DOCUMENT RESUME

ED 347 199 TM 018 715

AUTHOR	Young, Allison J.; And Others
TITLE	All Content Areas May Not Be Created Equal: Motivational Orientation and Cognitive Strategy Use in Four Academic Domains.
INSTITUTION	Michigan Univ., Ann Arbor. School of Education.; National Center for School Leadership, Urbana, IL.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	Apr 92
NOTE	32p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, April 20-24, 1992).
PUB TYPE	Reports - Research/Technical (143) -- Speeches/Conference Papers (150)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Academic Achievement; *Cognitive Processes; Educational Objectives; English; Grade 6; Grade 7; Intermediate Grades; Junior High Schools; *Junior High School Students; *Learning Strategies; Mathematics; Middle Schools; Models; Sciences; Sex Differences; Social Studies; *Student Motivation; Surveys; White Students
IDENTIFIERS	*Content Areas; Domain Analysis; *Goal Oriented Approach to Learning; Middle School Students; Strategy Choice; Student Surveys

ABSTRACT

Students' motivation was studied within specific academic content areas using a goal theory framework. The relationships between motivational orientation and cognitive processes within and across content areas are also considered. Six-hundred sixth and seventh graders, approximately 90% white, from two suburban middle schools participated. Students completed general and four domain-specific surveys in mathematics, English, social studies, and science. Surveys, constructed for this study, assessed individual goal orientation (learning focus or ability focus) and cognitive strategy use (surface or deep level) within each domain. Findings suggest that students differentiated their goals and strategies within the four subject matter areas. There was a significant negative relationship between learning-focused goal orientation and ability-focused goal orientation. Most gender differences occurred with respect to the English content area. In English, boys were less likely than girls to hold a learning-focused goal orientation and to report using deeper level strategies, and were more likely to use surface level strategies. Results suggest that motivation is more effectively studied in a domain-specific paradigm. Addressing motivational and cognitive issues within subject areas has the potential to add to the understanding of student decision making. Eleven tables and 8 graphs present study data, and there is a 33-item list of references. (SLD)

All Content Areas May Not Be Created Equal: Motivational Orientation and Cognitive Strategy Use in Four Academic Domains

Allison J. Young, Amy J. A. Arbreton, Carol Midgley

The University of Michigan

Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA, April, 1992.

This research is conducted in conjunction with The Middle School Coalition project and is funded by the National Center for School Leadership at the University of Illinois through the Office of Educational Research and Improvement, Department of Education.

Correspondence should be addressed to:

Allison J. Young
Combined Program in Education and Psychology
1400C School of Education
610 East University
University of Michigan
Ann Arbor, MI 48109-1259

A constellation of factors combine to have an impact on academic achievement for an individual student. Among these factors is motivation, which has become an integral part of the study of achievement in educational contexts (Maehr, 1989; Weiner, 1990). As the study of motivation becomes more articulated, various motivational constructs have been identified - attributions, goals, subjective task value, and intrinsic and extrinsic interest. Also, the increasing sophistication in the study of motivation has helped us to analyze these constructs within a more ecological framework - the classroom setting. This study proposes to take this work a step further and investigate students' motivation within specific academic content areas using a goal theory framework. In addition, we focus on the relationships between motivational orientation and cognitive processes within and across content areas.

Achievement Goal Theory

One tradition of research on achievement motivation stresses the importance of the goals students pursue. The work on goal theory has identified two dominant motivational orientations among students - "learning-focused" orientation and "ability-focused" orientation (Ames, 1987; Dweck & Leggett, 1986; Maehr, 1983; Maehr & Nicholls, 1980; Nicholls, Cobb, Wood, Yackel, & Patashnick, 1990).[1] Learning-focused students are interested in completing and understanding the task at hand for the sake of furthering their own knowledge of the topic, acquiring the necessary skills, and solving problems. In contrast, ability-focused students are concerned about their ability in comparison to other students

[1] These orientations have been labeled in various ways including task-involved and ego-involved (Maehr & Nicholls, 1980); mastery and performance (Ames & Archer, 1988); and learning and performance (Dweck, 1986).

and focus on competition and social comparison (Ames, 1987). These students are interested in appearing able, or avoiding appearing unable and are more concerned about the grades they receive than with what it is they are learning. Here, success is dependent on establishing that one's ability is superior to that of other students (Nicholls et al., 1990).

Students who endorse learning-focused goals work harder, persist longer, and take on more challenging tasks than students who pursue "performance" or ability-focused goals (Ames, 1987; Dweck, 1986; Maehr, 1989; Maehr & Nicholls, 1980; Nicholls, 1984). Ability-focused students attribute failure to a lack of ability, are more likely to engage in irrelevant or diversionary verbalizations, and generally show greater negative affect than learning-focused students (Dweck & Leggett, 1986).

Motivational Orientation and Cognitive Strategy Use

There is growing evidence that students' goal orientation is related to the type of learning strategies that they employ. Learning-focused students tend to use deeper processing strategies, such as monitoring comprehension, connecting new information with prior knowledge, and discriminating important from unimportant information. On the other hand, ability-focused students tend to use surface-level cognitive processing strategies such as memorization and rehearsal (Ames & Archer, 1988; Elliott & Dweck, 1988; Graham & Golan, 1991; Meece, Blumenfeld, & Hoyle, 1988; Nicholls et al., 1990; Nolen, 1988; Nolen & Haladyna, 1990). In addition, ability-focused students are more likely to employ ineffective or useless strategies and show deficits in actual performances (Dweck & Leggett, 1988).

The overall picture of a student with learning-focused goals is one who is intrinsically interested in the content and skills to be understood and applied, who takes errors in stride, who uses effective strategies, and who is focused on completing and understanding the work. The picture of an ability-focused student is one who is focuses on grades without necessarily understanding the material; one who is concerned about how things look on his or her records, and one who wishes to obtain positive judgements and avoid negative judgements of his or her competence.

Domain Specificity

Much of the previous research on achievement goal orientation in educational settings has been limited to single content areas or more general notions of goal orientation (Ames & Archer, 1988; Elliott & Dweck, 1988; Nolen, 1989; Nolen & Haladyna, 1990). However the issue of domain specificity has become salient in the study of cognitive aspects of the learning process (Glaser, 1984; Pintrich, Cross, Kozma, & McKeachie, 1986). Indeed, recent work by Stodolsky, Salk, and Glaessner (1991) suggests that the nature of instruction within academic domains may be central to students' motivational orientation. From their interviews with fifth grade students, the authors found that "The occasions students describe as times liked in math are primarily when work is easy. In social studies, positive experiences are described primarily as interesting." (p. 102). In an earlier study, Stodolsky (1988) found that math instruction was individualistic and used very few cooperative activities and materials. Thus, content areas themselves may produce different motivational contexts beyond the natural variation of individual teachers. Students as young as first grade differentiate self-perceptions of ability within different

domains (Wigfield, Harold, Eccles, Aberbach, Freedman-Doan, & Yoon, 1990).

