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Explorations of Preservice Teachers' Learning Strategy Use

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Abstract

The objectives were to identify learning strategy strengths and weaknesses of preservice teachers (n = 90) in an entry level educational psychology course that incorporated strategy instruction. Strategy use was assessed at the beginning and end of the course by the Learning and Study Strategies Inventory (LASSI), a diagnostic inventory of 10 scales. A comparison of mean percentiles with LASSI norms on all scales indicated need for remediation by students. The results indicated that learning strategy scores varied according to student GPA and final course grade. Implications for preservice teachers as learners and potential teachers of strategies were discussed.

What do we know about strategy use of college students and preservice teachers? With the onset of the research on cognition, the role of the learner in acquisition of content has received increased emphasis (Weinstein & Mayer, 1986), that is, the student's activities or strategies are seen as a key component in successful learning. This in turn has led to an increased interest in learning strategy instruction (Chipman & Segal, 1985; Phye & Andre, 1986) including increased research about the strategy use of postsecondary students and programs to train strategy use at this level (McKeachie, 1987; Weinstein & Underwood, 1985).

The initial concern for the need for strategy instruction at the postsecondary level was focused primarily on the underprepared or at-risk student (McKeachie, 1987; Weinstein & Underwood, 1985). There is increasing evidence that many college students, not just those categorized as "at-risk," are in need of strategy instruction if they are to perform well. Simpson (1984) reported that college freshmen were deficient in several areas: possessed restricted range of strategies, lacked an understanding of why a strategy was important to their own learning processing, and used one strategy for most learning tasks regardless of the content area. In a study of 514 college freshmen, Hulick & Higginson (1989) found: students scored lower than the normed sample on a measure of learning strategy use, the Learning and Study Strategies Inventory (LASSI); students who used strategies had higher grades at the end of the freshman year; and students who scored lower on several subscales judged college to be more difficult. In support of the need for strategy instruction at the college level, only 24% reported they had even minimal training in the use of learning strategies prior to college.

This concern with learning strategy proficiency extended to the learning strategy use of students who are enrolled in teacher education programs in this university. From observations and informal assessment of student strategy use, it was inferred that many students had a limited repertoire of strategies. On this basis weekly "mini-lessons" in strategy

use and student learning logs were included in an undergraduate educational psychology course. Descriptive data gathered through student learning logs gave a clearer picture of the preservice teachers as learners (Alderman, Klein, Seeley & Sanders, 1993). The students were categorized as successful, improving, and less successful. Students identified as successful and improving reported more use of specific as opposed to general strategies, set specific as opposed to general goals, and engaged in more self monitoring behavior. From these data, the authors concluded that there is a need to identify, through assessment, more specific strategy needs in order to provide more effective instruction.

The present approach to learning strategy assessment is a reflection of the cognitive research of recent years. Focus of cognitive research in the seventies and eighties was on remediation of learning deficits in academically underprepared students (Weinstein, 1988). This led to a need to identify a means of assessing student deficiencies in order to provide appropriate remediation.

Prior assessment approaches focused on traditional "study skill" areas such as notetaking and test taking and tended to use a "correlational design" (Svensson, 1977). Since items were created on the basis of how well they distinguished between students with high and low grade point averages, they provided little information about how students study or learn. In contrast, a "functional approach" to assessment identifies differences in how students learn, which directly affects learning and academic outcomes (Svensson, 1977).

The Learning and Study Strategies Inventory (LASSI) (Weinstein, Palmer, & Schulte, 1987) was developed as a functional approach. The LASSI consists of ten scales: attitude -- attitude and interest in college; motivation -- willingness to work hard and take responsibility for own effort; time management -- organization and scheduling of time; anxiety -- degree of worry about school and performance; concentration -- ability to pay close attention to academic tasks; information processing -- imaginal and verbal elaboration; selecting main idea -- ability to pick out most impor-

tant ideas; study aids -- use of support techniques or materials; self-testing -- comprehension monitoring; test-taking strategies -- preparation for exams. The scoring manual provides norms for the subscales with suggestions that students above the 75th percentile do not need remediation; those between 75th and 50th percentiles should consider improving relevant strategies in order to optimize performance, while those below the 50th percentile need to improve in order to have a chance of success in school (Weinstein, 1987).

The functionality of the LASSI as a measure is supported to some degree by Hulick & Higginson (1989). It was found that low and high GPA (above and below 2.75) students differed significantly on six subscales: attitude, motivation, anxiety, concentration, information processing, and test taking skills.

