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Gender, goals and attributions:
A study of form two and form five students

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For my parents,

Barbara and Spencer Loveridge

Abstract

Gender differences for causal attributions were investigated in an interview, employing a methodology which allowed for the subjective construction of the situation by the student. The questions addressed students' own school work in science and reading. The interviews were conducted with 51 form two students (28 females and 23 males) and 57 form two students (28 females and 29 males).

Predictions regarding differences between males and females were made in terms of goals in learning, causal attributions, and the relationship between goals of learning and attributions. Other variables addressed included students' self-perceptions for performance, views on the function of schools and why people go to school, and their perceptions of the gender-specificity of science and reading, as school subjects.

Overall, there were no consistent significant differences in the responses given by males and females. Form two and form five students differed in the frequency with which they described particular activities as successes and failures.

The discussion of the findings addressed their implications for findings from previous studies that have used rating scales, the proposed role of attributions in mediating gender differences and the implications for future research in the area.

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CHAPTER ONE

Introduction

Although the effects of the unequal participation of males and females in formal education have long been neglected, we are now beginning to document the numerous ways in which school experience may contribute to a sexual division of labour in adulthood (Acker, 1984). Megarry (1984) argues that there are three qualities which characterise females' experience of schooling and consitute it as a problem. Females under-participate both in science and technology-related subjects and in higher education. Females also under-achieve in science and technology-related subjects, and their performance in general 'fades' after an initial promising academic start in primary and secondary schools. Furthermore, females are also under-represented in tertiary colleges and universities, and the decision-making bodies, administrative organisations and curriculum advisory bodies in education, despite their strong representation in the teaching workforce. Research has attempted to explore the dynamics of this phenomenon. Researchers have examined the way in which class, gender and ethnic ideologies have shaped policies and forms of education. Much of this work has attempted to relate patterns of gender education to the structuring of the family and the labour process within a capitalist mode of production (Arnot, 1983; Barrett, 1983). Other researchers have entered at the level of institutions, considering the internal structures and processes of schooling involved in the creation and maintenance of gender and class differentiation (Delamont, 1980;

David, 1984). However, it is not yet clear how the cultural norms which are transmitted and negotiated within schools enter and affect the process of learning.

One theory that has been used to examine the experience of learning and achievement is attribution theory. Attribution theory refers to perceptions and inferences about the causes of behaviour of self or others. It has been argued that causal attributions are systematically related to expectancies for future performance, affective reactions and subsequent achievement strivings (Weiner, 1972).

Research within the attributional framework has not yet clarified the way in which gender differences (see footnote 1) in achievement may be mediated by gender differences in causal attributions. In general, much of the work on gender differences in achievement has involved the integration of females into the research by the so-called 'add-women-and-stir-method' (Bunch, 1979, cited in Renate, Duelli & Klein, 1984, p243). This approach is no longer considered adequate as it fails to recognize the qualitatively different experience of females and males. Maehr and Nicholls (1980) have criticized research within the attributional framework as undertheorized in relation to broader social theory. They argue that the majority of research has been conceptualized on the assumption that when males and females are explaining the causes of success and failure they are explaining the same phemomenon. Questions can also be asked of the validity of research findings where there is such inconsistency between the theoretical framework within which the resarch is conceptualized, and

the methodology used in doing the research. Attribution theory is based on phenomenological principles but researchers have tended to impose a set of causes, rate causes on pre-set dimensions, and define events as successes or failures. Furthermore, there are other issues of methodology that question the applicability and generalizability of the resesarch findings to the dynamics of motivation and learning in a classroom setting. Many studies have been conducted in experimental settings with white middle class university students, using tasks that are not specific to school subjects, and whose pen and paper format emulate the conditions of a test.

The purpose of this research then is to examine gender differences in terms of self-perceptions of achievement in relation to classroom situations. More specifically, the proposed process will allow students to define their own instances of academic success and failure, for which they will then generate their own causal statements. Furthermore, instances of success and failure will be explored both in areas that have historically been considered a 'male domain' and a 'female domain'. The relationship between students' goals in learning and the attributions they use will also be examined. This exploration will be conducted through the use of a structured interview. An interview format should minimize the similarities with the traditional testing situation of pen and paper formats, and allow for clarification of questions and responses.

Footnotes

[1] Much of the literature within the achievement motivation field speaks of 'sex differences'. However as Megarry (1984) argues:

> "Gender refers to the set of meanings, expectations and roles that a particualr society ascribes to sex. Differences due to sex should be stable and appear in all cultures if they are biologically determined. Gender differences, on the other hand vary widely from one culture to another; they may reflect, exaggerate or be quite independent of sex differences" (p17).

In view of these definitions it would seem more appropriate to discuss the differences referred to in the area of achievement motivation as 'gender differences'.

CHAPTER TWO

Review of Literature

In order to contextualise and clarify the issues of the present study, New Zealand education statistics for 1983 will be analyzed, and literature in the fields of attribution theory and achievement motivation reviewed. First, the nature of the participation, and achievement of females and males in the contemporary New Zealand education system will be examined. Second, the Weiner model for an attributional analysis of achievement motivation (Weiner et al., 1971) will be presented and subsequent modifications to the fundemental concepts of the model will be considered. Third, studies that have examined gender and developmental differences in causal attributions will be reviewed. Studies that have considered other variables in conjunction with the attributional model will also be reviewed. Fourth, critiques and reconceptualisations of achievement motivation that address issues beyond the concepts of the attributional model will be considered. Finally, the themes and arguments of the previous four sections will be integrated into a more comprehensive statement of the research problem.

Gender Differences in Educational Participation and Achievement

An analysis of subjects taken by males and females at secondary school, indicates that girls more than boys study in the areas of

languages, humanities, domestic and commercial subjects, and biology (see Table 1). In contrast, males tend to figure as the majority of those specializing in 'hard sciences', technical subjects and agriculture. This pattern of subject differentiation limits girls' choices for further education and access to a wide variety of jobs. The introduction of new technology in the clerical field, resulting in a substantive job loss, coupled with the comparative increase of jobs calling for specialized scientific and technological skills, leaves those females specializing in typing and shorthand, while by-passing science, in a precarious position for future employment (Ryan, 1984).

Table 2 indicates that girls achieve at a higher level than boys, at least up to University Entrance level. Fewer females than males leave with no formal qualifications and slightly more females than males leave with School Certificate, Sixth Form Certificate or University Entrance. However, as is evident in Table 3, the majority of females who knew what they were going to do on leaving school, indicated entering occupations that have been stereotypically defined as female; clerical, sales and related work, and the health services. The majority of these jobs require little or no further training. Although proportionately more females than males indicated going on to further full-time education, females more frequently than males indicated entering technical institutes or community colleges, which have traditionally had a lower status than universities.

Table 1

Subject Taken by All Secondary School Students Showing Percentages of Females and Males in Each Subject as at 1 July 1983

Subjects	Total Number	% of Females	% of Males
Shorthand Typing	7222	98.1	1.9
Clothing and Textiles	18775	94.7	5.3
Typewriting	54324	88.9	11.1
Home Economics	36045	79.3	20.7
Art History	3263	73.5	26.5
Human Biology	2667	71.5	28.5
Design for Living	2474	70.6	29.4
Secretarial and Business Studies	1274	68.5	31.5
Foreign Languages	44398	63.6	36.4
Biology and Biological Sciences	33983	60.5	39.5
Drama	5668	59.0	41.0
Liberal and General Studies	48019	55.7	44.3
Latin and Classical Studies	6979	55.4	44.6
History	22971	55.1	44.0
Health Education	2277	53.3	46.7
Geography	48188	52.5	47.5
Accountancy	20854	51.9	48.1
Computer Studies	12717	51.7	48.3
Maori	13456	50.1	49.9
English	226136	50.0	50.0
Art (Core, Special, Practical)	81596	49.7	50.3
Physical Education	194010	49.2	50.8
Social Studies	9664	49.1	50.9
Science and Alternative Sciences	161095	48.3	51.7
Mathematics	212839	48.2	51.8
Book Keeping	969	44.0	56.0
Maori and Polynesian Studies	7162	42.4	57.6
Horticulture	6161	41.0	59.0
Chemistry	16634	41.5	58.5
Applied Mathematics	5318	35.3	64.7
Workshop Craft	16344	25.7	74.3
Animal Husbandry	322	24.8	75.2
Physical Science	786	25.7	74.3
Physics	590	24.5	75.4
Agriculture	3638	20.0	80.0
Other Technical Options	104	15.4	84.6
Technical Drawing	57548	14.4	85.6
Woodwork	27934	10.4	89.6
Workshop Technology	2982	8.7	91.3
Engineering Workshop	23688	5.8	94.2

Note. Source: 1984 Education Statistics of New Zealand

Table 2

Highest Academic Attainment of Students Leaving All Secondary Schools in 1983, Showing Percentages of Females and Males for Each Attainment

Highest Attainment	Total Number	% of Females	% of Males
Entrance Scholarship	190	21.1	78.9
University Bursary	5488	47.5	52.5
Higher School Certificate	3387	46.9	53.1
University Entrance	8852	57.3	42.7
Sixth Form Certificate Grades	8027	53.5	46.5
School Certificate			
3 or more subjects passed	5458	50.3	
2 subjects passed	3096	52.8	47.2
1 subject passed	3525	52.7	47.3
No Formal National Academic Qualification	18034	44.6	55.4
Total	56057	49.7	50.3

Note. Source: 1984 Education Statistics of New Zealand

Table 3

Intended Destination of Students Leaving All Secondary Schools in 1983, Showing Percentages of Females and Males for Each Destination

Intended Destination	Total Number	% of Females	% of Males
Further Education at:			
- University	6819	44.2	55.8
- Teacher Training			
Attending University Full-time	190	62.1	37.9
Other (including Kindergarten)	408	85.8	14.2
- Technical Institute or Community College	5157	72.0	28.0
- Other Full-time Education	328	60.1	39.9
To Join Labour Force			
- Technical or Professional Work Requiring Further Part-time or Directed Education:			
Health Services	816	92.4	7.6
Technicians - Others	1026	37.4	62.6
- Apprenticeships	4365	15.3	84.7
- Clerical, Sales and Related Work	8926	71.8	28.2
- Production, Service Industries (including Armed Forces), Agricultural and Manual Occupations	11164	32.1	67.9
- No Occupation or Unknown	16860	51.5	48.5

Note. Source: 1984 Education Statistics of New Zealand

Table 4 shows that women now constitute slightly less than half (44.9% in 1983) of all internal university students (see footnote 1). However, there are fewer women (40.5%) than men (59.5%) enrolled in full-time internal courses, and more women (62.6%) than men (37.4%) enrolled in extra-mural courses. A more striking difference in the number of males and females is evident at the post graduate level, particularly in the number of doctoral candidates. Table 5 shows that only 26.4% of doctoral students in 1983 were female. Table 6 indicates that the subject specialisation observed in the distribution of males and females at secondary school is reflected in the distribution of males and females in the same subjects at university. A marked contrast in the distribution of males and females can also be observed in teaching positions at universities. Of all full-time university academic positions in 1983, only 13.5% were filled by women (see Table 7). The only level at which women were not significantly under-represented was that of instructors and demonstrators, where 45.2% of the positions were filled by women. This situation is very different from the virtual absence of women at the professorial level where they constituted only 2.9% of full-time professors.

It is clear from these data that males and females in New Zealand do not participate equally in our contemporary education system. This inequality implies a qualitatively different experience of schooling for males and females. Very little local research however has directly examined this inequality, or indeed conceptualized it as problematic and something to be explained in and of itself.

Table 4

Students on the Books of University Institutions at 1 July 1983, Showing Percentages of Females and Males for Each Category

Category of Student	Total Number	% of Females	% of Males
Internal			
Full-time	33144	40.5	59.5
Part-time	13326	55.9	44.1
Totals	46470	44.9	55.1
External			
Taking Courses at Massey	9673	62.8	37.2
Taking Courses at Own University	370	46.7	53.3
Totals	10043	62.2	37.8

Note. Source: 1984 Education Statistics of New Zealand

Table 5

Courses Taken by Internal Students at 1 July 1983, Showing Percentages of Females and Males for Each Level

Level of Course	Total Number	% of Females	% of Males
Post Graduate:			
- PhD Degrees	1058	26.4	73.6
- Masters Degrees	2452	39.7	60.3
- Bachelors (including Honours)	327	45.6	54.4
- Diplomas, Certificates	1225	45.4	54.6
- Other Courses	735	31.6	68.4
First Degree, Diplomas, Intermediates, Certificates and Other Courses:			
- Bachelors (including Honours)	36244	46.7	53.4
- Diplomas	1503	39.4	60.6
- Intermediate Courses	2434	31.0	69.0
- Certificates	2441	51.0	49.0
- Other Courses	175	54.9	45.1

Note. Source: 1984 Education Statistics of New Zealand

Table 6

Courses Taken by All Internal University Students at 1 July 1983, Showing Percentages of Females and Males for Each Course

Course	Total Number	% of Females	% of Males
Home Science	292	100	-
Education	2284	78.5	21.5
Social Work	347	77.2	22.8
Librarianship	47	74.5	25.5
Arts	12408	66.2	33.8
Music	342	61.4	38.6
Social Sciences	943	60.4	39.6
Fine Arts	296	59.2	40.8
Physical Education	321	57.0	43.0
Pharmacy	116	50.0	50.0
Veterinary Science	458	47.2	52.8
Others	2383	47.0	53.0
Law and Jurisprudence	3624	42.3	57.7
Regional and Resource Planning	95	42.1	57.9
Optometry	65	41.5	58.5
Philosophy (Masters)	83	41.0	59.0
Parks and Recreation	98	37.8	62.2
Medicine	1143	36.5	63.5
Science	7318	33.4	66.6
Commercial and Business Administration	7321	31.8	68.2
Dentistry	244	28.7	71.3
Agriculture and Horticulture	2905	27.6	72.4
Divinity and Theology	110	27.3	72.7
Architecture and Town Planning	801	25.0	75.0
Valuation	117	23.1	76.9
Technology and Food Science	667	21.2	78.8
Forestry Science	147	13.6	86.4
Surveying	110	5.5	94.5
Engineering	2436	5.4	94.6
Mineral Technology	115	4.4	95.6
Total	48594	44.8	55.8
(Adjustment for Students enrolled in more than one course)	2124		
	46470	44.9	55.1

Note. Source:· New Zealand Yearbook 1984

Table 7

Staffing of University Institutions in 1983, Showing Percentages of Females and Males in Each Position

Position	Total Number	% of Females	% of Males
	Full-time Staff		
Professor	373	2.9	97.1
Senior Lecturer	1725	7.7	92.5
Lecturer	121	20.4	79.6
Instructor/Demonstrator	124	45.2	54.8
	Part-time Staff		
Professor	36	-	
Senior Lecturer	409	9.5	90.5
Lecturer	48	41.6	58.4
Instructor/Demonstrator	1134	34.1	65.9

Note. Source: New Zealand Yearbook 1985

Nonetheless, some writers have attempted to explain the reasons for the differential gender participation. Aitken and Rosslyn (1981) examined the politics of resource allocation in education, focussing on the implications for women. They argued that policy choices have reflected the needs of the dominant male, Pakeha elite, and in so doing ensured the maintenance of a subservient class - women. In a structural analysis Ryan, (1984) argued that an explanation for these inequalities can be found in a discussion of womens' role in the family and the division of labour within a capitalist society. She contended that until any changes occur in the broader structures of society, education is powerless to achieve equality of the sexes. Middleton (1984) proposed that Bourdieu's concept of 'cultural capital' (Bourdieu, 1977) can be used to examine the way in which these inequalities are maintained and contested. She has attempted such an analysis of the lives of post-war feminist educators, using a case study approach with oral history procedures. There are also a small but increasing number of papers that have addressed the experience of females in the transition from school to work and some of these make reference to these inequalities (Loveridge, 1985). What has yet to be considered however, is the problem to be addressed here; the impact of gender on the process of learning as it is conceptualized within the attributional framework.

Attribution Theory

Attribution theory originates in Heider's seminal analysis (1958) of how people perceive and explain the causes of events. Heider based

his causal analysis of behaviour on the subjective meaning of the cause to the individual.

> If a person believes that the lines in his palm foretell his future, this belief must be taken into account in explaining certain of his expectations and actions. (Heider, 1958, p5)

He argued that the subjective meaning of behaviour was important for two reasons. First, whether 'true' or not, Heider saw 'commonsense' beliefs as guiding behaviour, and thus having a certain power to predict and explain events. Second, he considered 'commonsense' psychology as relevant for the truths it might contain, arguing that it was a source of knowledge important for 'scientific' psychology (Hewstone, 1983). Consequently, Heider's work has provided a conceptual framework for what has become known as a 'naive analysis of action'; that is, one based on what are held to be common sense assumptions, consciously available to the layperson.

Heider (1958) proposed that there are underlying dimensions to the causes that people use to explain an event. Causes can be distinguished as originating in the environment (external causes) or as inherent to the person (internal causes). In addition, a distinction can be made between causes which vary (unstable causes) and those that remain constant (stable causes). Furthermore, causes can be assumed to be under the conscious control of an individual (intentional causes) or not under conscious control (unintentional causes).

Many of Heider's ideas and concepts continue to constitute major strands in contemporary attribution related research. His work has been important both as a point of reference for current endeavours in

the theoretical analysis of human social behaviour, and in the amount of research it has continued to provoke. Following on from Heider, other researchers in the 1960s and early 70s attempted to formalize and apply attribution theory to a number of fields. Of these, Weiner's, (1971, 1972) have been the most salient in the field of education.

Weiner and his colleagues have been developing a theory of motivation in achievement situations, based on perceptions of causality for success and failure. Attributional analysis of achievement motivation (Weiner, Frieze, Kukla, Reed, Rest & Rosenbaum, 1971) is based on the assumption that affective and cognitive reactions to, and thus behavioural consequences of, achievement outcomes depend on the perceived reasons for outcomes. This initial formulation proposed that individuals generally tend to attribute success or failure to four causes: ability, effort, task difficulty and luck. Two dimensions were proposed to underly these causes. These dimensions were derived from a logical analysis of the properties of the four given causes. The locus of control was considered to differentiate between causes that are external or internal in origin, and the dimension of stability to distinguish between causes that vary over time, and those that remain constant. In this way, ability and effort are both considered internal, originating within the person. But ability is considered not to change with time, and hence is classified stable, while effort is considered variable and consequently is categorized unstable. The model proposes that the dimension of stability affects cognitive changes in expectancy following success or failure, and the dimension of locus of control influences affective responses. Furthermore, it is proposed that attributions mediate performance indirectly via affective

reactions and expectancy, as well as directly (Weiner, 1972).

It is this model which has been the focus of subsequent research on attributional processes in educational contexts. This review will initially concentrate on the reformulation of what might be considered the model's 'conceptual tools': the causes themselves and the dimensions on which these causes can be placed.

