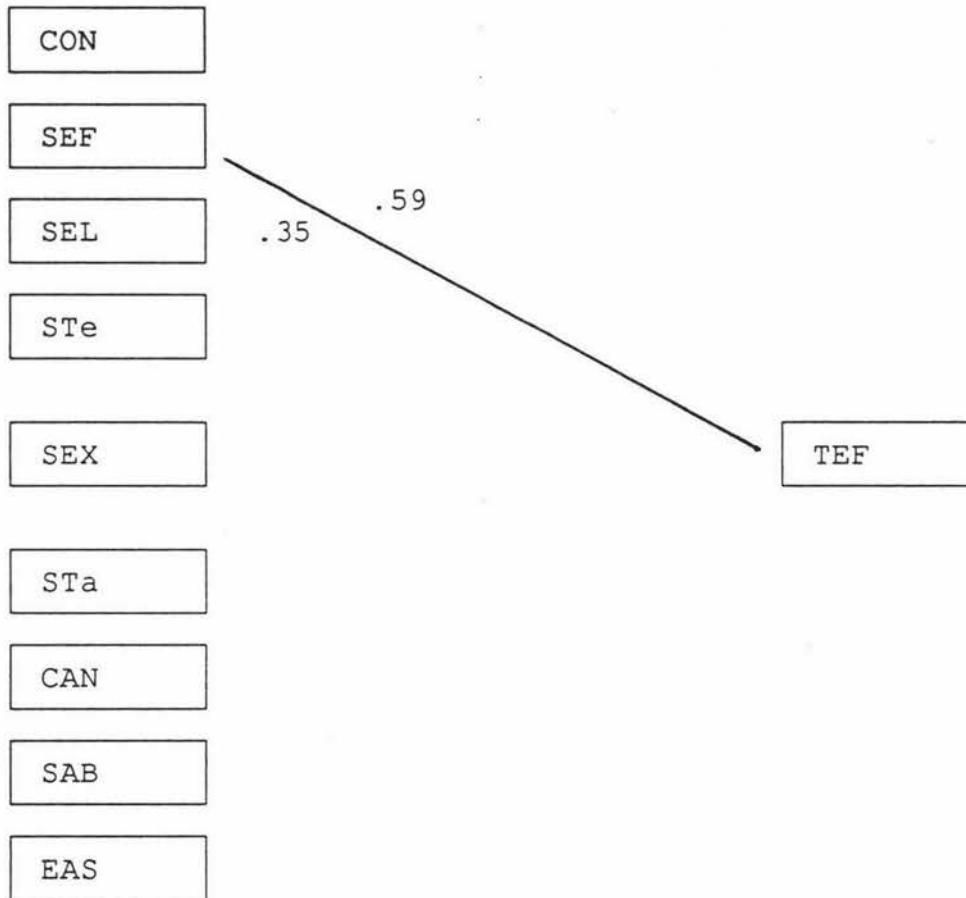
Figure 6: (k) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: First Form Task Three



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .27$, $F(9, 31) = 1.30$, $p = .28$.
 1 variable: $R^2 = .24$, $F(1, 39) = 12.09$, $p = .001$

Figure 6: (1) Path Diagram Showing Student Variables Which Make the Most Contribution to Teacher Judgments of Effort: First Form Combined Tasks



Beta weights are shown on the top of each path and squared partial correlations are show beneath. Paths have only been drawn for those variables, derived from a multiple regression backward, which make a significant contribution to the shared variance with the dependent variable.

9 variables: $R^2 = .46$, $F(9, 31) = 2.91$, $p = .01$.

1 variable: $R^2 = .35$, $F(1, 39) = 20.88$, $p < .001$

Over all subjects there is a high correlation between students' ability and effort ratings at both Form One and Form Four levels (Form 1: $r = .70$, $p < .01$; Form 4: $r = .69$, $p < .01$), yet there is a difference between the age levels in the relationship between students' ability and effort scores and teachers' ratings of achievement and ability. Fourth Form students' combined ratings of their ability (SAB) have no correlation with teachers' achievement, ability and effort ratings compared to moderate (between .3 and .5) correlations for Form One. Form Four general effort ratings (SEF) do not correlate with Teachers' Ability ratings whereas they do in Form One ($r = .36$, $p < .05$).

From these results it can be seen that there is a shift from Form One to Form Four in the relative influence of ability and effort judgments accounting for teachers' judgments of achievement. In Form One, students' perceptions of their ability best predict teachers' judgment of their achievement. In Form Four, the cluster of student effort variables contributes most to teachers' judgments of achievement.

The combined data throw some interesting light on teachers' judgments of students' ability. Students' ratings of their own ability correlate significantly with teachers' ability ratings in First Form ($r = .32$, $p < .05$), but not at all in Fourth Form ($r = -.04$). Similarly, First Form student general effort ratings correlate with teachers' ability ratings ($r = .36$, $p < .05$) compared to no correlation ($r = .02$) for Fourth Form. The variable that contributes most to the shared variance with teachers' ability is effort control (SEL) for both Form One (beta = .51) and Form Four (beta = .35).

In Form One the students judged as able are also those who see themselves as effortful, rating their general effort (beta = .37) and their specific effort (beta = .35) positively. In Form Four the able students are those who give themselves inconsistent general effort ratings (beta = -.36) and consistent general ability ratings (beta = .29). The overall impression is that teachers judge ability by demonstrations of effort.

For the Fourth Form combined group, teachers' effort ratings are very similar to the univariate correlations, indicating that three of the variables, positive effort ratings, control of effort (SEL) and stability of ability all contribute something independently to teachers' judgments of effort. In Form One, the overlap of the self-effort variable with the other effort variables, means that ratings for self-effort is the single significant predictor of teachers' effort rating.

These results suggest that at the First Form level students' judgment of their general level of ability is the central element influencing their classroom achievement behaviour. Those students who judge themselves positively also consider that they are effortful. As well, these students are those who can articulate control strategies. However, by the time they reach Fourth Form, they may demonstrate the shift that seems to be behind the difference shown by these Fourth Form students. Fourth Form students are less positive about their ability level and give more emphasis to their effort level. As well there is a qualitative change in the self-directed strategies articulated by the higher achieving Fourth formers from those given by lower achieving Fourth formers or First formers.

Summary of Findings

The first set of hypotheses was concerned with conceptions of ability. It was hypothesised that the terms "ability" and "intelligence" would be more semantically differentiated by Form Four than Form One students and that the correlations between ability and intelligence ratings on each task would be significantly higher for Form One than Form Four. Neither hypothesis was supported: there was no significant difference between the two age groups either in the questionnaire data or from the interviews.

In relation to the question whether ability is perceived as being stable or unstable, it was hypothesised that Form One students would see intelligence as more unstable than Form Four students. This was not supported: both groups in both data sets thought intelligence could change. In addition, there were no significant differences between the ability ratings students gave themselves over three subject areas. However, there was a significant within-subjects difference for specific ability scores. Boys' self-ability ratings were not significantly higher than girls' as was hypothesised.

It was hypothesised that Form Four students would have higher control of ability scores than Form One students. This was not supported from the questionnaire data but one third of the Fourth formers interviewed gave clear indication of self-agency of their learning compared to none of the Form One students.

The second set of hypotheses were concerned with conceptions of effort. That specific effort and general effort ratings will be unstable, was supported. However, the numerous significant correlations between effort ratings and in particular the intercorrelations of the teachers' ratings, indicates that general effort is more stable than individuals' self-ratings might indicate.

Students varied in the number of effort strategy statements but Form Four students did not have a significantly higher number of strategies than Form One on the questionnaire data. Form Four students made proportionately more self-management of effort statements than Form One students in the interview. That girls will have higher effort control scores than boys, was supported.

