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ABSTRACT

This paper investigates the motivational profiles of students in schools that participate in a professional development program (the CASE project), which has reported remarkable success in raising students' academic achievement. On the basis of new work on the characterization and measurement of motivational orientation, beliefs, and self-view, the question was raised of whether this apparent success can be attributed, at least in part, to the fact that schools that opt for the program already display a more adaptive motivational profile in their students than nonprogram schools. This is the first phase of a longitudinal study of the effects of CASE on achievement motivation. The focus is on the definition of constructs, the development of an instrument, and the question of systematic differences between CASE and non-CASE schools at pretest, before the program could have an effect. Early results do suggest that a higher proportion of students in CASE schools exhibit what C. Dweck and E. Leggett (1998) term adaptive motivational patterns and, therefore, might be expected to make better use of any intervention they receive. (Contains 3 tables, 8 figures, and 44 references.) (Author/SLD)

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Motivational Style, Commitment, and Cognitive Acceleration: Is It Only Good Schools Which Opt Into 'Successful' Projects?

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This paper investigates the motivational profiles of students in schools that participate in a professional development program (CASE), which has reported remarkable success in raising students' academic achievement. On the basis of new work on the characterisation and measurement of motivational orientation, beliefs and self-view, we raise the question of whether this apparent success can be attributed, in part at least, to the fact that schools that opt for the program already display a more adaptive motivational profile in their students than non-program schools. This is the first phase of a longitudinal study into the impact of CASE on achievement motivation. We concentrate here on the definition of constructs, the development of an instrument, and the question of systematic differences between CASE and Non CASE schools at pre-test, before the program could have an effect.

Introduction

The CASE project, initiated during the 1980's, is a science intervention programme followed by students during grades 6 and 7. (This is usually the first two years at secondary school in the UK). Its aim is to promote cognitive development. Following publication of the original research findings (Adey & Shayer, 1993), (Adey & Shayer, 1994) and subsequent media attention, interest in CASE has mushroomed. Recent research has established that students participating in CASE achieve higher grades at science, mathematics and English in public examinations (taken at the ages of 14 and 16) compared to equivalent students who have not participated (Shayer, 1996). It is estimated that upwards of 10% of all secondary schools in the UK have been involved in the CASE CPD programme (Adey, 1997).

Attention has now turned to the mechanism by which cognitive and subsequent academic gains are made. Adey and Shayer have been criticised for failing to give an adequate account of why some students benefit more than others ((Desforges, 1992) cited in (Bliss, 1995), (Leo & Galloway, 1996)). Leo and Galloway have suggested that motivational style might provide the missing explanation. This study is being carried out to evaluate their proposition. Findings from the first phase of research will form the focus for the present paper.

CASE

CASE consists of a series of 32 published 'Thinking Science' activities designed by the CASE team (Adey, Shayer, & Yates, 1989). Each activity is intended to replace an ordinary science lesson at regular intervals (approximately once a fortnight) and lasts between 60 and 70 minutes. All activities have a science context and aim to promote Piagetian formal operational thinking. For example activity TS27, 'Floating and Sinking', involves a practical exploration of objects varying in size and weight to see which float and which sink. Its purpose is to develop the pupil's notion of a compound variable, a formal operational schema, in this case density. Teachers are supported in their delivery of CASE lessons by an extensive CPD (continuing professional development) programme, lasting two years. This entails, in addition to learning how to use the materials, developing an understanding of the theoretical underpinnings and helping teachers to develop a sense of ownership of the scheme (Adey, 1997). Teachers are coached in their own classrooms as well as attending training sessions at the centre.

CASE lessons do not follow the pattern of most ordinary science lessons. Indeed Adey and Shayer claim, based on their analysis of existing intervention programmes that certain characteristics must be present for the intervention to be successful in its aim to promote cognitive development (Adey & Shayer, 1994). These features, termed the five pillars of CASE, are concrete preparation, cognitive conflict, construction, metacognition and bridging. Concrete preparation involves setting the scene and ensuring pupils are familiar with the appropriate language of the situation. They are then presented with cognitive conflict. For example in TS27, described above, students face a puzzle; they discover that a particular 800g jar sinks. What is surprising about this is that a similar sized jar weighing 400g floated, as did another 800g jar of a different size. So why does the jar in question sink? This challenges their view of the world and using Piagetian terminology, in order to assimilate this event there must be accommodation. (Adey, 1993) conceptualises this as a central processor changing and becoming more sophisticated.

The process described above is difficult for pupils to undertake and often cannot be done in isolation. Consequently CASE lessons include periods of group work and/or whole class discussion where pupils work together to try and solve the puzzle guided by the teacher. The rationale for this draws upon Vygotsky's notion of a zone of proximal development (Vygotsky, 1978). When pupils work together they are operating at their potential level of development. Elaborating on this idea (Newman, Griffin, & Cole, 1989) have coined the term 'construction zone activity' to describe mental activity that is beyond current competence levels. Adey and Shayer borrow this concept, describing the phases of the lesson where pupils are presented with the puzzle and subsequently try to solve it as encapsulating construction zone activity. The teacher's role in this process therefore is to guide the pupils rather than providing them with the answers. Cognitive development can only occur if pupils strive to reach the solution for themselves.

It is not enough however just to reach the solution, pupils must become aware of how this was reached and become self-reflective, the metacognitive phase of the lesson. The teacher's role now is to tease out how answers were reached, which can be done on a one to one basis, but typically occurs during whole class feedback on the problem. Finally, the last part of the process is bridging. Pupils must apply what they have learnt to other relevant contexts if the results are to be lasting. In TS27 pupils consider why boats, which are large heavy objects, float for example.