Most studies testing hypotheses derived from Weiner's model have focussed on the four listed causes, classified on the two given dimensions (Bar-Tal, Goldberg, & Knaani, 1984). Weiner (1974), however, has noted that there were "a number of deficiencies in the classification scheme" (p6), and pointed to the possibility of using other causes. Some researchers have responded to these deficiencies and provided new and/or different causal explanations that were derived from open-ended pilot data for use in structured questionnaires (Bar-Tal, Goldberg, & Knanni, 1984; Frieze & Bar-Tal, 1980). Others have used open-ended responses to generate coding schemes for use with open-ended measures (Frieze, 1976). A further approach has been a synthesis of categoric schemes that can be used on open-ended data (Cooper & Burger, 1980). Weiner (1983) has more recently argued that there are shortcomings with studies that used the four causes proposed in the 1971 model, and proposes that specific causes are associated with particular kinds of achievement.

Elig and Frieze (1979) examined both open-ended measures and structured measures and concluded that open-ended measures have poorer validity and reliability, but are useful for researchers asking for

causal attributions in a new situation. They suggested that the means by which attributions are measured will depend on the purpose of the study. Elig and Frieze also noted that although there is support for the four causes originally proposed, other factors such as mood, health, interest and fatigue have emerged from open-ended responses. Frieze (1981) has argued that open-ended techniques are used by most researchers wishing to establish the causal explanations used by young children. She proposed that when structured scales are used they should be based on lists generated by open-ended techniques. Frieze has also commented on the need to examine the variance in attributions that could be accounted for by the difference in wording of attribution questions.

The result of these alternative formulations and critiques has been the establishment of a much broader range of causes than was originally proposed. Futhermore, these alternatives have drawn attention to the philosophical and methodological contradictions involved in imposing causes whilst operating within a model based on phenomenological principles.

The 'underlying dimensions' of causal explanations have also been a focus of much debate. Heider postulated three dimensions of causality, but in the model proposed by Weiner et al.,(1971) only two were proposed. Rosenbaum (1972) elaborated on Weiner et al's. model by incorporating the third dimension proposed by Heider that had previously been ignored--the dimension of intentionality. In this way causes such as 'effort' and 'mood', which were both classified as internal and unstable, but which had seemed intuitively different could

be differentiated; effort being perceived as intentional and mood as unintentional. Weiner (1974, 1976) initially accepted this modification, but later argued that the dimension of intentionality had been mislabelled. He (1979) contended that effort differed from mood in that it was subject to volitional control not intentionality. Furthermore, he argued that the dimension previously referred to as 'locus of control' was confusing the elements of two dimensions: the locus of the cause and the control of the cause. Therefore he proposed the dimension previously known as 'locus of control' should be referred to as 'locus' and the dimension of 'intentionality' be more appropriately labelled 'controllability'.

A number of alternative formulations have been proposed. For instance, a fourth possible dimension has been identified by Abramson, Seligman, and Teasdale (1978). It refered to the stimulus generalization, and is labelled 'globality'. Burger and Arkin (1980) argue that controllability has been confused with predictability, and suggest that a fifth dimension of predictabilty should be incorporated into the model. Weiner (1979) cited studies using factor analytic or multi-dimensional scaling procedures as providing evidence for the three-dimensional model. Researchers have subsequently used both the two- and the three-dimensional model. However, it has been argued there is a need to reinterpret earlier work based on the two dimensional model, which in confusing locus and control could have misrepresented the linkages between attribution and affect, and attribution and expectancies (St. George, 1982). This proliferation of dimensions suggests that the process of deriving the underlying properties of the causes is not solely a logical analysis. Perhaps

there is also a subjective aspect to the identification of the dimensions.

There is also another related area of debate associated with the concept of the 'underlying dimensions'. Forsyth and MacMillan (1981) have questioned the appropriateness of researchers assigning causes to dimensions without knowledge of the individual's dimensional interpretation of the cause. Once again, the imposition of underlying dimensions to the causes can be seen as a violation of the basic phenomenological principles of attribution theory. Forsyth and MacMillan asked college students to reflect on the three dimensions of the causes themselves, rather than assuming that dimensions would be reflected in the causes. They also argued that the causes can be located at varying intervals along the dimensional continuum. Clearly, the use of specific causal ratings is problematic. Specific causal ratings cannot convey the position or direction of the cause on the dimensional continuum.

Another study with college age students asked respondents to order attributions on five dimensions (locus, stability, controllability, globality and predictability) on a seven point scale (Chandler & Spies, 1984). They also found that there were differences in the ways in which students rated the various attributions. Bar-Tal, Goldberg and Knanni (1984) have also argued that the meaning of the causes for the individual should be reflected in the dimensional classification of causes by the respondents themselves. Their study with twelve- and thirteen-year old students asked respondents to locate the causes on a five-point scale for locus, stability and controllability. Results

indicated that the individuals do invest the causes with different meanings and that each dimension is viewed as a bi-polar continuum, and not as a dichotomy. Furthermore, Bar-Tal, Goldberg and Knanni (1984) argued that students of this age were able to understand the concept of the dimensions and thus perform the task themselves.

Another aspect of the model that reflects the contradiction between the underlying philosophical principles of the model and the methods used in research based on the model, is the manner in which researchers have imposed their definitions of success or failure on an outcome. Frieze (1981) has addressed this issue, arguing that "attribution researchers need to consider more carefully what they mean by success and to integrate success judgements into the achievement attribution process" (p. 16). As I shall argue later, this is an aspect of the attributional model that has not been considered by those investigating gender differences in causal attributions as a possible explanation for the equivocal findings of studies to date.

Gender Differences in Causal Attributions

Although gender differences were observed in the very early studies of achievement-related attributions (Dweck & Reppucci, 1973; Simon & Feather, 1973), the findings are far from clear-cut. The following review of studies which deal with gender differences outlines the various conclusions that have emerged from different pieces of research, including New Zealand research. Various attempts to clarify the contradictory findings will then be examined.

Some studies have concluded that females more than males tend to make stronger attributions to external causes for success and failure. Simon and Feather (1973) asked university students to rate their ability, amount of preparation, task difficulty and anticipated outcome prior to sitting their end-of-year psychology examination. Two weeks later, on receiving their results, students were asked to rate the contribution of ability, luck, preparation and task difficulty to their examination result. Females rated luck and task difficulty as more important causes than did males. Deaux and Farris (1977) also found that female students more than male students explained their performance outcome on an anagram solution task in terms of luck. A study by Frieze and Bar-Tal (1980) with 9 - 17-year old students examined attributions for hypothetical situations involving a test. Their findings also supported the conclusion that females attribute their successes and failures more externally than males.

Another commonly asserted conclusion from attribution research is that females, more than males, use external causes for success and internal causes for failure. Feather and Simon (1973) asked students to rate the contribution of the task, their ability, their preparation and luck to their performance on a series of anagrams. They found that females who succeeded gave higher ratings to the contribution of task, than did females who failed. Conversely, males who succeeded gave lower ratings to the contribution of task than did males who failed. Bar-Tal and Darom (1979) asked fourth grade students to attribute causality for the grade they had received. They found that girls mainly attributed success to external causes and failure to internal causes.

Nicholls (1975) used an angle-matching task to evaluate the effects of gender on causal attributions. He found that girls attributed their failure to lack of ability more than they attributed their success to good ability. This 'derogatory' bias was not observed in the boys' pattern of responses.

The tendency for females to attribute failure to their lack of ability was also supported by Levine, Reis, Sue and Turner (1976), when they asked students to make causal attributions to ability and luck after completing an anagram task. However, these females also explained their successes in terms of their ability. Male students were more likely than females to attribute their successes to ability and their failures to luck.

New Zealand data are limited but have been interpreted as supporting the suggestion that there is a "more active achievement orientation in boys than girls" (Nicholls, 1980, p268). Nicholls (1980) reported a series of studies with a variety of New Zealand children. In one study involving upper socio-economic status (SES) thirteen year-old children, he found that girls more than boys attributed their success on an angle-matching task to luck (Nicholls, 1975). Another study was conducted with lower SES twelve-year old children based on test outcomes for an exercise requesting students to obtain information on Thailand by studying pictures (Nicholls, 1978a). This revealed that girls were less likely than boys to attribute success to ability, and were more prone to attribute success to luck. In a study with middle-class children, ranging from six to ten years of age that focussed on reading, Nicholls (1979) found that despite higher

perceived and actual attainment, girls more than boys attributed failure to a lack of ability. However, with another group of eight and ten year-old lower SES children, Nicholls (1978a) found that girls were more inclined than boys to attribute their success in reading to good ability, and less inclined than boys to view their failure as a result of poor ability, but rather as bad luck. Boys more than girls attributed their failure to a lack of effort.

Making a break with previous investigations, another New Zealand study (Lawes 1983) focussed on causal attributions for performance in the School Certificate English examination, an event that is of considerable importance in a student's academic career. She found that males and females did not differ when making attributions for success but differed in their attributions for failure. Males made stronger attributions for failure to unstable/external causes and stable/internal causes. However, in a more recent paper Lawes and Chapman (1984) argued that the methodology used to elicit attributional responses, the confirmation of expected outcome and the actual outcome, are all implicated in gender differences in causal attributions.

Generally, these gender differences have been interpreted as showing a distinct tendency for females' attributions to be more external, employ more luck attributions, and in general to rate their ability less highly. However, as more attribution research examines gender differences it becomes increasingly difficult to integrate the disparate findings from studies that have considered many different variables, into such succinct statements. For instance, there are an increasing number of studies that reveal no gender differences.

McMahan (1973) asked students to make paired comparsions of the six possible pairings of ability, effort, task difficulty and luck, after attempting to solve five anagrams. There were no significant main effects for gender. Likewise, Stipek and Hoffman (1980) asked first- and third-grade students to make paired comparisons on the six possible pairings of ability, effort, task difficulty and luck, after an anagram task. The students had been divided into high, average, and low achieving students by their teacher. The only significant gender difference was that boys who were rated low achievers were more likely to attribute failure to low ability than average or high achieving males. This difference was not evident amongst the females.

A meta-analysis of 21 studies examining gender differences in causal attributions for success and failure by Frieze, Whitely, Hanusa and McHugh (1982) indicated that there were no strongly supported gender differences. They made a distinction between studies which asked directly how much each of the various causal attributions was a cause of the outcome, and those that asked how much ability, effort and luck the person had, and how difficult the task was. The former they labelled 'causal wording' and the later 'informational wording'. The authors argued that attributions made in response to informational wording of questions were an indirect assessment of the underlying cause, and are more correctly categorized as asking for information about the situation. Slight support was found for the tendency of women more than men, to attribute failure to luck when the question had causal wording, and for men to make stronger attributions for ability when the question had informational wording. Frieze et al. suggest that perhaps attributional research has failed to reveal strong

consistent findings because important questions about male and female achievement behaviour are being ignored.

Bar-Tal, Goldberg and Knaani (1984) asked twelve and thirteen year-old students to indicate the relative influence of twenty-four causal statements on their received grade in Bible studies. There were no significant differences between the pattern of causal attributions exhibited by males and females. Attributions arising from familiar achievement situations were investigated by Frieze and Snyder (1980) with first, third and fifth grade students. The situations used were an academic examination, a football game, catching frogs in a pond and an art project. These were portrayed in a photograph and presented to the students in an interview situation along with a story about the situation. Interviewers were trained in the Elig-Frieze coding scheme (Elig & Frieze, 1975) and probed when necessary to clarify the exact meaning of the child's response. They found no difference in the overall use of attributions by males and females, and concluded that causal attributions are situation specific.

Some researcher have responded to the task of resolving the disparate findings by considering other variables. Bar-Tal and Frieze (1977) conducted a study with university students who were asked to attribute causality for their performance on a series of anagrams. Their analysis also considered students' level of achievement motivation derived from an administration of an achievement scale prior to the experimental task. They found the only gender difference that was independent of achievement level was for females to rate the causal category of luck higher than males did. Women who rated as highly

achievement motivated showed a strong belief in effort as a cause of success and failure, and they employed more external causal attributions for success than did highly achievement motivated men. In a review of attribution studies, Deaux (1984) observed that many reported gender differences are not generalizable; they are influenced by task characteristics which result in interactions between the subject and the perceived sex-appropriateness of the task. This suggests that studies which examine gender and attributions should take into consideration the specificity of gender socialisation when selecting tasks and/or analyzing responses to tasks.

Dweck and Bush (1976) attempted to conceptualize the nature of gender differences by examining the impact of adult and peer evaluators on the attributions made by fifth grade students for their performance on number problems. Students were randomly assigned to either an adult male, an adult female, a ten year-old boy or a ten-year old girl evaluator. All evaluators followed the same detailed script of questions and feedback, which was pre-recorded. Male and female students responded differently to the different evaluators, both in how they interpreted the feedback and in how it affected their following performance. Girls tended to attribute failure to a lack of ability with the adult evaluator but not with peers, while boys exhibited the reverse pattern, attributing failure to a lack of ability with peers but not the adult evaluator. Failure feedback from adults among girls led to little improvement in performance. However, failure feedback from peers for girls led to immediate and sustained improvement. The opposite pattern was observed for males, with failure feedback from adults improving performance and that from peers leading to no

improvement. Dweck and Bush concluded that males and females learn to interpret and respond differently to feedback from different agents.

In an attempt to further understand this process, Dweck, Davidson, Nelson and Enna (1978) investigated the type of response upon which feedback is typically contingent in the classroom and the effect of different types of feedback on attributions. It was found that girls received more positive and less negative feedback than boys. However, both the type of behaviour that elicited evaluative feedback from teachers, and the nature of the teacher's attribution accompanying the feedback for females, are hypothesized to foster attributions which are charactersitic of learned helplessness. This was not the case for males. Failure feedback that is solution specific is more conducive to children of either sex viewing the feedback as indicative of ability levels, compared with failure feedback which is solution irrelevant. Given that teachers were found overall to be more critical of boys, and to give more diffuse and less discriminative feedback to boys, Dweck et al., argued that it is easier for boys to disregard failure feedback. Conversely, the amount and pattern of feedback for girls is more easily interpreted as indicative of a lack of ability.

Traditionality and achievement level were two additional variables examined with gender and attributions for success and failure on anagram tasks by Weigers and Frieze (1977). They found that females made more effort attributions than males, and also more external attributions. However, these patterns were not evident for the non-traditional females who made more use of ability attributions for both successes and failures.

Eccles (Parsons), Adler and Meece (1984) have argued that more consistent findings might emerge in studies focussing on sex-typed achievement tasks. They asked students to rank the contribution of effort, ability, task difficulty and luck to their performance after a series of anagrams and number problems. Students were also asked after each trial how well they thought they would do on the next problem. On the basis of these expectancy questions students were divided into high and low expectancy groups. The only significant gender difference for ability attributions was for low expectancy females to rate their ability as a more important cause of failure in mathematics compared with high and low expectancy males. Gender differences in effort attributions for mathematics were evident between high expectancy males and high expectancy females. High expectancy males more frequently rated lack of effort as a more important cause of failure. Low expectancy males rated luck as a more important cause of failure in mathematics than high expectancy males and high and low expectancy females. There were no gender differences for attributions made to task difficulty. Eccles et al., (1984) concluded that there was very little consistent evidence of gender differences.

Another factor that has been explored in attempting to further understand these equivocal gender differences is the methodology used to obtain attributions. Parsons, Meece, Adler and Kaczala (1982) used both open-ended and structured rank-order response formats to question students about their performance in mathematics. The open-ended data revealed that boys more than girls, tended to attribute their successes and failures more frequently to effort. On the other hand, girls were more likely than boys to attribute their successes and failures to

skill. In contrast with this, rank-order data indicated that boys more than girls rated ability as an important cause of success while girls saw effort as a more important cause of success. Girls ranked lack of ability as a more important cause of failure than did boys who saw inconsistent effort as a more important cause of failure. There were no other gender differences evident on the other causes provided in the structured questionnaire. The authors concluded that the most consistent effects were those that were non-significant.

Lawes and Chapman (1984) also examined the effect of the methodology used on attributional response patterns. They were interested in the interaction of expectancy confirmation and outcome valence with gender and response format. Causal attributions for School Certificate English examination outcome were investigated using both structured and open-ended response formats. The structured questionnaire took the form of declarative statements of possible reasons for passing or failing School Certificate English, which students rated on a five-point Likert type scale in terms of the contribution made to their own examination outcome. These statements were classified into the two dimensions of locus of causality and stability using Cooper and Burger's (1980) dimensional categorization scheme. The open-ended reponses were coded using the attributional criteria advanced by Cooper and Burger (1980). Each response format revealed a different pattern of responding by males and females. No gender differences were observed in the response pattern resulting from the structured questionnaire, although females were more conservative in their ratings. Open-ended responses revealed only one significant difference, the tendency for females to make teacher attributions more

frequently than males. However, there were interesting interaction effects. Females who failed made more ability and teacher attributions than females who passed. Males who achieved an examination outcome they expected, made more immediate examination-related effort attributions than males who had unexpected outcomes. Females with unexpected results made fewer attributions for typical effort than males with unexpected outcomes. Females with confirmed expected outcomes made fewer attributions to effort than males in this position. However, females who passed unexpectedly attributed immediate effort more importance than males who unexpectedly passed. These authors concluded that "response format, expectancy confirmation and actual outcome are each associated with differential sex effects" (p23).

Although no definitive statement can be made from this review about gender differences in the causal attributions used by students in educational settings, a number of interesting points emerge. First, the majority of studies examined use structured questionnaires that were based on rating scales (Bar-Tal & Darom, 1979; Bar-Tal & Frieze, 1977; Bar-Tal, Goldberg, & Knanni, 1984; Deaux & Farris, 1977; Dweck & Bush, 1976; Feather & Simon, 1973; Frieze & Bar-Tal, 1980; Nicholls, 1975; Parsons, Adler & Meece, 1984; Simon & Feather, 1973; Weigers & Frieze, 1977) or paired comparsions (Levine, Reis, Sue & Turner, 1976; McMahan, 1973; Nicholls, 1978a; Nicholls, 1979; Stipek & Hoffman, 1980). Only two studies used both structured and open-ended questionnaires (Lawes & Chapman, 1984; Parsons, Meece, Adler & Kaczala, 1982), and only one study used interview techniques (Frieze & Snyder, 1980). Thus it would seem that there has been a heavy reliance on structured questionnaires, and little exploration of

other methods of investigating causal ascriptions. The appearance of structured and open-ended questionnaires both have a test-like quality, and students could react to this in ways that have not been taken into consideration. Furthermore, neither structured nor open-ended questionnaires give the opportunity for students to clarify the question asked, or the researcher to clarify the response given.