Our purpose in this exploratory study was to determine the learning strategy proficiency of preservice teachers to determine if course success could be predicted by strengths and weaknesses of reported learning strategy use. If differences existed between successful and unsuccessful student scores, a second purpose was to identify strategies used by the successful students. The specific research questions addressed were:

1. What learning strategy patterns are reported by preservice teachers and how do these compare to the established norms of the LASSI?
2. How do learning strategy patterns of preservice teachers vary according to specified GPA groups?
3. What were relationships between learning strategy patterns and course grade?
4. Do gain scores from entry to exit vary according to GPA group membership?

Method

Subjects and Assessment

The subjects (n=90) were enrolled in two sections of a sophomore level educational psychology course in an open-admission university. Approximately 68 percent of these students were female. The course is required for all preservice teachers although most students had not applied for admittance to the College of Education prior to taking the course. The GPA breakdown for all sections are shown in Table 1.

Table 1
Subjects by GPA Categories

GPA Category	Percentage of Class
3.6-4.0	12.2
3.1-3.5	23.9
2.6-3.0	36.1
2.1-2.5	22.4
<2.0	5.4

Instruments

Survey. During the first week of the semester, students were given a preassessment which consisted of questions about their perceived expectations for performance in the course, course difficulty (Likert scale ranging 1-7 with 1 low) adequacy of learning strategies for making an A or a B (Likert scale 1-7), and GPA.

LASSI. The LASSI (Weinstein, Palmer, & Schulte, 1987) was administered the first week of the course and the last week. The test consists of 77 items distributed across ten scales. Students respond to each item from "not at all typical of me" to very much typical of me." Items are scored on a likert scale of 1-5. Total scores are not used since the instrument was designed as a diagnostic one. Test-retest reliability coefficients on each of the scales run from .64 to .81. Several of the scales have been validated against performance measures. Scores on the "selecting main idea" scale have been compared to student's scores on selecting main ideas from texts and other readings ($r=.40$). The scoring manual provides a graph for raw scores on subscales to be converted to established norms in order to use established norms for comparisons (Weinstein, 1987).

Course Description

This course consisted of two large group sessions per week and one small group session. Major goals of the course were for students to learn the course content at application level and become effective learners themselves. The two primary evaluation criteria were five multiple choice exams and seven case studies. The grading system was criterion based allowing the first four exams to be retaken with the two grades averaged together. Learning strategy instruction was built into the course and consisted of:

Weekly strategy mini-lessons. These were presented in the large group sessions and were about fifteen minutes in duration. The lessons included: PQ4R (preview, question, read, recite, reflect, review) (Thomas & Robinson, 1972), goal setting, summarization, keyword and other mnemonics, and test taking tips.

STEPS To Successful Performance Manual (Alderman, 1989). This was a motivation and learning strategy manual developed for the course, providing expectations for performance and suggestions for motivational and cognitive strategy improvement.

Learning strategy labs. These were voluntary adjunct labs offered weekly to provide more extensive strategy training for students who opted to do this.

Learning logs. The purpose of the logs was to foster metacognitive awareness. Students wrote weekly about their learning strategies and received feedback every two weeks from their instructor.

Results

Survey

The preassessment data of rankings of course difficulty (1-7) and adequacy of learning strategies for making an A or B (1-7) found that the three upper GPA categories (from 2.6 - 4) rated course difficulty as 4.5 with the lower two groups rating it 4.7 and 4.9 respectively. All GPA groups except those below 2.5 rated adequacy of study skills for attaining an A or B above 5.5. Those below 2.6 rated adequacy 4.8 and 4.3 respectively.

Norm comparisons - patterns. What learning strategy patterns do preservice teachers report and how do these compare to the established norms of the LASSI? Entry and exit group mean percentiles are displayed in Figure 1 as they compare to the norms for the LASSI. Group means for the LASSI pretest showed that these students scored near the 50th percentile as compared to the norms presented on the LASSI graph. Group means for this population ranged between the 45th percentile and the 60th percentile. As a group the highest scores were on the Attitude and Concentration subscales followed by Time Management, Use of Study Aids, and Self Testing strategies. The lowest subscale score was Information Processing. Motivation, Anxiety, and Selecting the Main Idea subscale scores fell around the 50th percentile.

