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ABSTRACT

This study examined the efficacy beliefs of male and female college students in Southwestern Ontario (Canada) with and without scholastic deficits. A total of 20 men and 20 women without scholastic deficits and 51 men and 41 women with scholastic deficits (such as severe problems in reading, writing, or arithmetic) completed the Self-Estimate Test of Intellectual Functioning and Academic Achievement to measure students' judgements of how well they would perform on the Wide Range Achievement Test-Revised (WRAT-R). The participants then completed the WRAT-R. No significant gender differences were found between men and women without scholastic deficits in regard to predicted and actual WRAT-R scores. However, gender differences were found between men and women with scholastic deficits, with the men tending to overestimate and the women tending either to underestimate significantly or to provide accurate estimates of their WRAT-R scores. The results suggest that women with scholastic deficits are more vulnerable than men with scholastics deficits and display lower levels of efficacy. (Contains 31 references.) (MDM)

Running head: EFFICACY EXPECTATIONS

Efficacy Expectations, Ability Level, and Gender of Post-Secondary Students With and Without Severe Scholastic Deficits: Where Do We Go From Here?

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Abstract

Efficacy beliefs of male and female college students with and without severe scholastic deficits (SSD) were examined. Criterion measures were based upon predicted and actual WRAT-R (Jastak, 1984) subtest scores. No gender differences were expected in the group without SSD. Significant gender effects were expected in the group having SSD, with men tending to overestimate but women tending to have accurate estimates. Both hypotheses were supported. Possible implications for future research and educational policy are discussed.

Efficacy Expectations, Ability Level, and Gender of Post-Secondary Students With and Without Severe Scholastic Deficits: Where Do We Go From Here?

In this study, gender differences were investigated using predicted and observed subtest scores on the Wide Range Achievement Test-Revised (WRAT-R) obtained from post-secondary students with and without severe scholastic deficits (SSD). Bandura's (1977) theory of self-efficacy was employed to develop hypotheses. Self-efficacy is defined as the conviction that one can successfully organize and implement the behaviors needed to effect a desirable outcome (Bandura, 1984). Bandura (1986; 1989) asserts that people tend to overestimate (i.e., predicted scores exceed actual scores). Within the framework of social learning, self-efficacy beliefs are of particular importance with regard both to gender and ability groups. Overestimation is adaptive except when it is overly-exaggerated and when acting upon unrealistic beliefs has disastrous consequences (Bandura, 1997). These limitations must be considered when examining the context in which optimistic appraisals appear.

Perceived self-efficacy and task. Bandura (1995) states that "wide gender disparities exist in career aspirations and pursuits" (p. 24) particularly in mathematics, science, and technology, with women tending to have significantly lower efficacy expectations than men. In college, students develop crucial knowledge and skills in specific areas that prepare them for the workplace. If women avoid science and technology programs, their career options may be limited severely (Bandura, 1995).

In Hackett and Betz's (1981) occupational self-efficacy research, college students rated their efficacy for various careers. Women had significantly lower efficacy levels in scientific and technical fields than men. Hackett (1995) argues that "women are more vulnerable to failure than men" (p. 245), and that men tend to have more robust levels of efficacy than women when faced with adversity.

The implications of women's inefficacy in traditionally-male pursuits are grave. It is probable that women who enter these academic areas will experience external obstacles and challenges, and if they do not possess a strong internal conviction about their ability, they are unlikely to persist and to achieve their goals. If women's efficacy decreases when they are exposed to hardships, they may retreat, settling for 'second best', or for less personally-satisfying programs, which in turn decreases their efficacy.

In their study of college students enroled in algebra courses, Pajares and Miller (1994) also noted gender differences: although the sample tended to have high predicted scores in algebra, men had significantly higher estimates than women. In a study on post-test ratings of ability by Lundeberg, Fox, and Punćochař (1994), undergraduate and graduate groups estimated how well they had performed on test questions in their classes and/or labs. Men tended to overestimate significantly, particularly when their answers were incorrect, whereas women provided accurate estimates when their answers were incorrect.