Second, the majority of these studies have examined causal attributions for performance on anagrams or number problems (e.g.,Bar-Tal & Frieze, 1977; Deaux & Farris, 1977; Dweck & Bush, 1976; Eccles (Parsons), Adler & Meece, 1984; Feather & Simon, 1973; Levine, Reis, Sue & Turner, 1976; Nicholls, 1975; Stipek & Hoffman, 1980). A smaller number of studies examined attributions for hypothesized test outcomes and simulated school work (Frieze & Bar-Tal, 1980; Frieze & Snyder, 1980; Nicholls, 1978a; Weigers & Frieze, 1977). Only a few studies examined attributions for received examination results, school grades, or performances for own past school work (e.g.,Bar-Tal & Darom, 1979; Bar-Tal, Goldberg & Knanni, 1984; Lawes & Chapman, 1984; Nicholls, 1979; Parsons et al., 1982; Simon & Feather, 1973). This heavy use of hypothesized situations, and tasks that are not specific to school subjects, lays open to question the validity and generalizability of statements that can be made from these studies about the ways in which students explain their own academic outcomes. It also questions the validity of statements that are made on the basis of attributions concerning expectancies for future performance, subsequent achievement strivings and affective reactions in the classroom.

On a more positive note, questions are now being asked about the effect of the nature of the task on attributions (Deaux, 1984; Eccles (Parsons), Adler & Meece, 1984; Frieze & Snyder, 1980) and the extent to which the methodology used to investigate perceived causality influences the attributions made (Lawes & Chapman, 1984; Parsons et al., 1982). Although it is apparent that this critique of past research cannot explain the disparity in findings from studies that have examined gender differences in causal attributions, nor, in consideration of the range of other variables that have been considered in these studies, is it possible to speculate about the systematic distortions which could arise from the use of particular methodologies. However, it is evident that the methodology used to gather causal attributions, and the tasks used in the investigation are of crucial importance, and these issues will be addressed by this study.

Developmental Differences in Causal Attributions

Ruble (1980) has suggested that there are many 'moments' in the process of making causal attributions at which developmental factors could enter and affect the predictions of the attributional model. However, the impact of development on each of these 'moments' in the process is not clear because research in this area has not always focussed on the discrete parts suggested by Ruble. Furthermore, there can be a confounding of developmental effects with other variables that impinge upon the attributional process such as other demographic factors, like race, class and gender, other people involved, and the nature of the task concerned (Frieze, 1981). Despite the difficulties

associated with developmental analyses within the attributional framework, some of the research findings have implications for both our understanding of the attributional process, and the refinement of the attributional model itself.

Frieze (1981) reviewed studies investigating the way children of various ages make causal attributions. She summarized the findings as indicating that if the situation is presented in simple terms children as young as four years can use the same causal categories that an adult would. However, it is also evident that with age children become more systematic in their judgements and make finer discriminations.

In an innovative study, Nicholls (1978b) used a film of students working and interviews to examine the development of childrens' causal schemes for effort and ability. He also examined the development of two ability-related perceptions he believed would provide a broader based account of the development of achievement motivation; perception of academic attainment and the understanding that more difficult tasks require ability. The research was conducted with children aged five to thirteen. On the basis of his findings Nicholls proposed that there are four levels of reasoning associated with childrens' conceptions of effort and ability, and that progression through these levels reflects an increasing ability to analyze more logically. At the first level, demonstrated mainly by five and six year olds, effort, ability and outcome are not distinguished from each other. By level two, exhibited predominantly by seven to nine year olds, effort has been distinguished as a cause and outcome as an effect. At level three, generally reflected by ten and eleven year olds, the concept of ability was also

used as a cause, but not systematically. At level four, generally attained between twelve and thirteen years of age, the concept of ability is clearly differentiated from effort and established as a sense of capacity. A significant gender difference was observed in the differentiation of effort and ability at level four whereby females were 'under-represented' amongst those who had attained this level.

Similarly, in another study examining the development of perception of attainment and causal attributions for success and failure in reading, Nicholls (1979) also found support for an increasing differentiation with age between ability and effort. Furthermore, he argued that "the general developmental trend for causal attributions was from less to more logical relations between perceived attainment and attributions" (p97).

Frieze and Bar-Tal (1980) investigated the causal attributions of white middle-class students from fourth, sixth, eighth, tenth and twelfth grades, for a hypothetical test using a structured questionnaire. Students' expectations for and affective reactions to outcomes in various situations were also examined. There were no main effects for grade level but some interaction effects were significant. Younger childrens' ratings of effort and ability were more influenced by the outcome than were older students' ratings. Young children attributed more responsibility to their teacher for both success and failure than older students who blamed the task more for failure. Older children made more use of past performance history and normative history to make attributions.

In a developmental analysis, Harari and Covington (1981) considered both students' evaluations and students' perceptions of teacher evaluations for the performance of hypothetical students. The hypothetical students varied in their effort expenditure, ability and test outcome. The study involved students from first grade through to college. A marked difference was observed in the values attached to effort by young children and by those at junior high school. Effort was perceived by younger children as a predictor of ability, and thus by trying hard they could consider themselves both able and virtuous. However, by junior high school effort was no longer perceived as an assurance of success, and ability was perceived to be a fixed capacity.

Bar-Tal, Ravgad and Zilberman (1981) used an open-ended questionnaire to examine the attributions made by third, sixth, ninth, and twelfth grade students for hypothetical situations of academic success and failure. They found that the total number of causes used by students increased until 14-15 years, and after that students focussed on fewer and more critical causes. The use of internal and unstable causes decreased with age while the use of external causes increased with age. Stable causes increased for those in the 11-15 age group and unintentional causes increased until 14-15 years and then decreased at age 17-18. The use of intentional causes was similar for all age groups. The authors argued that quite clearly there are differences in causal attributions made for success and failure by children in different age groups.

In comparison with the number of studies that have examined gender differences in students' attributions, there have been fewer studies

which have explicitly addressed developmental differences. However, it is evident that a wider variety of methods and situations have been used by those investigating developmental differences. Perhaps the possibility of different experiences and ways of thinking associated with different stages of life has been more apparent to researchers than the possibility of different experiences and ways of thinking associated with gender. What is clear from these developmental studies is that, to some degree, students do use different causal attributions at different ages, and that the information drawn upon by students to make causal attributions also varies with age. The reason for this, disappointingly, remains unclear.

Rosenholtz and Simpson (1984) have provided one possible explanation. They questioned arguments which interpret findings that show variations with age, solely in terms of changes in students' perceptual apparatus and cognitive capacity. They accept that certain cognitive developments are necessary for processes such as the assessment and judgement of the behaviour of self or others, but they argued that developmental explanations do not sufficiently account for findings in this area. Instead they proposed that more satisfactory explanations can be found by viewing changes in the use of concepts such as ability as the formation of social constructs which students learn as they "come to accept a full interpretive model of ability isomorphic with that institutionalized in the larger society" (p39). In this way, attention is directed to the organisation and processes of the classroom, and the consequent interactions and activities of daily school life. This approach could offer insights to findings that are patterned according to other dimensions, such as gender.

Rethinking Achievement Motivation

In the initial section of this literature review, various debates that focussed on the 'internal' conceptualization of the attributional model were outlined. Studies that have examined gender differences and developmental aspects of the attributional process were reviewed and various attempts to resolve some of the equivocal findings through the consideration of the model in conjunction with other variables were examined. However, at a more general level there has also been a questioning of some of the fundemental assumptions associated with the theorization and research of achievement motivation. These contemporary formulations are characterized by a shift from male-biased formulations to a broader conception of achievement and the achievement process for both males and females. Some of this work has implications for the attributional model, and more specifically for the investigation of gender differences in causal attributions. This literature will now be examined. Particular attention will be given to the work of Maehr and Nicholls whose ideas have contributed to the formulation of the hypotheses in the present study.

Parsons and Goff (1980) have criticized previous achievement models in terms of the narrow operationalization of success and achievement goals. More specifically, drawing on the work of Bakan (1969, cited in Parsons & Goff, 1980, p355) they argued that the traditional Atkinsonian achievement model and Horner's (1968) refinement are conceptualized within an 'agentic' perspective, whereby

success is defined by personal achievement resulting from one's own action and attributes. They contend that not only has this directed attention to questions of why women do not achieve in particular areas (rather than looking at womens' achievement as well) but it has also focussed attention on one motive system (the need to achieve) and the achievement of a goal, thus neglecting the process involved. A sex-differentiated value system, as is found in western capitalist societies, could influence both the incentive values attached to various options and the manner in which involvement with a task is approached and structured. Hence, it can be argued that both these aspects need to be examined. Parsons and Goff (1980) proposed that the most serious problem with the traditional achievement model is the limited conception of incentive value as an extension of one's expectations with no real significance, and because of this the model lacks predictive power.

As an alternative conceptualization, Parsons and Goff (1980) draw attention to the other modality of life suggested by Bakan: communion, characterized by "openness, non-contractual cooperation and the sense of being at one with others"(p.365). In contrast with the agentic perspective where achievement of an individual goal is paramount, the communion perspective includes concern with the process of attaining a goal and draws attention to the contributions of other motive systems. Parsons and Goff argued for the necessity to consider people's communal needs as a means to lend more predictive power to the model in terms of career aspirations and life goals for men and women, and reveal intrapsychic values mediating mens' and womens' achievement behaviours.

Kaufman and Richardson (1982) have also criticized previous achievement models. Focussing on the traditional expectancy-value model they argued it is "an academic theory with a narrow conceptual purview, a highly specific frame of reference and inadequate theoretical support" (p.12). As an alternative conceptualization they proposed the notion of the individual as a sentient actor, living in both the public and private spheres, within politically, socially and economically prescribed circumstances. They argued for the need to consider the circumstances and timing of events in one's life as working to sanction certain strategies for accomplishing culturally acceptable goals.

In a paper on gender differences in math achievement Meece, Parsons, Kaczala, Goff and Futterman (1982) presented a general model of academic choice that builds on earlier expectancy-value models of achievement. The model proposes that task value interacts with expectations to influence achievement related behaviour. The framework was developed by Parsons, Adler, Futterman, Goff, Kaczala, Meece and Midgley (in press, cited in Meece at al 1982, p335). It is a model that describes the causal effects of aptitude, socialization, attitudinal and affective factors on subsequent academic choices from a motivational perspective. It contends that achievement expectations and values are "influenced by students' perceptions of their own ability, personal needs and future goals, and by their perception of task characteristics" (Meece et al., 1982, p334). It is assumed that the socializers' beliefs and behaviours, causal attributions, personal achievements and perceptions of appropriate behaviour and goals further influence individual differences in achievement expectations and

values. Task value is also assumed to influence behavioural choice and is conceptualized in terms of the attainment value, intrinsic value, utility value and cost.

Covington and Omelich (1984) also argued for the existence of qualitatively different motivational goals, but with specific reference to classroom goal structure. They examined the effects of task-oriented versus competitive structures on the motivation and performance of undergraduate psychology students over four instructional units. Students were randomly assigned to either a norm-referenced or a criterion-referenced grading condition for the duration of the course. Students were also assigned to either a one-test or a retest condition. But this distinction was counterbalanced across the first and second half of the course, giving all students equal opportunity for repeated testing. On the first mid-term performance they found that those assigned to the mastery condition performed better than those in the competitive condition, but this was due solely to the opportunity to retest. Under these task-oriented circumstances the inital test acted to enhance confidence and grade aspirations. These authors argue that "different classroom goal structures elicit different motivational orientations" (p1047), and thus mediate achievement performance.

In a paper focussing on culture and achievement motivation, Maehr and Nicholls (1980) argued that not only is there a need to redefine achievement in situ, but that such accounts must also consider the function and meaning of the behaviour for the people concerned. They point to the tendency within the attributional analysis of achievement

model, and the culture at large, to define ability and achievement in masculine terms. The vast majority of attribution research has been conceptualized on the assumption that when males and females are explaining the perceived cause of their success or failure they are explaining the same phenomenon. Considering the ways in which gender differentiation is regulated within society this would seem to be a faulty assumption. Maehr and Nicholls proposed that an adequate analysis of causal attributions should start by examining the goals of behaviour before examining the perceived situational and cognitive determinants.

Nicholls (1981) has since proposed an intentional theory of motivation in which it is assumed that individuals are achievement oriented when they are attempting to display their competence either to themselves or others, to improve their competence, or to avoid appearing incompetent. Nicholls postulated that two different conceptions of ability are associated with these different intentions. The existence of two conceptions of ability has been made evident by research on the development of the concept of ability. One concept of ability concerns a gain in knowledge or mastery and is self-referenced. The other implies a hierarchical concept whereby ability is judged with reference to the performance of others. Young children appear to only use ability in the first sense. These different conceptions of ability are similar to those proposed by Crandall (1963) and Veroff (1969). However, Crandall and Veroff were working within the assymetry tradition of gender development which assumed that there would be greater problems for females tham males in establishing a strong motive to achieve (see Kaufman & Richardson, 1982 for a critique of this

tradition).

Nicholls (1981) proposed that different psychological states are associated with the goal of demonstrating the two different conceptions outlined above. Task-involvement describes the state in which individuals are concerned to master or understand something; learning is of value as an end in itself. Ego-involvement refers to the state in which performance is viewed within the hierarchy of the performance of others; learning is of value as a means to an end. Initially children perceive ability to be implied by learning or mastery. However, with the realisation that people may achieve the same performance with a varying amount of effort, the differentiation between effort and ability becomes apparent, and the concept of ability as capacity is established. The full differentiation of ability as capacity is not complete until around 12 years of age (Nicholls, 1978). The negative implications of self-derogatory ability attributions then become more marked.

Nicholls, Jagacinski and Miller (in press) argued that attribution theory applies better in ego- than task-involving situations. In task involving situations individuals do not gauge their competence by reference to a distinction between the contribution of effort and ability. They also argue that attribution theory presupposes finely differentiated conceptions of other factors that young children do not make or hold. In view of these limitations Nicholls, Jagacinski and Miller suggest there is a need to rethink the manner in which attribution theory is currently applied in the investigation of achievement motivation.

Maehr (1983) has proposed a framework for investigating achievement motivation which assumes that as an individual's goal varies so will their behaviour. He argued that a particular situation will be interpreted by individuals in terms of both goals and beliefs and available information. The meaning thus constructed will then determine and mediate the response to an achievement task. Central to Maehr's argument then is the proposal that an investigation of the meaning of achievement will be an examination of the nature and function of goals. A defining feature of goals is that they are essentially associated with an individual's perception of personal success (or failure), and as such they will vary with the situation as well as the individual.

Maehr suggests that it is possible to narrow goals defined as subjective success regularly associated with school achievement to four categories. Following Nicholls (1981), the first two categories are designated 'task' and 'ego' goals. The other two categories, which Maehr considers to be somewhat more arbitarily labelled, are 'social solidarity' and 'extrinsic reward'. Along a continuum of intrinsic/ extrinsic rewards, task and ego goals fall at the intrinsic end, while social solidarity along with extrinsic rewards can be located at the extrinsic end.

Nicholls (1981) and Maehr (1983) have traced the implications of these various goals for achievement behaviour. Task-involved students should select tasks that offer opportunity to realistically challege their ability; that is they will choose tasks for which a standard of excellence is demonstrable, for which the outcome is uncertain and for

which they can take responsibility. For those who are task-involved effort will lead to mastery and increased sense of competence. On the other hand, when ego-involved learning becomes a means of demonstrating superior ability, the attainment of ego-goals is dependent upon being best, or winning. For those who are ego-involved, learning through effort will only imply high ability if others have required more effort to perform to the same level. Ego goal conditions make a sense of competence salient, and hence persons with a low sense of ability will be motivated to either choose a task they will certainly succeed on, or one they are unlikely to succeed on. Perceived ability and intrinsic motivation appear to be positively correlated (Harter & Connell, in press, cited in Nicholls, Jagacinski and Miller, in press.) This implies that those who perceive their ability as high or have high expectations of their ability are more likely to become task-involved. People who are confident of their ability operate at similar levels in both task and ego goal conditions. Those with low self-concepts of ability however, perform better in task-involving conditions and at a similar level to those with high perceived ability (Nicholls, 1981). Evidence from a range of studies support this distinction between ego-involvement and task-involvement (Nicholls, Jagacinski and Miller, in press).

Maehr's (1983) propositions concerning the implications of social solidarity and extrinsic reward goals are more tentative. Very little research has been done in this area. Social solidarity goals refer to achievement-related goals whereby the individual succeeds by gaining social approval. Recognition for faithfulness, or for pleasing, is more important than doing the task for its own sake, or to show that

one is better than someone else. It is proposed that social solidarity conditions induce faithful conformity to the expectations of others, and the acceptance of tasks requiring much effort but little ability. Extrinsic-rewards refers to sub-goals which function to facilitate the attainment of other goals. It would appear that the introduction of extrinsic rewards redefines the goal of behaviour as work (Maehr, 1983). Consequently the surest route is taken to secure the reward, and if there is no reward there is no reason to work. Thus it would seem that risk taking is eschewed, and motivation determined by the probability of success and a concomitant reward.

Ames (1984) investigated the pattern of achievement cognitions elicited by competitive and individual goal structures. She found that children in a competitive situation were more likely to focus on ability attributions, and those in the individual situation focussed more on effort and self-instruction. Gender differences were found; females tended to explain failure or negative outcomes by a lack of ability more than males. Females also made more effort attributions for positive outcomes than males. However, Ames did not comment on the interaction between goal structure, gender and causal attributions, nor did she consider the individual's perception of success and failure.

It can be seen that there has been a move within the field of achievement motivation to broaden the notion of achievement and conceptions of success and failure. It is also evident that there is a greater capacity to entertain the tension that arises from a search for communality and individuality. In part, this has arisen from the recognition that 'appropriate goals' are to a large extent culturally

prescribed. Hence, people who differ in their class, ethnic origin or gender may have different goals and different conceptions of success. At the same time it has been acknowledged that an individual's goals may vary over their lifespan and, even more specifically, within different situations and contexts. Somehow we must allow for the expression of these similarities and variations.

Within attribution theory itself, the narrow and limiting operationalization of goals inherent in the initial model (Weiner et al., 1971) has been discussed. However, it has been proposed by Maehr and Nicholls (1980) that causal attributions and their relationship to achievement motivation might be more adequately investigated by establishing the goals of behaviour before examining the perceived situational and cognitive determinants. In particular the model proposed by Maehr (1983), that builds on this notion, seems a productive method to use to examine the relationship between gender and attributions, and it may offer some insights into the contradictory results that have emerged in this area to date.