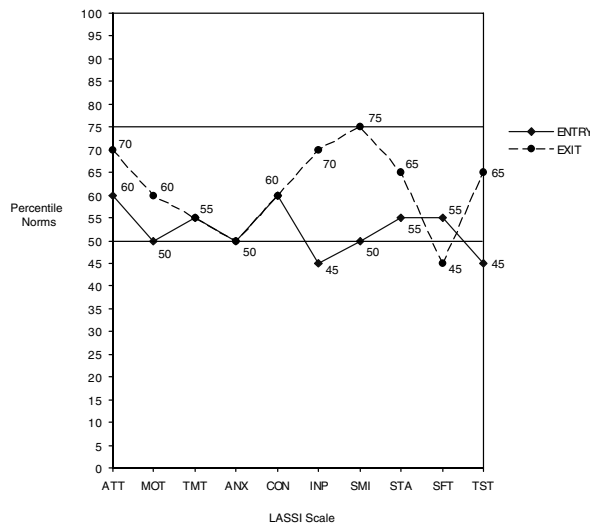


Figure 1. LASSI entry and exit mean percentile scores.

LASSI patterns by GPA categories. At course entry, do learning strategy patterns of preservice teachers vary according to specified GPA groups? A MANOVA was conducted to determine if there were significant differences among the four GPA groups on the 10 scales of the LASSI. The results indicated significant differences on six of ten scales. The Wilk's lambda approximate F value was significant $F(4, 69) = 7.60, p < .0001$.

Following a significantly different MANOVA, univariate analyses of variance were performed on each scale to determine which variables displayed significant mean differences. The variables with significant differences were: Attitude, $F(4, 69) = 4.91, p < .0015$; Motivation, $F(4, 69) = 3.21, p < .018$; Time Management, $F(4, 69) = 3.16, p < .02$; Anxiety, $F(4, 69) = 4.99, p < .0014$; Concentration, $F(4, 69) = 5.18, p < .0010$; Test Strategies, $F(4, 69) = 7.60, p < .0001$. Scheffe post hoc tests, with an alpha level of .05, were performed on variables showing significant differences. These tests indicated upper GPA groups scored higher than lower groups in all cases. On the Attitude scale, GPA 3.1-3.5 had higher scores than 2.1-2.5; on Anxiety, GPAs from 3.1 to 4.0 were higher than 2.0-2.5; on Concentration 4.0 scored higher than 2.1-2.5; on Test Strategies, 4.0 was higher than the two lowest categories, 2.1-3.0.

Of major interest to us is how means for each GPA category compare with LASSI norms. When means were placed on the normed graph (see Figure 2) each GPA group had a different pattern of learning strategy use. A very exaggerated pattern difference can be seen between students above and below a GPA of 3.0. This is consistent with results from the MANOVA.

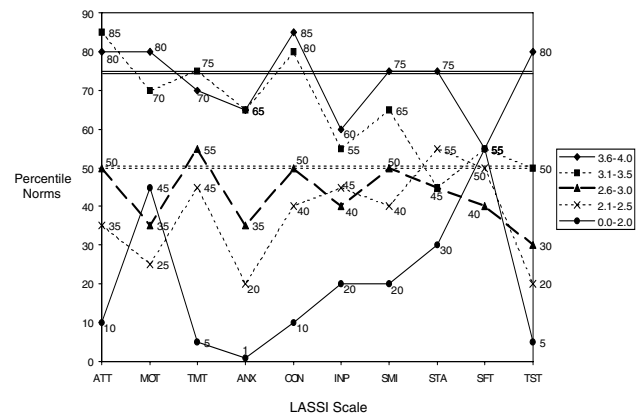


Figure 2. LASSI mean entry percentile scores for each college GPA level.

LASSI patterns and relationships to final course grade. What were relationships between entering LASSI patterns and course grade? A MANOVA was conducted to determine if there were significant differences among the course grade groups (A, B, C, D) on the 10 scales of the LASSI. The results indicated significant differences on three of ten scales. The Wilk's lambda approximate F value was significant $F(3, 63) = 3.60, p < .016$.

Having found significant differences using the MANOVA, univariate analyses of variance were performed on each scale to determine which variables displayed significant mean differences. To determine where these differences were, i.e. between which course grade groups, post hoc analyses using the Scheffe test were performed on variables where significant F -tests had been found. Those scales

with significant F's follow: Motivation, $F(3, 63) = 6.22, p < .0009$; Concentration, $F(3, 63) = 3.42, p < .022$; Test Strategies, $F(3, 63) = 3.69, p < .016$. For each of the significant differences (alpha .05), students who scored higher in the course had higher LASSI scale scores. On the Motivation scale, the A students had higher scores than both the C and D students; the difference in means were 6.064 and 7.014 respectively. For both Concentration and Test Strategies, A students had scores significantly higher than C students; the difference in means were 6.107 and 4.893 respectively.