That failure (whether real or imagined) might reduce women's efficacy level relates to a very important part of Bandura's principals of self-efficacy and

appraisals of ability. He first states that interpretations of ability tend to influence self-efficacy (Bandura, 1977). If these perceptions of ability are failure-oriented, veridical estimates may be a possible outcome. Bandura (1989) argues that veridical estimates are potentially self-limiting. Prior to developing self-regulatory skills, people must first believe that they are able to master such skills despite recurrent failure (Bandura, 1995; Taylor, 1995; Taylor & Brown, 1988). The observation that women tend to exhibit a lower level of efficacy in challenging situations than men is of great concern.

Ability level. Ability level appears to be related to gender effects. Lent, Brown, and Larkin (1986) conducted a series of vocational self-efficacy studies with college students. Students enroled in a 10-week engineering program that had been designed to provide information about educational and vocational demands of the profession. None of these studies demonstrated gender interactions. These findings were inconsistent with research and observations Hackett (1995) and Pajares et. al. (1994), both of whom found differential gender effects with post-secondary students. However, Lent et al. (1986) proposed that the intellectually-homogeneous, restricted samples of high-ability engineering students used in their study would not display gender differences whereas the more heterogeneous samples employed by the other researchers would. They argued that remedial treatments for low self-efficacy should be developed and that: "where self-efficacy is...veridical with actual ability" (p. 361) students should receive assistance because such accurate estimates of ability may pose a real threat to students' achievement. With respect to ability level, Hackett (1995) asserts that "nowhere is the

need for efficacy-based academic and career interventions more pressing than with students 'at risk' for academic failure" (p. 252). Related concerns regarding self-efficacy of students with severe scholastic deficits (SSD) have been expressed by a few other workers (see Bandura & Schunk, 1981; Saracoglu, Minden, & Wilchesky, 1988; Schunk, 1989; 1996). They found that students with SSD tended to have lower levels of efficacy than students who had been defined as normally-achieving (NA). Unfortunately, very little research has been done at the college level regarding the efficacy level of students with SSD. Due to the array of problems that exist (e.g., reading disability, arithmetic disability, social skills disability) this group is by definition heterogeneous in severity level and complexity. (For a discussion of severity levels in students with SSD, see Stanovich, 1989, 1991.)

In this research on gender and ability level, we asked two questions relating to self-efficacy theory. Based upon (a) Bandura's (1995; 1997) observations, and (b) based upon the conclusions from Hackett (1995) and Hackett et al.'s (1981) studies which indicated that women tend to be more vulnerable to failure and to diminished efficacy than men, we anticipated that gender differences would emerge in the group with SSD, and that women having SSD would tend to have lower estimates than men in subtests. Second, we expected that the group without SSD, which was less heterogeneous than the group having SSD would be less likely to display significant gender effects (Lent et al., 1986).

Questions to be Investigated

We asked two questions. First, will there be gender differences in the group having SSD, with women having lower efficacy than men? Also, will men tend to overestimate as suggested by the literature (Lundeberg et al., 1994; Pajares et al. 1994). Second, will the group without SSD (the more homogeneous group) display no significant gender differences (Lent et al., 1996).

Accurate, Over-, and Under-Estimation

For the purposes of this study, accurate estimation was defined as no significant difference between predicted and actual scores, overestimation was defined as a significant positive difference between predicted and actual scores, and underestimation was defined as a significant negative difference between predicted and actual scores.

Method

Participants

All of the post-secondary students employed for this study were taken from colleges in Southwestern Ontario. They had: (a) English as their first language, (b) IQs of 85 or above, and (c) no primary emotional problems. The majority of students were enroled in Social Sciences and Humanities undergraduate programs. The mean age for both groups was 26.

There were 40 volunteer students ($\underline{n}$ = 20 men, $\underline{n}$ = 20 women). Initial screening showed that the students not having SSD had not received psychoeducational testing for learning or scholastic problems, none had been placed in remedial classes, none were

experiencing severe scholastic difficulties currently, and none perceived themselves as having learning disabilities. There were 92 students with SSD (**n** = 51 men, **n** = 41 women). These students sought assistance from the Adult Study Skills Clinic due to severe problems in one or more areas (e.g., reading, writing, arithmetic). Students with SSD had experienced constant severe academic difficulty dating back to public school. They also scored below the 40th percentile on four or more of the 21 psychoeducational subtests examined. Their scores were below the 40th percentile on an average of seven subtests.