Summary:

Although many variables could be studied in terms of gender and causal attributions, the literature indicates that individual learning goals and subject specificity in relation to these goals might prove fruitful meditational elements in gender-based attributions. The unequal participation and achievement of males and females in the New Zealand education system has been outlined, and it was argued that this implied a qualitively different experience of schooling for males and females. Different goals may be associated with these different experiences and these could be subject specific. Weiner et al's., (1971) model of causal attributions was then discussed along with numerous variations of the model that have been subsequently proposed. A central concern evolving from attempts to reformulate the model has focussed on a methodology for examining attributions which does not contradict the underlying phenomenological principles of attribution theory. However, the argument made by Frieze (1983), that researchers defining events as a success or a failure is also a violation of phenomenological principles, does not appear to have been taken seriously by those interested in gender differences in causal attributions. The conditions of many of the investigations of attributions have reflected ego-involving situations, with a pen and paper format and tasks that resemble 'tests'. The implications of this for the attributions made by those taking part in the investigation have also been ignored. Moreover, Nicholls (1978) has been able to document developmental changes in students' conceptions of effort and ability through the the use of interviews. This suggests that interviews could be a productive way to clarify the extent and nature

of gender differences in causal attributions. It is evident that studies which have examined gender and causal attributions have produced contradictory findings, and that there is no strong evidence to suggest that minor alterations to the model will change this. However, the specific nature of the situation used in the investigation of causal attributions, and the possible interaction between the individual and their perceptions of the sex-appropriateness of the task have emerged as factors that should be addressed. Finally, it is clear that different goal strucutres are associated with different classroom experience, and these elicit different motivational orientations. Also, it is evident that we need to be sensitive to both the commonality of experiences, that arise through socialisation, and the differences associated with varying situations and contexts.

It is proposed in this study, that the model outlined by Maehr (1983), which asks students to attribute causality for an event they have defined themselves, combined with questions about student's goals, could provide a productive framework in which to examine some of the issues that have been raised. Furthermore, it is proposed that the interview technique could be an appropriate method to use. In line with these issues, the following questions emerge as being of particular importance:

1. Do males and females have different achievement-related goals in learning?

2. Do males and females select different indicators of academic success and failure ?

3. Do males and females use different causal attributions for achievement outcomes?

4. Are males' and females' attributions subject specific?

5. Is there any relationship between perceived sex-appropriateness of task and attributions?

6. Is there any relationship between the goals held by students and the types of attributions made? If so, is the relationship the same for males and for females, and is the relationship subject specific?

Hypotheses:

Question: Do males and females have different goals in learning?

It is apparent from the examination of New Zealand educational statistics that females underachieve in science and technology subjects, and that although they generally achieve at a higher level than boys up to sixth form, their participation in formal education then decreases. Although one explanation for these inequalities may be found in a discussion of women's role in the family and the division of labour within a capitalist society (Ryan, 1985), the gender-specific aspects of the process of socialization which lead to these inequalities need to be identified. Bakan (1966) proposed two types of

success orientation: agentic: concerned with self-expression, self-protection, isolation, and the need for power or impact on others and, communion: concerned with how the task is done, and having close personal relationships. Parsons and Goff (1980) have subsequently proposed that girls are socialized to be more communal in their success values while boys are more agentic. It can be argued that the notion of 'agentic' appears to correspond well with Maehr's concepts of 'ego' and 'extrinsic reward', and 'communion' with Maher's concepts of 'task' and 'social solidarity' goals (Maehr, 1983). Therefore it is proposed that:

1.1. males more than females will tend to express 'ego' and 'extrinsic reward' goals.

1.2. females more than males will tend to express 'task' and 'social solidarity' goals.

1.3. the hypothesized gender differences concerning the differential distribution of goals will become more marked from form two to form five.

Question: Do males and females use different causal attributions?

From the review of the literature it is apparent that findings of previous studies which have considered the relationship between gender and causal attributions have been equivocal. Furthermore, it has

become apparent that attributions may take on different meanings in different situations; for example, when 'task-involved' effort will lead to mastery and an increased sense of competence, but when 'ego-involved' effort will only imply a sense of competence if others required more effort to perform to the same level (Maehr, 1984; Nicholls, 1981). Likewise, Ames (1984) found that in 'competitive' situations, children were more likely to focus on ability attributions, and those in 'individual' situations focussed more on effort attributions and self-instructions. In response to the emerging differences in meanings of attributions, Nicholls, Jagacinski and Miller (in press) have argued that attribution theory applies better in ego than in task involving situations. These more recent studies point to the difficulty in formulating hypotheses about gender and attributions without knowing how students were involved at the time.

However, Deaux (1984) observed that many reported gender differences are not generalizable; they are influenced by task characteristics. Likewise, Frieze and Snyder (1980) concluded that causal attributions are subject specific. In the examination of the nature of male and female participation in the New Zealand education system it was revealed that females more than males take subjects in the areas of languages, humanities, domestic and commercial subjects, and biology. In contrast, males constitute that majority of students specializing in 'hard science', technical subjects and agriculture. On the basis of these gender differences, it would seem reasonable to propose that:

2.1. In science, males more than females will make more 'interest and involvement' and 'ability and skill' attributions.

2.2. In reading, females more than males will make more 'interest and involvement' and 'ability and skill' attributions.

The present study marks a departure from previous research within the attributional framework in that students were able to define their own successes and failures, and the information was gathered in an interview situation. Taking these innovations into account, it was considered most appropriate to generate a coding scheme that would be informed by previous resarch but based on the responses of students in the present study. For this reason, no specific predictions were made about the relationship between gender and other attributions, such as effort, task difficulty and luck, that have been used in previous research. Nor were specific predictions made about the relationship between gender and the particular use of attributions in situations of success and failure. It was intended however, that these relationships would be examined in the analysis.

Question: Is there any relationship between the goals held by students and the types of attributions made?

Nicholls (1981) and Maehr (1983) have proposed that different psychological states are associated with the process of achieving different goals. They have suggested that when ego-invloved learning

becomes a means of demonstrating superior ability, while those task-involved are concerned to master, and hence effort leads to a sense of competence. Maehr (1983) has also suggested the recognition for faithfulness, such as praise for trying hard, is important for those with social solidarity goals. Ames (1984) found that children in a competitive situation were more likely to focus on ability attributions and those in the individual (mastery) situation focussed more on effort and self-instruction. Therefore it is proposed that:

3.1. Individuals who express different goals will use different causal attributions.

More specifically, it is predicted that:

3.2. Those who express ego goals will use more ability attributions than those who express other goals.

3.3 Those who express task goals will use more effort and self-instructions than those who express other goals.

3.4. Those who express social solidarity goals will use more effort attributions than those who express other goals.

Footnotes

[1] 'Internal' university students refers to those students who are registered as attending courses at the university, in contrast with 'extra-mural' students who are taught at a distance, receiving postings of course materials.

CHAPTER THREE

Methodology

Development of Interview Schedule

From the general discussion about recent developments in the investigation of achievement motivation, and the more specific critiques of attributional analyses, a number of suggestions emerge for a more fruitful method of examining gender differences. Maehr and Nicholls (1980) suggested that a more adequate analysis of causal attributions should start by taking account of the function and meaning of the behaviour for the people concerned. Similarly, Frieze (1981) argued that students' own judgements of success or failure need to be integrated to the achievement process. Subsequently, Maehr (1983) emphasised the subjective side of achievement more specifically by arguing that "it is, finally the subjective construction of the situation by the individual that is of critical importance" (p.90, my emphasis). In a similar vein, Forsyth and MacMillan (1981) argued that it is more appropriate to have individuals locate causes on an interval scale for each proposed dimension, than to have the researcher assign the causes to the dimensions. It was with these suggestions in mind that a basic pattern for this study was established for interview questions concerning personally experienced academic outcomes. This pattern was developed for both success and failure situations and for the subject areas of science and reading. Students were first asked

about a success and then a failure in science, followed by a success and then a failure in reading. It was thought that begining the interview by addressing a successful event would be less threatening for students than begining by talking about a failure. Most curricular areas involve some form of reading, but it was preferred that students would explore events that were formally associated with the curriculum area of reading. Therefore it was considered that the questions might be more comprehensible for the students, and it would encourage them to focus on specific events if they were first addressed to science.

The basic pattern, which comprised three stages, is detailed here with reference to academic outcomes in science (see Appendix 1 for interview schedule). First, students were asked to think of a time when they had done something in science that they thought was successful, and when they had remembered it clearly, to recount the situation to the interviewer. Second, they were asked how they knew that they had been successful. Third, they were asked what the reason was for their success. After answering these questions about a success in science they were then asked the same questions about a time they could remember when it felt like they had failed in science. Next, students were presented with a card with five statements printed on it which described different goals in learning. The statements were also read aloud to the students, and then they were asked to indicate which statement best described the sort of goal they had in learning science. These statements were based on the distinguishing characteristics of the four goals cited by Maehr (1983), and the goal of 'avoiding work' identified by Nicholls, Patashnick and Nolen (in press). The proposed

relationship between the goal of learning and the statement was as follows:

1. Task: when I understand something or learn something new.

2. Ego: when I show people I am clever or do better than other people.

3. Social solidarity: when other people like my work or I please other people.

4. Work Avoidance: when I manage to get out of working.

5. Extrinsic reward: when I get something for what I have done.

Different combinations of the statements were printed on five different cards, with each statement being first on one of the five cards. The order of the cards was rotated so that they were used equally and their presentation to the student was randomized. The pattern of questions outlined above was then repeated for reading. If students gave more than one answer for any of the questions they were asked to identify the most important answer, and this was recorded.

Immediately after each question asking the reason for the success or failure in science and reading, students were asked to locate the causes given on the dimensions of stability, controllability and locus (after Forsyth & MacMillan, 1981). This was done with the aid of a card for each of the dimensions. The cards had the numbers 1 to 5 printed on them horizontally at evenly spaced intervals and a phrase describing the extremes of the dimension printed under the 1 and the 5, for example 'changes' and 'doesn't change'. The bi-polars of each

dimension were explained with reference to aspects of students' experiences; for example, 'something that changes like the weather' and 'something that doesn't change like the colour of your eyes'. Students were asked to indicate on the card where the reason they had just given would be.

Immediately before the final, more general section of the interview section, students were presented with a piece of paper on which thirty circles were printed in a column. This was a slight modification to Nicholls (1979) use of schematic faces; circles were used instead of faces as it was thought that fifth formers would find the faces less age-appropriate. The students were told that the circle at the top of the page represented the person in their class who did the best in science, and the circle at the bottom represented the person who did the worst. They were then asked to indicate on the column of circles where they would be in their science class. This proceedure was repeated to ask students about their performance in reading.

The final section of the interview schedule included some general questions asking students about their views on schooling and their plans for the future. The very last question asked students to locate science and then reading, on a continuum as a male or a female domain. Once again, cards were used to help students conceptualize this. Here, numbers between 0 and 5 were printed horizontally in descending and ascending order, with 0 in the middle and a 5 at each end. The word 'male' was printed under one 5, and the word 'female' printed under the other.

Pilot Study

The interview schedule was trialed in two schools with 11 form 2 and 10 form 5 students. These students were considered by the principals and teachers to represent the range of abililties typically found in regular classrooms. The interviews were taped with a small cassette recorder and students' answers were also written on an interview schedule. After each interview was completed the student was asked if there had been anything that was difficult to understand, and if they could think of questions or options that had been missed out that should have been included. Form five students were also asked specifically if it made sense to be asked about reading. This question was included because it was considered important to ask form two and form five students about the same subject areas. Form two students have a specific curriculum of reading, whereas reading for form five students is interwoven with other curricular areas. Teachers involved with these students were also asked for their comment on the wording of the questions. Two researchers involved in the investigation of achievement attributions had also examined the structure and wording of the interview schedule during its construction.

After careful examination of the interview tapes, responses on the interview schedule, and comments made by students and teachers, it was decided to leave the questions as they were. Form five students and teachers felt that there was enough reading in the English curriculum for fifth form students to relate to the questions concerning reading.

Two additional questions were included in the general section because when asked what they would do when they left school, students had consistently and voluntarily offered information about why they had decided on a particular job, and what their family thought of this. Hence, one question asked students what had made them decide to do what they were going to, and the other asked what their family thought of their choice. Students reported that they did not feel inhibited by the tape recorder. As it had proven very useful to have both the verbal and the written record of the interviews, to clarify and check responses, it was decided to follow the same proceedure for the main study.

Sample Selection

The principals of an intermediate and a secondary school were approached in September, 1984, to request their schools' participation in the study. The nature of the study was outlined, and the pilot form of the interview schedule and a statement of ethical considerations attached. Both principals agreed to their school's participation, and arrangements were then made for the selection of students and the scheduling of the interviews. Both schools were located in regional urban centres, whose economies were based on light industry and rural servicing. It seemed reasonable to assume, on the basis of broader data about the socio-economic composition of these centres, that both school populations would reflect the range of socio-economic classes evident in the New Zealand population, though very high income families are probably under-represented.

The selection of the form five students was achieved by a random sample of all students who were enrolled in both School Certificate English and Science. Where possible, the interviews were scheduled to take place during Physical Education periods, and where this was not possible Study periods were used. The selection of the form two students was achieved through the allocation of two classes to the study. Streaming is not practised at this school and it was believed that these two classes were representative of the school population. In each school the interviews were conducted over a week; form five students were interviewed late October-early November, 1984, and the intermediate students were interviewed mid-November, 1984.

Although 121 students had been selected the final sample was 108 . Sixty one form two students were interviewed but there were ten students who did not provide answers about a success and a failure in both science and reading. These students were withdrawn from the sample, giving a total of 51 form two students of whom 28 were female and 23 were male. Three form five students failed to attend their interviews and because School Certificate examinations were imminent and the timetable was full, these people were not replaced. Therefore, a total of 57 students completed interviews. Of these 57, 28 were female and 29 were male. Table 8 presents a breakdown of the final sample by form level and sex.

Table 8

Breakdown of Total Sample by Form and Gender

Form	Gender	
	Females	Males
Two (N=51)	28	23
Five (N=57)	28	29
Total (N=108)	56	52

There was no significant difference in the proportions of males and females (=.14, df=1, n.s) or form two and form five students (=.32, df=1, n.s) in the final sample.

Introduction of Research Project to Students

Form two students were informed about the study by the author, when she was introduced to each of the classes taking part. The purpose of the research was outlined. It was stressed that their particiaption was voluntary and that the interivew would be confidential. It was checked that the students fully understood these last two points. At the time of the interview, voluntary participation and confidentiality were clarified again. At the introductory meetings the students were also given a letter to give to their parents or guardians informing them about the study and the conditions of the student's participation (see Appendix Two). None of the students declined to take part.

Form Five students were informed about the study by their Dean, at a special meeting of those who had been randomly selected to participate. The purpose of the study was briefly outlined, and it was stressed that student's participation was voluntary, their selection had been random, and that the interview would be confidential. These points were stressed again at the begining of the interview. None of the students declined to take part.

Table 9

Coding Reliability for Open-ended Questions as Percentages of Agreement on Responses

Question	% of Agreement on Responses
Science - Success	
- Activity student described	90.0
- How student knew s/he had succeeded	90.0
- Why student thought s/he had succeeded	90.0
Science - Failure	
- Activity student described	86.7
- How student knew s/he had failed	96.7
- Why student thought s/he had failed	96.7
Reading - Success	
- Activity student described	96.7
- How student knews/he had succeeded	93.6
- Why student thought s/he had succeeded	90.0
Reading - Failure	
- Activity student described	96.7
- How student knew s/he had failed	86.7
- Why student thought s/he had failed	86.7
General	
- Why people go to school	90.0
- What schools should do for people	93.6
- Plans for after leaving school (combined)	96.7
- Reasons for deciding that (combined)	96.7
- Family's view of choice	100.0

Coding of Interview Schedule

Coding categories were formulated for each of the questions on the basis of the responses to 50% of the total interviews. Additional categories were then added whenever a response could not be coded according to the initial categories. All of the interviews were then coded from the written interview schedule, with use being made of the taped responses where an answer was not clear. Another coder who had previous experience in coding attributions was then given training in the use of the specific coding categories. Twenty five per cent of the interviews were randomly selected and these were recoded without knowledge of the intial coding. Reliability was calculated as follows:

$$\frac{\text{number of disagreements}}{\text{number of disagreements and agreements}}$$

Reliability ranged form 86.7% to 100% (see Table 9).

Analysis

Before proceeding with the analysis, some of the categories were combined in the coding schemes for the questions about (1) how students knew they had been successful or failed, and (2) what students thought the reason was for their success or failure. It was considered that a number of these coding categories reflected a common theme and that a more powerful analysis could be made if those categories were merged.

In order to achieve this recategorization the author established criteria for the proposed combined categories. These criteria were formulated in consideration of previous research in the area of achievement motivation, and the original categories generated to code responses to the specific instances of success and failure in science and reading explored by students in this study. Two researchers actively involved in the area of achievement motivation, and the author, then separately categorized the initial coding categories, according to the given criteria, into the new categories. These three recategorizations were then compared, and where there was disagreement the various options were discussed until a consensus was reached. The rationale and the criteria for the new categories are provided below.

Standards Used to Describe Success and Failure

It is apparent from themes commonly expressed in the works of Frieze, Francis and Hanusa (1981), Nicholls (1983) and Ames (1984) that, at a very basic level, two fundamentally different standards for defining success and failure can be discerned. One standard focusses on the intrinsic qualities of the individual's involvement in and completion of the task, and the other has the external standards set by others' performances or expectations as its reference point. The former is represented as reflecting a relatively subjective viewpoint of success and failure, and the latter as a more objective and self-aware viewpoint. For the purposes of this research the former has been labelled 'internal standard' and the latter 'external standard'. More specifically, the nature of these standards can be differentiated by their particular dimensions, as follows:

Internal standard:

-involvement and interest
-notions of mastery and understanding
-completion of task
-effort expended

External standard:

-praise received from others
-performance in relation to others
-'objective' indicators of success or failure imposed by others

Attributions Used to Explain Success and Failure

The following categories were formulated on the basis of the responses students generated, and coding schemes used in previous research (Ames, 1984; Bar-Tal, Goldberg & Knanni, 1984; Copper & Burger, 1980).

Involvement and interest: statements reflecting individuals' involvement and interest in the activity for which the outcome is being explored.

Strategies and self-instructions: statements about the specific strategies used, or not used, which contributed to the outcome of the activity being explored.

Effort: general statements about the amount of work and trying that contributed to the outcome of the activity being explored.

Task itself: statements about the way in which the nature of the task itself may have contributed to the outcome of the activity being explored.

Ability and skill: statements about the way in which the individual's abilities or skills in this area may have contributed to the outcome of the activity being explored.

Other people: statements about the way in which other people may

have contributed to the outcome of the activity being explored.

Miscellaneous: those statements which did not fit the above categories but which did not form a category themselves.

After the responses were recategorized the analyses proceeded. The hypotheses were tested using a chi-square test of independence, with an acceptance level of five per cent. A chi-square test of independence was also used to examine the differences in various group responses, about which hypotheses had not been formulated, but which were of interest. The only exception to the use of the chi-square test of independence was when the frequency with which the total sample of students used internal and external standards was examined using a chi-sqaure one-sample test. In line with the arguements put forward by Camilli and Hopkins (1978), and Conover (1974), hypotheses which involved expected cell frequencies less than five were not tested.