Predictors of final grade. To determine which variable accounted for the most variance in final grade, each of the LASSI entry scores was regressed on the final grade. The only variable which accounted for a significant amount of variance was Motivation, $F(3, 63) = 9.763, p = < .0027$. No other LASSI variable contributed enough variance within the final grade to be significant.

When each of the LASSI exit scores was regressed on the final grade, this changed. Test Strategies accounted for a significant amount of variance in final grade, $F(3, 63) = 31.657, p < = 0.0001$; the R^2 full model = 0.5482 and the R^2 restricted model = 0.3857. When the regression procedure was used to test the amount of variance college GPA accounted for, it, too, was significant, $F(3, 63) = 17.6428, p = 0.0001$. R^2 full = 0.4835 and R^2 restricted = 0.3048.

Do gain scores from entry to exit vary according to GPA group membership? When pre- and posttest scores were plotted on the normed graph, students appeared to separate at the 3.0 level. GPA groups were then collapsed to two categories, greater and less than 3.0. To determine whether one GPA group or other gained more from entry to exit, multivariate pair-wise t comparisons was conducted. None of the scales produced a significant t indicating that neither category gained more than the other from entry to exit.

Discussion

What learning strategy patterns were reported by this population of preservice teachers and how do these scores compare with national norms? Weinstein (1987) reports that the 75th percentile is a common cutoff score for determining which students need intervention. Students between the 50th and 75th percentiles should consider improving relevant strategies in order to optimize performance, while those below the 50th percentile need to improve in order to have a chance of success in school. When LASSI subscale scores for this population were compared to the national norms, percentile mean scores ranged from the 45th to the 60th percentile. This indicates that, as a group, students are in need of some learning strategy improvement. The students were weakest in: Motivation - willingness to work hard and take responsibility for their own learning; Anxiety - degree of worry about school and performance; Information Processing - imaginal and verbal elaborations; Selecting The Main Idea - ability to pick out most important ideas; and Test Strategies - preparation for exams.

What do these scores mean for a group of predominantly sophomore preservice teachers? From survey of strategy adequacy and entry LASSI score, it appears that, as a group, these students were somewhat unaware of their learning strategy strengths and weaknesses in relation to course difficulty. On the survey, they rated adequacy for making an A or B as 4.3 or higher while 65 percent had a GPA below a 3.1. They tended to underrate course difficulty while overestimating their strategy proficiency. Although we did not determine previous learning strategy instruction of these students, in the Hulick and Higginson (1989) study, only 24 percent reported having had even limited instruction in any learning strategies prior to college.

In the present study, group means appeared to mask informative data. How did students vary across GPA groups? Once the entry scores were plotted by GPA group, variability among groups was evident. It appears that these students tended to separate into two groups, at the 3.0 GPA level. Although clear differences can be seen between these two groups on the motivational scales, the actual learning strategy means are more erratic and less definitive as seen in Figure 2. The erratic pattern on learning strategies may be an indication that students coming into this course lack a core set of learning strategies.

Which LASSI scores indicated differences by final grade? Three scales which showed significant differences by final grade were Motivation, Concentration and Test Strategies. On each of these three scales, students making an A had higher entry scores than other grade levels. According to descriptions of scales, these students are described as willing to work hard, accept responsibility for performing tasks related to course success, focus their attention on the task at hand, and know about characteristics of tests, test items, and test preparation.

How do end of course LASSI scores compare to beginning scores? For the whole group, all scales increased except Time Management, Concentration, Anxiety, and Test Strategies and no scales decreased. One important finding is that students above and below 3.0 GPA gained equally on the LASSI. Thus high and low GPA categories are in need of learning strategy instruction.

The patterns described in this study reveal that students entering teacher education cannot be assumed to possess a repertoire of effective learning strategies. Who needs intervention? From this data, it appears that almost all preservice teachers in this open admission university were in need of some degree of strategy intervention. For students at the upper GPA levels, more effective strategies will enable them to optimize performance as they proceed to upper level courses. Students at the lower GPA levels need more effective strategies to improve chance of success in college and to do more than "get through" their teacher education program. If preservice teachers are to become teachers of learning strategies, teacher educators must help them develop this repertoire.

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