Motivational Constructs

Current theoretical approaches to achievement motivation conceptualise motivation in social-cognitive terms. Research focuses on the role of thoughts, beliefs and perceptions in the motivational process (Anderman & Maehr, 1994). This has resulted in the emergence of goal theory, which is the perspective this research draws upon. (Ames, 1992) describes achievement goals as follows:

'An achievement goal concerns the purpose of achievement behaviour. It defines an integrated pattern of beliefs, attributions and affect that produces the intentions of behaviour and that is represented by different ways of approaching, engaging in, and responding to achievement-type activities.' (pp261)

The implication is that achievement goals are part of a person's make-up and will influence how they respond to an achievement situation. They can therefore be considered to have to some extent trait-like qualities. (Dweck & Elliott, 1983) state 'Achievement motivation may be viewed as involving goals relating to competence' (pp645), whilst (Nicholls, 1984a) defines achievement behaviour as 'behaviour directed at developing or demonstrating high rather than low ability' (pp328). Therefore we are concerned with goals relating to competence or ability. Use of the term motivational goal to refer to an individual characteristic is problematic as some studies have demonstrated that the situation a person finds themselves in determines the goal they adopt ((Elliott & Dweck, 1988), (Graham & Golan, 1991) and (Jagacinski & Nicholls, 1987)). Consequently we adopt the terminology introduced by (Niemvirta, 1998), taking goal or motivational orientation to refer a 'personal factor' influencing the goal a person selects in a given situation and goal to refer to a 'desired end-state'.

Although researchers use a variety of terms, two major goals have been identified in the literature. (Nicholls, 1984b) outlines task-involvement and ego-involvement, (Dweck & Leggett, 1988) contrasts learning and performance goals, and (Ames, 1992) distinguishes mastery from performance goals. The former all share similar characteristics: the goal is to learn or improve at something with the central belief that success will follow effort. As success is internally referenced, performance of other people on the same task is irrelevant. We have adopted the term 'task orientation' for this. The latter share a goal of demonstrating ability relative to others. If you have done better than others, better than a norm-referenced standard or do well with little effort, you have demonstrated ability. Effort as a means of attaining success is not valued; if you have to try hard to succeed on a task which others have more easily attained then you cannot be very able. We have labelled this 'ego orientation'.

There are other orientations that may also be relevant. (Nicholls, Patashnick, & Bobbit Nolen, 1985) identify 'work avoidance' which appears similar to (Covington, 1984)'s 'failure prone'. Covington suggests that these students were initially successes oriented but discover that they cannot maintain self-worth in the face of insufficient awards. They discover that the best option if they can't be successful is to avoid situations where they might fail. In other words they 'opt out' of school where possible. We have labelled this orientation 'work avoidance'. According to Covington, continued experience of failure can lead to passive acceptance of the situation, which may be linked to Seligman's concept of 'learned helplessness' (Peterson & Seligman, 1984). Nicholls also identifies an endpoint in this process, 'alienation', when students are completely switched off to the point that they actively disrupt the system. It is unclear whether these represent degrees of the same orientation, or whether they represent separate orientations. We have followed Nicholls' terminology and called this 'alienation'.

Recent researchers have suggested that pupils may pursue more than one goal (Ainley, 1993), (Meece & Holt, 1993) and (Seifert, 1995). It is therefore too much of a simplification therefore to label students either task, ego, work avoidance or alienation oriented, students need to be assessed on each

of these dimensions. (Leo & Galloway, 1996) suggest that students must be task oriented in order to benefit from CASE but they also suggest it is possible that CASE induces task orientation in students. The longitudinal design of this research allows this claim to be investigated. Furthermore they propose that 'individual children could present different motivational styles across subject domains' (pp38 Leo & Galloway, 1996). To evaluate this motivational orientation has been assessed on a subject specific basis as well as for school in general.

The concept of self-confidence or perceived competence is inextricably linked to motivational orientation. Both Covington and Nicholls suggest that when a student perceives him or herself to be unable to demonstrate ability or self-worth a work avoidance orientation will begin to be adopted. This hinges on perceived ability rather than actual ability. As with motivational orientation, different researchers use different terms; (Nicholls, 1984b) refers to perceived competence, (Covington, 1984) to self-image, (Ames & Felker, 1979) to self-concept, (Carr, Borkowski, & Maxwell, 1991) to self-esteem, and (Zimmerman & Martinez-Pons, 1990) to self-efficacy. (Shavelson, Hubner, & Stanton, 1976) defines self-concept as follows:

'In very broad terms, self-concept is a person's perceptions of himself. These perceptions are formed through his experience with his environment...and are influenced especially by environmental reinforcements and significant others.' (pp411)

(Shavelson & Bolus, 1982) expand on this and identify seven critical features of self-concept. It is organised, multifaceted and hierarchical. General self-concept is stable but as one descends the hierarchy, self-concept becomes increasingly situation specific and as a consequence less stable. It is increasingly multifaceted with age, has both a descriptive and evaluative dimension, and it can be differentiated from other constructs such as academic achievement. Given these aspects of self-concept it is possible to reconcile the different terminology and uses suggested by the authors above. For example self-esteem could be regarded as an evaluative aspect of the self, whereas perceived competence could be seen as a descriptive aspect. It is clear however that self-concept is not a unitary construct and it does have a hierarchical structure. (Marsh, 1990b) has demonstrated that students have subject specific self-concepts which are distinct from 'general school' self-concept. Given the multiplicity of terminology in usage, we have named this 'Self-View'. As CASE has been shown to influence examination grades in English and mathematics as well as science self-view has been assessed on a subject specific basis as well as for school in general.