There were no hypotheses postulated for the second section of this investigation. All the variables in this study would be expected to contribute to a student's achievement, ability and effort as perceived by his or her teacher. Students' conceptions of ability and effort and their perceptions of their ability and effort relative to others in the class have been accepted components of attribution theory and other models of motivation. The relationships between four ability variables, four effort variables and gender with each other and with teachers' ratings of achievement, ability and effort was explored using mean scores of student variables by achievement groups. Analysis of variance showed there is a significant difference between achievement groups for perceived general level of ability (SAB), stability of ability (STa), general level of effort (SEF) and control of effort (SEL). Then, the student variables were regressed on the teachers' achievement ratings within the subject groupings so that the influence of particular subjects on the relationships between the variables can be compared for each age group.

The data from the ratings for each task were combined so that the influence of individual tasks and individual teachers' would be minimised so that the relationship between the variables and achievement at the two age levels could be compared. At both age levels there was a strong univariate correlation between general ability ratings and effort ratings which had the effect of removing the contribution of the weaker one from the shared variance. Whether ability or effort ended up as a significant contributor in one

multivariate regression analysis meant that one had, in that analysis, more shared variance in association with the other variables in the equation than the other. So when interpreting the results, it must be remembered that when either general ability or general effort remain as a significant contributor, it has only slightly more power of prediction than the one that does not remain. With this caution in mind, the pattern that emerges is that Form One achievement seems to be driven by students' judgments of their ability level and Form Four achievement by effort level. In both forms, stability of ability is important. In Fourth Form, effort level is also associated with control of effort, and with gender.

This research shows that achieving students at the First Form level have a stable self-concept of ability which corresponds fairly well with their teachers' judgments of their ability, they believe their ability can increase and can state appropriate strategies for doing so. Able students also are effortful and are better able to control effort than less able students. There are significant differences between the high and low achievement groups for ability and effort ratings and for number of strategy suggestions.

In Form Four, the important differences between groups are for general effort in conjunction with control of effort. Self-ability judgements do not correspond to teachers' judgments overall. This lack of correspondence may be due to the frequently documented phenomenon of girls focusing on effort as the principal cause of success.

CHAPTER 5

Discussion

The initial task for this research was to explore the conceptions of ability and effort of New Zealand school students and relate them to the assumptions of attribution theory about the nature of ability and effort as causes of achievement outcomes. The results show that there is good reason to question the usefulness of attribution theory to explain the motivational orientation of these students. However, the variables that emerged as representing student characteristics that were predictive of teachers' ratings for achievement suggest new ways that attribution theory's stability and controllability dimensions could be reformulated.

Conceptions of Ability

To investigate whether New Zealand students conceptualise "ability" as having the dimensions of stability and uncontrollability as defined by attribution theory, it was first necessary to uncover whether they perceive "intelligence" as stable and uncontrollable, since "intelligence" would be expected to refer to a construct that is more stable and uncontrollable than "ability".

The Stability of Ability

Most students interviewed, in both age groups, thought "intelligence and "ability" refer to different things. Two-thirds of First Form and 74% of Fourth Form students made the distinction that "intelligence" referred to mental activity and "ability" referred to practical competence or acquired skills. "Ability", therefore, is perceived as dependent

on opportunity to learn and practise; it is learned, not innate. An unexpected extra finding was that "intelligence" is perceived by most students as being the product of "a good education", and that intelligence is produced by "doing your schoolwork". Only a third of students believe that intelligence is something one is born with, and only two out of the nineteen Fourth Form students interviewed considered that both what you are born with AND life experiences are important for intelligence.

The data from the questionnaires showed that, for both age groups, students' ratings of their intelligence and their ability in particular school subjects demonstrate that they do not see them to be the same, although they are related. The small to moderate correlations of ability and intelligence of Fourth Form boys and First Form students in some tasks were significant, but the Fourth Form girls' were not.

If New Zealand students perceive "intelligence", even at the age of 14, as modifiable by doing schoolwork, and "ability" as having been taught a learned skill, the assumptions behind attribution theory's "ability" would seem to be quite inaccurate for New Zealand school students. They appear to conceptualise "ability" as being certainly unstable and perhaps externally controlled.

However, further examination of the literature indicates that this conceptualisation of "ability" may not be peculiar to New Zealand school students, but that no-one appears to have related that information to the use of attribution measures with schoolchildren. Nicholls (1989) outlines the developmental stages of acquiring an understanding of the nature of knowledge. He indicates that few people, before the end of secondary school, acquire an understanding that knowledge is more than learning facts. So school students in the United States as well as in New Zealand may be constrained by their developmental level to conceptualise intelligence as "amount of knowledge".

The results from this study are similar in some ways to those of Yussen and Kane (1985). Yussen and Kane first asked children what it means to say that someone is smart, and that someone is intelligent, and in following questions used the words interchangeably. Almost half of the sixth graders, but only a few of the younger children, thought "intelligent" meant the same as "smart", and that "smart" referred to amount of knowledge and academic skill. When the same format was used to ask New Zealand students about "ability" and "intelligence" only one third of first formers (who

are the N.Z. equivalent of sixth graders in the U.S.) and a quarter of fourth formers, considered them to mean the same thing. This evidence suggests that the terms "smart" and "intelligent" in the U.S. may converge whereas the terms "ability" and "intelligence" in New Zealand may diverge as children grow older.

Yussen and Kane had hypothesised that there would be a developmental progression towards a more mature "interactionist perspective", but 65% of their oldest group, the sixth graders, gave "experience" as the source of intelligence, as compared to 15% mentioning that one is born with it and 30% consider both important. If an interactionist perspective is a mature approach to conceptualising "intelligence", 14 year-old New Zealand students show scant signs of development. The perception of the majority of both the American and the New Zealand 11 year-olds that intelligence is learned (or provided by good schools), not innate, should not be ignored by researchers who believe they hold a more mature view. The affective impact of a belief that one's intelligence is limited by the quality of one's school will be rather different than the belief that one's intelligence is limited by an inefficient brain.

These New Zealand students also agreed with Yussen and Kane's students in a belief in the malleability of intelligence. Most students believe intelligence can be improved but only older students perceive that it is possible for it to be reversed. In both investigations most students thought it was experience, mostly school, that changed intelligence. The New Zealand interviews were searched for evidence that students might see themselves as agents in their acquisition of intelligence. Less than half the first form students and only 53% of fourth form students made any statement that suggested self-agency or that it was possible for people to make themselves more intelligent and this was generally related to getting their schoolwork done. Therefore the attribution theory assumption that "ability" is perceived as an internal cause of success and failure is unlikely to be valid for New Zealand and American children under 12 years, and is of doubtful validity for older New Zealand students if "ability" is mostly conceived of in terms of external provisions rather than internal processes.

Nicholls (1989) argues that conceptions of intelligence, conceptions of ability, and attributions of ability should not be confused. He says that questions such as "What does it mean to be intelligent (or smart)? How can someone get more intelligent?" produce

responses that might reflect conceptions of ability, conceptions of intelligence, or both. "Subjects might also interpret a question of changeability as referring to changeability of biological potential, current skill level relative to others, or the possibility of learning new things even if one's standing doesn't change (Nicholls, 1989, p.220). These New Zealand school students will not be wondering whether their "biological potential" can change; they do not see intelligence as a physical inheritance.

Nicholls' use of the expression "conceptions of ability" is specialised. He does not use it as he uses "conceptions of intelligence" to mean all the possible concepts relating to the word that people might have. He uses it to refer to self-evaluations of one's capacity to succeed or fail on a task at one point in time, that is, a judgment of one's capacity, relative to others. Conceptions of ability, to Nicholls, contains "the notion of capacity as distinct from effort" (ibid., p.20) and, as quoted above, one's "current skill level relative to others". In this investigation, conceptions of ability are considered in the same way as conceptions of intelligence. If an attribution to ability has implications for motivation, it is the individual's conception of the term which is the basis of the feelings associated with success and failure which have motivational consequences. In an extended discussion of these issues, Nicholls accepts that the explanatory power of attribution theory is of most use with situations of ego-involvement and clear success/failure outcomes, and that "we still know nothing about, for example, the larger purposes of the task-involved individual" (p.146).