Very little work, however, has been done to identify systematic differences in students' goals for learning across subject matter areas. Pintrich and DeGroot (1990), in a study using both quantitative and qualitative methods, looked at the relationship between students' intrinsic value beliefs and use of cognitive and self-regulatory strategies in three subject matter areas: English, social studies, and science. Intrinsic value beliefs involve students' perceptions that their school work is worthwhile and interesting as well as their endorsement of learning goals. The results of the quantitative analyses indicated very few domain differences. However, the qualitative data elicited quite a different picture. In interviews with students, all content areas were discussed. Here, in contrast to the relative stability across domains found in the quantitative data, the student interviews revealed differences across domains. "In particular. math seemed to stand out as being very different from the other subjects" (Pintrich & DeGroot, 1990, p.23). Therefore, we include all four domains when we examine motivational variables.

Gender Differences

Lastly, there is a strong research tradition focusing on gender differences in motivational variables in various content areas, particularly in math and English. Studies have reported that girls more than boys: tend to use stable, internal attributions to explain success in mathematics (Eccles, MacIver, & Lange, 1986a; Ryckman & Peckham, 1987; Wigfield, Eccles, MacIver, Reuman, & Midgley, 1991;); exhibit more performance-oriented behavior in experimental situations involving math (Dweck, 1986);

tend to have low self-efficacy and self-concept of ability in mathematics (Eccles, Adler, & Meece, 1984). Much of this prior work examines personal factors in motivation, however, some work has pointed to the role of context in accounting for gender differences in math.

In particular, the influence of context on gender differences in motivation toward mathematics has been investigated. Some researchers have suggested that the classroom climate of mathematics classes has a detrimental effect on girls' motivation (Brush, 1980; Eccles et al., 1986a; Eccles, Miller, Reuman, Feldlaufer, Jacobs, Midgley, & Wigfield, 1986b). Eccles and her colleagues have identified "girl unfriendly" classrooms, which involve instructional practices that enhance competition among students, involve the public evaluation of ability during recitation-type instruction, encourage social comparison based on ability assessment, and involve the differentiated use of praise. Brush interviewed girls regarding their mathematics and English classes, and found that they described English classes as characterized by more student-teacher interaction, positive teacher emotional support, and high levels of teacher control over public recitation.

We included gender in our analyses to determine whether different content areas might foster different goal orientations for boys and girls. The work of Stodolsky and Eccles suggests that students might adopt a more ability-focused orientation in mathematics, and a less ability-focused orientation in English. We suggest that boys and girls may react differently to these contrasting environments and thus, show different motivational orientations within domains. Also, we were curious to see if there would be any gender differences in reported cognitive strategy use, since nothing in the literature reviewed addressed this issue.

In sum, we were interested in looking at motivational orientation and cognitive strategy use within and across the four major academic content domains - English, social studies, math, and science. Specifically, we will examine the following research questions:

1) Within each content domain, are there distinct learning and ability goals and deeper and surface strategy constructs?
2) Is the relationship between motivational orientation and cognitive strategy use consistent with that found in previous literature, which looked at these constructs more globally?
3) Do the content areas elicit different motivational goals and strategies? Specifically, are students more ability-focused in math than in English, social studies, and science? We ask this question because the instructional formats found by Stodolsky in the math content area appear to be more conducive to an ability-focused orientation.
4) Are there gender differences in learning-focused or ability-focused goal orientation and in deeper or surface cognitive strategy use in each content area?

METHOD

Participants

Data for this study were collected in the winter of 1991 as part of a larger study investigating the influence of the school environment on students' learning and motivation. Six hundred 6th and 7th graders from two middle schools participated in this study. These students attended public school in a working-class suburb of a large, midwestern metropolitan center. An equal number of males and females were represented. The sample consisted of approximately 90% white students, 9% African American, and 1% other.

Measures

Students completed five separate surveys; a general survey and four domain specific surveys in math, English, social studies, and science. These surveys were constructed for this study by research staff, drawing from previous work by Ames and Archer (1988), Harter (1981), Nolen (1989), Nolen and Haladyna (1990), and Pintrich and DeGroot (1990). Only the domain specific data are included in this study. These surveys assessed individual goal orientation (learning-focus or ability-focus), and cognitive strategy use (surface level or deep level) within each of the four domains. Each domain specific survey consisted of between 28 and 32 items and required approximately ten minutes to complete (see Table 1). Items assessing motivational orientation were identical across content areas, with the name of the content area substituted for in each item (e.g., "I like [math] the best when the work is really hard"). With the exception of two or three items, cognitive strategy use was assessed using very similar items across content areas. Each survey required the respondent to rate items on a five-point, Likert scale from 1-Not at all true of me, to 5-Very true of me. Surveys were

administered in the corresponding subject matter classrooms (thus the science survey was given during science class, etc.). All surveys were administered by research staff. Students were assured of the confidentiality of their responses.

RESULTS

Motivational goal orientation and cognitive strategy use within and across domains.

A principal components analysis with a varimax rotation was performed to examine the dimensionality of students' goal orientation and cognitive processes within and across domains. We used the Kaiser criterion to determine the number of factors that best described the data. In order to examine our hypothesis that students' personal goal orientation and cognitive processing strategies would be distinct from each other within each domain, we performed factor analyses within each domain on both sets of items. In each of the four domains separate and reliable factors were formed for each of the constructs of interest. Reliabilities were assessed using Cronbach's alpha and are reported in Table 2. Based on our analyses, scales representing ability-focused goal orientation, learning-focused goal orientation, deep level processing strategies, and surface level processing strategies were created within each domain using a composite of mean scores of items that loaded highly on each of the factors. These scales were used in subsequent analyses reported in this study. The results of the factor analyses suggest that within each domain learning-focused goals and ability-focused goals are differentiated. Deep processing strategies and surface processing strategies are also differentiated. Means

and standard deviations of constructs, separated by gender for subsequent analyses, are shown in Table 3.