How students view the world will also effect the goals they choose to pursue, as is implied in Ames' definition of achievement goals above. (Weiner, 1979) first suggested an attributional framework as a theory of motivation over twenty years ago, its central tenet being that search for understanding is the 'spring of action'. In terms of the classroom, researchers have considered how students attribute success and failure and in particular have focused on the roles played by effort and ability attributions in terms of their relationship with motivational orientation. An early study found that helpless children attributed failure on a task to lack of ability, whilst mastery children made fewer attributions and when they did gave luck, lack of effort, unfairness of the experimenter and task difficulty as reasons (Diener & Dweck , 1978). (Nicholls, 1989), among others, has investigated further and discovered that students from grade 2 up to 12 who are task oriented value effort and see success as being contingent upon it, whereas those who are ego oriented only value ability. (Harter & Connell, 1984) suggest that control is an essential feature; if students feel they can control their environment their intrinsic motivation will be high, whereas if students don't feel in control or simply don't know why things happen then their intrinsic motivation will be lowered. Thus it seems prudent to assess students beliefs in some way. Given that beliefs about the cause of success may differ from beliefs about failure, both have been assessed.

The Development of an Instrument

A self-report instrument has been developed to assess the motivational variables discussed above. Four sections assess motivational orientation, beliefs about the cause of success and failure (separate sections) in school, and self-view. There are 70 items in total. A provisional questionnaire was piloted with a grade 7 cohort (N=178) in October 1997 to assess reliability and check administration details. As a result a few minor changes were made to question wording, layout and instructions and to the number of items in some subscales.

The questionnaire is administered on a whole class basis. General instructions, for the class teacher to go through, preface the first section and section specific instructions are given at the start of each section. Students complete the questionnaire in silence and at their own pace. Completion typically takes 25 minutes. Each question is pre-coded allowing student responses to be entered directly into SPSS.

Details about each section are given below.

Motivational Orientation: This is measured using a modified version of (Nicholls, 1989)' 'Motivational Orientation Scale'. Students are asked to think about when they feel they've had a really successful day at school and then respond to a number of items. Each item has a common stem 'I feel successful when...' and students respond on a five point scale where (1) is strongly disagree, (2) disagree, (3) neither agree or disagree, (4) agree and (5) is strongly agree. Students are asked to make three responses to each item, in relation to school in general, in relation to science and in relation to English. This then gives a motivational orientation score for each of these three domains. An example is given in below in figure 1:

1. I feel successful when I show people that I'm clever

in school generally	in science	in English
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Figure 1: Example of the layout of questions on the 'Motivation Questionnaire'

Students circle the appropriate response for them. As well as having students respond on a domain specific basis, items have also been reworded where necessary to make them suitable for a British audience. Some sub-scales have been shortened resulting in 21 items spanning the four sub-scales of task, ego, work avoidance and alienation orientations.

Success and Failure Beliefs: These are assessed by drawing on two existing scales; (Duda & Nicholls, 1992)' 'Classroom Beliefs Scale' and (Connell, 1985)'s 'Multidimensional Measure of Children's Perceptions of Control'. Beliefs regarding success are assessed in a separate section to beliefs about failure. Students are asked to think about reasons why people do well at school (and don't do well, in the failure beliefs section) and respond to a number of statements. Each item has a common stem 'People do well if...' ('don't do well' in the failure beliefs section) and students respond on a five point scale with (1) being never true, (2) rarely true, (3) sometimes true, (4) often true and (5) always true. The format and layout of the motivational orientation section is retained so beliefs across the three domains of school in general, science and English are measured. Nicholls' instrument contains sub-scales to assess beliefs in ability, motivation/effort, deception and external factors. These sub-scales were retained, although the number of items was reduced in some cases and rewording was necessary

for a British audience. Connell's instrument includes assessment of the notion that students may not know what causes success, what he calls 'unknown control'. Accordingly a further sub-scale was added of unknown beliefs. The subject of Nicholls' scale is the cause of success and although Connell's instrument assesses success and failure separately, only a limited number of items came from this scale. It was therefore necessary to write a new scale for failure based on the same items as the success scale. For example Nicholls' original item 'People succeed if they are just lucky' yielded 'People do well if they're just lucky' in the success beliefs section and 'People don't do well if they're unlucky' in the failure section. In the case of the deception sub-scale it was sometimes not appropriate to have an equivalent failure item. For example there is no failure belief item for 'People do well if they know how to impress teachers'. As a consequence the Success Beliefs Scale consists of 15 items whilst the Failure Beliefs Scale consists of 13 items.

Self-View: This is assessed using (Marsh, 1990a)'s 'Self Description Questionnaire'. As the study was concerned solely with the domains of school in general, science and English, items were only used from the General School, Mathematics and English sub-scales. It was felt that it was appropriate to use the mathematics items, replacing mathematics with science to assess science self-view. Students are asked to think about how they feel about themselves when it comes to school and respond to each item on a five point scale where (1) was false, (2) mostly false, (3) not true or false, (4) mostly true and (5) true. As with assessment of the other constructs some rewording was necessary to make the scale appropriate for a British audience and some sub-scales were shortened. This results in a scale of 21 items.

Sample and Design

The design is longitudinal and quasi-experimental, comparing students participating in CASE to similar students who do not over the two-year period of the intervention. When a school chooses to opt into CASE the whole science department is involved, not just a few teachers and classes, so CASE is run on a whole school basis. For this reason it is not possible to conduct a 'true' experiment.

The experimental group consists of five CASE schools, which were chosen to represent a wide range of backgrounds rather than be representative of all schools. These include inner-city, suburban and rural schools as well as public and private schools. This ensures that children differ widely in terms of ability, socio-economic background and ethnicity. Four control schools were chosen to roughly match the experimental schools. All students in these schools entering grade 6 in September 1997 are involved. A breakdown by type of school and gender is given in table 1.

The self-report instrument was administered between November 1997 and the start of January 1998 (after the pilot study had been completed). Most of the CASE schools did not start the CASE programme until late October / early November, therefore it is reasonable to suppose that the questionnaire tapped students' motivation before CASE had had time to make any real impact.