This research did not look at the purposes of task-involved individuals but did ask students about the non-competitive tasks they were involved in under conditions where their responses would not be publically scrutinised. In this situation, it is possible to get closer to the phenomenological understanding of these students under ordinary, non-evaluative classroom conditions.

In this research, Specific Ability measured judgments of capacity to perform the task. There was a significant within-subjects difference in the students' ratings for Specific Ability over three tasks, but no significant differences for self-ratings of intelligence or General Ability across three school subject areas. This finding indicates that students have, what might be called, a stable self-concept of ability, but this cannot be diagnosed from judgments of capacity to perform specific tasks. Yet attribution

theory assumes an attributional orientation sometimes on the basis of one success or failure situation. (The rationale for aggregating the results of responses to many hypothetical success/failure situations can be criticised on different grounds, for example, that such questionnaires focus students' attention on the logic of such situations, rather than what may be perceived as causal in real situations.)

What is more important is that capacity to perform one task in a single school subject area is not predictive of students' ratings of their relative capacity to perform well generally in that school subject. Specific Ability did not correlate significantly with General Ability in any subject area for either group. This is despite the fact that the General Ability question invited students to rate themselves relative to others in the class. Clearly, Nicholls' distinction of "ability" in attribution theory as capacity at one point in time does not produce an affective reaction that can be seen to influence subsequent motivation. The assumption of attribution theory, that ability is perceived as a stable internal cause of success and failure, may not, therefore, be valid.

It has been a frequent finding in educational research that teachers' perceptions are influential in shaping students' perceptions of their own ability (e.g., Skinner et al., 1990; Goldenberg, 1992). It would be expected, therefore, that there would be reasonably high correlations between students' ratings of their relative position in each subject and their teachers' judgments of their position, and that this effect would be increased when ratings for three subjects were combined. This was true of Form One results but not Form Four. It is interesting to note that the girls, and especially Fourth Form girls, rated themselves very differently to their teachers. For example, in English, the correlation was significantly negative ($r = -.37$, $p < .05$). This unrealistic appraisal of their ability by the girls had a powerful effect on the relationship of the student variables to the teacher ratings in the regression analyses. Since Fourth Form general ability and general effort had a significant correlation of .68, it is not surprising that gender became a significant and independent contributor to teachers' ratings and the variable control of effort became important.

In other research, when girls have been found to give effort rather than ability attributions (e.g., Fennema, 1985) and low ability attributions (e.g., Ryckman et al., 1990), it is suggested that socialisation factors are involved. At the age of 14, these New

Zealand girls seem to be excessively modest about their relative ability which may be the result of sensitivity to adolescent attitudes, or a reflection of more widespread New Zealand attitudes to ability and appropriate female behaviour.

The stability of ability variable was calculated on the basis of whether students' three ability scores were the same or different. Only 7% of Form One and 24% of Form Four gave unstable ratings of ability. Means analyses show a significant linear relationship between mean scores of stability of ability for achievement and ability groups, with those in the lowest group having less stable scores. Since Fourth Form students rate themselves less highly than First Form students for ability (which may be due to girls' excessive underrating), and a higher proportion have unstable ability ratings, it appears that the older students are differentiating more between abilities than younger students. This increasing instability is in contrast to the usual findings that students become increasingly more accurate in their ratings of their ability and achievement level as they move into the secondary school (e.g., Dweck, 1986).

When all results are combined, the stability of ability variable correlates significantly with teachers' effort ratings in Form Four which means that those students who rate themselves differently for ability are perceived by their teachers as less effortful. The stability of ability variable is shown to be important in the regression analyses, contributing significantly to ability and effort in Science, achievement and effort in Social Studies, and overall to Fourth Form achievement, ability and effort. For the First Form students, Stability of Ability was an important contributor to achievement ratings in the second and third groups of tasks and to achievement overall, as well as to ability for the third group of tasks. This degree of significance for performance outcomes can be explained only by the instability factor: regardless of whether students rate themselves high or low for ability, they perform less well if they do not have a stable self-concept of ability that transcends specific tasks and particular subject areas.

The literature on self-concept suggests that people have many self-concepts of ability (e.g., Marsh & Gouvenet, 1989); few people feel they are totally useless at everything or very competent at everything. To give poor ability as a reason for failure in a specific task, does not have to mean that the student has a generalised self-concept of low ability, even in the same school subject area. In fact, to use Nicholls' argument,

if an attribution to ability means a judgment of one's capacity at that point in time in that specific success or failure situation, it would be quite logical for an individual to credit success to ability because the capacity to succeed had been demonstrated, and failure to lack of ability, because that had also been demonstrated. Because students experience many situations of success or failure, feelings of competence or feelings of uncertainty about their competence, their attributions for successes and failures in different tasks may be variable. The data from this study suggests that attributions given for specific situations may signal general self-concept of ability, self-concept of their ability in that performance area, or simply an observation that is relevant only to that particular occasion. Attributions to ability are as difficult to interpret as questions about the changeability of intelligence. What becomes clear is that ability attributions have been interpreted as if they are general, although based on specific situations, and measuring instruments may be tapping what other theoretical approaches call "self-concept" of ability. Students with an unstable self-concept, who recognise that their abilities differ in different subject areas, may be more ready to attribute failure to lack of ability. Since Form Four students' general ability ratings were more unstable than Form One students, the older students may be becoming more aware of "ability" as distinct from "effort" as having the potential to limit performance.

It has become "common sense" that a positive self-concept contributes to motivated performances. Yet a positive self-concept of ability does not automatically come from performing well relative to others at school. Phillips (1984, 1987) has reported that some students have an inappropriately low perception of ability and that there are no differences in the proportion by gender. Teachers' ability ratings reflect informed judgments "which are largely accurate and based on the best available information" (Good & Brophy, 1987, p.127, cited in Goldenberg, 1992). Teachers' expectations of what students can achieve based on their judgments of ability have been shown to influence students' self-perceptions (e.g. Eccles, 1983, Skinner et al., 1990). However, neither Form One nor Form Four girls' general ability ratings correlated significantly with teachers' ability ratings in the subject areas. If girls discounted their ability compared to boys, the teachers appear not to have. When all subject ratings were combined, gender (girls) appears as a significant independent contributor to teachers'

ability ratings. So, in spite of teachers' perceptions of their ability, and presumably some sort of objective information from classroom activities, Fourth Form girls underrate themselves.

The importance of a stable self-concept of ability as distinct from a positive self-concept of ability for achievement sheds a new light on the dimension of stability of ability in attribution theory that requires further detailed investigation. In addition, we need to look more closely at girls' self-concept of ability, its stability from subject to subject area, and its stability over time. It may be that for girls, a self-concept of ability to make an effort, may be more adaptive than a self-concept of ability, even of high ability.

Attribution theory argues that there is significance in whether ability or effort attributions are given. The high correlation between ability and effort at both ages, together with the evidence that students at these ages believe that the two go together, suggests that attributions to ability or to effort would not predict different affective consequences or subsequent motivational orientation, but that the choice of attribution indicates their beliefs about the causes of success and failure. However, these are just labels, learned from their cultural environment. At this age they do not have the distinctions expected by attribution theory. If it is believed that it is more adaptive for a child to attribute success to ability and failure to lack of effort, then it should be important to alter the attributions of the cultural environment because that is where a child learns the concepts attached to words and learns what people think are the causes of success and failure. Attempts to assist failing students by attribution retraining, which initially seemed promising (Andrews & Debus, 1978), but other research has found that attributional orientation is difficult to change (Wortman & Dintzer, 1978), can have varied effects and may produce no subsequent behaviour change (Relich et al., 1986). If students' understanding of the word "ability" and the relationship of that concept to achievement is embedded in a social context, a short term school intervention of "attribution retraining" alone is unlikely to make any lasting and generalised change in understanding.