Analyses have not been reported for the questions concerning the underlying dimensions of the causal attributions, students' plans for their future education and employment, and their families' reactions to these plans. These analyses, and the relationship between these variables, and the variables addressed by the present study will be reported in subsequent reports.

CHAPTER FOUR

Results

Data pertaining to the hypotheses will be considered within a more general examination of students' explorations of success and failure in science and reading. This examination will parallel the order of the questions in the interview schedule, first considering the responses concerning outcomes in science and then those concerned with outcomes in reading. This will be followed by a synopsis of the main features of students' responses to these questions, which will also consider the relationship between the responses given for the two subject areas. Next, a summary statement about the hypotheses, intergrating the material from questions about science and reading will be presented. In the second section of the results, some of the responses to the more general questions will be considered. These questions addressed other variables which were considered to be potential mediators of goals and attributions along with gender and subject area. Hypotheses were not formulated about these variables.

So that the results might be reported more clearly, use has been made of two supplementary appendices. Appendix Three contains supplementary tables of chi-square values. Chi-square values which have a bearing on the hypotheses, or which revealed significant differences are also presented within the text. Appendix Four contains tables showing a more detailed breakdown of the data within the main text, which have been analyzed in terms of gender. In these tables the

data are presented for males and females at each form level.

Success and Failure in Science

Activities described as successes and failures in science

It can be seen from Table 10 that overall 'an experiment' was the most frequently described success in science and 'a topic' the most frequently described failure. However, it is also evident that there were significant differences between the activities described by form two and form five students as times when it felt that they had been successful or failed. Form two students more frequently than form five students described 'a topic' as a success (χ^2=3.92, df=1, $p<.05$) and failure (χ^2=5.36, df=1, $p<.05$). Form five students more frequently than form two students described a performance on 'a test or exam' as a success (χ^2= 11.7, df=1, $p<.001$) and failure (χ^2= 19.7, df=1, $p<.001$). The only significant difference in the activites related by males and females as successes and failures was that females, more frequently than males, described 'an experiment' as a time when it felt like they had failed (χ^2= 5.4, df=1, $p<.02$).

Table 10

Activities Described as Successes and Failures in Science, Showing Percentages of Responses for Gender and Class Groups

Group		Activity: A Topic	An Experiment	A Test/ Exam	Written Work
			Successes in Science		
Gender					
Females	(N=56)	30.3	41.1	19.6	9.0
Males	(N=52)	40.4	38.5	13.4	7.7
Class					
Form 2	(N=51)	47.1	33.3	5.9	13.8
Form 5	(N=57)	24.6	45.6	26.3	3.5
Total					
All	(N=108)	35.2	39.8	16.7	8.4
			Failures in Science		
Gender					
Females	(N=56)	41.1	26.8	23.2	9.0
Males	(N=52)	59.6	7.7	25.0	7.6
Class					
Form 2	(N=51)	66.7	17.6	2.0	13.7
Form 5	(N=57)	35.1	17.5	43.9	3.6
Total					
All	(N=108)	50.0	17.6	24.0	8.4

Table 11

Standards Used to Describe Successes and Failures in Science, Showing Percentages of Responses for Gender and Class Groups

Group	Standards	
	Internal	External
	Successes in Science	
Gender		
Females (N=56)	51.8	48.2
Males (N=52)	63.5	36.5
Class		
Form 2 (N=51)	51.0	39.0
Form 5 (N=57)	63.2	36.8
Total		
All (N=108)	57.4	42.6
	Failures in Science	
Gender		
Females (N=56)	64.3	35.7
Males (N=52)	51.9	48.1
Class		
Form 2 (N=51)	62.7	37.3
Form 5 (N=57)	54.4	45.6
Total		
All (N=108)	58.9	41.1

Standards used to evaluate success and failure in science

The total number of students was fairly evenly split between those who used an internal standard and those who used an external standard to describe how they knew they had succeeded in science (see Table 11; $\chi^2 = 2.6$, df=1, n.s). Similarly, students were distributed fairly evenly between those who used an internal and an external standard in describing how they know they had failed in science ($\chi^2 = 2.3$, df=1, n.s). There was no significant difference in the standard used by males and females or by form two and form five students to describe how they knew they had succeeded or failed in science (see Appendix 3, Table A).

Attributions given to explain success and failure in science

As can be seen from Table 12, there were three main categories of attribution statements given by students to explain their success in science: 'interest and involvement' (22.2%), 'strategies and self-instructions' (28.7%) and 'effort' (28.7%). Failure in science was most frequently ascribed to the categories of 'strategies and self-instructions' (20.4%) and 'effort' (36.1%).

To ascertain if there was any relationship between the activity described as a success or failure and the attribution used to explain the outcome, chi-square analyses were performed (see Table 13 and Appendix 3, Table B). Due to the small size of many of the cells, this calculation was only made for the three most frequently given attributions, for the two most frequently described successes and

failures. In the case of successful outcomes, students made more frequent attributions to 'strategies and self-instructions' in explaining why their experiment was successful, than did those explaining why the topic they had covered was successful (χ^2=4.1, df=1, p<.05). There was no significant difference in the use of the categories of 'interest and involvement' and 'effort' by those explaining successful experiments or topics covered (see Appendix 3, Table B). The two most frequently described failures in science were 'a topic' and 'a test or exam'. There was no signifcant difference in the use of 'strategies and self-instructions', 'effort', or 'skill and ability' attributions to explain these failures (see Appendix 3, Table B).

Hypothesis 2.1 predicted that males more than females would make attributions for outcomes in science to 'interest and involvement' and 'skill and ability'. A significant difference was found in terms of interest and involvement (χ^2=5.0, df=1, p<.05). Males made more attributions for success in science to 'interest and involvement', than did females. However, this difference was not observed in males' and females' explanations of their failures in science (χ^2= .17, df=1, n.s.). Due to the small numbers of students who attributed causality for success in science to 'ability and skill' analyses were not performed. There was no significant difference in the numbers of males and females who attributed failure in science to 'ability and skill' (χ^2 = .64, df=1, n.s.). Hence hypothesis 2.1 can be said to be partially supported in relation to attributions for success but not for failure.

Table 12

Attributions Used to Explain Success and Failure in Science, Showing Percentages of Responses for Gender and Class Groups

Group	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
			Successes in Science				
Gender							
Females (N=56)	12.5	32.1	32.1	5.4	5.4	8.9	3.6
Males (N=52)	32.7	25.0	25.0	1.9	7.7	3.8	3.8
Class							
Form 2 (N=51)	27.5	31.4	27.5	3.9	9.8	-	-
Form 5 (N=57)	17.5	26.3	29.8	3.5	3.5	12.3	7.0
Total							
All (N=108)	22.2	28.7	28.7	3.7	6.5	6.5	3.7
			Failures in Science				
Gender							
Females (N=56)	8.9	23.2	32.1	1.8	-	19.6	14.3
Males (N=52)	11.5	17.3	40.4	3.8	-	13.5	13.5
Class							
Form 2 (N=51)	15.7	17.6	29.4	5.9	-	15.7	15.7
Form 5 (N=57)	5.3	22.8	42.1	-	-	17.5	12.3
Total							
All (N=108)	10.2	20.4	36.1	2.8	-	16.7	13.9

Table 13

Attributions for Outcomes of Particular Activities in Science, Showing Percentages of Attributions Used for Each Activity

Activity		Attributions						
		Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
Successes in Science								
Topic	(N=38)	34.2	18.4	28.9	5.3	7.9	5.3	-
Experiment	(N=43)	14.0	44.2	14.0	4.7	7.0	7.0	9.3
Test or Exam	(N=18)	11.1	11.1	61.1	-	5.5	11.1	-
Written Work	(N=9)	33.3	33.3	33.3	-	-	-	-
Total	(N=108)	22.2	28.7	28.7	3.7	6.5	6.5	3.7
Failures in Science								
Topic	(N=54)	18.5	16.7	31.5	5.6	-	14.8	13.0
Experiment	(N=19)	-	52.6	15.8	-	-	10.5	21.1
Test or Exam	(N=26)	-	11.5	57.7	-	-	23.0	7.7
Written Work	(N=9)	11.1	-	44.4	-	-	22.2	22.2
Total	(N=108)	10.2	20.4	36.1	2.8	-	16.7	13.9

More generally, there were no differences in males' and females' use of the other major causal categories of 'strategies and self-instructions' and 'effort' in ascribing causality for success or failure in science (see Appendix 3, Table C). Likewise, there were no significant differences in form two and form five students' attributions for success and failure (see Appendix 3, Table C).

Goals of learning in science

Students' responses to the various options provided in the question asking about their goals in learning science are shown in Table 14. The majority of students (73.1%) indicated that their goal in learning science was to 'understand something or learn something interesting', reflecting a 'task' orientation. As a consequence, the cell sizes for the other goals, when broken down by class and by gender, were very small. Hence, analyses were not performed to test hypotheses 1.1, 1.2, and 1.3.

More generally, with one exception, there were no significant differences in the distribution of responses made by males and females, or by form two and form five students across the two most frequently choosen, and statistically examinable, goal catogeories of 'task' and 'ego' (see Appendix 3, Table D). This exception was that form two students more frequently than form five students expressed the goal of 'social solidarity ' in learning science ($\chi^2 = 6.1$, df= 1, $p < .02$).

Table 14

Students' Goals in Learning Science, Showing Percentages of Responses for Gender and Class Groups

Group		Goals				
		Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
Gender						
Females	(N=56)	76.8	3.6	7.1	1.8	10.7
Males	(N=52)	69.2	7.7	15.4	1.9	5.8
Class						
Form 2	(N=51)	60.8	5.9	19.6	.9	11.8
Form 5	(N=57)	84.2	5.3	3.5	1.8	5.3
Total						
All	(N=108)	73.1	5.6	11.1	1.9	8.3

Table 15

Attributions Used to Explain Success and Failure in Science, Showing Percentages of Attributions Used for Each Goal

Goal		Attributions						
		Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
				Success in Science				
Task	(N=79)	24.1	27.8	24.1	5.1	6.3	7.6	5.1
Ego	(N=6)	-	66.7	33.3	-	-	-	-
Social Solidarity	(N=12)	41.7	16.7	25.0	-	16.7	-	-
Work Avoidance	(N=2)	-	-	50.0	-	-	50.0	-
Extrinsic Reward	(N=9)	-	33.3	66.7	-	-	-	-
				Failure in Science				
Task	(N=79)	10.1	21.5	31.6	3.5	-	20.3	13.9
Ego	(N=6)	-	16.7	50.0	16.7	-	16.7	-
Social Solidarity	(N=12)	25.0	25.0	33.0	-	-	-	16.7
Work Avoidance	(N=2)	-	-	100.0	-	-	-	-
Extrinsic Reward	(N=9)	-	11.1	55.6	-	-	11.1	22.2

It can be seen from Table 15 that there was very little difference in the attributions used by those students expressing different goals to explain success and failure in science. A large proportion of all students (63% or more), regardless of the goal they expressed, explained their success and failure in science with reference to the causal categories of 'interest and involvement', 'strategies and self-instructions' and 'effort'. The only exception to this was the two students who expressed 'work avoidance' as a goal, who both referred to 'effort' as the cause of success in science and 'effort' and 'ability and skill' as the causes of failure.

Hypothesis 3.1 proposed that individuals who expressed different goals would use different causal attributions. More specific predictions were made to test this. Hypothesis 3.2 predicted that those who expressed ego goals more than those who expressed other goals would attribute outcomes to 'ability and skill'. However, none of the proposed relationships between the goals and attributions were analysed because of the small cell sizes involved.

Success and failure in reading:

Activities described as successes and failures in reading

It can be seen from Table 16 that students talked about a variety of reading-related activities when describing successes and failures in reading. Overall, 'reading a book' was the most frequently described success and failure, followed by 'written work'.

Table 16

Activities Described as Successes and Failures in Reading, Showing Percentages of Responses for Gender and Class Groups

Group	Reading a Book	Book Review	Questions on a Book	Reading to Others	A Play	Poetry	Written Work	New Words Punctuation	A Test/ Exam
	Activity								
Successes in Reading									
Gender									
Females (N=56)	28.6	3.6	12.5	10.7	5.4	3.6	26.8	5.4	3.6
Males (N=52)	42.3	11.5	3.8	1.9	11.5	1.9	21.1	-	5.8
Class									
Form 2 (N=51)	31.4	11.8	13.7	13.7	-	5.9	17.6	2.0	3.9
Form 5 (N=57)	38.6	3.5	3.5	-	15.8	-	29.8	3.6	5.3
Total									
All (N=108)	35.2	7.4	8.3	6.5	8.3	2.7	24.1	2.8	4.6
Failures in Reading									
Gender									
Females (N=56)	34.0	1.8	5.4	8.9	12.5	8.9	17.9	1.8	8.9
Males (N=52)	46.2	3.8	3.8	5.7	7.7	5.8	7.7	-	19.2
Class									
Form 2 (N=51)	51.0	3.9	9.8	13.8	9.8	-	17.6	-	3.0
Form 5 (N=57)	29.8	1.8	-	1.8	17.5	14.0	8.8	1.8	24.6
Total									
All (N=108)	39.9	2.8	4.7	7.4	10.2	7.4	13.0	.9	13.9

However, there were some significant differences in the frequency with which form two and form five students focussed on particular activities when describing times when it felt that they had failed. Form five students more frequently than form two students described work related to 'a play' (χ^2=6.4, df=1, p<.02) and performance on 'a test or exam' (χ^2=9.9, df=1, p<.01) as times when it felt that they had failed in reading. There were no significant differences in the events related by males and females as successes or failures in reading.

Standards used to evaluate success and failure in reading

Students were fairly evenly divided between those who described knowing that they had succeeded with reference to an 'internal' standard (58.7%), and those who refered to an 'external' standard (41.3 %, χ^2 = 3.0, df=1, n.s.) (see Table 17). However, there was a significant difference in the type of standard used by students when describing how they knew they had failed (χ^2=19.58, df=1, p<.001). As can be seen from Table 17, an 'internal' standard was used more frequently (71.3%) than an external standard (28.7%). However, there was no significant difference in the standard used by males and females or form two and form five students in describing their successes and failures in reading (see Appendix 3, Table A).

Table 17

Standards Used to Describe Successes and Failures in Reading, Showing Percentages of Responses for Gender and Class Groups

Group	Standards	
	Internal	External
	Successes in Science	
Gender		
Females (N=56)	55.4	44.6
Male (N=52)	61.5	38.5
Class		
Form 2 (N=51)	58.8	41.2
Form 5 (N=57)	57.9	42.1
Total		
All (N=108)	58.3	41.7
	Failures in Science	
Gender		
Females (N=56)	69.6	30.4
Males (N=52)	73.1	26.9
Class		
Form 2 (N=51)	68.6	31.4
Form 5 (N=57)	73.7	26.3
Total		
All (N=108)	71.3	28.7

Table 18

Attributions Used to Explain Successes and Failures in Reading, Showing Percentages of Responses for Gender and Class Groups

Group	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
Successes in Reading							
Gender							
Females (N=56)	33.9	10.7	19.6	17.9	7.1	10.7	-
Males (N=52)	36.5	9.6	28.8	15.4	1.9	7.7	-
Class							
Form 2 (N=51)	31.4	15.7	21.6	15.7	5.9	9.8	-
Form 5 (N=57)	38.6	5.3	26.3	17.5	3.5	8.8	-
Total							
All (N=108)	35.2	10.2	24.1	16.7	4.6	9.3	-
Failures in Reading							
Gender							
Females (N=56)	16.1	16.1	14.3	25.0	3.6	21.4	3.6
Males (N=52)	11.5	13.5	19.2	26.9	3.8	17.3	7.7
Class							
Form 2 (N=51)	13.7	15.7	11.8	33.3	5.9	11.8	7.8
Form 5 (N=57)	14.0	14.0	21.1	19.3	1.8	26.3	3.5
Total							
All (N=108)	13.9	14.8	16.7	25.9	3.7	19.4	5.6

Attributions used to explain success and failure in reading

Students attributed success and failure in reading to different sets of causal categories (see Table 18). Success was most frequently explained with reference to 'interest and involvement' (35.2%) and 'effort' (25.9%). In contrast with this, failure was more frequently attributed to the 'task itself' (25.9%) and 'ability and skill' (19.4%). Overall, students' explanations for failure were more evenly spread across the various categories than they were for success.

Table 19 shows the distribution of attributions used to explain success and failure in reading, across the various activities described as successes and failures. Chi-squares were computed for the three most frequently given causes for the two most frequently described successes and failures in reading. In the case of successful outcomes in reading, students made more attributions to 'effort' to explain success at written work, than they did to explain success in reading a book (χ^2=5.24, df=1, p<.05). However, more attributions were made to the 'task itself' to explain success in reading a book than to explain success in written work (χ^2=5.90, df=1, p<.02). There was no significant difference in the use of the category 'interest and involvement' to explain success in either of these activities (see Appendix 3, Table B). The two most frequently described failures in reading were 'reading a book' and 'a test or exam'. Students made more attributions to the 'task itself' to explain a failure in reading a book, than to explain failure at a test or exam (χ^2= 4.5, df=1, p<.05). Analyses were not performed to examine the use of the causal categories of 'interest and involvement' and 'strategies and self-instructions'

because of small cell sizes.

Hypothesis 2.2 predicted that females more than males would make attributions for outcomes in reading to 'involvement and interest' and 'skill and ability'. There was however, no difference in the use made of either of these categories by males and females in explaining success ('interest and involvement': χ^2 =.05, df=1, n.s.; 'ability and skill' : χ^2 =.15, df =1, n.s) or failure ('interest and involvement': χ^2=.38, df=1, n.s; 'ability and skill': χ^2 =.23, df=1, n.s.) in reading. Hence, hypothesis 2.2 was not supported.

More generally, there were no significant differences in the categories offered by males and females in ascribing causality for success and failure in reading (see Appendix 3, Table C). Similarly, there was no significant difference in the explanations given by form two and form five students for success and failure in reading (see also Appendix 3, Table C).

Goals of learning in reading

Students most frequently indicated that their goal in reading was 'to understand something or learn something interesting' (62.0%), reflecting a 'task' orientation. The next most frequently indicated goal reflected an orientation toward 'social solidarity' (16.7%) (see Table 20).