Results

Preliminary Analyses of the questionnaire

Factor Analysis: As existing instruments had undergone extensive modification in designing the motivation questionnaire, factor analysis was carried out to validate the existence of the various sub-scales within each of the four sections of the questionnaire. Confirmatory factor analysis identified the appropriate sub-scales for motivational orientation (task, ego, work avoidance and alienation). In terms of success and failure beliefs, separate factors for ability, effort and unknown beliefs were

isolated, but deception and external beliefs were classed together. Looking at the wording of the items in these sub-scales most were concerned with the teacher in some way, so this factor was renamed relationship with teacher. Within the self-view section, English, science and school in general were found to be distinct.

Internal Consistency: Cronbach's alpha scores were calculated for each sub-scale and are shown in table 2. Although the motivational orientation and success beliefs alphas are a little lower than (Duda & Nicholls, 1992)'s original values, they are acceptable given the reduced number of items in each sub-scale. The self-view sub-scales values are similar to (Marsh, 1990a).

Primary Analyses

Correlational analysis: Three issues of interest were examined. Firstly relationships across the three domains (general school, science and English) for each sub-scale were investigated. For motivational orientation, success and failure beliefs interrelations were extremely high. For example the correlation between alienation scores in science and school in general was 0.926 ($p < 0.001$). All values exceeded 0.765 and were generally above 0.9. This suggests that motivational orientation and beliefs may not vary much from subject to subject. Interrelations for self-view were much lower, (school in general self-view correlated 0.373 with science and 0.356 with English whilst science and English self-views correlated 0.105) implying that self-view does vary from subject to subject.

Next relationships between the sub-scales of each construct were investigated. As there is a high correspondence between scores for each sub-scale across each domain (discussed above) results for school in general only will be given. These are presented in table 3. One area of interest is the relationships within motivational orientation. In a recent comparison of different measuring instruments correlations between learning and performance goals depended on the instrument used (with positive, negligible and negative relationships found) (Dupeyrat, Escribe, Marine, & Bissey, 1998). In this study, task orientation was found to be positively correlated with ego orientation and negatively correlated with alienation. Work avoidance and alienation are positively correlated. Overall relationships within the motivational orientation and beliefs scales are similar to those found by (Duda & Nicholls, 1992).

Finally relationships between the constructs were assessed. Of particular interest was the finding that task orientation is positively correlated with the belief that effort is at the root of success and failure, and a positive self-view. Ego orientation on the other hand is positively correlated with the belief that ability is the cause of success and failure, (and also effort and teacher beliefs for success) and a positive self-view. Work avoidance is positively correlated with all beliefs except effort and associated with a negative self-view, a pattern that is also true for alienation. These relationships mirror earlier findings, in particular (Nicholls, Cobb, Wood, Yackel, & Patashnick, 1990), (Nicholls, 1984a), (Dweck & Leggett, 1988), (Covington, 1984), (Harter & Connell, 1984) and (Marsh, 1990b).

Effect of type of school: Analysis of variance was conducted to isolate type of school (CASE Vs Non CASE) and gender effects and possible interaction between these variables on the various motivational constructs. Given the similarity of motivational orientation and beliefs across different domains, only findings for school in general will be presented. These can be seen graphically in figures 4 to 7. We focus here on the influence of type of school.

Within motivational orientation there was a main effect for type of school on task orientation ($F(1,1422)=22.056$, $p < 0.001$), and ego orientation ($F(1,1425)=6.105$, $p < 0.05$). In both cases CASE schools had higher values on average. There was a type of school x gender interaction on task

orientation ($F(1,1422)=7.010, p<0.01$), with boys having lower scores than girls in Non CASE schools but higher than girls in CASE schools. There was also a type of school x gender interaction on alienation ($F(1,1443)=6.887, p<0.01$) with boys showing the highest levels of alienation in Non CASE schools and girls showing higher levels in CASE schools.

Analysis for success and failure beliefs revealed similar findings. There was a main effect for type of school on the belief that effort causes success ($F(1,1413)=4.925, p<0.05$), lack of effort causes failure ($F(1,1381)=10.026, p<0.01$), and the view that the cause of failure was unknown ($F(1,1410)=46.211, p<0.001$). In all cases CASE schools had higher scores on average. There was a type of school x gender interaction for the belief that the cause of success was unknown ($F(1,1354)=15.274, p<0.001$). Girls in CASE schools espoused this view more frequently than boys did, whilst the opposite was true in Non CASE schools.

Within the Self-view subscales there was a main effect for type of school on school in general ($F(1,1360)=5.233, p<0.05$) and English ($F(1,1374)=9.591, p<0.01$), with pupils in CASE schools having higher scores in both cases. There was also a type of school x gender interaction for school in general ($F(1,1360)=5.233, p<0.05$) and science ($F(1,1377)=5.055, p<0.05$). For the former boys have lower scores than girls in Non CASE schools whilst the opposite is true in CASE schools; for the latter boys have higher scores in CASE schools compared to Non CASE schools, whilst girls the pattern is the opposite.

Cluster Analysis: To identify motivational profiles that were common to significant numbers of students, responses to the motivational orientation items were subjected to a cluster analysis. This addresses the issue of individuals pursuing multiple goals. Ward's method and centroid clustering techniques were applied to the whole data set and to individual schools, with and without self-view to isolate consistent clusters (validity checks suggested by (Everitt, 1974)). Six motivational profiles emerged. Details are given in table 4 and figure 8, however the characterisation is as follows:

1. The 'task' group. Students fitting this profile have relatively high task scores, moderately low ego and work avoidance scores and very low alienation scores.
2. 'Performance'. These students score highly on the task scale, moderately highly on the ego scale and have low scores on the work avoidance and alienation scales.
3. 'Performance by the Easy Route'. Moderately high scores on the task and work avoidance scales, high ego scores and moderately low alienation scores typifies these students.
4. 'Strong Responders'. These students score moderately highly on task scale and highly on the other three.
5. 'Work Avoidant and Alienated'. These students have moderately low scores on the task and ego scales, but relatively high scores on work avoidance and alienation.
6. 'Disenchanted'. Moderately low task and ego scores combine with moderate work avoidance and moderately high alienation scores.