In sum, our findings lead us to believe that students do differentiate their goals and strategies within the four subject matter areas. Tables 4a-d illustrate the relationships of these constructs across content areas. We found moderate, positive correlations among similar constructs across domains.

Relations among different motivational goal orientations and cognitive processing strategies within each domain

Separate zero-order correlation matrices were computed within each of the four domains to examine the relations among the different cognitive processing strategies and motivational goal orientations. Results are reported in Tables 5a-d. Similar to what has been found in previous literature examining the same constructs in a more global manner, we found strong and significant positive correlations between learning-focused orientation and deep processing strategies on the one hand (all p's<.001), and between ability-focused orientation and surface level strategies on the other (all p's<.001). Additionally, learning-focused orientation was negatively related to using surface processing strategies, and ability-focused orientation was negatively related to using deep processing strategies. Within each domain, our results revealed a significant negative relation between ability-focused orientation and learning-focused orientation. Also, there were significant negative relationships between surface strategy use and deeper strategy use.

Finally, English was the only content area in which gender was significantly related to these constructs. Boys were significantly less likely than girls to hold learning-focused goals (p<.05) and to use deeper-level

strategies (p<.01), and more likely to hold ability-focused goals and to use surface-level strategies (p<.01).

To test the strength of these relations when taking into account students' self-concept of ability in each domain as well as the value they place on each content area, we analyzed the same data again, partialling out the effects of self-concept of ability in each domain and the valuing of each domain. The same significant relationships were found between goal orientation and cognitive strategy use. Regardless of the level of students' value and self-concept of ability for a particular domain, these relations are strong.

Differences by content area and gender in students' goals and strategies

The influence of the content area on students' goals and strategies was examined using repeated measures MANOVAs. The design in each case consisted of the overall construct as the dependent variable (for example, learning-focused goal orientation) with domain as the within-subjects factor (with 4 levels). In each case where there was a significant within subjects effect, paired t-tests between each of the possible content area pairs were examined. Differences among the content areas reported below are statistically significant at p<.001 or better using the Wilks' lambda statistic as the multivariate test of significance. Results of the MANOVA's are depicted in Figures 1 through 4. Gender was then included as a between-subjects factor so that the design was a domain by gender MANOVA.

These analyses revealed that student's learning-focused orientation is significantly higher both in math and in science in comparison to either English or Social Studies (see Figure 1a). The effect size for the domain effect in this comparison is .07 (h^2=.03). However, there is also a significant (p<.01) interaction

of domain with gender (effect size=.02; see Figure 1b). Girls are more likely to hold learning-focused goals in English, math, and science than are boys.

We also found that students' reported use of deep processing strategies is significantly higher in English than in math, science, and social studies. Conversely, deep processing strategy use is significantly lower in social studies than in all other content areas (see Figure 2a). Here, there was a stronger main effect for domain, with an effect size of .21 (h^2=.07). Also, this analysis revealed both a main effect for gender (h^2=.01) and an interaction effect (effect size=.02, h^2=.01), both of which are significant at the $p<.05$ level (Figure 2b). Girls are more likely than boys to report employing deeper-level cognitive strategies. Also, girls are more likely to report using these strategies in English than in the other content areas.

Students are most likely to hold an ability-focused orientation in social studies than in other content areas (Figure 3a). English was rated significantly less ability-focused than social studies, but more ability-focused than math and science. Students were least ability-focused in math and science. The effect size for domain is .05 (h^2=.02). There are no effects for gender or interaction effects with respect to ability-focused goal orientation (Figure 3b).

Finally, students reported being significantly more likely to use surface-level strategies in social studies than in all other subjects, and they are significantly less likely to use these types of strategies in science (see Figure 4a). English and math are rated similarly with respect to students' use of surface-level strategies. Domain effect size is .12 (h^2=.06). Also, there is a significant interaction effect with gender (effect size=.04, $p<.001$). Boys are more likely to report using surface-level cognitive strategies in English and science than are girls (Figure 4b).

DISCUSSION

Although these are preliminary findings, they suggest that within each domain students hold distinct learning-focused and ability-focused goal orientations, and differentiate between surface-level and deeper-level cognitive strategies. The fact that students distinguish between these constructs within each domain provides support for moving beyond global assessments of students' goals for learning and their relationship to cognitive processing strategies within a goal theory model.

Also, the findings regarding the relationship between motivational orientation and strategy use within domains replicates those found looking more broadly at these constructs. We found a significant negative relationship between learning-focused goal orientation and ability-focused goal orientation. Students who report high endorsement of learning-focused goals report low endorsement of ability-focused goals. Some other researchers have suggested that these orientations are unrelated. We believe that this finding is due, at least in part, to the particular items we chose for our scales. Although we believe them to be adequately assessing the constructs of interest, the items are different from items that have been used in some previous scales. For example, items comprising the ego-focused construct used by Nicholls tend to focus more closely on students' self-evaluations that illustrate an ability focus (i.e. "I feel most successful if I score higher than other students" and "I feel most successful if I don't do anything stupid in class"). The items used in this study focus more closely on students' reasons for working on tasks in a given content area (i.e., "The main reason I do my work in [math] is because we get grades" and "The main reason I do my work in [math] is because it makes me feel good

inside"). Some of the items in our ability scale are similar to items contained in Nicholls' "work avoidance" scale (i.e., "I feel really pleased in math when it is easy to get the right answers" and "I feel really pleased when all the work in math is easy"). Nicholls finds a significant negative relationship between his work avoidance construct and task-involved orientation, which is consonant with our finding.

Additionally, our examination of students' motivational goals and use of cognitive strategies reveals how students differ in their motivational orientation and strategy use when they are working in different content areas. We were interested in what appeared to be occurring in social studies, where students seemed more focused on ability goals and were more likely to use surface strategies and less likely to use deeper strategies, because this finding was not what we expected. The following excerpt derived from an interview with one of the teachers in our study sheds some light on these findings:

> I really think that they are not ready to conceptualize time spans like adults are. Many more of them do get into geography. Memorizing the countries in Europe, some of them get real excited about. Or we're learning land forms, some of them get excited....It's hard for them to understand contributions of famous people. It's just hard for them at this age. Some of them get it and some of them don't. You can just see there is a real fine line between those that have become more abstract and those that are still pretty concrete. Pretty concrete kids don't get into social studies. Too many new words, too many strange concepts. You keep chiseling away at that lack of vocabulary and understanding, but you don't get very far. And you want to talk about geographic terms? We gave them a sheet with, I think there were 50 terms on it, and we said, "just pick three you don't know, any three." Now we'd be happy if they learned three new terms in the next couple of weeks. I'm going to give them a quiz and they will have to know it for the quiz.
> - BC, sixth grade teacher

In this statement, the teacher points out that many concepts in social studies are abstract, in some cases too abstract for some of the students to handle. On the other hand, this excerpt also illustrates the teachers' emphasis on facts, dates, and terms. Thus, the instructional tasks that students are given may lend themselves more to surface level processing. In addition, social studies is typically introduced for the first time as a formal discipline during the middle school years, and it may be that this novelty is contributing to some of the domain effect. Students unfamiliar with the content area may not have developed a clear sense of how to approach the learning of social studies information. Therefore, the reasons for doing tasks in social studies may lend themselves to an ability-focused goal orientation - doing tasks that are required and doing them because they are graded.