Table 19

Attributions Used to Explain Success and Failure of Particular Activities in Reading, Showing Percentages of Attributions Used for Each Activity

Activity	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
Successes in Reading							
Reading a Book	44.7	2.6	13.2	31.6	5.3	2.6	-
Book Review	12.5	37.5	37.5	12.5	-	-	-
Questions on a Book	30.8	15.4	15.4	15.4	-	23.1	-
Reading to Others	14.3	14.3	42.8	14.3	14.3	-	-
A Play	66.7	-	11.1	11.1	11.1	-	-
Poetry	66.7	-	-	-	-	-	33.0
Written Work	26.9	15.4	42.3	3.8	-	11.5	-
New Word/Punctuation	-	-	33.3	-	33.3	33.3	-
A Test/Exam	37.5	12.5	-	25.0	-	25.0	-
Failures in Reading							
Reading a Book	14.6	12.2	9.8	43.9	2.4	9.8	7.3
Book Review	-	33.3	33.3	-	-	-	33.3
Questions on a Book	40.0	20.0	20.0	20.0	-	-	-
Reading to Others	-	25.0	25.0	-	25.0	25.0	-
A Play	18.2	9.1	18.2	9.1	9.1	27.3	9.1
Poetry	25.0	-	-	37.5	-	37.5	-
Written Work	18.7	18.7	12.5	25.0	-	18.7	6.3
New Word/Punctuation	-	-	-	-	-	100.0	-
A Test/Exam	-	20.0	40.0	6.7	-	33.3	-

Table 20

Students' Goals in Learning Reading, Showing Percentages of Responses for Gender and Class Groups

Group		Goals				
		Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
Gender						
Females	(N=56)	66.1	5.4	17.9	3.6	7.1
Males	(N=52)	57.7	7.7	15.4	5.8	13.5
Class						
Form 2	(N=51)	62.7	9.8	15.7	3.9	7.8
Form 5	(N=57)	61.4	3.5	17.5	5.3	12.3
Total						
All	(N=108)	62.0	6.5	16.7	4.6	10.2

Hypothesis 1.1 predicted that males more than females would tend to express 'ego' and 'extrinsic reward' goals. Hypothesis 1.2 predicted that females more than males would tend to express 'task' and 'social solidarity' goals. Hypothesis 1.3 predicted that the proposed differences of hypotheses 1.1 and 1.2 would become more marked from form two to form five. However, these predictions were not tested in relation to students' goals in learning science because of the small cell sizes involved.

More generally, there were no significant differences in the responses made by males and females or form two and form five students across the three most frequently chosen, and statistically examinable, goal categories of 'task', 'social solidarity' and 'extrinsic reward' (see Appendix 3, Table D).

Over half of the students in each goal category explained their success in reading with reference to 'interest and involvement' or 'effort' (see Table 21). Explanations for failure in reading appear more varied across the goal categories, however because of the small numbers involved, these differences were not tested. The category of 'task itself' was the most frequently given explanation of failure for the two goal categories with the largest numbers ('task' and 'social solidarity').

Table 21

Attributions Used to Explain Success and Failure in Reading, Showing Percentages of Attributions Used for Each Goal

Goal		Attributions						
		Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
Success in Reading								
Task	(N=67)	37.3	10.4	17.9	22.4	3.0	9.0	-
Ego	(N=7)	14.3	14.3	42.9	14.3	14.3	-	-
Social Solidarity	(N=18)	22.0	11.1	44.4	5.6	5.6	11.1	-
Work Avoidance	(N=5)	40.0	-	20.0	20.0	-	20.0	-
Extrinsic Reward	(N=11)	54.5	9.1	18.2	-	9.1	9.1	-
Failure in Reading								
Task	(N=67)	16.4	16.4	16.4	25.4	4.5	17.9	3.0
Ego	(N=7)	-	14.3	-	57.1	-	14.3	14.3
Social Solidarity	(N=18)	-	11.1	22.2	27.8	-	22.2	16.7
Work Avoidance	(N=5)	20.0	20.0	40.0	20.0	-	-	-
Extrinsic Reward	(N=11)	27.3	9.1	9.1	9.1	9.1	36.4	-

Hypothesis 3.1 proposed that individuals who expressed different goals would use different causal attributions. More specific predictions were made to test this. Hypothesis 3.2 predicted that those who expressed 'ego' goals more than those who expressed other goals would attribute outcomes to 'ability and skill'. Hypothesis 3.3 predicted those who expressed 'task' goals would make more 'strategies and self-instructions' and 'effort' attributions than those expressing other goals. Hypothesis 3.4 predicted those expressing social solidarity goals would make more 'effort' attributions than those expressing 'other' goals. These predictions were not analysed in relation to students' goals of learning in reading because the cell sizes involved were too small. It is of interest to note that none of the students expressing 'ego' goals explained their success with refernce to 'ability and skill'.

Relationship of responses to questions about science and reading:

Students described a wider range of activities at which they had succeeded or failed for reading than they did for science. Differences were evident in the frequency with which form two and form five students referred to activities as times when it felt that they had succeeded and failed in science, and failed in reading. In science, form two students made more references for success and failure to 'a topic' and form five students made more references for success and failure to 'a test or exam'. In reading, form five students made more references for failure to 'a play' and 'an exam or test', than did form two students. The only difference in the frequency with which males

and females described an activity as a success or failure was that females more frequently referred to 'an experiment' as something in science at which they felt they had failed.

Students used internal and external standards fairly evenly in describing their successes and failures in science, and successes in reading. Internal standards were used more frequently than external standards to describe a failure in reading. There was no difference in the standards used by males and females or form two and form five students to describe their successes or failures in science and reading.

The frequency with which causal categories were given varied with subject area and outcome. These variations were not tested statistically, therefore the three causal categories used most frequently by the entire sample are listed below for each subject and outcome, as percentages of total attributions. Table 22 provides the total figures for each attribution category used to explain success and failure in both subject areas.

1. Success in science: interest and involvement (22.2%), strategies and self-instructions (28.7%), and effort (28.7%).

2. Failure in science: strategies and self-instructions (20.4%), effort, (36.1%) and ability and skill (16.7%).

3. Success in reading: interest and involvement (35.2%), effort (24.1%), and task itself (16.7%).

4. Failure in reading: task itself (25.9%), ability and skill (19.4%), and effort (16.7%).

Table 22

Attributions Used to Explain Successes and Failures in Science and Reading, Showing Percentages of Attributions for Each Outcome

Situation	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
Success							
Science	22.2	28.7	28.7	3.7	6.5	6.5	3.7
Reading	35.2	10.2	24.1	16.7	4.6	9.3	-
Failure							
Science	10.2	20.4	36.1	1.8	-	16.7	13.9
Reading	13.9	14.8	16.7	35.9	3.7	19.4	5.6

Some interesting features of this summary and Table 22 can be noted; for example, 'effort' is the only causal category common to all situations. 'Interest and involvement' was more frequently given as a cause of success in both science and reading than as a cause of failure in both science and reading. Likewise, although not used frequently, the causal categoy of 'skill and ability' was more frequently used as an explantion of failure than success in science and reading. 'Task itself' was more frequently used as an explanation of success and failure, particularly failure, in reading than in science, and 'strategies and self-instructions' was used more frequently as an explanation of success and failure in science than in reading.

The frequency with which the causal categories were given also varied in some instances with the activity being described, within the subject area and with outcome (see Tables 13 and 19). The causal category of 'strategies and self-instructions' was more frequently given to explain success in science with an experiment than with a topic. The 'task itself' was more frequently used to explain success at reading a book than success with written work. Students made more attributions to effort to explain success at written work than they did to explain success at reading a book. The 'task itself' was a more frequently given cause of failure for reading a book, than for performance on test or exam in reading.

The only significant gender difference in the use of attributions for success and failure in reading and in science was that males more frequently attributed their success in science to 'interest and involvement' than did females. There were no significant differences

in any of the attributions used by form two and form five students.

Students most frequently expressed the 'task' oriented goal of 'understanding something or learning something interesting' in both science and reading. There was no significant difference in the goals expressed by males and females in learning science or reading. The only significant difference in the goals voiced by form two and form five students was that form two students more frequently expressed the goal of social solidarity in learning science.

There was very little difference in the attributions used by students expressing different goals, to explain situations of success or failure in reading and science.

Summary of findings related to hypotheses:

Hypotheis 1.1 predicted that males more than females would tend to express 'ego' and 'extrinsic reward' goals. Hypothesis 1.2 predicted that females more than males would tend to express 'task' and 'social solidarity' goals. Hypothesis 1.3 proposed that these postulated gender differences concerning the differential distribution of goals would become more marked from form two to form four.
These predictions were not tested for students' goals in learning science or reading because the numbers of students distributed across all but task goals were too small.

Hypothesis 2.1 predicted that in science males more than females would make 'interest and involvement' and 'ability and skill' attributions. This prediction was partially supported for students' explanations of success. Males made more attributions for success to 'involvement and interest' than did females. There were insufficient numbers of students who attributed success to 'ability and skill' to test any difference in males and females use of this category to explain success. Hypothesis 2.2 predicted that in reading females more than males would make attributions to 'invovlement and interest' and 'skill and ability'. This hypothesis was unsupported in both situations of success and failure.

Hypothesis 3.1 proposed that individuals who expressed different goals would use different causal attributions. More specific predictions were made to test this. Hypothesis 3.2 predicted that those who expressed 'ego' goals would use more 'ability and skill' attributions. Hypothesis 3.3 predicted that those who expressed 'task' goals would make more 'strategies and self-instructions' and 'effort' attributions than those who expressed other goals. Hypothesis 3.4 predicted that those expressing 'social solidarity' goals would use more 'effort' attributions than those expressing other goals. The relationships proposed in these hypotheses were not statistically examined because of the small numbers involved.

Overall then, there was only partial support for hypothesis 2.1, with the other hypothesis being unsupported or untestable due to small frequencies of responses.

Section Two

The main focus of this study was an examination of the argument that gender differences in achievement could be mediated by gender differences in causal attributions. This argument was examined within the context of students' experiences in the subject areas of science and reading, and with reference to the goals students have in learning. This second section of the results examines response to some of the questions in the more general part of the interview. These questions were included to explore some other variables which could be implicated in the differential achievement pattern of males and females. The relationships between these variables, and gender and attributions were also of interest. The three variables considered were:

1. Students' perceptions of their performance in science and reading.

2. Students' perceptions of science and reading as school subjects which might be conisdered as male or female domains.

3. Students' views on the function of schools and why people go to school.

The frequencies for students' responses to the questions asking them about their performance in science and reading were each divided as closely as possible into quartiles. The cut-off points for these

quartiles and the distribution for males and females and form two and form five students, within each quartile, are shown in Table 23. The only significant difference in the responses of males and females to both of these questions was that males more frequently than females perceived themselves to be in the first quartile of their science class (χ^2=9.4, df=1. p<.01). There was no significant difference in the responses of form two and form five students to these two questions (see Appendix 3, Table E).

The distribution of students within each quartile group across each goal category is shown for science in Table 24 and for reading in Table 25. Due to the small numbers of students who expressed 'ego', 'social solidarity', 'work avoidance' and 'extrinsic reward' goals, the only variation examined was the frequency with which students in each of the quartile groups expressed 'task' goals. There was no significant difference in the frequency with which students from each of the quartile groups expressed task goals for science (χ^2=1.2, df=3, n.s) or reading (χ^2=2.03, df=3, n.s.).

Table 23

Students' Perceptions of Their Performance in Science and Reading, Showing Percentages of Responses for Gender and Class Groups

Group		1 (1-8)	2 (9-14)	3 (15-17)	4 (18-28)
		Class Quartiles for Science			
Gender					
Females	(N=55)	12.7	29.1	25.5	32.7
Males	(N=52)	44.2	23.1	11.5	21.2
Class					
Form 2	(N=50)	20.0	32.0	24.0	24.0
Form 5	(N=57)	35.1	21.1	14.0	29.8
Total					
All	(N=107)	28.0	26.2	18.7	27.1
		Class Quartiles for Reading			
		1 (1-8)	2 (9-13)	3 (14-16)	4 (17-30)
Gender					
Females	(N=55)	27.3	21.8	27.3	23.6
Males	(N=52)	23.1	26.9	19.2	30.8
Class					
Form 2	(N=50)	24.0	22.0	20.0	34.0
Form 5	(N=57)	26.3	26.3	26.3	21.1
Total					
All	(N=107)	25.2	24.3	23.4	27.1

Table 24

Goal of Learning in Science by Perception of Performance in Science, Showing Percentages of Responses for Each Quartile Group

	Goals				
Quartile Group	Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
First (N=30)	76.7	3.3	16.7	-	3.3
Second (N=28)	64.3	7.1	3.6	-	25.0
Third (N=30)	65.0	15.0	20.0	-	-
Fourth (N=29)	82.8	-	6.9	6.9	3.4
Total (N=107)	72.9	5.6	11.2	1.9	8.4

Table 25

Goal of Learning in Reading by Perception of Performance in Reading, Showing Percentages of Responses for Each Quartile Group

Quartile Group	Goals				
	Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
First (N=27)	63.0	7.4	14.8	-	14.8
Second (N=26)	69.2	7.7	11.5	7.7	3.8
Third (N=25)	72.0	-	16.0	-	12.0
Fourth (N=29)	44.8	10.3	24.1	10.3	10.3
Total (N=107)	61.7	6.5	16.8	4.7	10.3

The distributions of students within each quartile group across each attribution category is shown for success and failure in science in Table 26, and success and failure in reading in Table 27. Chi-square analyses were computed for the two most frequently given reasons for success and failure in science and reading to see if there was any difference in the frequency with which students from each quartile group gave these attributions. There was no significant difference in the frequency with which each quartile group gave the two most frequently used explanations of success and failure in science and reading (see Appendix 3, Table F).

Students' perceptions of the gender-domains of science and reading are shown in Table 28. A large proportion of students considered science (65.7%) and reading (60.2%) to be subjects for both males and females. In view of this, the small numbers of responses indicating varying degrees of maleness and femaleness were combined to produce a three-way split: a subject for both males and females, a subject more for males and a subject more for females. Science was more frequently perceived to be a male domain (28.7%) than a female domain (5.6%). Likewise, reading was more frequently perceived to be a female domain (35.2%) than a male domain (4.6%). There was no significant difference in males' and females' or form two and form five students' perceptions of science and reading as male or female domains (see Appendix 3, Table G).

Table 26

Attributions Used to Explain Success and Failure in Science by Perceived Performance in Science, Showing Percentages of Attributions Used for Each Quartile Group

Quartile Group	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
				Success			
First (N=30)	30.0	30.0	23.3	3.3	3.3	3.3	6.7
Second (N=28)	14.3	39.3	32.1	-	7.1	3.6	3.6
Third (N=20)	20.0	25.0	40.0	-	10.0	5.0	-
Fourth (N=29)	24.1	20.7	24.1	6.9	6.9	13.8	3.4
Total (N=107)	22.4	29.0	29.0	2.8	6.5	6.5	3.7
				Failure			
First (N=30)	10.0	20.0	40.0	-	-	13.3	16.7
Second (N=28)	10.7	32.1	28.6	-	-	14.3	14.3
Third (N=20)	-	15.0	40.0	5.0	-	25.0	15.0
Fourth (N=29)	13.8	13.8	37.9	6.9	-	17.2	10.3
Total (N=107)	9.3	20.6	36.4	2.8	-	16.8	14.0

Table 27

Attributions Used to Explain Success and Failure in Reading by Perceived Performance in Reading, Showing Percentages of Attributions Used for Each Quartile Group

Quartile Group	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
				Success			
First (N=27)	33.3	11.1	25.9	14.8	-	14.8	-
Second (N=26)	34.6	7.7	19.2	30.8	-	7.7	-
Third (N=25)	44.0	12.0	24.0	8.0	8.0	4.0	-
Fourth (N=29)	31.0	10.3	27.6	10.3	10.3	10.3	-
Total (N=107)	35.8	10.3	24.3	15.9	4.7	10.3	-
				Failure			
First (N=27)	11.1	14.8	14.8	18.5	7.4	22.2	11.1
Second (N=26)	7.7	15.4	26.9	30.8	-	15.4	3.8
Third (N=25)	24.0	16.0	20.0	12.0	4.0	24.0	-
Fourth (N=29)	13.8	13.8	6.9	37.9	3.4	17.2	6.9
Total (N=107)	14.0	15.0	16.8	25.2	3.7	19.6	5.6

Table 28

Perceptions of Science and Reading as Male or Female Domain, Showing Percentages of Responses for Gender and Class Groups

Group		Domains		
		Both Male and Female	Male	Female
		Science		
Gender				
Females	(N=56)	63.2	28.0	8.8
Males	(N=52)	67.3	28.8	3.9
Class				
Form 2	(N=51)	66.7	25.5	7.8
Form 5	(N=57)	64.9	31.6	3.5
Total				
All	(N=108)	65.7	28.7	5.6
		Reading		
Gender				
Females	(N=56)	67.8	1.8	30.3
Males	(N=52)	51.9	7.7	40.4
Class				
Form 2	(N=51)	66.7	9.7	23.5
Form 5	(N=57)	54.4	-	45.6
Total				
All	(N=108)	60.2	4.6	35.2

Students' views on what schools should do for people were categorized into three main functions:

1. To give knowledge and educate.
2. To prepare for the future and work.
3. To give social support and understanding.

The frequency with which students gave responses within each of these categories is shown in Table 29. Students most frequently perceived the function of the school to one of giving knowledge and educating. There was no significant difference in males' and females' or form two and form five students' view on what schools should do for people (see Appendix 3, Table H).

Students' views on why people go to school were recategorized into two broad reasons:

1. To be educated.
2. To prepare for employment.

Students most frequently believed that people go to school to be educated (64.7% :see Table 30). There was no significant difference in the reasons given by males and females or form two and form five students (see Appendix 3, Table I).

Table 29

Students' Views on What Schools Should Do for People, Showing Percentages of Responses for Gender and Class Groups

Group		Views: Give Knowledge and Educate	Prepare for Future and Work	Give Social Support and Understanding
Gender				
Females	(N=54)	53.7	24.1	22.2
Males	(N=48)	56.3	27.1	16.7
Class				
Form 2	(N=45)	62.2	22.2	15.6
Form 5	(N=57)	49.1	28.1	22.8
Total				
All	(N=102)	54.9	25.5	19.6

Table 30

Students' Views on Why People Go to School, Showing Percentages of Responses for Gender and Class Groups

Group	Views	
	To be Educated	To prepare for Employment
Gender		
Females (N=54)	68.5	31.5
Males (N=48)	60.4	39.6
Class		
Form 2 (N=46)	76.1	23.9
Form 5 (N=56)	55.4	44.7
Total		
All (N=102)	64.7	35.3

Chapter Five

Discussion

Overall, the explorations of success and failure made by students in this study point to the way in which these experiences are to a large extent situation specific and contextually bound. A wider range of activities were described as successes and failures in reading than in science, and the frequency with which students gave some causal categories varied with the activity being described, the subject area and the outcome. When the three most frequently given causes for success and failure in both science and reading were examined, 'effort' was the only causal category common to all four situations. Internal and external standards were used fairly evenly by students as they recounted their successes and failures. Internal standards however, were used more frequently than external standards to describe a failure in reading. Students most frequently expressed the task goal of understanding or learning something interesting in both science and reading, and most frequently believed that people go to school to be educated. Science and reading were perceived by the majority of students to be subjects for both females and males. Science was more frequently considered a subject for males, and reading was more frequently considered to be a subject for females, by those who did not consider them to be subjects for both males and females.