The Controllability of Ability

The controllability of ability has not been questioned by attribution theorists. Attribution theory was formulated and initially tested in a time when researchers had been raised in a climate of intelligence testing, and standardised intelligence measures were considered a necessary part of most educational research to establish reliably and validly students' ability level. Current assumptions about the nature of intelligence were attached to the use of the term "ability" in interpreting the effect of ability attributions. Over this same period there has been a reappraisal of the concept of intelligence, so that learners are seen not so much as limited by the "capacity" of their brain, but as limited or enabled by other self-characteristics such as energy level, capacity to focus attention and sense of security, autonomy, self-worth, initiative, purpose and competence. With the interest now in the self-directed (self-initiated, self-regulated) learner and the development of metacognitive control strategies, the issue of the controllability of ability (and effort) needs to be addressed.

Asking students how they could improve their ability on each task produced a CAN score - the number of self-directed strategies they gave. These scores did not correlate with any of the students' self-ratings overall but mean scores for self-ratings by achievement groups indicated a linear trend with higher achievers tending to give more self-directed strategies. When the student variables were regressed against the teachers' ratings, CAN emerged as a significant independent contributor to achievement and effort in Science in Fourth Form, to achievement in the third group of First Form tasks and for achievement when all tasks were combined for First Form. CAN also contributed significantly to effort ratings in Task 2.

Simply asking students how they can improve causes them to think metacognitively if they are able to, but it does not influence their answers. Any cognitive or metacognitive strategies mentioned are direct evidence of metacognitive knowledge. Metacognitive awareness does not mean that a student is necessarily metacognitively active but metacognitively aware students should have a greater sense of control over performance outcomes than those who cannot name any appropriate strategy. It was hypothesised that a sense of control (in this case, that there are things that can be self-

initiated to improve one's ability) will be more apparent in more successful than in less successful students. The evidence from this research is promising: the control of ability measure demonstrates that it is a factor in school achievement in association with, and independent of, ability and effort judgments. Further investigation is essential. Students can be assisted to become more metacognitively active by drawing students' attention to useful strategies and providing opportunities for them to be practised (Borkowski et al., 1988). An increase in awareness of metacognition will influence students' understanding of concepts such as "intelligence" and "ability". More students may acquire an "incremental" concept of intelligence which will mean that they see themselves as instrumental in the learning process and agents in their own successes and failures. Ability and effort attributions will be equivalent.

In summary: From the interviews we get the impression that there is little age difference in the ways that students conceptualise ability. Since they consider that intelligence is created by schooling, that it is accumulated by principally by doing schoolwork, and discount the possibility that it is an in-born capacity, the description of ability as internal, stable and uncontrollable cause of academic achievement outcomes is markedly different to how these school students conceptualise ability. From the evidence of the use of the terms "intelligence" and "ability" in the questionnaires, we note that students rate their ability and intelligence somewhat differently so for most they are distinguished, but that most students give themselves the same intelligence rating and the same ability rating for three subjects. On the other hand, they rate themselves significantly differently for Specific Ability (their "capacity") to do three different tasks. So ability is task-dependent and unstable, but when judging performances over time their self-concept of ability emerges, and this is stable for the younger group and somewhat less stable for the older group. These results suggest that self-perceptions are modified later, perhaps by the different climate of secondary schools, by the academic challenges of the secondary school curriculum or by the inevitable self-appraisal of adolescence.

The controllability of ability is also a significant factor in achievement. Differences in the number of metacognitive statements distinguish higher from lower performing students. Consequently, attributions to ability from this group of students

might well imply that ability is uncontrollable by those students with low self-concept of ability, but students who do have the potential to feel that they can do something about their intelligence/ability will be performing better than their self-rating of their level of ability would predict.

Conceptions of Effort

Conceptions of effort have not been investigated independently of conceptions of ability. Nicholls and Miller (1984 a,b) indicate that "effort" is a poorly differentiated concept until about the age of 12 when it becomes differentiated from "ability".

Students interviewed found effort hard to explain, especially first formers. For some students it meant doing work rather than talking and wasting time, or time spent studying; to others it meant actively avoiding distractions, focussing attention on the requirements of the task and trying to do it as well as possible, characteristic of self-directed learners. A third of fourth formers also made statements which indicated they saw themselves as self-directed learners. On the other hand, more than half stated unambiguously that they did their schoolwork or homework for rewards or to avoid punishment. This demonstrates a developmental change in the concept. At a lower level, students may work hard for perceived external reasons - effort is doing enough by external standards. A later development is the awareness of the nature of effort, of variability in effort quality, of the relationship of time-management, planning and quality control to performance level.

The construct "effort" in attribution theory is defined as being internal, unstable and controllable and interpreted accordingly. This ignores the possibility that students do not know what is meant by effort. Some students in this sample indicated that if someone tells them they are not trying hard enough, that is an encouragement, a compliment. It is taken to mean that the speaker has judged them to be more able than the present performance might indicate. They may not interpret the statement as a suggestion that they take better control of what they are doing. They may not conceive

effort to be more than doing more of the same thing they have been doing. The construct "effort" in attribution theory cannot be assumed, therefore, to be internal, unstable and controllable without considering developmental level.

Stability of Effort

In this research, Specific Effort, was intended to operationalise "effort level" and General Effort "effort stability" (Covington & Omelich, 1983), otherwise called specific and usual effort by Weiner (1983) and situational and dispositional effort by Stipek and Weisz (1981). As soon as "effort" is differentiated in this way it is obvious that effort may be dispositionally stable and situationally unstable.

Since it was expected that students might have very different or poorly developed conceptions of effort, General Effort was operationalised to focus students' attention on two aspects of effort as perceived by adults. Students were asked to judge their position in the class in regards to completing work and for the carefulness of their work. The teachers were simply asked to rate students on effort and to indicate the basis on which they judged effort. Carefulness and completion were important criteria.

Data from the questionnaires showed a significant within-subjects difference for both Specific Effort and General Effort, so students judged that their effort level AND the stability of their effort were different in different subjects. This suggest that the simple answer is that "effort" is unstable regardless of whether it is task-specific or usual. However, there was considerable intercorrelation between the components of the General Effort variable, Completion and Carefulness of classwork in each subject, for both Form Four and Form One. When results were combined, Specific and General Effort showed significant correlations at both form levels. There were also significant intercorrelations between General Effort scores and Teachers' Effort ratings at both levels. In addition, Specific Effort scores in Form One correlated significantly with Teachers' Effort ratings. Clearly, although students may rate themselves differently for effort, students who are judged by teachers to be more effortful, rate themselves as more effortful than students who are judged to be less effortful. While students may rate their effort in one subject

lower than in another, their effort in both these subjects may still be consistently higher or lower than the ratings of another student. Hence, from the point of view of self, effort is variable; from the point of view of another, such as a teacher, effort may be stable.

The difference in judgments about self and other has been well documented (Fiske & Taylor, 1984; Bandura, 1986). Usually one is aware more of the fluctuations in one's intentions, interest and desire to perform, and so judge oneself as variable, whereas others are judged on more general impressions.

To investigate the dimension of stability from another perspective, Stability of Effort was a variable calculated in the same way as Stability of Ability. There was a greater proportion of students with unstable effort than with unstable ability. There were no significant differences between groups by age and gender but Form Four girls were more stable than Form Four boys. Stability of Effort proved to be a significant contributor to Fourth Form Teachers' Ability ratings in Science, Teachers' Achievement and Ability ratings for Social Studies and overall to Teachers' Achievement and Ability. Unstable effort was associated with better performing students. In Form One, stable effort was a significant contributor to ability ratings on the second group of tasks. So Stability of Effort is a positive characteristic of Form One students who are achieving well but not for Form Four students. The reasons for this rather ambiguous finding may be connected to the issue of controllability of effort.