We also were interested in the finding that students did not appear to be markedly more ability-focused or use more surface strategies in math than in the other content areas. This is contrary to our original hypothesis based on the work by Stodolsky and her colleagues. Of course we do not have data on the instructional practices used in the classroom. Our hypothesis was based on findings by others that math instruction often inspires competition and social comparison among students, as well as an emphasis on right answers and memorization.

Finally, there was a significantly higher incidence of deeper strategy use in English than in the other content areas. This is more in line with previous research. In their English classes, the emphasis is on reading and writing, where there are more opportunities to apply these strategies. This may indicate that the instruction in these English classes may lend itself more to, or even necessitate the use of deeper cognitive strategies. Our

study points out the need to consider domain differences in goal orientation and strategy use. Further studies are needed to see if the differences we found are the rule rather than the exception, and to probe further into the antecedents of these differences.

It was interesting that most of the gender differences found in this study occurred with respect to the English content area. In English, boys are less likely than girls to hold a learning-focused goal orientation, to report using deeper-level strategies and more likely to use surface level strategies. This "negative" motivational profile for boys in English may reflect in part, society's perception that language arts and reading are "more feminine," which fosters certain expectations of parents, teachers, and students themselves about interest, value, goals, and academic behaviors in this content area (Bank, Biddle, & Good, 1980; Fennema, 1987). Thus, English classes may be lack of fit between the context of English classes and the motivational orientation of boys towards this subject matter.

Overall, our findings in this study have generated a number of issues. We believe that beyond the content area itself, the type of instruction the teacher is using influences students' motivational goals. The next step will be to look more closely at what is happening in these subject-specific middle school classrooms in a way similar to Stodolsky's observational examination of social studies and math instruction in elementary school classrooms. It is conceivable that middle school curricula for these content areas is sufficiently different from that of elementary schools, particularly in social studies, to show the effects that we report here. Thus, future research may wish to explore these constructs at various grade levels. There is a need to examine both materials and methods of instruction. Teachers can use the same materials in a variety of ways, and thereby

emphasize different goals. This will mean observing classrooms, or at the very least, collecting information on students' and teachers' perceptions of classroom processes.

On a final note, it is important to bear in mind that although these findings are statistically significant, their substantive differences may not be particularly strong. This may be the case because departmentalized instruction is relatively new to these students, as they have recently completed a transition to the middle school. It is also possible that other motivational factors such as interest and value begin to enter the picture at this time, and students will differentiate between subjects more clearly as they identify and articulate these interests. Finally, it would be useful for further research account for other types of goals which students may hold, such as social approval and social interaction (Wentzel, 1989, 1991). Including social goals may help us to understand gender differences in particular.

This study adds to our understanding of the motivational aspects of the learning process, particularly as they relate to cognitive engagement within the four major academic domains. It appears to be the case that like cognitive strategies (Glaser, 1984; Pintrich et al., 1986), motivation is also more effectively studied in a domain specific paradigm. Addressing motivational and cognitive issues within subject areas has the potential to add to our understanding of the forces that influence student decision-making and choice of further courses and later careers.

References

Ames, C. A. (1987). Enhancing student motivation. In M. Maehr, & D. Kleiber (Eds.), *Recent advances in motivation and achievement, Vol. 5: Enhancing motivation*. Greenwich: JAI Press.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260-267.

Bank, B.J., Biddle, B.J., & Good, T.L. (1980). Sex roles, classroom instructions, and reading achievement. *Journal of Educational Psychology, 72*, 119-132.

Brush, L. (1980). *Encouraging girls in mathematics: The problem and the solution*. Cambridge, MA: Abt Books.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 40*, 1040-1048.

Dweck, C., & Leggett, E. (1986). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256-273.

Eccles, J.S., Adler, T.F., & Meece, J.L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology, 46*, 26-43.

Eccles, J.S, MacIver, D., & Lange, L. (1986a). Classroom practices and motivation to study math. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Eccles, J.S, Miller, C., Reuman, D., Feldlaufer, H., Jacobs, J. Midgley, C. & Wigfield, A. (1986b, April). *Transition to junior high school and gender intensification*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*, 5-12.

Fennema, E. (1987). Sex-related differences in education: Myths, realities, and interventions. In V. Richardson-Koehler (Ed.) Educator's handbook: A research perspective (pp.329-347). New York: Longman.

Glaser, R. (1984). Education and thinking: The role of knowledge. *American Psychologist, 39*, 93-105.

Graham, S., & Golan, S. (1991). Motivational influences on cognition: Task involvement, ego involvement, and depth of information processing. *Journal of Educational Psychology*, *83*, 187-194.

Harter, S. (1981) A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology, 17*, 300-312.

Maehr, M. L. (1983). On doing well in science: Why Johnny no longer excels--why Sarah never did. In S. Paris (Ed.), *Learning and motivation in the classroom*. Hillsdale, N.J.: Lawrence Erlbaum.

Maehr, M. L. (1989). Thoughts about motivation. In C. Ames, & R. Ames (Eds.), *Research on motivation in education, Vol. 3: Goals and cognitions*. New York: Academic Press.

Maehr, M. L., & Nicholls, J. G. (1980). Culture and achievement motivation: A second look. In N. Warren (Ed.), *Studies in cross-cultural psychology, Vol.2* (pp. 221-267). New York: Academic Press.

Meece, J., Blumenfeld, P., & Hoyle R., (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psyhcology, 80*, 514-523.

Meece. J. L., Wigfield, A., & Eccles, J. S. (1990). Predictors of math anxiety and its influence on young adolescents' course enrollment intentions and performance in mathematics. *Journal of Educational Psychology*, *82* , 60-70.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, *91*, 328-346.