A χ^2 analysis was conducted to investigate type of school and gender differences among the motivational profile groups. We focus only on type of school differences. Compared to CASE schools, Non CASE schools have a higher proportion of Disenchanted students ($\chi^2=7.939, p<0.01$).

Discussion

A reliable and apparently valid instrument to tap various motivational variables has been constructed for a selection of existing scales. This instrument has been used as a 'pre-measure' with students embarking on a cognitive intervention program and with a matched group who will not follow the

program. The intention was to provide a base measure against which subsequent change could be assessed and attributed to the CASE program. However it has transpired that there are systematic differences between the students in CASE and control group schools at the onset of the study.

It appears that a higher proportion of students in CASE schools exhibit what (Dweck & Leggett, 1988) term adaptive motivational patterns and might therefore be expected to make better use of the intervention that they will receive. The exact nature and direction of causality in this relationship is still to be uncovered. It is possible that individual schools effected the results, so that the differences were the result of chance sampling errors. To investigate this further one way ANOVAs were conducted with school (rather than the collapsed variable, type of school) as the independent variable and the motivational constructs as the dependent variables. Whilst differences in beliefs and self-view could be explained by extreme scores in individual schools, all of the CASE schools have higher mean values on task and ego motivation than Non CASE schools. This suggests that these findings merit serious consideration.

The possibility is raised that those schools which opt to join an innovative program already have an ethos of success while schools which 'cannot find the time' to join the program have a higher proportion of disenchanted pupils, either because of their environment or resulting from in-school influences. Is this the root cause of the claimed 'value added' effects of CASE and similar programs? One might look, for instance, at Success for All (Slavin, 1990). Success for All only agrees to work in schools where 80% of the teachers vote to commit themselves to the program. Can the subsequent success be attributed to the self-selection of such programs by schools that are already characterised by a success culture?

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Table 1: *Number of Participants by Type of School and Gender*

		Type of School		
		CASE	Non CASE	Total
Gender	Boys	390	300	690
	Girls	498	403	901
	Total	888	703	1591

Table 2: *Cronbach Alpha Scores for each Sub-scale in the Questionnaire*

Scale	Number of Items	Domain		
		School in General	Science	English
Motivational Orientation				
Task	6	0.68	0.70	0.70
Ego	5	0.75	0.75	0.75
Work Avoidance	6	0.72	0.72	0.72
Alienation	3	0.76	0.73	0.74
Success Beliefs				
Ability	4	0.61	0.60	0.60
Unknown	2	0.61	0.56	0.60
Effort	4	0.55	0.56	0.55
Teacher	5	0.68	0.66	0.67
Failure Beliefs				
Ability	4	0.61	0.61	0.62
Unknown	2	0.66	0.65	0.63
Effort	3	0.58	0.58	0.58
Teacher	4	0.57	0.57	0.55
Self-View	7	0.82	0.84 ^a	0.79 ^b

^a 6 item sub-scale

^b 5 item sub-scale

Table 4: *Number of Students in and Characteristics of each Motivational Profile Group*

Motivational Profile Group	N	(%)	Mean Motivational Orientation Score			
			T %	E %	WA %	A %
Task	175	(13.4)	86.7	54.8	51.7	26.0
Performance	279	(21.3)	91.3	80.4	49.0	24.0
Perf/Easy	345	(26.4)	87.3	84.4	68.7	33.3
Strong Responder	167	(12.8)	87.3	90.8	84.0	58.0
WA/A	118	(9.0)	60.0	60.0	72.3	72.0
Disenchanted	225	(17.2)	73.7	68.0	69.7	45.3

Key:

N – Number of pupils in group

T – Mean task orientation score for group expressed as a percentage of the total possible score

E – Mean ego orientation score for group expressed as a percentage of the total possible score

WA – Mean work avoidance score for group expressed as a percentage of the total possible score

A – Mean alienation score for group expressed as a percentage of the total possible score

Perf/Easy – Abbreviation for ‘Performance by the Easy Route’

WA/A – Abbreviation for ‘Work Avoidant and Alienated’

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Sub-scale	T	E	WA	A	Sab	Su	Seff	Ste	Fab	Fu	Feff	Fte	SV	Srt
Task Orientation (T)	-	.364	-.171	-.395	.084 ^c	-.120	.368	-.098	0.062 ^b	-.059 ^b	.165	-.051 ^a	.259	.021 ^a
Ego Orientation (E)		-	.181	.045 ^a	.300	.097	.174	.158	.174	.027 ^a	.134	.143	.189	.063 ^a
Work Avoidance (WA)			-	.514	.246	.252	-.011 ^a	.345	.280	.181	.067 ^b	.194	-.249	-.067 ^b
Alienation (A)				-	.157	.258	-.150	.319	.260	.194	.006 ^a	.244	-.222	-.056 ^a
Ability Success Belief (Sab)					-	.163	.276	.447	.488	.149	.273	.414	.052 ^a	.150
Unknown Success Belief (Su)						-	.019 ^a	.324	.265	.467	.050 ^a	.166	-.188	-.082 ^b
Effort Success Belief (Seff)							-	.073 ^c	.031 ^a	.010 ^a	.351	.070 ^c	.178	.063 ^a
Teacher Success Belief (Ste)								-	.436	.236	.099	.485	-.119	-.019 ^a
Ability Failure Belief (Fab)									-	.252	.242	.437	-.093 ^c	.043 ^a
Unknown Failure Belief (Fu)										-	.153	.178	-.171	-.028 ^a
Effort Failure Belief (Feff)											-	.244	.090 ^c	.081 ^b
Teacher Failure Belief (Fte)												-	-.051 ^a	.074 ^b
Self-View (SV)													-	.197
Cognitive Level (Srt)														-

Note: ^a not significant, ^b $p < 0.05$, ^c $p < 0.01$, all other correlations are significant at the 0.1% level.