Measures

Students with SSD reported the reasons they sought assistance from the Adult Study Skills Clinic. Writing essays, writing essay examinations, and reading were reported by 68 to 80 percent of the sample as problems persisting from youth to adulthood. Students without SSD completed a similar survey; no deficits were reported.

Self-Estimate Test. Bandura (1984) stated that "in thought, the types of outcomes people anticipate depend largely on their judgments of how well they are able to perform in given situations" (p. 235). The Self-Estimate Test of Intellectual Functioning and Academic Achievement (Shafrir, 1994) was administered to measure students' judgments of how well they would perform on the and WRAT-R subtests. Each subtest was described concisely and then illustrated briefly by an easy and a difficult example. Students predicted their accuracy of response on a relative scale from 1 to 19 (1 = much worse than people my age, 10 = as well as people my age, 19 = much better

than people my age). The Wide Range Achievement Test-Revised (WRAT-R) was administered to students and the actual subtest scores were collected. Predicted and actual scores were transformed to standard scores with a mean of 100 ($\underline{M}$ = 100) and a standard deviation of 15 ($\underline{s}$ = 15). Expected and actual achievement scores were then compared.

Procedure

Students were assessed individually. They answered questions about their learning history, predicted their ability on the subtests, and then completed the actual tests. (Students with SSD were administered the remaining test battery after completing this phase.) Criterion measures were the standardized predicted scores on the Self-Estimate subtests and the standardized actual scores on the WRAT-R subtests.

Results

The data were analysed by a repeated measures analysis of variance using the profile analysis method as recommended by Greenhouse and Geisser (1959). We predicted that men and women in the group without SSD would not demonstrate significant gender differences as a result of these analyses. Second, we expected that gender effects would occur in the group with SSD, with the men tending to overestimate and the women tending either to underestimate significantly or to provide veridical estimates.

A 2 (female versus male) by 2 (predicted versus actual scores) by 3 (subtests; WRAT-R) repeated measures analysis was used for both the group without SSD and for

the group having SSD. The Bonferroni procedure was used to test differences between means in significant interactions; Barcikowski and Elliot (1997) argue that the Bonferroni is the most effective procedure for controlling Type I Error associated with multiple tests between means.

Group without SSD. In this analysis, the men and women without SSD were examined. As predicted, the 3-way interaction was not significant ($F(2,76) = 2.23$, $p > .10$). In addition, none of the 2-way interactions were significant (Gender by Predicted/Actual Scores $F(1,38) = 2.29$, $p > .10$; Gender by Subtests $F(2,76) = 1.13$, $p > .10$; and Predicted/Actual scores by Subtests $F(2,76) = 1.15$, $p > .10$). Further, there was no main effect for Gender ($F(1,38) = .01$, $p > .10$).

Group with SSD. In the first analysis, predicted and actual scores of men and women with SSD were examined. The three-way interaction was not significant ($F(2,180) = 1.66$, $p > .10$). However, all three 2-way interactions were significant. The first interaction was Gender by Predicted/Actual Scores ($F(1, 90) = 4.71$, $p < .01$). Table 1 plots the means, standard deviations, and t tests, while Figure 1 plots the interaction. The second significant interaction was Gender by Subtests ($F(2,180) = 6.54$, $p < .01$). Table 2 plots the means, standard deviations, and t tests, while Figure 2 plots the interaction. The third significant interaction was Predicted/Actual Scores by Subtests ($F(2,180) = 7.89$, $p < .001$). Table 3 plots the means, standard deviations, and t tests, while Figure 3 plots the interaction.

Gender by Predicted/Actual Scores. Men had significantly higher predicted

scores than women.

Gender by Subtests. There was no difference between men's and women's performance in the Reading subtest. However, in Spelling, the women had significantly higher performance scores relative to the men. In Arithmetic, this pattern was reversed, with the men having significantly higher actual scores than the women.

Predicted/Actual Scores by Subtests. There was no significant difference between predicted and actual scores in the Reading and Spelling subtests. However, in the Arithmetic subtest, the predicted score was significantly higher than the actual score.