Generally, there was very little difference in the responses made by female and male students as they described instances of success and failure, and responded to the more general questions concerning schooling. The only differences observed were that:

1. Females more frequently than males referred to 'an experiment' as something in science at which they had failed.

2. Males more frequently attributed their success in science to 'interest and involvement' than did females.

3. Males more frequently than females perceived their performance in science as within the first quartile of the class.

The only observed differences in responses that were patterned by age were that:

1. The frequency with which form two and form five students described certain activities varied. In science, form two students made more references to 'a topic' as a success and failure and form five students more frequently referred to 'a test or exam' as a failure. In reading, form five students made more references for failure to 'a play' and 'an exam or test' than did form two students.

2. Form two students more frequently than form five students expressed the goal of pleasing others and having other people like

their work.

The first set of hypotheses addressed students goals' in learning. They predicted that males more than females would tend to express 'ego' and 'extrinsic reward' goals, and females more than males would tend to express 'task' and 'social solidarity' goals. Furthermore, it was proposed that these differences would become more marked from form two to form five. However none of these predictions was tested because the majority of males and females expressed 'task' goals in science and reading. Nonetheless, there are a number of comments which can be made which might provide some insights into this unexpected result.

First, Maehr's (1983) work which provided the concepts which related to goals was, as he acknowledged, speculative. Supporting evidence was drawn from research and theory arising in various fields of enquiry relating to achievment motivation. However, the four basic assertions proposed by Maehr had not been examined together in one study.

Second, Maehr (1983) suggested that these goals could be examined by having students rate statements which indirectly addressed learning in general. However, in the present study, students were asked to choose the <u>one</u> statement that best described their goals in science, and then again for reading. It could be that when asked more directly about their goals in learning in specific subject areas, students <u>do</u> perceive themselves as having task goals, and the other goals do not seem relevant. On the other hand, it may be that in the interview situation, students felt it socially desireable to express task goals.

Third, the work by Maehr (1983) was addressed to the issue of students' achievement and motivation in learning science in the United States. Educational ideologies and goals articulated in the American and New Zealand classroom may well vary, and this could result in the expression of different responses. New Zealand based research on educational goals, and research examining the systematic distortions that arise from the use of particular methodologies, are clearly both avenues for future research in this area.

The second set of hypotheses examined the differences in attributions made by females and males. The prediction that in reading, females more than males would make more 'interest and involvement' and 'ability and skill' attributions was not supported. The prediction that in science males more than females would make more 'interest and involvment' and 'ability and skill' attributions was partially supported, but only in relation to attributions for success and not failure. Males made more attributions for success in science to 'interest and invovlement' than did females. However, there were insufficient numbers of students who attributed success in science to 'ability and skill' to examine any gender differences in the use of this causal category. There are also a number of comments that can be made about this unexpected result.

Although the predictions of the hypotheses were not borne out, these results cast serious doubt on the findings of many previous studies, which have examined gender differences in attributions. As it was argued in Chapter Two, previous studies in this area have violated the underlying phenomnological principles of attribution theory by

imposing definitions of success and failure, and sets of causal attributions (Bar-Tal & Darom, 1979; Bar-Tal & Frieze, 1977; Bar-Tal, Goldberg, & Knanni, 1984; Deaux & Farris, 1977; Dweck & Bush, 1976; Feather & Simon, 1973; Frieze & Bar-Tal, 1980; Levine, Reis, Sue & Turner, 1976; McMahan, 1973; Nicholls 1975; Nicholls 1978a; Parsons, Adler & Meece, 1982; Simon & Feather, 1973; Stipek & Hoffman, 1980; Weigers & Frieze, 1977). Furthermore, the majority of these studies examined attributions in an experimental situation, using tasks that are not specific to school subjects (Bar-Tal & Frieze, 1977; Deaux & Farris, 1977; Dweck & Bush, 1976; Feather & Simon, 1973; Levine, Reis, Sue & Turner, 1976; Nicholls, 1975; Stipek & Hoffman, 1980). Hence, it was argued that the results of these studies could be questioned in terms of their validity and their generalizability to the classroom setting. Moreover, the present study has shown that when allowed to define their own successes and failures associated with their own school work in science and reading, and when given the opportunity to generate their own set of causes in an interview situation, females and males attributions' do not differ. This suggests that the results of those studies using structured questionnaires based on rating scales or paired comparisons, which revealed gender differences, (Bar-Tal & Darom, 1979; Deaux & Farris, 1977; Frieze & Bar-Tal, 1980; Levine, Reis, Sue & Turner, 1976; Nicholls, 1980; Simon & Feather 1973) may lack ecological validity.

Given that the methodology of the present study is more phenomenologically and ecologically valid than previous studies, these results also suggest that gender differences in achievement patterns may not be mediated by a differential use of causal attributions by

females and males. In chapter two it was demonstrated that males' and females' academic achievement in New Zealand is patterned, however there was no pattern evident in the causal attributions used by males and females in the present study. The findings of 'no difference' in the present study are also supported by a number of more recent, studies (including one using interviews, and three focussing on students' own school work), which have found very little or no difference in the causal attributions used by males and females (Bar-Tal, Goldberg,& Knaani, 1984; Freize & Snyder, 1980; Freize, Whitely, Hanusa,& McHugh, 1982; Lawes & Chapman, 1984; McMahan, 1973; Parsons, Meece,& Adler, 1984; Stipek & Hoffman, 1980; Weiger & Freize, 1977). A number of these and other studies have suggested that some gender differences emerge when other variables are considered, such as ratings of achievement (Stipek & Hoffman, 1980), levels of achievment motivation (Bar-Tal & Freize, 1977), and expectancy (Eccles, Adler,&Meece, 1984). The present study also examined males' and females' perceptions of their performance in science and reading classes, and then the relationship between perception of performance and attributions was examined. The only difference in males' and females' perceptions of their performance was that males more frequently than females perceived themselves to be in the first quartile of their science class. However, there was no relationship between students' perceptions of their performance and attributions used. The present study also examined students' perceptions of the 'gender specificity' of science and reading. However, the relationships between these perceptions and the attributions students used were not examined because the majoritiy of students saw science and reading as both female and male domains, and there were no

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significant differences in the perceptions of males and females.

This discussion of the role of causal attributions in mediating gender differences in achievement patterns can also be extended to question the proposed relationship between causal attributions and achievement patterns at a more general level. More specifically, it appears that achievement performance is not necessarily mediated through differential attributions, via affective reactions and expectancy in the way the Weiner model proposes. There is a growing body of literature that supports this interpretation.

Covington and Omelich (1979) tested the proposed links in the Weiner model using path analysis. The data required to test all the components specified by the model was obtained from students who felt they had failed in the first of two test-taking opportunities. Their results suggested that subsequent test performance was not influenced either directly or indirectly through the proposed affective and expectancy pathways, by differential attributions for a previous test failure. In another study Covington and Omelich (1981, cited in Covington 1983, p146), compared the explanatory power of effort and ability attributions, as located in Heider's (1958) oringinal model as antecedent determinants of behaviour, and as located in Weiner's model where attributions are made retrospectively. Analysis revealed that in Heider's antecedent model, 25% of the variance in subsequent test performance was accounted for by all predictor variables, however in Weiner's model only 14% was explained. When ability was treated as an antecedent determinant it accounted for 83% of the explained variance, whereas within the retrospective model, ability only accounted for 4%

of the explained variance.

Eccles, Adler and Meece (1984) compared and tested explanations of gender differences in academic achievement patterns, informed by self-concept theory, attribution theory, learned helplessness/mastery orientation theory and expectancy-value theory. They found very little consistent evidence of gender differences in attributions or on indicators of learned helplessness for mathematics or verbal tasks. Furthermore, they found that "verbal and behavioural indexes of achievement beliefs were often inconsistent" (p.26). These authors concluded that subjective task value was the most important mediator of both academic achievement plans in general, and of gender differences in achievement behaviour. Although the present study considered males' and females' perceptions of their performance in science and reading, and the 'gender specificity' of science and reading, task value was not examined.

An alternative interpretation of the findings that males and females attributions did not differ is that the classroom practises and societal beliefs that have a bearing on the attributions made by students have been changing, and in this respect males' and females' experiences of schooling may not differ. However, a recent report by Abigail (1983), examining aspects of school life which bear on the vocational choice and aspiriations of young women, does not support this interpretation. Nor is this interpretaion supported by the ethnography of two secondary school girls' classes by Jones (1985). The three differences in males and females responses revealed by the current study did all relate to science, which also suggests that in

some areas differences may exist. This also implies that the attribution construct has insufficent explanatory power to account for the way in which the process of learning is affected by the transmission and negotiation of cultural norms.

A number of other interesting observations can be made about the attributions revealed by this study. Attributions were not confined to those proposed in the original model (Weiner, 1971), and which have been the focus of most studies testing hypotheses derived from Weiner's model. The results partially replicate the findings of other open-ended studies which point to the frequent utilization of the 'effort' category (Bar-Tal & Darom, 1979; Bar-Tal, Goldberg, & Knanni, 1984; Cooper & Burger, 1980; Freize, 1976; Freize & Snyder, 1980; Lawes & Chapman, 1984; Parsons, Meece, Adler, & Kaczala, 1982). Other causes used frequently (by 20% or more of students) in this study that were the same or similar to causes reported as occurring frequently in other studies were: 'interest and involvement': interest in the subject matter (Bar-Tal, Goldberg,& Knaani, 1984) and 'task itself': task difficulty or ease (Freize & Snyder, 1980). The absence of the 'luck' category is also consistent with previous research using open-ended questionnaires (Cooper & Burger, 1980). The attributions reported in this study differed from previous studies in that the form they took and the name they were given needed to reflect the ideas being expressed, which arose out of the situations students chose to recount. The category 'strategies and self-instructions' is an example of a category commonly given that has not been addressed by previous coding schemes in other studies.

Eccles, Adles and Meece (1984), have suggested that "people have different belief structures for different subject areas and these beliefs may predispose the use of different causal schemes for different tasks"(p.42). The findings of this study support this argument. The 'task itself' category was more frequently used as an explanation of success and failure in reading than in science, and the category 'strategies and self-instructions' was more frequently used in explanations of success and failure in science than in reading. At an even more specific level, in some instances, students gave attributions for success or failure more frequently for some activities than for others; for example, the causal category of 'strategies and self-instructions' was more frequently given to explain success in science with 'an experiment' than with 'a topic'. This is consistent with the results reported by Freize and Snyder (1980). They examined students' attributions for four familiar achievement situations, one of which related to academic work, and concluded that causal attributions are situation specific. The attributions offered in the present study also varied with the outcome; 'interest and involvement' was more frequently given as a causes of success in both science and reading than as a cause of failure, while 'skill and ability' was more frequently used as an explanation of failure than of success in science and reading. These findings also give support to Rosenholtz and Simpson's (1984) argument that students' interpretations of their experience will be influenced by the structure of the experience itself. This has implications for the sorts of tasks that are made available to students in consideration of the causal schemes we believe to be important for their educational and social development.

The third set of hypotheses addressed the relationship between goals and causes. It was specifically proposed that those who expressed ego goals would use more ability attributions than those who expressed other goals, those who expressed task goals would use more effort and strategy and self-instruction attributions than those who expressed other goals, and those who expressed social solidarity goals would use more effort attributions than those who expressed other goals. However, as mentioned previously, students' goals were not distributed across the goal categories; the majority of students expressed task goals in science and reading. Hence, these predictions could not be examined.

In addition to the comments which have already been made about the lack of variation in students' expressed goals, there is a methodological point to be considered which relates specifically to the process of examining the relationship between goals and attributions. During the interviews with the students the author often had the impression that a more effective way to examine this particular relationship would be to invetstigate students goals and attributions in situ, whilst they were involved with a particular activity. In the present study students were giving attributions for specific activities, but were expressing their goals at a more global level. Although this raises another set of issues related to 'think-aloud' and open-ended data (see Taylor & Fiske, 1981), it does offer the opportunity to examine the relationship between the structure of the situation, students' goals and attributions for specific tasks. Ames (1984) has successfully monitored students achievement cognitions for their performance on a puzzle while they were involved with doing the

puzzle. However, this method has not been used with students own school work to examine the relationship between goals, gender and causal attributions. Investigating the relationships in this way could help to some extent to counter the impulses students may feel to give socially desireable responses in the straight interview situation.

Conclusions

The purpose of the present study was to examine the 'underachievment of females' within the context of attribution theory, using a methodology that was phenomenologicaly more consistent than previous studies, and ecologically valid. The data offered no support for the proposition that gender differences in achievement performances are mediated by a differential use of attributions by males and females. Males and females use of attributions did not differ, with one exception; males more frequently than females ascribed causality for success in science to 'interest and involvement'. Nor was there any support for a mediating role for attributions between gender and self-perceptions of performance. These findings suggest that the power of the attribution construct, may have been overestimated, and that attributions do not necessarily mediate differences in achievment in the way that the Weiner model propses.

A clear picture emerges from this study of the extent to which attributions are influenced by the nature of the specific situation, and its context. These findings support the argument put forward in chapter two that the methodology employed to investigate causal attributions needs to allow for the expression of this variation. They

also point to the relationship between students' interpretation of their experience and the structure of the experience. This has implications for the sorts of tasks that are made available in terms of the role we believe causal schemes have for students' learning processes. Previous studies not using phenomenologically valid approaches may have less to offer than has been implied in the literature.

Overall, these results support the argument that it is the "subjective construction of the situation by the individual that is of critical importance" (Maehr, 1983, p90). Students chose to recount a variety of activities as successes and failures, used both internal and external standards in describing the situation, and offered a range of attributions, that to some extent, reflected the nature of the activity being described as a success or failure. Unlike previous studies, the findings of the present study have demonstrated that the methodology that has dominated this field has contradicted its theoretical underpinnings, and has represented a distorted view of students' attributions, and more specifically, the differential use of attributions by females and males.

The author considers this study to have made a unique contribution to the field of attribution theory, in terms of the reformulation of a methodology that is more consistent with the theory that it addresses. Furthermore, it represents an ecologically valid contribution to the unresolved issue of the differential participation of females and males, and the subsequent limitations this places on females in their choices for further education, and access to a wide variety of jobs.

It is hoped that this enquiry will stimulate further research in this area, which explicitly addresses the impact of the transmission and negotiation of cultural norms on the process of learning, and the dynamics of achievment motivation.

Suggestions for Future Research

One line of inquiry for future research that is suggested by the findings of the present study is the combination of the methodological reformulations of the present study with the relocation of causal attributions as antecedent determinants of behaviours, as suggested by Covington (1983). Covington argued that because attributions expressed retrospectively are more likely to be reactions to rather than causes of behaviour, cognitive determinants of behaviour are obscured in the cognitive attribution theory propsed by Weiner and his colleagues.

A number of points arising from this research have also suggested the need for more research that is not only related to students' own school work, but that takes place within the classroom itself. Firstly, it can be argued that research in situ would reveal more clearly the relationship between specific tasks, goals in learning and attributions. Secondly, it is evident we need to know more clearly the nature of the relationship between attributions and behaviour. Thirdly, it can be argued that the relationship between attributions and behaviour might be more fruitfully examined if considered within the context of a more complex, and less reductionist model. In particular, the model proposed by Parsons et al., (in press, cited in Meece et al., 1982, p335), which emphasises 'task value' may offer some

insights. Furthermore, in line with other fields of enquiry addressing the relationship between gender and education (Arnot, 1980), it is appropriate to suggest that future studies within the field of achievment motivation might also consider the student in the context of the family. Moreover, the mediating role of the family between class origin and school, and the implications this has for achievment and motivation could be considered.

However, as was evident in the present study, a tension exists between using a slightly more complex model and appropriate methodologies of investigation and analysis. If the research questions demand a methodology which, for logistical reasons, does not give rise to a large sample, and if there is a wider range of variables on which students can vary, it may be difficult to analyze the resulting data statistically. In consideration of these issues, it can be argued that it may now be appropriate for those wishing to examine students' attributions and the implications these have for their motivation and achievement, to do in-depth classroom based investigations. These studies would not necessarily aim to generalize, but rather to come to a fuller understanding of the dynamics of achievement and motivation for particular groups of students within particular situations.

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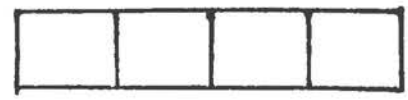

Appendix One

Introduction

In this interview I am going to ask you some very specific questions about things that have happened in school. However, because the questions are about events that happened to you, and they are things that you are going to remember, there can be no right or wrong answers....just try to tell me things as you remember them.

First, some questions about science. I want you to think of something you did in science that you thought was successful... this can be anything. Anything you felt was a success. Take time to remember it clearly, and tell me what it was that you had done when you felt like you had succeeded in science.

_____

_____ [ ]

_____

Still thinking of this time when you _____, how did you know that you had been successful?

_____ [ ]

_____

_____ [ ]

What was the reason you were successful?

_____ [ ]

_____ [ ]

_____

OK, this time I want you to think of the reason you have just given me... that you succeeded at .....because .....

If 1 equals something that changes in time, like the weather, and 5 equals something that doesn't change like the colour of your eyes.....where on this scale do you think your reason would be ?

___ [ ]

Now, if 1 equals something you can control, like who your friends are, and 5 equals something you cannot control, like the weather.... where on this scale do you think your reason would be?

___ [ ]

Still thinking of the reason you were successful? This time, if 1 equals something that is inside a person, like their feelings, and 5 equals something outside a person, like the weather,where on this scale do you think your reason would be ?

[ ]

Now I am going to ask you about a time that you felt you had failed in science. Remember, this is going to be something that has happened to you, and that there are no `right' or `wrong' answers.... just take your time and remember that time you failed as clearly as possible. Now, tell me what it was that you had done when you felt like you had failed in science....

_____ [ ]

_____

_____

Now, thinking of this time you felt you had failed, what were the things that made you feel like you had failed? How did you know you had failed ?

_____ [ ]

_____ [ ]

_____

What was the reason you failed?

_____ [ ]

_____ [ ]

_____

This time I want you to think of the reason you have just given me... that you failed at _____ because

If 1 equals something that changes in time, like the weather, and 5 equals something that doesn't change like the colour of your eyes.....where on this scale do you think your reason would be ?

[ ]

Now, if 1 equals something you can control, and 5 equals something you cannot control, where on this scale do you think your reason would be?

____ [ ]

Still thinking of the reason you failed? This time, if 1 equals something that is inside a person, and 5 equals something outside a person, where on the scale do you think your reason would be?