Table 3: Correlations Among Sub-scales of the Motivation Questionnaire

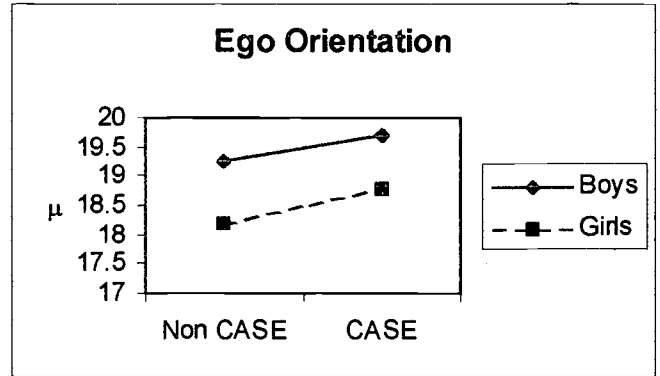
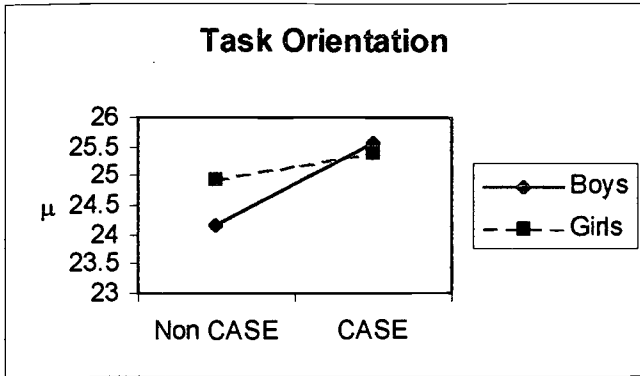
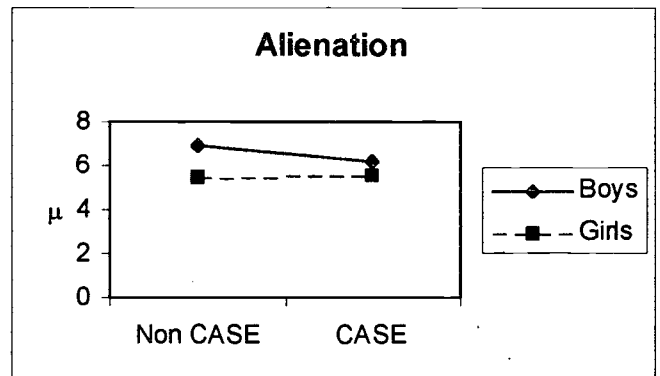
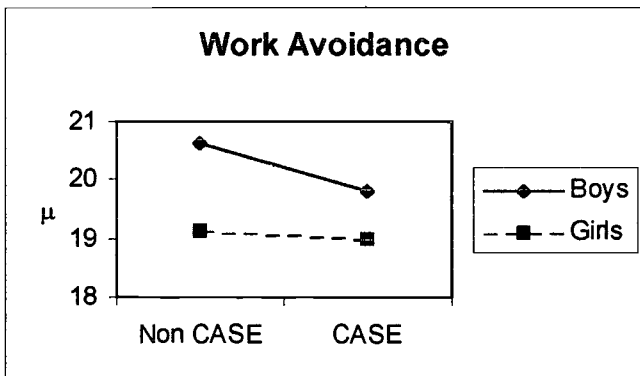


Figure 4: *Effect of Type of School and Gender on Motivational Orientation*



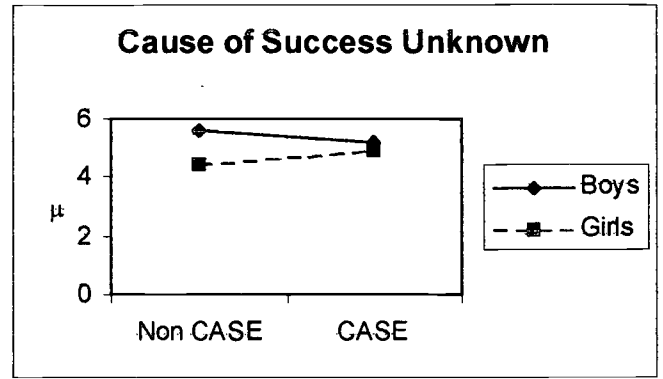
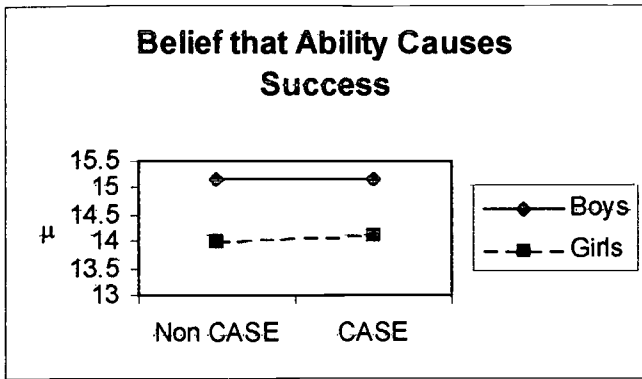
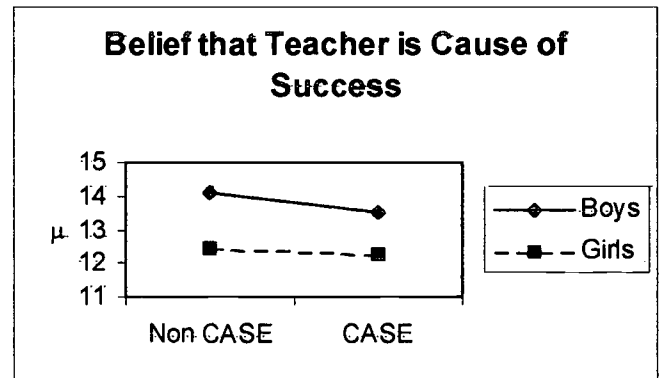
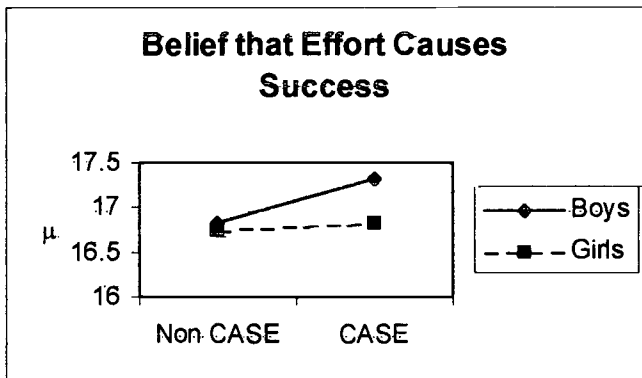