Discussion

Gender and Performance Level

Group without SSD. The present study indicates that gender differences in efficacy are less likely to occur if members of a university group are generally competent in academic performance. This finding is consistent with those of Lent et al. (1986) who observed no gender differences among college students having high ability levels. The present study used volunteers who stated that they had no scholastic disabilities and did not report any deficits in their past or present academic performance. This group, apparently, did not have prolonged, repeated, severe failure experiences that influence the self-efficacy of males and females in a differential manner. The divergence of efficacy between males and females may more likely occur when students have experienced academically-challenging, stressful situations over an extended period of time.

Group with SSD. This group has had a history of difficulty in scholastic achievement, and so it presents the conditions in which beliefs about personal efficacy might be reduced (Bandura, 1977; 1995). Bandura (1997) argues that "academic deficiencies foreclose many life paths and erect barriers to others that are difficult to surmount" (p. 235). Although these students have compensated for their deficits sufficiently that they have been admitted to university, it is probable that their past difficulties will have influenced their efficacy beliefs. Consistent with this expectation, although the three-way interaction (Gender x Predicted/Actual Scores x Subtests) was not significant, all three two-way interactions were significant. Indeed, the Predicted/Actual Scores by Subtests interaction showed a complex pattern of beliefs: students' expectations were realistic in reading, they underestimated performance in Spelling, but they significantly overestimated how well they would do in Arithmetic. The finding for Arithmetic was unexpected; however, it is possible that this group was composed of people whose major difficulty was with literacy.

The primary interest in this study was the association between gender and other variables. In the Gender by Predicted/Actual Scores interaction, it was found that women tend to have lower predicted scores than men, although there is no significant difference in their actual achievement scores. Apparently scholastic deficits are associated with relatively greater decline in expectancies of personal efficacy in females as compared to males. The finding that men tend to have higher performance expectations than women has been noted in previous research by others (Hackett et al., 1981; Lundeberg et al.,

1994). Gender differences in efficacy are of particular importance when students are considering progression to higher education. Although women with SSD could potentially benefit from college and university, they might avoid such education. If they do attend university, they might be particularly plagued by doubts and uncertainties.

The Gender by Subtests interaction provides additional information about how the males and females differ. There was only a difference in Arithmetic, a traditionally-male subject, and, as might be expected, on the combined predicted and actual score males performed better than females. Previous workers (Bandura, 1995; 1997; Hackett, 1995; Pajares et al., 1996) indicated that in mathematics, females tend to underestimate despite the fact that their actual scores are not significantly different than those of the men. However, in the present study of university students with SSD, the depression did not just occur in the predicted score but rather in the combined predicted and actual score. The mean predicted and actual score was 94.12 for the women, and although it was within the normal range, it was much lower than might be expected of university students. This finding is particularly troubling because people with such performance might be unwilling to choose programs that open career opportunities (Fox, Brady, & Tobin, 1980; Hackett, 1995; Hackett et al., 1981) especially in mathematics, sciences, and technologies. Bandura (1997) states that: "...because mathematics is an essential entry skill for scientific and technological occupations, a low sense of mathematical efficacy operates as a barrier to a wide range of occupational pursuits requiring quantitative skills" (p.423).

Mathematics seems to be a particular problem in North American culture for women (Bandura, 1997; Hackett, 1995). Adams, Ellis, and Beeson (1977) report that mathematics is one of the most dreaded subjects in school. With respect to efficacy, though, Bandura (1997) argues that efficacious people accept aversive matters as a necessary stepping stone to mastery of the subject, stating that "among children who have little chance of academic success according to objective base rates, those with inflated self-appraisals are much more likely to make it to college than those with realistically low expectations" (p. 77). For inefficacious students, though, Adams et al. (1977) recommend that both parents and teachers encourage children to perform mathematical procedures as much as they urge them to read and write. Such modeling by significant others may create a sense of efficacy for students.

Unfortunately, well-meaning parents and educators may permit students with scholastic deficits to avoid more advanced mathematics fearing that this area will be too frustrating for them. As a result, these students may have less exposure to mathematics than other students and not develop the skills and strategies needed to solve problems. They may also believe that they lack the ability to perform numerical tasks successfully. Girls, in particular, have been allowed to avoid subjects with substantial mathematical content, and so their capability in this area suffers. These experiences augment conditions that produce low self-efficacy for mathematics. In addition, women in the group with SSD may have difficulty developing literacy skills. With both reduced literacy and numeracy skills, women having SSD may be barred from a large number of

post-secondary courses and consequently do not qualify for many rewarding careers (Sells, 1990).