Controllability of Effort

The controllability of effort variable, like the controllability of ability, is based on the rationale that the ability to make appropriate metacognitive statements indicates awareness of contingencies between different strategies and outcomes. Such awareness is necessary for a sense of control. It proved to be a very effective measure. Control of Effort (SEL) emerged as the only student variable that correlates significantly with all three teacher variables in both Form One and Form Four. It also correlates significantly with students' General Effort ratings in Form One, and with gender (girls give more strategies at both age levels). The regression calculations showed that SEL contributed significantly to Teachers' Ability ratings in Science, and Achievement and Effort ratings

in Social Studies. It also demonstrated its overall important contribution to the Fourth Form combined regression on Achievement, Ability and Effort. In the First Form, SEL contributed significantly to Ability in Task 1, to Achievement and Ability in Task 2 and to Ability ratings overall. Thus, knowledge of appropriate strategies reflects a student characteristic that independently contributes up to 26% of teachers' ratings of a students' ability.

These statistics do not reflect the qualitative difference between useful cognitive strategies and useful metacognitive strategies, but knowledge of the former must contribute to the acquisition of the latter. In First Form, Control of Effort (SEL) correlates significantly with self-effort (SEF) and both SEL and SEF correlate significantly with all the teachers' ratings. So effortful students are those who can state more appropriate strategies. The increased importance of metacognitive ability, as distinct from effort level, to Fourth Form performance level compared to First Form may reflect the increasing efficacy of a sense of being able to control performance outcomes to some extent at least by making strategic choices. By Fourth Form, there is a clear advantage in having a conception of effort that is more than "time-on-task", and a more critical appreciation of how effort can vary in quality as well as quantity. In recent research with seventh-grade students, Pintrich and de Groot (1990) found "that self-regulation was the best predictor of academic performance [and that this] suggests that the use of self-regulating strategies, such as comprehension monitoring, goal-setting, planning and effort management and persistence, is essential for academic performance on different types of actual classroom tasks... " (p. 38).

In summary, their effort level is perceived by students as unstable, but recognised by their teachers as relatively stable. It is not judgment of effort level or the consistency of their effort level that is as important as students' ability to control their effort. For students who cannot provide cognitive strategies, that is, who do not seem aware of ways to control effort, effort may be uncontrollable. Conceptions of effort become qualitatively different as students become more metacognitively aware. Students who are in the highest achievement group at both ages, rate themselves higher on ability and effort and are more metacognitive than students in the lowest group.

Influences of Student Variables on Achievement

The ability to control effort becomes more important for achievement in the secondary school, but the development of this ability begins earlier. Self-evaluations of ability level appear to be the most influential factor in First Form achievement levels. Students who rate themselves highly on ability also rate themselves highly for effort. These students also have significantly more metacognitive awareness than students in the lowest group.

So it can be stated that, in general terms, students who are able are also effortful. The interaction between ability and effort level over years provides students with more or less opportunity to make associations between quantity of effort and outcome, and then quality of effort and outcome. Some students will acquire a reinforcing sense of competence and control in their school achievement. Others may lack this sense of control and, if asked, might attribute their lack of achievement to either low ability or low effort. Contrary to attribution theory which considers attributions to ability in situations of failure as being maladaptive and to effort as adaptive, future motivation for classroom tasks is unlikely to be different for students at the First Form level or earlier. Because ability and effort self-evaluations are likely to be very similar, the degree of difference between them is so small that the choice of one or another is more likely to be a reflection of the most common reason given for failure in the students' social environment than a statement that reflects a conceptualisation of ability as stable and uncontrollable and effort as unstable and controllable. The important influence on later achievement motivation is whether or not they have a sense of control - to increase their ability, and whether they have discovered that effort is more than spending a lot of time doing something and having a strong desire to something well.

In the secondary school, students begin to realise that "ability" may vary between subjects, and adjust their overall self-concept of ability downwards to take into account those subjects that they find more difficult. Ability and effort levels remain highly correlated but it is effort level that becomes more important to achievement outcomes than perceived ability level. Students who have developed more awareness of control of ability through their own choices of performance strategies and self-management

strategies, achieve at a higher level than those without an awareness of control strategies. In the Fourth Form, the students who rated their effort level differently (Unstable Effort) in different subjects achieved significantly higher than those with a stable rating of their effort level. Thus the better performing students exhibit more awareness of differences in quantity and quality of effort - evidence of conceptual development - the ability to make finer distinctions between related concepts.

Age appropriateness of attribution theory

There was considerable literature available that indicated that attribution theory would not be appropriate for use with students under twelve years when this investigation was started. Since then, there have been more reports of development of instruments for measuring achievement attributions and research using elementary school children.

Nicholls had shown that students do not differentiate between ability and effort before the age of twelve. For the attribution model to work, ability and effort must be differentiated, ability conceptualised as an innate capacity that cannot be changed and effort as being under volitional control. Almost all of these students perceive ability as changeable and most can state ways that they can improve their ability. Some students did not give evidence that they knew ways to control effort. These students may have wished to be more effortful, but they may not have had the ability to control effort. Four of the nineteen students interviewed (one low achieving Fourth Form boy and three First Form students) indicated that they may perceive "effort" in terms of whether they were achieving results according to someone else's expectations. Here "effort" seems to be measured by outcomes, which has been found in other research (e.g. Lamb, 1987), and Nicholls and Miller (1984) said was typical of their Stage 1 conception of ability which is most common at age five or six. If students receive comments about effort as descriptive of a product, they may have no understanding that effort is a process that can be controlled.

So for these New Zealand students ability is changeable and effort may or may not be controllable. For some it may not even be a process. Therefore, any causal

attributions they might give for successes or failures cannot be explained using either the two dimensional or the three dimensional Weiner models.

Gender differences

Attribution research has often produced significant gender differences in attributions, especially in research into gender differences in mathematics achievement. The usual finding is that boys tend to make attributions to ability and girls to effort (e.g. Phillips, 1987). Consequently, boys who are failing are more likely to give ability attributions and be more failure-avoidant than girls. The findings of this research provides some illumination on the differences in emphasis and value of boys and girls to ability and effort. It is interesting that boys rate themselves similarly to their teachers, but girls do not, especially the older girls, so that gender becomes an independent predictor of girls' achievement because their ability ratings compared to the boys' are so inaccurate. It is difficult to decide which came first, a competitive need for males to gain status through "ability" or the social expectation that it is important for men to be able, and to be able without effort is particularly desirable. The other side of this coin is that that "ability" is a male issue, and it is "nicer" for girls to be diligent and there are unpleasant consequences for women who are too "smart" (Gilligan, 1982). Whatever the causes the effects are still apparent despite twenty years of advertising that girls CAN do everything.

A feeling of well-being for children under twelve is closely associated with (amongst other things) their self-concept of ability. This research suggests that the Form One students' self-evaluations in relation to achievement were influenced particularly by their self-rating of ability. This had changed in Fourth Form so that it was students' evaluations of effort that best indicated their achievement level. In Fourth Form, the girls are more effortful than boys relative to their ability level and so they are achieving higher when subjects are combined.

Boys may lose out in achievement overall because they do not make as much effort in English and Social Studies as they do in Science. Boys who rate their effort and

ability highly in English and Social Studies also do well in Science, indicating a robust self-concept of ability which allows them to admit to effort. On the other hand, the girls focus on effort and down-play ability, perhaps because of social pressures to be modest or perhaps because of an established belief that it is effort that produces results (Phillips, 1984; Ryckman et al., 1990). It may be that girls get to the developmental stage of perceiving that ability and effort are so interrelated that superior ability enables one to make superior effort and that effort contributes to increases in ability. The ability to be effectively effortful may be more salient to girls than to be clever but lazy - which is a condition available to only a few. Whatever the reasons, ability seems to be the central influence on achievement in First Form and perhaps for boys in Form Four. Effort seems to be the effective influence in Fourth Form achievement and this is dominated by girls.