Figure 5: *Effect of Type of School and Gender on Success Beliefs*



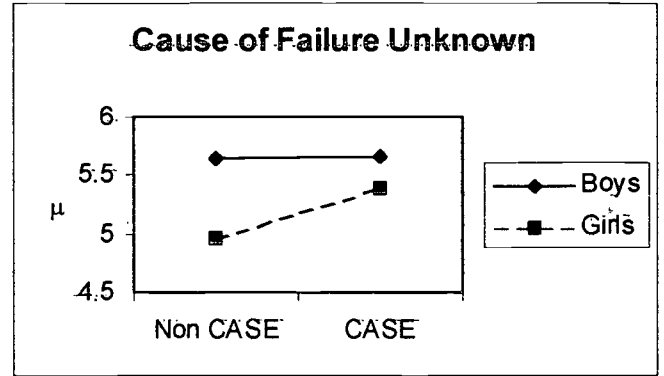
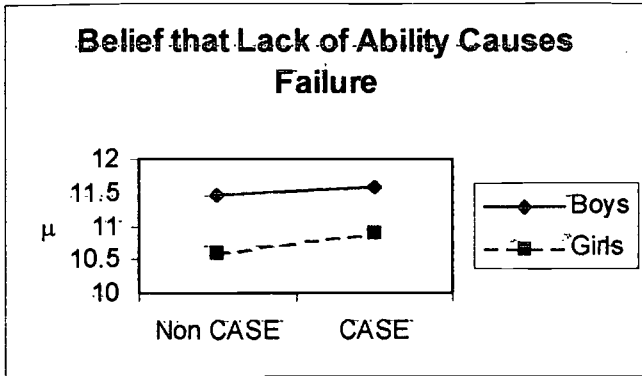
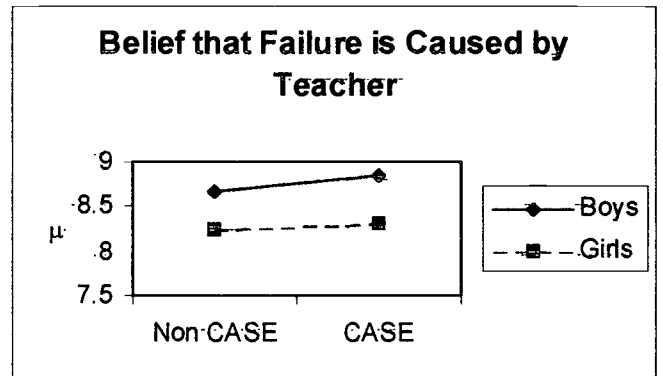
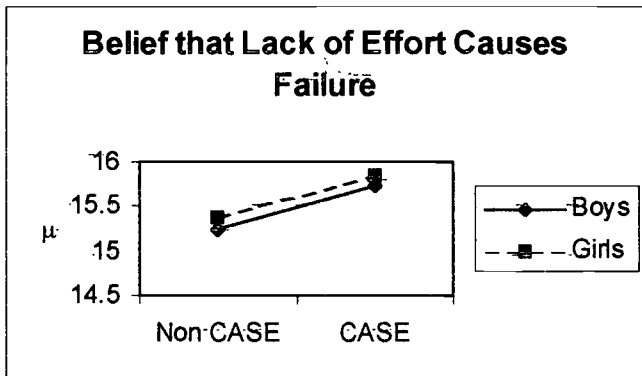