Where Do We Go From Here?

This study indicates that the relation between gender and self-efficacy is complex. In students without SSD, there is no difference between males and females in self-efficacy, but under the prolonged academic stress of SSD, women are apparently more vulnerable than men (Hackett, 1995) and display lower levels of efficacy. Furthermore, women show more serious deficits than men in their combined predicted and actual arithmetic score. Self-detracting attitudes and beliefs combined with inadequate skill can lead to marginalization of people and limit career opportunities (e.g., Fox et al., 1980; Hackett, 1995; Hackett et al. 1981). Possible solutions such as changes in educational policy, accommodations for students with SSD, and expanded guidance and counselling might be considered for students in risk of missing subject areas such as mathematics.

Educational policy. When educational policy was modified in Ontario to permit much greater subject choice, this change had some undesirable side effects. For example, secondary students are now required to take five English courses (three being at the senior level). However, they need only take two intermediate level courses from mathematics and/or science and one technology course (e.g., computers, home economics, food preparation, shop, etc.). The lack of substantial, comprehensive, and compulsory requirements in the critical areas of mathematics, science, and technology is

disturbing because it implies that these are inferior subjects even though they are essential prerequisites for advanced training leading to many worthwhile careers. Although increased choice is an important social value, to make it work effectively requires a high level of intensive and authoritative guidance counseling that is probably impractical in reality. The present policy allows students to avoid or refuse subjects even if they are strongly recommended. Policy changes ensuring that students are more likely to take subjects up to the senior level in all three areas of mathematics, science, and technology should be seriously considered.

Another approach to emphasizing the importance of numeracy and technology is through nontraditional approaches to instruction. For example, it has been observed that modeling in the workplace may help people to develop greater appreciation for the importance of mastery of relevant subjects (Bandura, 1977; Wood & Bandura, 1991). Cooperative programs such as accounting and merchandising courses give students placements where they are introduced (or reintroduced, if they are adults in upgrading programs) to the world of work. From supervisors and colleagues at the placement, they soon learn the need for knowledge and mastery of mathematics in order to manage efficiently various accounting and software programs. Cooperative learning programs may also be applied in college contexts.

Directions for future research. Longitudinal investigations are needed to appraise further the prolonged consequences of inefficacy perceptions. Tracking the development of college students with and without SSD throughout their programs would

show whether significant differences appear among groups, programs, and genders. The nature of programs (e.g., traditionally-male) and differential dropout rates among males and females and among groups with and without SSD could signal a need for possible program modification. Other factors associated with dropout and failure besides belief structures that occur in dropout students but not in graduates would also be informative. Belief structures could be investigated by measures of subject and vocational self-efficacy, self-esteem, anxiety, learned helplessness, and informal interviews about problem-soving strategies. Such data might provide useful indicators for intervention approaches for students who are at risk.

The Self-Estimate Test is a dynamic clinical assessment procedure which permits comparison of predicted scores (beliefs about ability) and actual scores (measured ability) for adults, adolescents, and children. At various developmental stages and in different contexts, overestimation may be more desirable than veridicality (e.g., learning a new skill, working in stressful, challenging environments, etc.). In a college environment, students require a robust sense of efficacy in order to learn from and excel in the challenging tasks that we demand of them. Some workers tend to argue that data indicating tendencies towards overestimation reflects a defensive behavior. This theory has been entitled *the* 'Imposter Phenomenon' by researchers who have devoted much of their time and effort to demonstrating that women tend to have this condition more than men. However, other workers challenge this perception and argue that overestimation tends to be a more effective and adaptive strategy than both veridical thinking and

underestimation (Bandura, 1996; 1997; Beck & Emery, 1985; Beck, Rush, Shaw, & Emery, 1979; Taylor et al., 1988). Bandura (1997) asks "Should optimism about one's capabilities really be cast as deceit?" (p.75). He proposes that more beneficial research proceeds from studying the advantages of optimistic efficacy in a positive manner as opposed to approaching research problems in a negative manner, which assumes that peoples' actions are based upon pretense.