This suggests a further question that needs to be researched: in this period of increasing participation for women in many areas of tertiary education previously dominated by men, are men becoming increasingly disadvantaged by a desire to be seen to be able without effort, while women are prepared to work harder to ensure success? Evidence, such as more than 50% of students in courses in medicine, law and veterinary science, selected on academic merit now being women, and often carrying off the majority of the prizes on graduation, indicates that there is something, perhaps their attitude to effort, that is giving young women an achievement advantage.

On the other hand, there still remains the consideration that it seems to be important for self-esteem that one has a positive self-concept of one's ability. If a positive self-concept of ability is more likely to be held by males than females, does that mean that females have lower self-esteem, with all that might imply. To look further into that issue, the self-efficacy approach of Schunk (e.g. Schunk & Rice, 1987) or the attribution - self-concept work of Marsh et al. (1984) and Chapman (e.g. Chapman et al., 1986) could prove informative.

Implications for Attribution Theory

This investigation of students' perceptions of their ability and effort in relation to three specific tasks and their general ability and effort levels in relation to their classmates, has shown that the descriptions of the two causal attributions which have most significance to academic motivation, do not carry the same meaning for these New Zealand students. If the same methodology was used with other samples of students of the same ages in other countries, it is probable that similar divergence from the attribution theory definitions would be found.

What now should be investigated is whether New Zealand students really are delayed in achieving Nicholls' "mature" conception of ability, or whether ability and effort never become differentiated but together represent "present capacity compared to others" but that "capacity" is not fixed but "an ever expanding repertoire of skills and knowledge that is increased through one's own instrumental behaviour" (Dweck and Bempechat's description of an incremental conception of intelligence, 1983, p.244).

Attribution theory's interpretation of ability attributions in failure situations as maladaptive, makes sense because it is in accord with the accepted belief in the malignant effects of low self-esteem or low self-concept. However, attributions to lack of ability may not mean that the person giving it is inevitably negatively affected to the extent that it is predictive of future motivation. A person with a robust self-concept can make attributions to lack of ability in some situations because he or she accepts that we all have strengths and weaknesses. Attribution measures cannot distinguish between individuals who are confident enough to admit lack of ability from those who are concerned about their lack of ability.

Attributions to effort are also subject to misinterpretation since they do not distinguish between those who have a conception of effort that includes self-regulation and quality control from those who have a simpler conception of the term, such as doing as distinct from not doing. If students cannot conceive of effort as a process that they can control, attributions to effort may not mean much at all.

Clifford (1987) suggests that the internal dimension of attribution theory should not be seen as a line with ability on one end and effort on the other, but as a continuum,

not necessarily linear and perhaps containing other facets such as mood and "strategy". These results from this exploration of aspects of ability and effort suggest that students' conceptions of ability/effort should be plotted along the control dimension. The control dimension can be seen to be of great importance for secondary students, but it emerges only in later childhood. The basis of the sense of control is being established in childhood as students engage with school tasks and get a sense that they are making progress, that their ability is increasing. This will be more likely to occur if they are encouraged to be task-involved rather than becoming concerned about their relative position in a competitive education system. If they establish the habit of being actively involved with classroom tasks, if only for the reason that they will get into trouble if they are lazy, they will be more likely to get positive feedback from others and to become aware of intrinsic satisfactions from the activity and the accompanying sense of competence. As they reach the stage of cognitive development where they can better differentiate between tasks that they find easier or difficult to do well compared to others, they should then be able to develop a concept of effort that distinguishes between more and less effective actions, and a sense of self-agency, that they are the doers and the learners and the quality of their performance depends on internal initiatives carried through. This investigation has shown that, independent of students' perceived effort and ability level, awareness of effort control strategies is important to achievement for Fourth Form students, and awareness of ways ability can be improved is characteristic of better performing students in Form One.

Older students, such as the college students used by Covington (e.g., Covington & Omelich, 1984a,b) in an achievement attribution research programme, may be still developing their awareness of metacognitive strategies, and some will be more self-critical of their effort-level and effort processes than others. Tertiary students will measure their ability generally from their grades and in specific failure or success situations in relation to the amount and quality of prior effort. Students with a sense of the controllability of effort who are aware of the deficiencies in the quality of their effort will have a different motivational effect than those who only understand effort as a quantity. These latter may conclude that their ability is deficient, and indeed it is if they do not have the ability to control effort.

"Ability" and "effort" are not distinct entities operating independently in performance situations, but together form a "capacity" to perform which is activated by a desire to be actively engaged in demonstrating or acquiring competence, a desire which is enhanced by an increasing sense of control which contributes to self esteem.

Implications for Education

This research has demonstrated the importance of a positive self-concept of ability. However, a positive self-concept of ability does not have to mean that one knows one is more able than others. That is a competitive, ego-oriented point of view. A positive self-concept of ability can mean that one feels confident that one is capable of learning and doing what others ordinarily can do and that one can master skills or bodies of knowledge that are personally important if one goes about it the right way. White (1959) argued that humans are motivated by a need to feel competent, able to function in their environment. A feeling of competency comes from engaging in a task and knowing that improvement is taking place, progress is being made. Harter (1982) proposes that achievement motivation is the product of the energising capacity of feelings of self-worth that come from the interaction of feelings of competency and perceptions of control. A positive self-concept of ability should therefore be defined in terms of feelings of competency and perceptions of control.

It has been argued that perceptions of control come from feelings of self-agency. Related to this is the necessity for children to learn the relationship between cause and effect, not only in material relationships but also to learn the logical effects of their own behaviours on what they do and make, and on others and their relationships with others. This cannot be learned in too regulated an environment, where there are few opportunities to make choices, or in an environment that allows too much latitude so that children are protected from the consequences of their own actions or are not rewarded for accomplishment. So schools must give students the opportunities to make choices and give feedback on effects, especially those that can be praised.

As well as a sense of self-agency, individuals build up a repertoire of behaviours and knowledge that can be selected for use when appropriate to achieve a desired

outcome. To encourage the development of a sense of control, schools should be training students in cognitive and metacognitive strategies. However, as Weinstein (1988) has said, learning about what to do and how to do it, is not enough. Students also have to learn to put that knowledge into practice. The making explicit of the possibility that there are better or worse strategies that can be chosen to accomplish specific tasks on a day to day basis in the classroom, and making clear that the choice of strategy can cause a success or failure, provide valuable opportunities for students to develop an understanding of the nature of effort and control. This focus on strategy in relation to a specific task causes students to be task-focused rather than ego-focused, and pushes them towards taking responsibility for their own learning and behaviour regulation. At the same time, statements, such as "I am dumb" need no longer mean "I have a poor quality brain", but perhaps "I made a bad decision. I forgot to take something into consideration". Similarly, students need no longer be confused when someone tells them to try harder. The teaching of cognitive and metacognitive strategies will make it clear that effort refers to the suitability of the actions taken to achieve a task to a desired quality level. Above all, older students should be encouraged to look at their "executive control processes" (Weinstein, 1988), to check that they know their objectives, to be flexible in their choices of strategies and they should talk about strategies and the conditions where they are appropriate. Students also need exposure to time-management and "mood control" strategies so that they have some defence against internal and external pressures to release control.

Conclusion

This study began with dissatisfaction with attribution theory's definitions of the dimensions of ability and effort and the continued use of Weiner's two dimensional model to explain the different motivational consequences of attributions to ability and effort, especially in situations of failure. It seemed that not only were the characteristics of these attributions inflexible, they were probably wrong for children, questionable for adolescents, and may only apply for those people in the cultural group who believe that

a high score in an I.Q. test is objective evidence that an individual is intelligent. These New Zealand 11 and 15 year-olds perceive ability/intelligence as modifiable, mostly by external agency such as the school, but for some students by attitudes and actions that they themselves can initiate. They judge themselves as unstable in effort but their usual effort levels are relatively stable. Instability of effort judgments is more characteristic of the older students who seem to be gaining increasing awareness that effort can vary in quality as well as quantity. Lack of ability to name control strategies is associated with poor achievement outcomes.