Figure 6: *Effect of Type of School and Gender on Failure Beliefs*



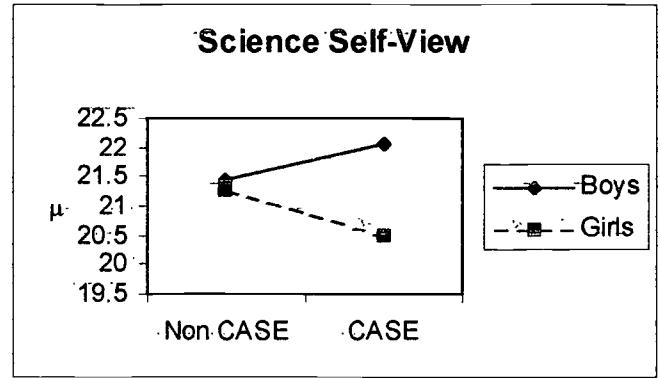
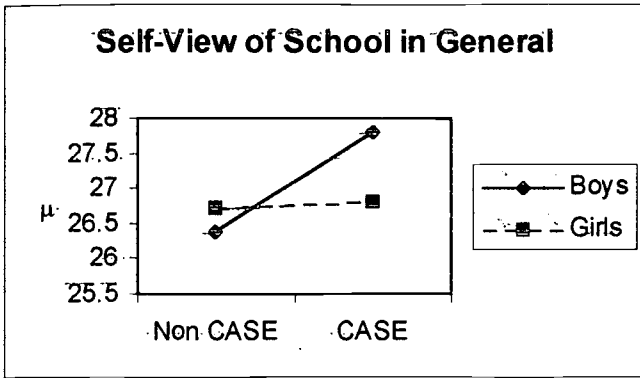


Figure 7: Effect of Type of School and Gender on Self-View

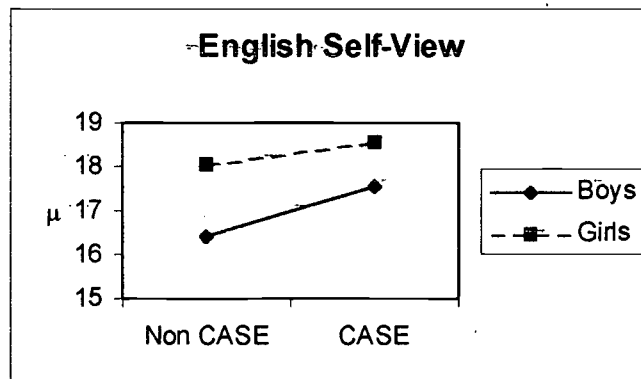
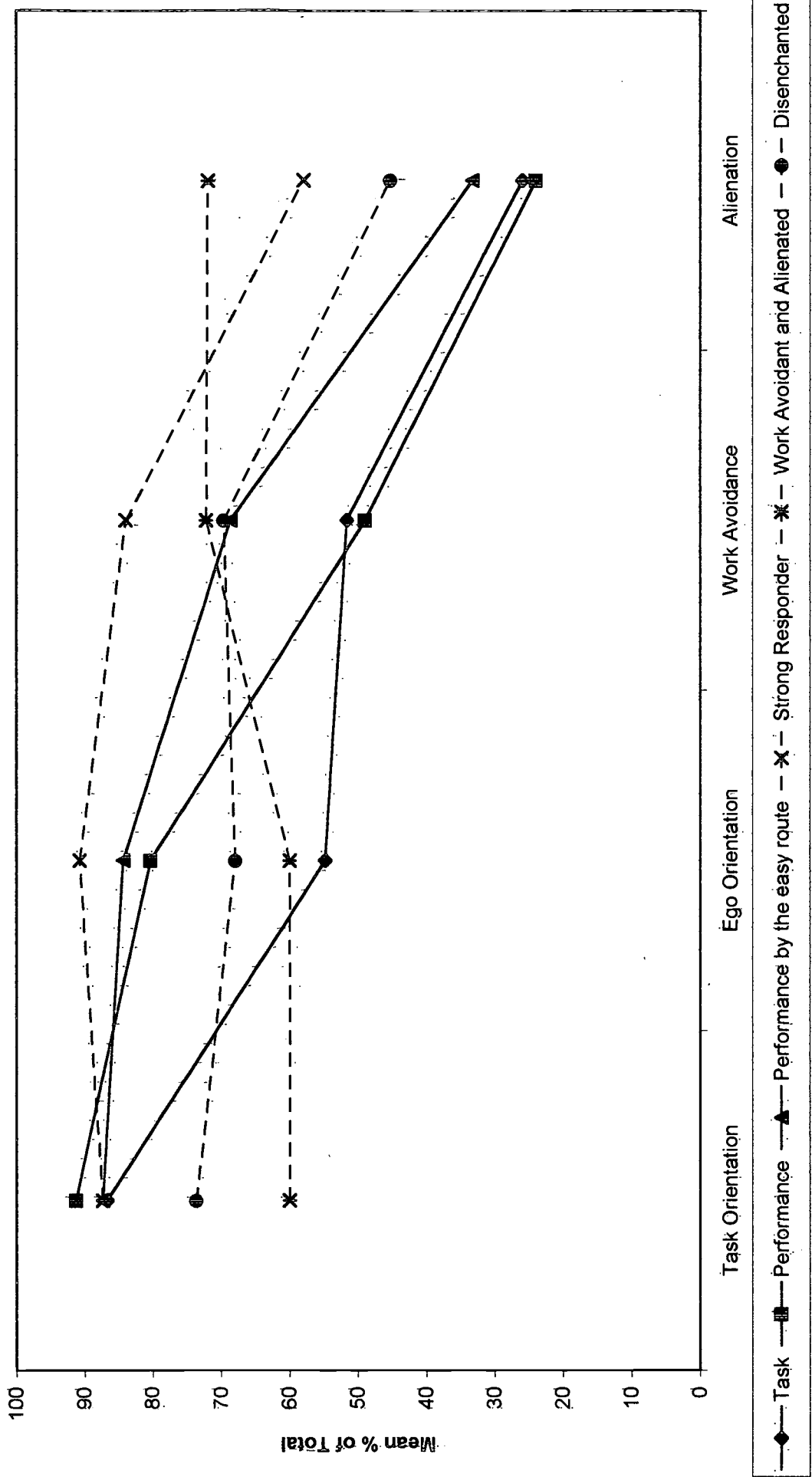


Figure 8: Characteristics of the Science Motivational Profile Groups





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