Limitations of the Study and Future Directions for Research

Although we have drawn on the results of other studies in developing research questions, our sampling procedures and criterion measures differ in important ways form those of workers such as Hackett et al. (1981) and Lent et al. (1986). Unlike these others, a major focus of our study was college students with SSD. Such students are a limited and special group from adults having SSD. Kaufman (1990) argues that students with scholastic disabilities who have developed compensatory strategies which allow them to overcome academic obstacles and gain entry to university should be considered an "elite" group. It might be instructive to compare their beliefs with non-college adults having SSD. Also, interviewing students to determine what strategies they used in order to solve various examination questions might give provide useful qualitative information about how these students learn to adjust to traditional instruction (Stage & Milne, 1996). Our criterion measures of efficacy were based upon the relation between students' predicted and actual scores on the WRAT-R Reading, Spelling, and Arithmetic subtests. Other studies have used self-rating questionnaires, anxiety levels, and self-esteem

indices. The results of our study are restricted to the criterion measures used; however, within this scope they provide an examination of self-efficacy in three fundamental academic achievement areas. Bandura (1997) argues that "self-inefficacious thinking retards development of the very subskills upon which more complex performances depend" (p. 61) and so we investigated these basic subskills.

Conclusions

Self-efficacy indices are appropriate for counseling, teaching, and remediation because of their economy of time and cost. In addition, data about students' performance expectations should be collected because it is critical that educators become sensitized to and challenge self-defeating beliefs (Adams et al., 1977; Bandura, 1986; Reisman et al., 1990). Bandura (1997) states that: "self-efficacy is concerned with human enablement, not with moral judgments. If people harbor beliefs that are self-hampering, it does not mean that the problem is exclusively an individual one and that the solution lies solely in personal change" (p. 33). It is our responsibility as educators and researchers to alter policies that allow students to avoid critical subjects that are necessary for the world of work, and to design supportive but effective educational programs that will foster students' beliefs in their ability to attain their goals.

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Table 1. Significant Two-Way Interaction of Gender by Predicted/Actual Scores for the Group with Severe Scholastic Deficits.

	Gender		
	Female (**n**=41)	Male (**n**=51)	**t**
Mean Score			
Predicted Score	98.70	103.57	-2.55**
SD	20.91	20.54	
Actual Score	101.98	100.10	0.98
SD	11.79	15.40	

Note. **SD** = Standard Deviation, **MSE** = 248.85

**$p<.01$.

Table 2. Significant Two-Way Interaction of Gender by Subtests for the Group with Severe Scholastic Deficits.

	Gender		
	Female (n=41)	Male (n=51)	t
Subtests			
Reading Test	104.70	105.57	-0.34
SD	14.51	17.21	
Spelling Test	102.21	98.25	1.56
SD	16.79	17.81	
Arithmetic Test	94.12	103.02	-4.31**
SD	17.96	18.87	

Note. SD = Standard Deviation, MSE = 293.05

**p<.01.

Table 3. Significant Two-Way Interaction of Predicted/Actual Scores by Subtests for the Group with Severe Scholastic Deficits.

	Mean Scores		
	Predicted (n=92)	Actual (n=92)	t
Subtests			
Reading	104.49	105.87	-0.87
SD	18.96	12.48	
Spelling	98.04	101.98	-2.47**
SD	20.70	13.21	
Arithmetic	101.67	96.45	3.27**
SD	22.36	14.41	