Nicholls, J. G., Cobb, P., Wood, T., Yackel, E., & Patashnick, M. (1990). Assessing students' theories of success in mathematics: Individual and classroom differences. *Journal for Research in Mathematics Education*, *21*, 109-122.

Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction*, *5*, 269-287.

Nolen, S. B., & Haladyna, T. M. (1990). Motivation and studying in high school science. *Journal of Research in Science Teaching, 27* , 191-202.

Pintrich, P.R., Cross, D.R., Kozma, R.B., & McKeachie, W.J. (1986). Instructional psychology. *Annual Review of Psychology, 37*, 611-651.

Pintrich, P.R., & DeGroot, E.V. (1990, April). *Quantitative and qualitative perspectives on student motivational beliefs and self-regulated learning*. Paper presented at the annual meetings of the American Educational Research Association, Boston, MA.

Ryckman, D. B. & Peckham, P. (1987). Gender differences in attributions for success and failure situations across subject areas. *Journal of Educational Research, 81* , 120-125.

Stodolsky, S. S. (1988) *The subject matters: Classroom activity in math and social studies*. Chicago: The University of Chicago Press.

Stodolsky, S. S., Salk, S., & Glaessner, B. (1991). Student views about learning math and social studies. *American Educational Research Journal, 28*, 89-116.

Wentzel, K.R. (1989). Adolescent classroom goals, standards for performance, and academic achievement: An interactionist perspective. *Journal of Educational Psychology, 81*, 131-142.

Wentzel, K.R. (1991). Relations between social competence and academic achievement in early adolescence. *Child Development, 62,* 1066-1078.

Weiner, B. (1990). History of motivational research in education. *Journal of Educational Psychology, 82*, 616-622.

Wigfield, A., Harold, R., Eccles, J., Aberbach, A., Freedman-Doan, C. & Yoon, K.S. (1990, April). *Children's ability perceptions and values during the elementary school years*. Paper presented at the annual meeting of the American Educational Research Association, Boston, MA.

Wigfield, A., Eccles, J.S., MacIver, D., Reuman, D.A., & Midgley, C. (1991) Transitions during early adolescence: Changes in children's domain specific self-perceptions and general self-esteem across the transition to junior high school. *Developmental Psychology, 27* , 552-565.

Table 1: Sample items for constructs in the math domain

Goal Orientation - Ability-Focus (alpha = .59)
I do the work that is required in math, nothing more.
I like math work that is easy.
In this class I only study things I know will be on a test or assignment.
The main reason I do my work in math is because we get grades.

Goal Orientation - Learning-Focus (alpha = .74)
Understanding the work in math is more important to me than the grade I get.
The main reason I do my work in math is because it makes me feel good inside.
I like math the best when the work is really hard.
I like math work that I'll learn from, even if I make a lot of mistakes.

Strategies - Surface (alpha = .67)
When the work in this class is difficult, I either give up or do the easy parts.
When I don't understand my math work, I get the answers from my friends.
I only figure out why I got a problem wrong when the teacher makes me do it.
When I'm working on something difficult in class, I write down the first answer that comes to mind.

Strategies - Deeper (alpha = .75)
If I can't solve a math problem one way, I try to use a different way.
In this class I try very hard to connect new work to what I've learned before
When working on a math problem, I try to see how it connects with something in everyday life
When I work on math problems, I draw pictures or diagrams to help me figure it out.
When I make mistakes in this class, I try to figure out why.
In this class I spend some time thinking about how to do my work before I start it.
I use my book or other materials like number lines when I'm not sure how to do a problem.

Note: These items are representative of items asked in other domains, replacing the focus on Math with English, Science, and Social Studies.

Table 2: Reliabilities for constructs by content area

Learning-Focused Goal Orientation	
Math	alpha=.74
English	alpha=.67
Social Studies	alpha=.69
Science	alpha=.73
Ability-Focused Goal Orientation	
Math	alpha=.59
English	alpha=.60
Social Studies	alpha=.59
Science	alpha=.56
Deep Processing Strategies	
Math	alpha=.75
English	alpha=.84
Social Studies	alpha=.81
Science	alpha=.82
Surface Processing Strategies	
Math	alpha=.67
English	alpha=.67
Social Studies	alpha=.51
Science	alpha=.63

Table 3: Means and standard deviations for constructs by domain.

	N	English	Social studies	Math	Science
Learning focus					
Boys	277	2.68 (.90)	2.76 (1.00)	2.90 (1.03)	2.92 (1.04)
Girls	292	2.88 (.85)	2.74 (.89)	3.00 (.91)	2.98 (.91)
Total	569	2.79 (.88)	2.75 (.94)	2.94 (.97)	2.95 (.97)
Ability Focus					
Boys	277	3.45 (.91)	3.48 (.88)	3.38 (.91)	3.34 (.89)
Girls	292	3.34 (.86)	3.53 (.91)	3.34 (.88)	3.29 (.87)
Total	569	3.39 (.88)	3.50 (.90)	3.36 (.90)	3.32 (.88)
Deep Level Strategy Use					
Boys	278	3.35 (.88)	3.08 (.90)	3.25 (.86)	3.27 (.95)
Girls	292	3.59 (.79)	3.16 (.82)	3.35 (.74)	3.35 (.80)
Total	570	3.47 (.84)	3.13 (.86)	3.30 (.80)	3.31 (.88)
Surface Level Strategy Use					
Boys	275	2.70 (.90)	2.68 (.87)	2.54 (.94)	2.43 (.98)
Girls	292	2.40 (.81)	2.71 (.83)	2.52 (.94)	2.33 (.85)
Total	567	2.54 (.87)	2.70 (.85)	2.53 (.94)	2.38 (.92)

Note: Standard Deviations are in parentheses following means.

Tables 4a-d:
Zero-order correlations for motivational orientation and cognitive strategy use across all content areas.