____ [ ]

Thinking about the goals people have in their schoolwork..... Some people feel most successful at school when other people like their work or they please other people, others feel most successful when they show people they are clever or do better than other. Other people feel most successful when they understand something or they learn something interesting, while others feel most successful when they get something for what they have done. Some people feel most successful at school work when they manage to get out of working.

Looking at this card now. Which of these reasons best describes the sort of goals you have in your science class?

____ [ ]

Section Two

Now I am going to ask you some questions about reading. Make sure the answers you are telling me this time are about reading. Reading and science are very different subjects so there is no reason why your answers should be the same.

First of all I want you to think of something you did in reading that you thought was successful...this can be anything . Anything you felt was a success. Take time to remember it clearly, and tell me what it was that you had done when you felt like you had succeeded in reading.

_____ [ ]

_____

_____

Still thinking of this time when you were _____, how did you know that you had been successful?

_____ [ ]

_____ [ ]

_____

What was the reason you were successful? 139

_____ [ ]

_____ [ ]

_____

OK, this time I want you to think of the reason you have just given me... that you succeeded at .....because .....

If 1 equals something that changes in time, like the weather, and 5 equals something that doesn't change like the colour of your eyes.....where on this scale do you think your reason would be ?

[ ]

___

Now, if 1 equals something you can control, like who your friends are, and 5 equals something you cannot control, like the weather.... where on this scale do you think your reason would be?

[ ]

___

Still thinking of the reason you were successful? This time, if 1 equals something that is inside a person, like their feelings, and 5 equals something outside a person, like the weather....where on this scale do you think your reason would be ?

[ ]

Now I am going to ask you about a time that you felt you had failed in reading. Remember, this is going to be something that has happened to you, and that there are no `right' or `wrong' answers.... just take your time and remember that time you failed as clearly as possible. Now, tell me what it was that you had done when you felt like you had failed in reading....

_____

_____

_____ [ ]

Now, thinking of this time you felt you had failed, what were the things that made you feel like you had failed? How did you know you had failed ?

_____ [ ]

_____

_____ [ ]

What was the reason you failed?

_____ [ ]

_____

_____ [ ]

This time I want you to think of the reason you have just given me... that you failed at _____ because _____,

It 1 equals something that changes in time, like the weather, and 5 equals something that doesn't change like the colour of your eyes.....where on this scale do you think your reason would be ?

___ [ ]

Now, if 1 equals something you can control, and 5 equals something you cannot control, where on this scale do you think your reason would be?

___ [ ]

Still thinking of the reason you failed? This time, if 1 equals something that is inside a person, and 5 equals something outside a person, where on the scale do you think your reason would be?

___ [ ]

Thinking about the goals people have in their schoolwork..... Some people feel most successful at school when other people like their work or they please other people, others feel most successful when they show people they are clever or do better than other. Other people feel most successful when they understand something or they learn something interesting, while others feel most successful when they get something for what they have done. Some people feel most successful at school work when they manage to get out of working.

Looking at this card now, which of these reasons best describes the sort of goals you have in your reading class?

[ ]

Looking at this line of cirlces now, if this is the person in the class who does the best in science, and this one is the one who does the worst...where would you be?

____ [ ]

How about for reading?...where would you be?

____ [ ]

Section Three

In this last section I am just going to ask you some very general questions about school.

Why do you think people go to school?

_____ [ ]

_____

What should schools do for people?

_____ [ ]

What will you do next year?

(a) stay at school [ ]

(b) leave school [ ]

If you are going to stay on what subjects will you take next year? [ ] [ ] [ ] [ ] [ ]

_____

_____

What do you think you will do when you leave school?

_____ [ ]

What has made you decide to do that?

_____ [ ]

_____

What does your family think of that choice? [ ]

_____

_____

If you are going to leave what do you think you might do?

_____ [ ]

What has made you decide to do that?

_____ [ ]

_____

What does your family think of that choice?

_____ [ ]

_____

Some jobs people think of as female jobs, like nursing, and other jobs people think of as male jobs, like engineering.

Thinking about science now, where would you place it on this scale, if XX equals a `male' subject, and XX equals a female subject?

____ [ ]

How about reading ? - where would you place it on this scale, if XX equals a `male' subject, and YY equals a female subject?

____ [ ]

Massey University

PALMERSTON NORTH, NEW ZEALAND

TELEPHONES, 69 079, 69 089, 69 099.

In reply please quote:

Appendix Two

Department of Education,
Friday 9 November, 1984.

Dear Parent or Guardian,

Pupils in your child's class have been asked to participate in a research project during the week of the 12th - 16th November. This letter is to inform you as to what is involved.

The study is an investigation of young people's educational goals. It is being carried out with Form II and Form V pupils. A 20 minute interview, during normal school hours, is all that is needed. The interview will be treated as confidential. Participation in the study is not compulsory, however, everyone's cooperation would be most helpful and greatly appreciated. It is hoped that the study will shed some light on the nature of pupil's motivation and involvement with schoolwork, and thus be of practical value to teachers.

The study is being supervised from Massey University and has the full support of the school Principal, .

I would be happy to answer any questions about the study, and can be contacted through at School during school hours on the 12th - 13th and 15 - 16th November.

Yours sincerely,

Judith A. Loveridge.

Judith A. Loveridge,
Researcher.

Appendix Three

Table A

Chi-squares for Comparison of Standards Used by Females and Males and Form 2 and Form 5 Students to Describe Success and Failure

Group	Standard	
	Internal	External
	Success in Science	
Female/Male	.66	.83
Form 2/Form 5	.70	.90
	Failure in Science	
Female/Male	.99	1.02
Form 2/Form 5	.34	.46
	Success in Reading	
Female/Male	.18	.23
Form 2/Form 5	.005	.00
	Failure in Reading	
Female/Male	.04	.10
Form 2/Form 5	.09	.25

df=1

Table B

Chi-squares for Comparison of Attributions Used to Explain Outcomes for the Two Most Frequently Described Activities

Attributions Used	Activities Described
	Success in Science Topic/Experiment
Interest and Involvement	3.54
Strategies and Self-Instructions	4.1*
Effort	2.25
	Failure in Science Topic/Test or Exam
Strategies and Self-Instructions	.37
Effort	3.01
Ability and Skill	.74
	Success in Reading Reading a Book/Written Work
Interest and Involvement	1.30
Effort	5.24*
Task Itself	5.90**
	Failure in Reading Reading a Book/Test or Exam
Interest and Involvement	-
Strategies and Self-Instructions	-
Task Itself	4.5*

df=1
*$p < .05$
**$p < .02$

Table C

Chi-squares for Comparisons of Attributions Used by Females and Males, and Form 2 and Form 5 Students to Explain Success and Failure in Science and Reading

Group	Attributions					
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill
			Success in Science			
Females/Males	5.0*	.46	.46	-	-	-
Form 2/Form 5	1.21	.25	.04	-	-	-
			Failure in Science			
Females/Males	.17	.46	.50	-	-	.64
Form 2/Form 5	2.85	.40	1.19	-	-	.06
			Success in Reading			
Females/Males	.05	.04	.96	.11	-	.15
Form 2/Form 5	.38	2.85	.26	.06	-	.04
			Failure in Reading			
Females/Males	.38	.12	.37	.04	-	.23
Form 2/Form 5	.002	.04	1.39	2.10	-	2.9

df=1

*$p < .05$

Table D

Chi-squares for Comparison of Goals Expressed in Learning Science and Reading by Females and Males and Form 2 and Form 5 Students

Group	Goals				
	Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
			Science		
Females/Males	.20	-	1.61	-	-
Form 2/Form 5	2.01	-	6.1*	-	-
			Reading		
Females/Males	.31	-	.11	-	1.04
Form 2/Form 5	.009	-	.06	-	.53

df=1
*$p < .02$

Table E

Chi-squares for Comparison of Perceptions of Performance in Science and Reading of Females and Males and Form 2 and Form 5 Students

Group	Class Quartiles 1	2	3	4
		Science		
Females/Males	9.4*	.27	2.7	.72
Form 2/Form 5	2.1	1.2	1.5	.31
		Reading		
Females/Males	.18	.30	.78	.50
Form 2/Form 5	.05	.10	.47	1.70

df=1
$p < .02$

Table F

Chi-squares for Comparison of the Frequency With Which Quartile Groups for Perceived Performance Used Two Most Frequently Given Attributions

Attributions	Situation
	Science Success
Strategies and Self-instructions	1.84
Effort	1.49
	Science Failure
Strategies and Self-instructions	2.72
Effort	.65
	Reading Success
Interest and Involvement	.70
Effort	.43
	Reading Failure
Task	4.37
Ability and Skill	.66

df=3

Table G

Chi-squares for Comparison of Females' and Males', and Form 2 and Form 5 Students' Perceptions of Gender Domain of Science and Reading

Group	Gender Domain		
	Both Male and Female	Female	Male
		Science	
Females/Males	.04	-	.001
Form 2/Form 5	.01	-	.32
		Reading	
Females/Males	1.14	.76	-
Form 2/Form 5	.67	3.67	-

Table H

Chi-squares for Comparison of Females' and Males', and Form 2 and Form 5 Students' Views on What Schools Should Do for People

	Views		
Group	Give Knowledge and Educate	Prepare for Future and Work	Give Social Support and Understanding
Females/Males	.02	.10	.38
Form 2/Form 5	.79	.34	.66

df=1

Table I

Chi-squares for Comparison of Females' and Males' and Form 2 and Form 5 Students' Views on Why People Go to School

Group	View	
	To be Educated	To prepare for Employment
Female/Male	.27	.49
Form 2/Form 5	1.71	3.1

df=1

Appendix Four

Table A

Activities Described as Successes and Failures in Science, Showing Percentages of Responses for Gender by Class

Group		Activity: A Topic	An Experiment	A Test/ Exam	Written Work
			Successes in Science		
Form 2					
Females	(N=28)	39.3	39.3	7.1	14.3
Males	(N=23)	56.5	26.1	4.3	13.0
Form 5					
Females	(N=28)	21.4	42.9	32.1	3.6
Males	(N=29)	27.6	48.3	20.7	3.4
Total					
All	(N=108)	35.2	39.8	16.7	8.4
			Failures in Science		
Form 2					
Females	(N=28)	60.7	25.0	-	14.3
Males	(N=23)	73.9	8.7	4.3	12.9
Form 5					
Females	(N=28)	21.4	28.6	46.4	3.6
Males	(N=29)	48.3	6.9	41.4	3.4
Total					
All	(N=108)	50.0	17.6	24.0	8.4

Table B

Standards Used to Describe Successes and Failures in Science, Showing Percentages of Responses for Gender by Class

Group		Standards: Internal	Standards: External
Successes in Science			
Form 2			
Females	(N=28)	50.0	50.0
Males	(N=23)	52.2	47.8
Form 5			
Females	(N=28)	53.6	46.4
Males	(N=29)	72.4	27.6
Total			
All	(N=108)	57.4	42.6
Failures in Science			
Form 2			
Females	(N=28)	67.9	32.1
Males	(N=23)	56.5	43.5
Form 5			
Females	(N=28)	60.7	48.3
Males	(N=29)	48.3	51.7
Total			
All	(N=108)	58.9	41.1

Table C

Attributions Used to Explain Successes and Failures in Science, Showing Percentages of Responses for Gender by Class

Group	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
			Successes in Science				
Form 2							
Females (N=28)	17.9	35.7	32.1	7.1	7.1	-	-
Males (N=23)	39.1	26.1	21.7	-	13.0	-	-
Form 5							
Females (N=28)	7.1	28.6	32.1	3.6	3.6	17.9	7.1
Males (N=29)	27.6	24.1	27.6	3.4	3.4	6.9	6.9
Total							
All (N=108)	22.2	28.7	28.7	3.7	6.5	6.5	3.7
			Failures in Science				
Form 2							
Females (N=28)	14.3	17.9	25.0	3.6	-	25.0	14.3
Males (N=23)	17.4	17.4	34.8	8.7	-	4.3	17.4
Form 5							
Females (N=28)	3.6	28.6	39.3	-	-	14.3	14.3
Males (N=29)	6.9	17.2	44.8	-	-	20.7	10.3
Total							
All (N=108)	10.2	20.4	36.1	2.8	-	16.7	13.9

Table D

Students' Goals in Learning Science, Showing Percentages of Responses for Gender by Class

Group		Goals				
		Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
Form 2						
Females	(N=28)	64.3	7.1	10.7	-	17.9
Males	(N=23)	56.5	4.3	30.4	4.3	4.3
Form 5						
Females	(N=28)	89.3	-	3.6	3.6	3.6
Males	(N=29)	79.3	10.3	3.4	-	6.9
Total						
All	(N=108)	73.1	5.6	11.1	1.9	8.3

Table E

Activities Described as Successes and Failures in Reading, Showing Percentages of Responses for Gender by Class

Group	Activity								
	Reading a Book	Book Review	Questions on a Book	Reading to Others	A Play	Poetry	Written Work	New Words Punctuation	A Test/ Exam
Successes in Reading									
Form 2									
Females (N=28)	28.6	3.6	17.9	21.4	-	7.1	14.3	3.6	3.6
Males (N=23)	34.8	21.7	3.8	4.3	-	4.3	21.6	-	1.9
Form 5									
Females (N=28)	28.6	3.6	7.2	-	10.7	-	39.3	7.2	3.6
Males (N=29)	48.3	3.4	-	-	20.7	-	20.7	-	6.9
Total									
All (N=108)	35.2	7.4	8.3	6.5	8.3	2.7	24.1	2.8	4.6
Failures in Reading									
Form 2									
Females (N=28)	50.0	-	10.7	14.3	3.6	-	21.4	-	-
Males (N=23)	52.0	8.7	8.7	13.0	-	-	13.0	-	4.3
Form 5									
Females (N=28)	17.8	3.6	-	3.6	21.4	17.9	14.3	3.6	17.9
Males (N=29)	41.4	-	-	-	13.8	10.3	13.4	-	31.0
Total									
All (N=108)	39.9	2.8	4.7	7.4	10.2	7.4	13.0	.9	13.9

Table F

Standards Used to Describe Successes and Failures in Reading, Showing Percentages of Responses for Gender by Class

Group		Standards: Internal	Standards: External
Successes in Reading			
Form 2			
Females	(N=28)	60.7	39.3
Males	(N=23)	56.5	43.5
Form 5			
Females	(N=28)	50.0	50.0
Males	(N=29)	65.5	34.5
Total			
All	(N=108)	58.3	41.7
Failures in Reading			
Form 2			
Females	(N=28)	67.9	32.1
Males	(N=23)	69.6	30.4
Form 5			
Females	(N=28)	71.4	28.6
Males	(N=29)	75.9	24.1
Total			
All	(N=108)	71.3	28.7

Table G

Attributions Used to Explain Successes and Failures in Reading, Showing Percentages of Responses for Gender by Class

Group	Attributions						
	Interest and Involvement	Strategies and Self-Instructions	Effort	Task Itself	Other People	Ability and Skill	Miscellaneous
				Successes in Reading			
Form 2							
Females (N=28)	32.1	14.3	21.4	17.9	7.1	7.1	-
Males (N=23)	30.4	17.4	21.7	13.0	4.3	13.0	-
Form 5							
Females (N=28)	35.7	7.1	17.9	17.9	7.1	14.3	-
Males (N=29)	41.4	3.4	34.5	17.2	-	3.4	-
Total							
All (N=108)	35.2	10.2	24.1	16.7	4.6	9.3	-
				Failures in Reading			
Form 2							
Females (N=28)	21.4	10.7	10.7	32.1	3.6	17.9	3.6
Males (N=23)	4.3	21.7	13.0	34.8	8.7	4.3	13.0
Form 5							
Females (N=28)	10.7	21.4	17.9	17.9	3.6	25.0	3.6
Males (N=29)	17.2	6.9	24.1	20.7	-	27.6	3.4
Total							
All (N=108)	13.9	14.8	16.7	25.9	3.7	19.4	5.6

Table H

Students' Goals in Learning Reading, Showing Percentages of Responses for Gender by Class

Group		Goals				
		Task	Ego	Social Solidarity	Work Avoidance	Extrinsic Reward
Form 2						
Females	(N=28)	67.9	7.1	14.3	-	10.7
Males	(N=23)	56.5	13.0	17.4	8.7	4.3
Form 5						
Females	(N=28)	64.3	3.6	21.4	7.1	3.6
Males	(N=29)	58.6	3.4	13.8	3.4	20.7
Total						
All	(N=108)	62.0	6.5	16.7	4.6	10.2

Table I

Students' Perceptions of Their Performance in Science and Reading, Showing Percentages of Responses for Gender by Class

Group	1 (1-8)	2 (9-14)	3 (15-17)	4 (18-28)
	Class Quartiles for Science			
Form 2				
Females (N=27)	7.4	44.4	25.9	22.2
Males (N=23)	34.8	17.4	21.7	26.1
Form 5				
Females (N=28)	17.7	14.3	25.0	42.9
Males (N=29)	51.7	27.6	3.4	17.2
Total				
All (N=107)	28.0	26.2	18.7	27.1
	Class Quartiles for Reading			
Form 2				
Females (N=27)	22.2	14.8	29.6	33.3
Males (N=23)	26.1	30.4	8.7	34.8
Form 5				
Females (N=28)	32.1	28.6	25.0	14.3
Males (N=29)	20.7	24.1	27.6	14.0
Total				
All (N=107)	25.2	24.3	23.4	27.1

Table J

Perceptions of Science and Reading as Male or Female Domain, Showing Percentages of Responses for Gender by Class

Group	Domains		
	Both Male and Female	Male	Female
		Science	
Form 2			
Females (N=28)	67.8	25.0	7.2
Males (N=23)	65.2	26.1	8.7
Form 5			
Females (N=28)	60.7	32.1	7.2
Males (N=29)	69.0	31.0	-
Total			
All (N=108)	65.7	28.7	5.6
		Reading	
Form 2			
Females (N=28)	75.0	3.6	21.4
Males (N=23)	56.5	17.3	26.2
Form 5			
Females (N=28)	60.7	-	39.3
Males (N=29)	48.3	-	51.7
Total			
All (N=108)	60.2	4.6	35.2

Table K

Students' Views on What Schools Should Do for People, Showing Percentages of Responses for Gender by Class

Group	Views: Give Knowledge and Educate	Prepare for Work	Give Social Support and Understanding
Form 2			
Females (N=26)	69.2	19.2	11.5
Males (N=19)	52.6	26.3	21.1
Form 5			
Females (N=28)	39.3	28.6	32.1
Males (N=29)	58.6	27.6	13.8
Total			
All (N=102)	54.9	25.5	19.6

Table L

Students' Views on Why People Go to School, Showing Percentages of Responses for Gender by Class

Group	Views: To Be Educated	Views: To Prepare For Employment
Form 2		
Females (N=26)	76.9	23.1
Males (N=20)	75.0	25.0
Form 5		
Females (N=28)	60.7	39.3
Males (N=28)	50.0	50.0
Total		
All (N=102)	64.7	35.3