A clear gender difference is apparent in the ability to provide control strategies (girls higher) and in the accuracy of self-ratings of ability (girls lower). This sheds light on attribution research findings that boys are more likely to attribute success to ability and girls to effort. Less able boys also were less likely to make an effort in the lower status subjects (for boys) of English and Social Studies than girls and more able boys.

The key point to note is that ability and effort levels are highly correlated in both age groups, so the significance of an attribution either to ability or to effort is attenuated. Because the younger students have a less differentiated concept of effort, their achievement levels are mostly accounted for by their self-concept of ability. The older students' achievement is mostly explained by their ability to control effort.

At one time, attribution theory seemed to supply an answer for those seeking to assist failing students. Today it seems like wishful thinking that encouraged academics to explore the possibility that an intervention based on simply changing students' attributions could improve motivation and subsequent performance. More recent attempts to assist failing students have demonstrated that it is necessary to teach strategies and to make explicit the efficacy of effort in association with choice of strategies, regardless of perceived ability.

While the basic attributional model would make sense to most people over the age of ten or twelve if it was explained to them, there would soon be disputes or lack of comprehension about the nature of ability and effort and their relationship to success and failure. People undoubtedly vary in their conceptualisation of ability and effort - not just children under twelve. Social groups and language groups have a different understanding of the terms "ability" and "effort" and associated expressions and also vary what they

think is most important or most praise/blameworthy in success and failure situations. The definitions of ability and effort in attribution theory may be in accord with the conceptions of some people but they are unlikely to be generally held by New Zealanders, and especially unlikely to be true of schoolchildren.

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STUDENT QUESTIONNAIRE

APPENDIX A

What do students think about their schoolwork? How much do you think about what you are doing when you are doing school work? Knowing something about this may help students learn.

Some of these questions might be hard to answer because you may never have thought about them, but your answers will help us all understand a little better.

This is not a test. It is a survey to gather information.

Your name is needed to match with the other questionnaires in other subjects but will be coded and all information will remain anonymous.

Name: _____ |__|__|__|

Age: Years _____ Months _____ |__|__|5

Class: _____ |__|__|

Sex: _____ |__| 10

Subject: _____ |__|__|

Teacher: _____ |__|__|

School: _____ |__| 15

1. What was the activity you were doing when I interrupted this class? (You could have been writing, reading, listening, doing a maths problem or a P.E. exercise, etc.) |__|__|

2. How well were you concentrating on that task?
(Circle a number.)

6	5	4	3	2	1	
----- ----- ----- ----- -----						
Not at all	Doing it but not thinking about it or thinking about something else				Fully focussed on task	|__|

(In the following questions, circle YES or NO)

3. Is this a task you can do easily?

YES

NO

4. (a) Is this a task which most people your age can do even if they have never been taught how to do it?

YES .

NO - you need to be taught how to do it.

20

(b) Is this a task that once it is learned you can't get any better at - you will probably do it much the same all your life? (e.g. sitting, counting to ten, riding a bike, folding your arms)

YES

NO - this is something that people can get better at.

(c) Is this a task that you must learn so that you can learn to do other more difficult and important things?

YES

NO - Learning how to do this doesn't help with any other task or skill.

(d) Does this task practice a skill which you will need when you are an adult?

YES

NO

5. Can YOU get better at this task?

YES - How? _____

NO - Why? _____

25

6. Does this task require a particular natural ability?

(Underline any of the following abilities that are necessary for this task and rate your ability level by circling a number.)

Memory:

	6	5	4	3	2	1	
My memory is	|	|	|	|	|	|	|__|
	very poor		poor		good		

Strength:

	6	5	4	3	2	1	
I am ....	|	|	|	|	|	|	|__|
	very weak		rather weak		quite strong		

Physical Co-ordination:

	6	5	4	3	2	1	
I am ....	|	|	|	|	|	|	|__|
	very poorly co-ordinated		rather awkward		reasonably co-ordinated		well co-ordinated

Intelligence:

	6	5	4	3	2	1	
I am ....	|	|	|	|	|	|	|__|
	really dumb		not very clever		reasonably intelligent		very intelligent

Artistic:

	6	5	4	3	2	1	
I am ....	|	|	|	|	|	|	|__| 30
	not at all artistic		a little artistic		quite artistic		very artistic

7. If you were a coach or special tutor, what could you suggest to students that they should be doing if they were really making a big effort to do this task well?

(You should be able to think of at least three things.)

APPENDIX B

Interview Schedule

I want you to think about "intelligence" and "ability".

1. Is "intelligence" the same thing as "ability"?
2. What then is "intelligence"?
3. What is "ability"?
4. If a person is very intelligence, was he or she born that way?
5. If a person is very intelligent, is it because of the things he or she has done or the experiences he or she has had?
6. What is more important in making someone intelligent - what we are born with or what we have done?
7. Can a person do something to make him or herself more intelligent?
8. Can a person do anything to make him or herself less intelligent?
9. Do you think that clever people are good at everything or just very good at some things?
10. Do you think that people who are not very intelligent can be really good at some things?
11. What do people mean when they say to you that you must make more effort or you must try harder?
12. Do you have any method of getting yourself to do something when you really don't want to do it?
If I gave you an essay for homework and you had to do it tonight, what would you do to get yourself to do it?
13. Would you call yourself a "self-starter", or does someone have to push you, or tell you to get going on a task?

APPENDIX C

Letters to Schools

Education Department
Massey University

2nd November 1990

The Principal
Queen Elizabeth College
Rangitikei Street
Palmerston North

Dear Mrs Collett

Following our phone conversation about possible use of three fourth form classes at Queen Elizabeth College for an educational research project, this note is to explain what it is that is required so that you can assess whether this is possible in the light of what is happening in the College for the rest of the year.

The theoretical basis of this study is attribution theory and self-efficacy. I want to find out how students assess some features of school tasks and relate it to their ideas about whether they can or can't do particular tasks and whether and how it is possible for them to improve their ability on those tasks. As well I want to know how they can get themselves to do a task well even if they do not want to do it, in other words, the strategies they know about for initiating and maintaining effort

Three fourth forms with a good range of ability are required. These classes will need to be interrupted in three subjects, English, Maths and Science, while they are all actually doing more or less the same thing. This means that it is less annoying to the class and teacher if they are doing some sort of book work or practical work rather than listening to explication, engaged in discussion, drama or getting feedback on tests.

I will hand out answer sheets to the class and work through it with them. In the first class this may take up to twenty minutes, but should take only about ten minutes for the other two subjects for that class. It is possible to do two classes in one period.

While the class is filling in the questionnaire, the teacher is asked to rate each student for Ability, Effort and Achievement, using a scale of Low, Medium and High which should be very simple for teachers to fill in without needing to check records. Then each teacher is asked to outline the criteria they used to judge "ability", "effort" and "achievement". In practice the teacher can do this at the same time the class is doing the questionnaire, but they may wish to do it later at their leisure.

Some time later I would also like to interview each student briefly about the connection between intelligence and learning, and what they do to get themselves moving when they don't feel like doing something.

If this project does nothing else, it will be an opportunity for the students involved to pay some attention to the different requirements of different school tasks and to exercise their minds in the effort of articulating something they may never have thought about. It may begin a useful process of reassessing their attitudes in regards to their responsibility for their own learning. However, if the students are already aware of the implications of the questions it will serve to reinforce the idea that they can do something about their approach to school tasks and the development of skills.

I appreciate that this is another imposition in a hectic timetable and apologise for the inconvenience, but I would be very grateful if you could squeeze it in so it can be worked on over the summer.

Yours sincerely

Ph.69099 Ext 7906

4th December 1990

The Principal
Queen Elizabeth College
Rangitikei Street
Palmerston North

Dear Mrs Collett

I would like to thank you for allowing me the opportunity of working with your students and staff over four days. In particular I owe much gratitude to Marian Johnson who cheerfully and efficiently organized classes for me, prepared the teachers and introduced us. I thoroughly enjoyed meeting and observing classes 4SH, 4OD and 4WT and wish to thank their teachers, Ms Shaw, Mr Biddick, Ms Barnett, Mr Young, Mr Basha, Ms O'Donoghue, Ms Sortanos and Mr Beaver. There was a pleasant atmosphere in all classes and the students were tolerant of my interruptions and cooperated fully.