Table 4a. Learning-focused goal orientation

	English	Social Studies	Math	Science
English	–			
Social Studies	.63***	–		
Math	.54***	.50***	–	
Science	.56***	.51***	.51***	–

Table 4b. Ability-focused goal orientation

	English	Social Studies	Math	Science
English	–			
Social Studies	.63***	–		
Math	.55***	.50***	–	
Science	.55***	.54***	.48***	–

*p<.05, **p<.01, ***p<.001

Table 4c. Deeper level strategy use

	English	Social Studies	Math	Science
English	–			
Social Studies	.68***	–		
Math	.61***	.58***	–	
Science	.62***	.63***	.62***	–

Table 4d. Surface-level strategy use

	English	Social Studies	Math	Science
English	–			
Social Studies	.54***	–		
Math	.48***	.54***	–	
Science	.56***	.54***	.62***	–

*p<.05, **p<.01, ***p<.001

Table 5a-d. Zero-order correlations for motivational orientation, cognitive strategy use, and gender within each domain

Table 5a. English

	Learning-focused goal orientation	Ability-focused goal orientation	Deeper-level strategy use	Surface-level strategy use
Gender (0=m, 1=f)	.10*	- .07*	.14**	- .17**
Learning-focus	--	- .35***	.66***	- .42***
Ability-focus		--	- .25***	.45***
Deeper strategy use			--	- .46***

Table 5b. Social Studies

	Learning-focused goal orientation	Ability-focused goal orientation	Deeper-level strategy use	Surface-level strategy use
Gender (0=m, 1=f)	- .02	.03	.03	.00
Learning-focus	--	- .43***	.67***	- .34***
Ability-focus		--	- .31***	.41***
Deeper strategy use			--	- .28***

*p<.05, **p<.01, ***p<.001

Table 5c. Math

	Learning-focused goal orientation	Ability-focused goal orientation	Deeper-level strategy use	Surface-level strategy use
Gender (0=m, 1=f)	.04	-.04	.06	-.04
Learning-focus	--	-.32***	.62***	-.26***
Ability-focus		--	-.20***	.46***
Deeper strategy use			--	-.25***

Table 5d. Science

	Learning-focused goal orientation	Ability-focused goal orientation	Deeper-level strategy use	Surface-level strategy use
Gender (0=m, 1=f)	.02	-.03	.04	-.06
Learning-focus	--	-.42***	.73***	-.40***
Ability-focus		--	-.31***	.46***
Deeper strategy use			--	-.39***

*p<.05, **p<.01, ***p<.001

Figure 1a:
MANOVA results comparing learning-focused goal orientation across content areas

