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ABSTRACT

The Learning Strategies Questionnaire (LSQ) was developed to assess students' declarative knowledge of strategy utility. Goals were to develop a reliable survey that: (1) could be administered for fourth-, fifth-, and sixth-graders in a group setting; (2) would provide a profile of children's declarative knowledge of strategies for classroom learning; and (3) would show good external and discriminant validity. Two pilot samples, one of 21 fifth-graders and one of 45 sixth-graders, participated in the initial skill construction. Based on results from the pilot administration, the questionnaire was revised to a survey of 48 items across instructional situations. A validation sample consisted of 194 subjects drawn from three grade levels in four schools in Indiana and Michigan. The revised LSQ was administered along with a battery of other scales to 194 elementary students, 51 high school students, and 122 classroom teachers enrolled in a summer graduate course in education at Purdue University. The LSQ showed good reliability and validity with elementary and high school students, and with classroom teachers. Subscale scores were found to be related to age, achievement level, and motivational orientation. Results are discussed in terms of both the development of strategy knowledge and the role of personal goals and values. Directions for future use of the LSQ as a research tool are suggested. A four-page list of references and data tables are appended. (LMO)

Development of a Scale to Assess Students' Knowledge of the Utility of Learning Strategies

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Abstract:

The Learning Strategies Questionnaire (LSQ) was developed to assess students' declarative knowledge of strategy utility. The LSQ showed good reliability and validity with elementary and high school students, and with classroom teachers. Subscale scores were found to be related to age, achievement level and motivational orientation. Results are discussed in terms of both the development of strategy knowledge and the role of personal goals and values, and directions for future use of the LSQ as a research tool are suggested.

This paper was presented at the annual meeting of the American Education Research Association, San Francisco, April 1986. The research was supported in part by a David Ross Grant from Purdue University to the second author.

Development of a Scale to Assess Students' Knowledge of the Utility of Learning Strategies

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The development of effective strategies for children's learning is a subject that has received considerable attention. In recent years, the relationship between children's metacognition and academic performance has become a major area of research. In general, most studies have shown that better students are aware of and select from a variety of learning strategies according to the demands of the academic tasks. Poorer students, on the other hand, tend to have less knowledge related to various learning strategies, to be less aware of their functional value or appropriateness, and/or to be less able to use them selectively in response to situational and task demands (see for example, Brown, 1980; Brown, Bransford, Ferrara & Campione, 1983; Champagne, Klopfer & Gunstone, 1982; Greeno, 1976; Paris & Cross, 1983; Resnick, 1976).

Paris and his colleagues (Paris & Cross, 1983; Paris & Jacobs, 1984; Paris & Lindauer, 1982) have identified three types of knowledge that influence the performance of children on various learning tasks: (1) declarative knowledge of various cognitive skills and strategies required in learning; (2) procedural knowledge of the processes that facilitate learning; and (3) conditional knowledge of the situational appropriateness and value of various strategies. Within this framework, knowing how to use strategies and being able to produce strategies are viewed as only minimal prerequisites for learning. It is knowing when and why to apply strategies that determines the selective use of strategies and that makes a learner planful and strategic rather than mechanical (Paris & Jacobs, 1984; Paris, Lipson, & Wixson, 1983; Pressley, Bonkowski, & O'Sullivan, 1984).

The purpose of this study was to develop a group administered instrument to assess students' perceptions of the utility value of various learning

strategies. On the basis of previous research, our scale focused on children's knowledge of the appropriateness and usefulness of these strategies for different learning situations. In order to help validate this instrument, other data were also collected to examine its relation to measures of standardized achievement, motivation, and self-concept.

Although other researchers have developed measures of strategy knowledge, they are not well suited to large scale studies for a variety of reasons. First, some researchers have used interviews to obtain information on students' strategy knowledge (e.g., Paris & Meyers, 1981; Swing, 1985). While this technique allows for detailed probing of students' knowledge, it is quite time consuming. Second, other group administered measures ask students to report how often they habitually use certain strategies. This practice has come under criticism in recent years on the grounds of inaccuracy (Ericson & Simon, 1980; Nisbett & Wilson, 1977; Swing, 1985). In addition, it does not assess students' abilities to recognize the varying utility of specific strategies in specific situations. Finally, most measures have concentrated on strategies for a particular subject matter, such as reading (Paris et al., 1984) or for certain types of learning situations. No group measure is currently available that asks elementary students to rate the usefulness of strategies across either different subject or different learning situations.

In response to these problems, we have constructed and tested the Learning Strategies Questionnaire (LSQ). Our goals were to develop a reliable survey that (1) could be administered for fourth, fifth, and sixth graders in a group setting, (2) would provide a profile of children's declarative knowledge of strategies for classroom learning, and (3) would show good external and discriminate validity, inuicating that the dimensions of the

scale were psychologically meaningful. Our interest was to obtain information concerning students' perceptions of learning strategies; this was not an attempt to determine whether the strategies selected were best for any particular task. Future studies can then examine the relation of this type of knowledge to learning outcomes and the conditions under which children put their knowledge to use.