Towards the end of First Term next year I will send you a report on the findings, and if appropriate, perhaps I can give some feedback to the students who participated.

As an expression of my appreciation to Queen Elizabeth College I would like you to accept a copy of "The New Zealand Green Guide: A Healthy Lifestyle - For You and the Planet" by Peter Davis and Judith Hodge. It contains local information that should be very useful for a variety of student assignments and research projects.

Yours sincerely

Ph.69099 Ext 7906

10th December 1990

The Principal
Ross Intermediate
Freyberg Street
Palmerston North

Dear Mr Gauld

Thank you for giving me the opportunity to come into Ross Intermediate and meet the staff and students. In particular, I wish to thank Mrs Grant, Mrs Carver and Mr Kearney and their classes who cheerfully assisted me and tolerated my intrusion. The lessons I observed were excellent examples of competent teachers providing valuable learning opportunities to all the students in their classes. The responses of the students indicated high levels of involvement and enjoyment of the activities.

Towards the end of first term next year I should be able to give you a full account of what I have discovered about the students' ideas about ability and effort and the requirements of various school tasks.

In appreciation, I would like to present to Ross Intermediate a copy of the book, "Learning With Databases", which I know will be of particular interest to Mr Kearney, and may be of use to other teachers and students.

Yours sincerely,

Sue Watson.

APPENDIX D

Additional Tables

Appendix D.1

Mean Scores for ad hoc Control of Ability Groups: CANT, CAN 0 and CAN 1/2

Fourth Form

	Mean	S.D.	Cases
Science Self-Effort			
CANT	6.400	1.430	10
CAN 0	4.143	2.340	7
CAN 1/2	5.324	1.314	37
	Anova F = 4.775, df:2, p = .013		
Science Self-Directed Strategies			
CANT	2.200	0.788	10
CAN 0	1.571	1.512	7
CAN 1/2	1.730	1.018	37
	Anova F = .967, df:2, p = .387		
Science Teachers' Effort			
CANT	2.500	0.707	10
CAN 0	2.571	0.535	7
CAN 1/2	1.649	0.676	37
	Anova F = 10.198, df:2, p = .0002		
English Self-Ability			
CANT	3.500	0.577	4
CAN 0	3.286	0.951	7
CAN 1/2	2.581	0.698	43
	Anova F = 5.193, df:2, p = .009		
English Specific Effort			
CANT	3.750	0.957	4
CAN 0	3.429	1.512	7
CAN 1/2	2.209	1.337	43
	Anova F = 4.428, df:2, p = .017		

Note: Form One had 3 students who said they CANT improve on Task 1, and one for Task 3. Smaller scores means higher ratings, except for Self-Directed Strategies (SEL) which is a count of strategies.

English Self-Effort

Appendix D1 continued

CANT	6.500	1.292	4
CAN 0	6.571	1.618	7
CAN 1/2	4.861	1.641	43

Anova F = 4.739, df:2, p = .013

English Self-Directed Strategies

CANT	2.000	0.817	4
CAN 0	1.429	1.618	7
CAN 1/2	1.884	1.051	43

Anova F = 0.544, df:2, p = .584

English Teachers' Effort

CANT	2.000	0.817	4
CAN 0	2.429	0.535	43
CAN 1/2	1.744	0.658	43

Anova F = 3.394, df:2, p = .041

Social Studies Specific Effort

CANT	2.000	1.000	3
CAN 0	2.375	1.408	8
CAN 1/2	3.209	0.989	43

Anova F = 3.575, df:2, p = .035

Social Studies Self-Effort

CANT	5.000	0.000	3
CAN 0	3.625	2.066	8
CAN 1/2	5.674	1.835	43

Anova F = 4.269, df:2, p = .019

Social Studies Self-Directed Strategies

CANT	1.667	2.012	3
CAN 0	2.375	0.916	8
CAN 1/2	2.023	1.080	43

Anova F = .528, df:2, p = .593

Social Studies Teachers' Effort

CANT	3.000	0.000	3
CAN 0	1.500	0.756	8
CAN 1/2	2.116	0.793	43

Anova F = 4.431, df:2, p = .017

Appendix D.2

Mean Scores for ad hoc Control of Ability Groups: CAN 0, CAN 1 and CAN 2

Fourth Form	Mean	S.D.	Cases
Science Teachers' Effort			
CAN 0	2.529	0.624	17
CAN 1	1.697	0.684	33
CAN 2	1.250	0.500	4
Anova F = 11.323, df:2, p = .0001			
English Self-Ability			
CAN 0	3.364	0.809	11
CAN 1	2.563	0.669	32
CAN 2	2.6364	0.809	11
Anova F = 5.111, df:2, p = .010			
English Specific Effort			
CAN 0	3.546	1.293	11
CAN 1	2.469	1.437	32
CAN 2	1.455	0.522	11
Anova F = 7.354, df:2, p = .002			
English Self-Effort			
CAN 0	6.546	1.440	11
CAN 1	5.094	1.748	32
CAN 2	4.182	1.079	11
Anova F = 6.356, df:2, p = .003			
Social Studies Specific Effort			
CAN 0	2.273	1.272	11
CAN 1	3.222	0.929	36
CAN 2	3.143	1.345	7
Anova F = 3.438, df:2, p = .040			
Social Studies Self-Effort			
CAN 0	4.000	1.844	11
CAN 1	5.694	1.737	36
CAN 2	5.571	2.440	7
Anova F = 3.5842, df:2, p = .035			

Appendix E

Coding Criteria for Students' Response Questionnaire

Question 5. Yes = 1, No = 0

Classification of Strategies:

The numbers on the left are the original code numbers. The numbers on the right are as they were finally recorded.

1.	Practise - get quicker, more accurate, do more	.....	1
2.	Listen - more	.....	2
3.	Concentrate - pay attention	.....	3
4.	Revise/study - sic	.....	4
5.	Learn/memorise - more, get better understanding	.....	5
6.	Learn to do more difficult version or apply it	.....	6
7.	Ask teacher	.....
8.	Don't miss school	.....
9.	Experimenting	.....	6
10.	Improve quality - choose better strategy, learn from mistakes	.....	7
11.	Follow instructions	.....	2
12.	Time management - take your time, don't waste time	.....	7
13.	Take more care - write neatly, use a ruler	.....	7
14.	Do it - rather than not do it	.....
15.	Get better understanding of English	.....
16.	Have proper equipment	.....

Reject (don't count) if not a "how", i.e. actionable

e.g. Try, work harder, gain understanding, do your best, by growing older, "because of the skill of your brain and your hand"

Problems:

- Be a bit more accurate.
- Having better judgment.
- Putting things in the right place.
- Process the information.

Question 7.

SEL = number of reasonable self-initiable, managing actions appropriate to doing the task well

EXT = number of statements of external interventions

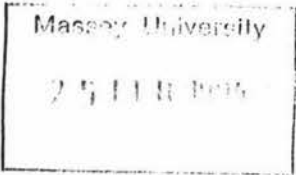
TRY = number of effort or "try" statements

AFF = number of self-efficacy or affect statements

Categories of self-initiated, regulated strategies:

1. Listen
2. Concentrate - focus attention
3. Avoid distractions
4. Remember - think back to previous occasion, previous memorising
5. Think about what you should be doing - being clear about nature of task
6. Think about how you should be doing it - processes involved
7. Be on task - don't muck about
8. Manage time - specific statement
9. Do more - quantity rather than quality statement
10. Other

Problems: Keep it up.
 Be conshus.
 Don't give up.
 Use artistic work.
 Understand.



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Signed *Sheila Watson*

Date *24th February, 1974*

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