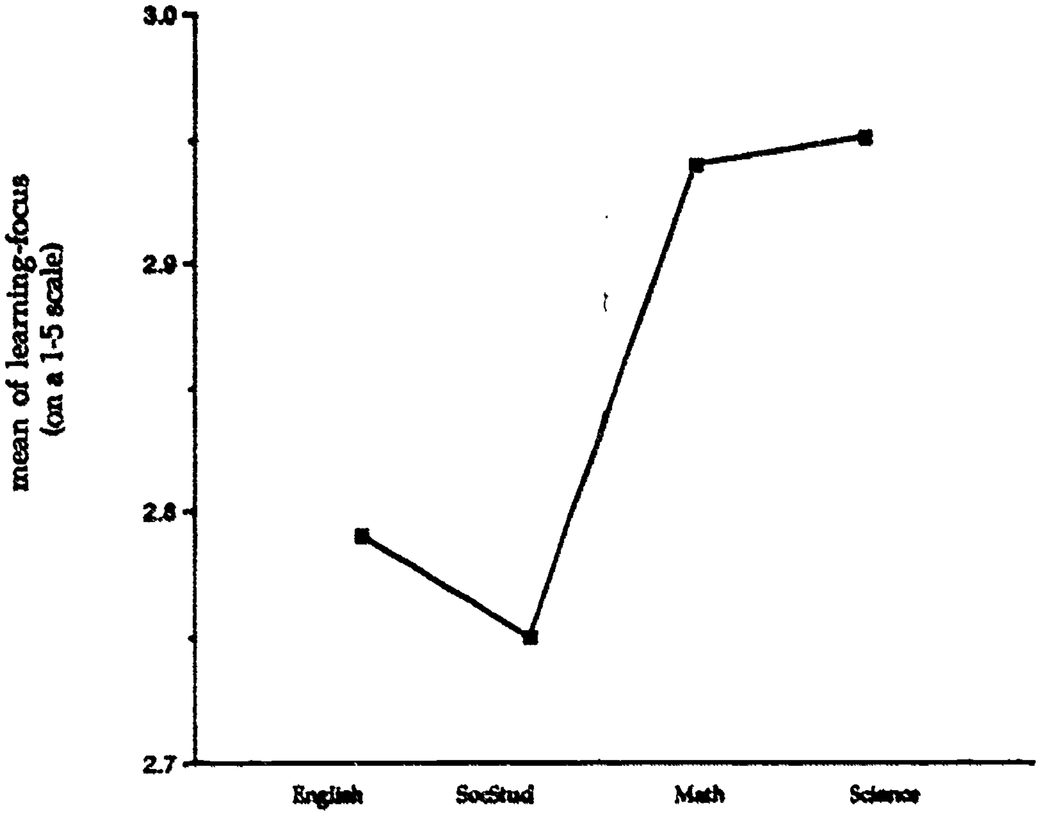

Figure 1b:
Content area and gender effects for learning-focused goal orientation

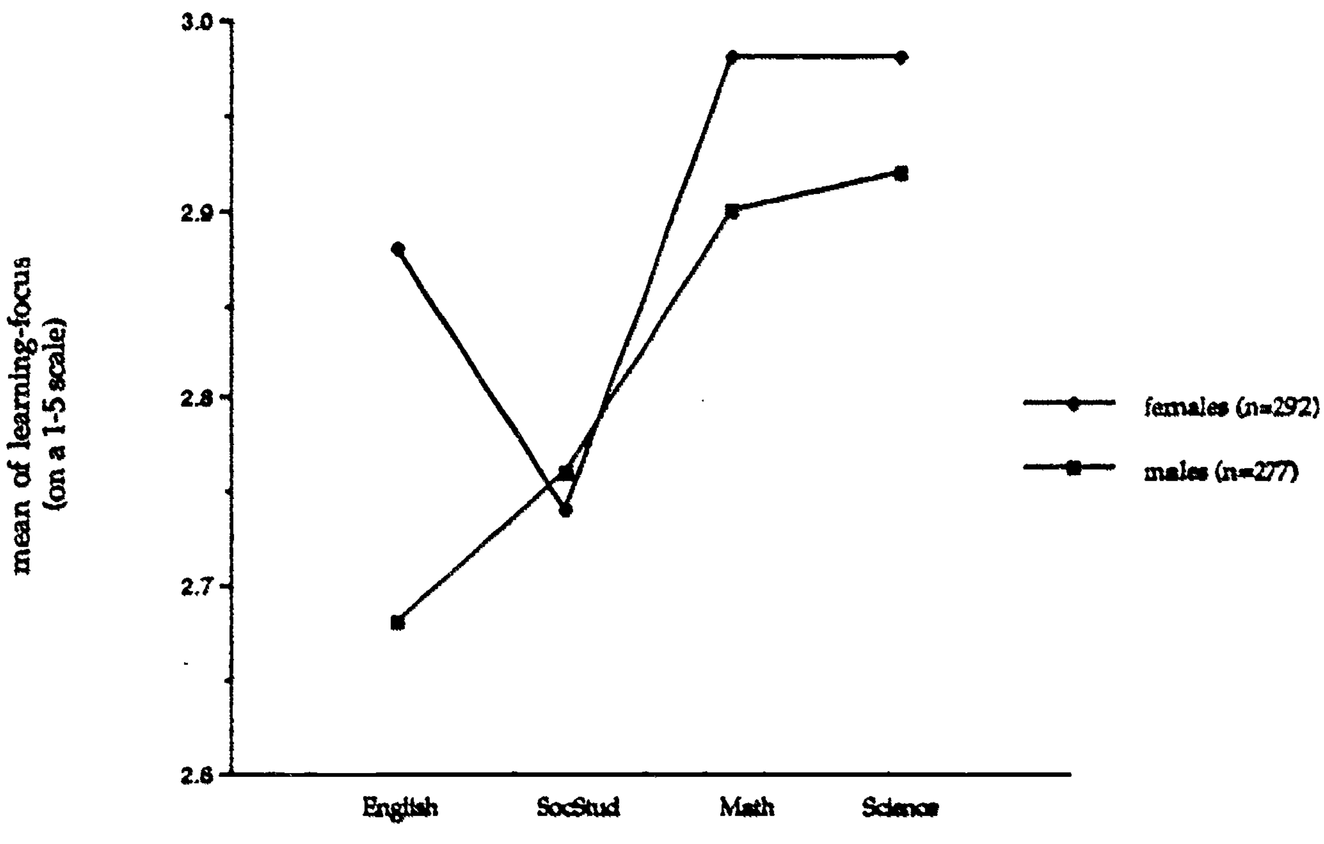

Figure 2a:
MANOVA results comparing deeper strategy use across content areas

Figure 2b:
Interaction effects of content area by gender on deeper strategy use

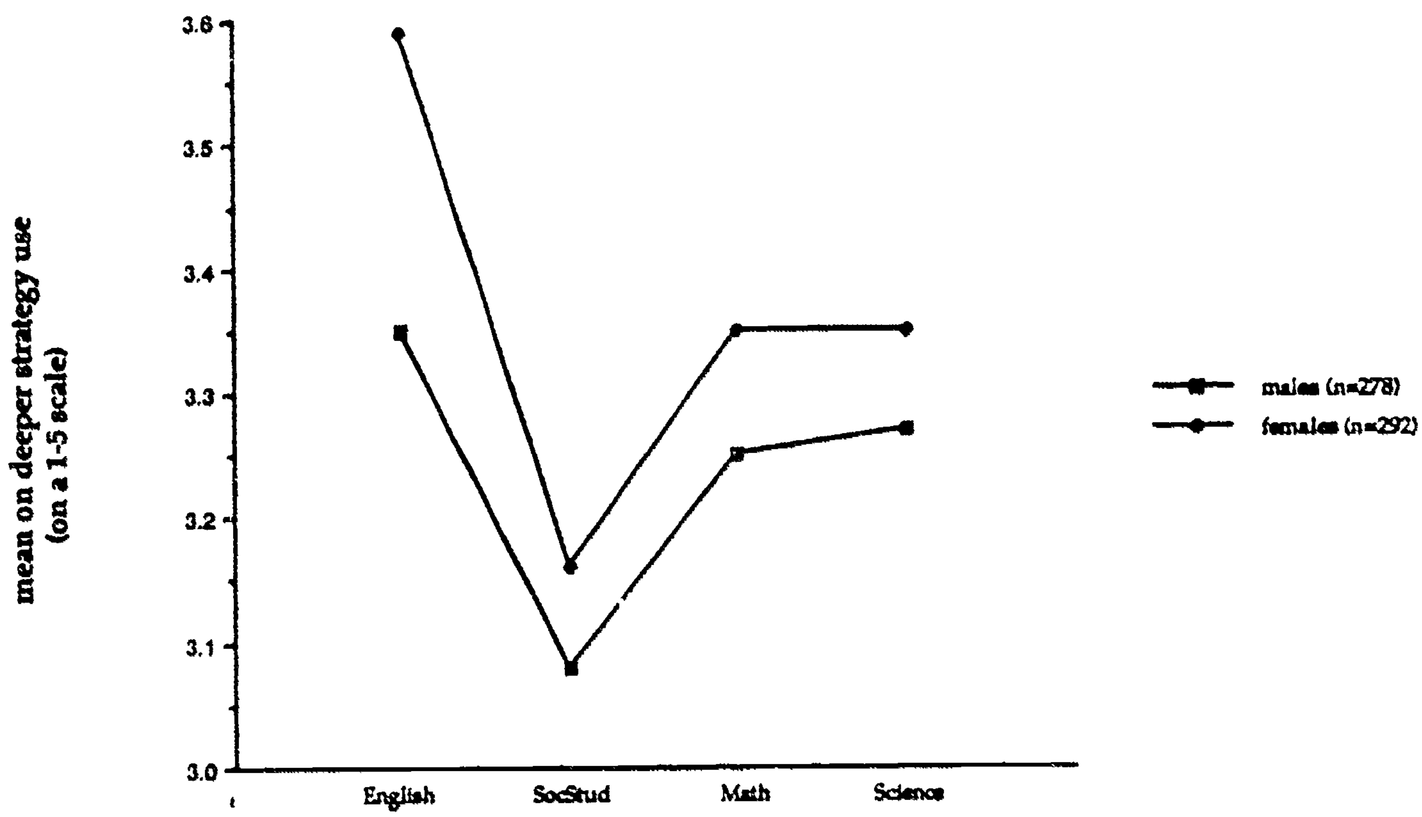

Figure 3a:
MANOVA results comparing ability-focused goal orientation across content areas