Note. SD = Standard Deviation, MSE = 117.00

**p<.01.

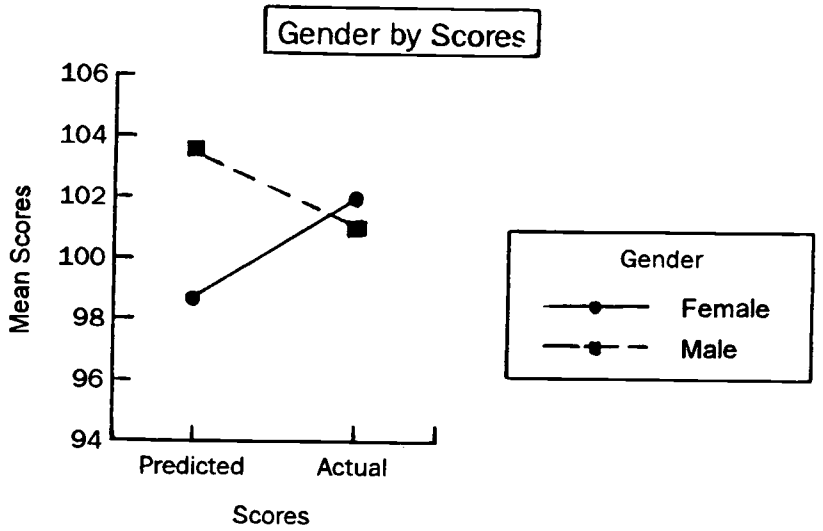

Figure 1.

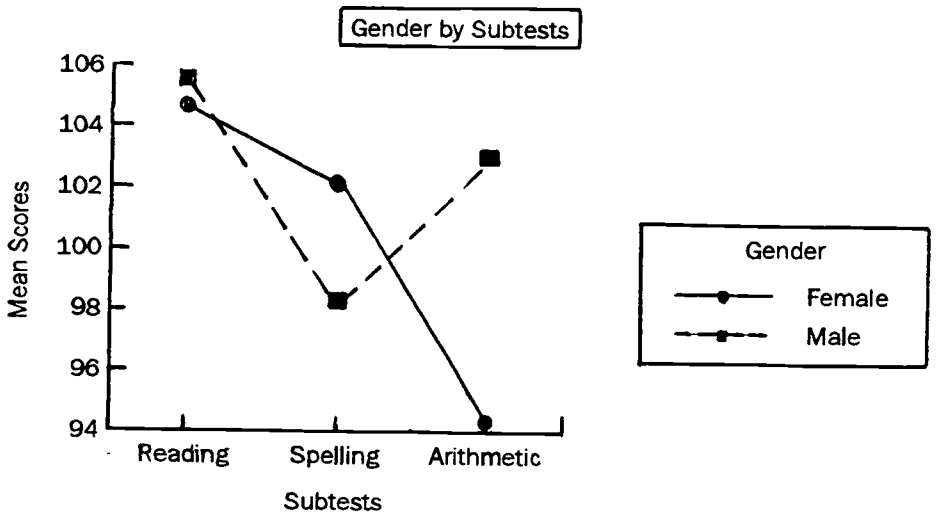

Figure 2.

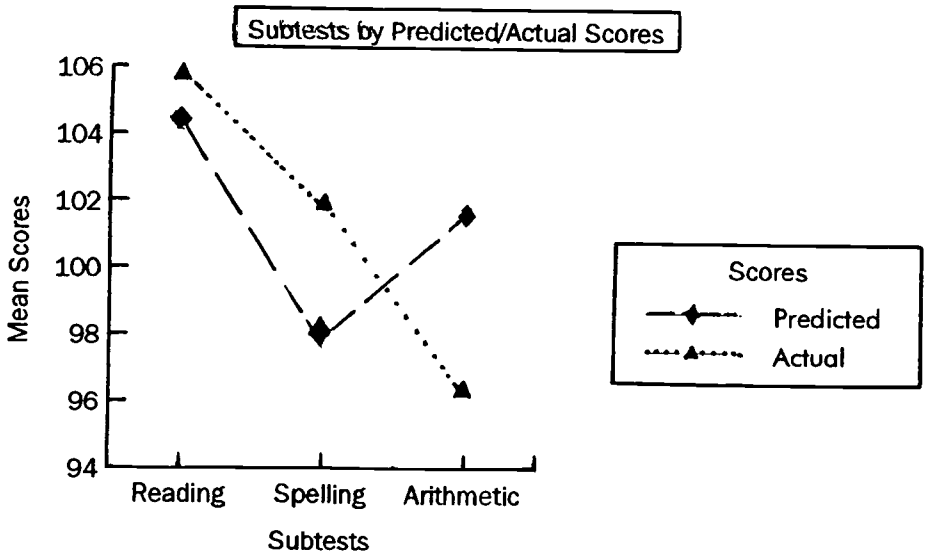

Figure 3.

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