Figure 3b:
Content area and gender effects for ability-focused goal orientation

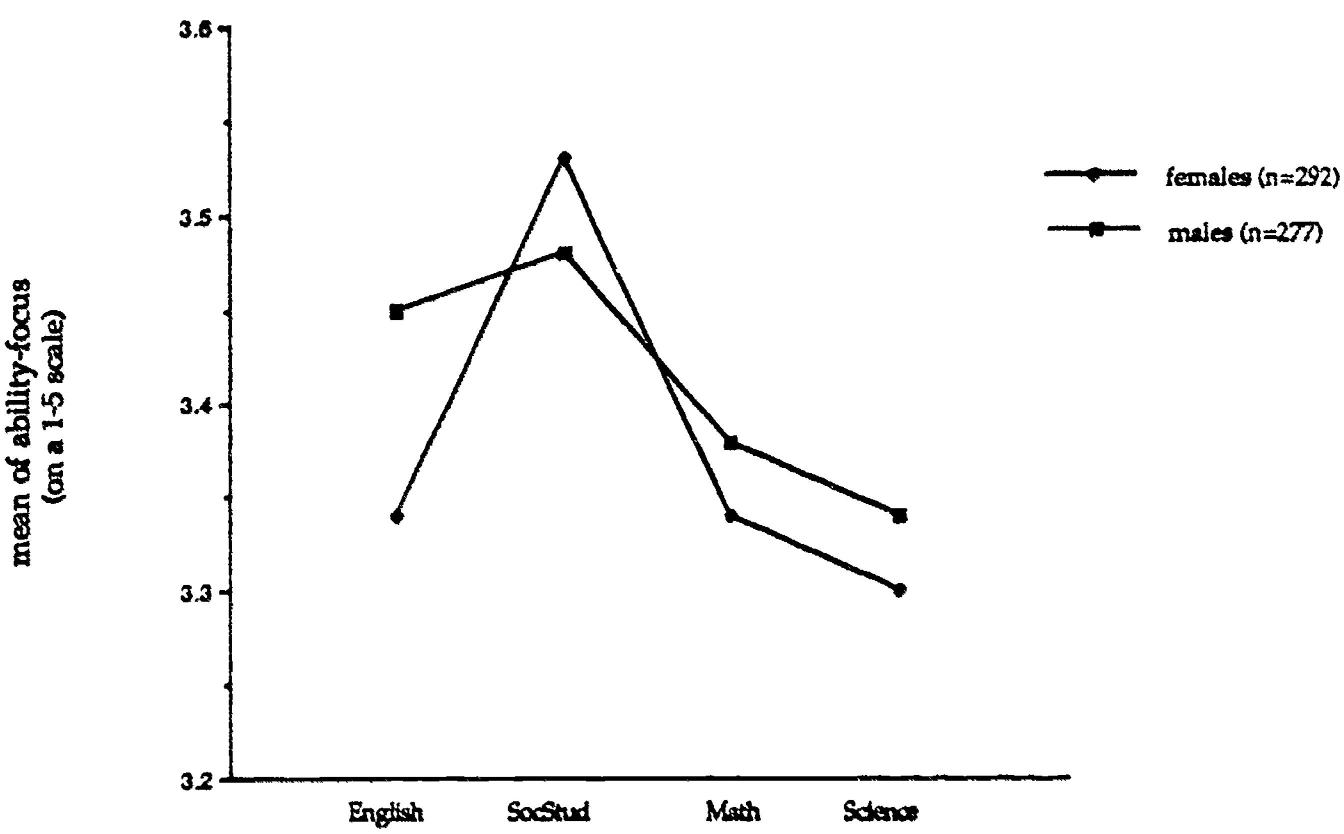

Figure 4a:
MANOVA results comparing surface strategy use across content areas

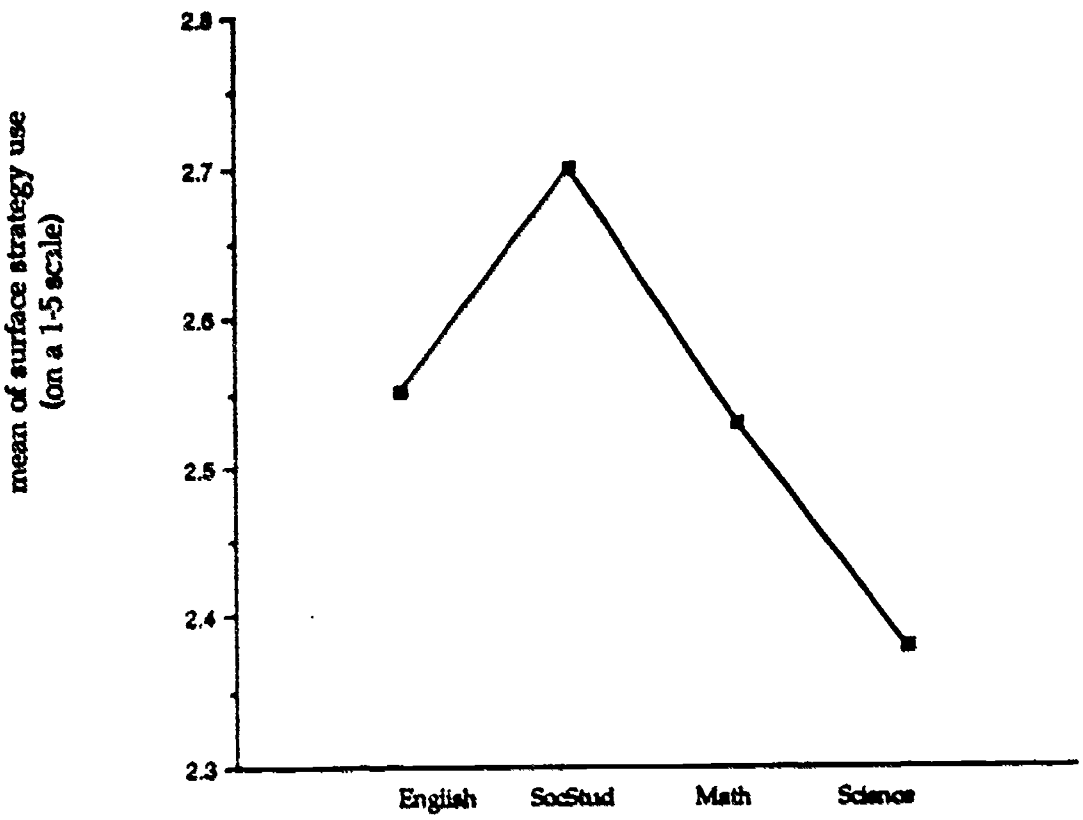

Figure 4b:
Interaction effects of content by gender on surface strategy use