In order to test the utility of this instrument for future research, we examined its ability to show developmental trends and to detect differences related to both achievement and motivation levels. On the basis of previous research, we expected to find group level differences related to age (Brown, et al., 1983; Paris, 1978; Paris & Lindauer, 1982) and achievement level (Paris & Meyers, 1981; Peterson, et al., 1984; Resnick, 1976). In general, research has shown that both older and better students differ from younger and poorer students in that they tend to be flexible in their approach to problems; they attend to task goals, select from a variety of strategies those that are best suited to the goal, apply those strategies and monitor their progress regularly (Brown, et al., 1983). Others have shown that better students are more aware of the ineffectiveness of certain strategies than are less able students (Paris & Meyers, 1981). Some researchers (see Waters, 1985) have also reported sex differences in the development of strategy knowledge, therefore this source of variation was explored.

To the extent that students' self-concepts of ability reflect achievement level differences, we also expected to find differences related to a measure of perceived academic competence. Specifically, students with high concepts of their ability should show more awareness of the effectiveness and ineffectiveness of various strategies as described above with regards to

achievement level differences. Research has shown that students who have high concepts of their ability generally believe they have control over their learning outcomes (e.g., Covington & Omelich, 1979; Harter & Connell, 1985; Nicholls, 1976; Sohn, 1977; Weiner, Russel, & Lerman, 1978). As a result, they also show a tendency to set high expectations for performance, to show high persistence on difficult tasks, to set realistic achievement goals, to display high levels of task engagement, and to take pride in their accomplishments (Butkowsky & Willow, 1980; Coopersmith, 1967; Harter, 1983; Meece, Parsons, Kaczala, Goff, & Futterman, 1982; Parsons, 1983; Rosenberg, 1979; Weiner, 1979). These behavioral patterns, which have all been found to be associated with high self-concepts of ability, are also likely to reflect differential strategy use.

Finally, we were interested in examining group differences related to different motivational orientations. Paris and Lindauer (1982) stress the importance of motivation in a child's decision to employ a particular strategy. Knowing when and how a particular learning strategy will promote learning does not insure that students will choose to use it for every appropriate occasion. This decision is likely to be influenced by the learner's own intentions and goals for that situation. While some students may want to learn as much as they can from a given learning task and may even derive some inherent satisfaction from their learning and accomplishments, other students may prefer to do the same task as quickly as possible with the least amount of effort, fully aware that such an approach is unlikely to promote learning (Brophy, 1983; Corno & Mandinach, 1983; Harter & Connell, 1985; Paris & Cross, 1983; Winne & Marx, 1982).

Given that the utility and choice of a particular strategy is relative to

the student's own goal, we expected to find a relation between students' ratings of the utility value of various learning strategies and their motivational orientation. Specifically, students with a mastery learning orientation who are intrinsically motivated to learn should recognize the ineffectiveness of such strategies as starting to work without a clear understanding of the task and should instead favor self-reliance and self-monitoring. In contrast, those whose primary objective is merely finishing an academic task rather than learning may rate strategies that get the job done with a minimum amount of effort (e.g., asking a friend how she or he did a problem, or waiting to see if something must be learned for a test or assignment) as more helpful.

Methods

Subjects

Two pilot samples, one of 21 fifth-graders and one of 45 sixth-graders, participated in the initial scale construction. The subjects who participated in the validation sample were drawn from three age levels. Elementary subjects consisted of 208 fourth-, fifth- and sixth-graders in eight science classrooms from four schools in Central Indiana and Southeastern Michigan. Elimination of those subjects with learning disabilities resulted in a final sample of 194 subjects. Our high school sample contained 55 9th-grade students enrolled in a required English class. The oldest sample consisted of 122 elementary and high school classroom teachers who were enrolled in a graduate course in education.

Measures

Scores were obtained on a number of other measures for the students in the elementary sample. These included the following:

Scale of Intrinsic vs. Extrinsic Motivation in the Classroom (Harter, 1981), a group-administered scale comprised of 30 items, 6 in each of five subscales. The subscales were designed to assess children's attitudes in the following areas: (1) learning for curiosity vs. learning to please the teacher, (2) incentive to work for one's own satisfaction vs. working to please the teacher and get good grades, (3) preference for challenging work over easy work, (4) desire to work independently vs. dependence on the teacher for help, and (5) preference for internal criteria for success or failure over external criteria. In this study we used the second (Mastery) subscale and a composite scale (Intrinsic) consisting of the first three subscales, described by Harter as measuring intrinsic motivation.

Perceived Competence Scale for Children (Harter, 1982) is a group-administered scale comprised of 28 items, 7 in each of four subscales measuring children's conceptions of their own Cognitive, Physical and Social Competence, and General Self-Worth. The Cognitive Competence subscale was used in this study as a measure of students' ratings of their academic ability.

Both the items in this scale and the Intrinsic vs. Extrinsic Orientation scale described above are constructed in a structured alternative format from which children choose the statement that best describes themselves (see Harter, 1982).

As a measure of scholastic achievement, composite scores on the California Achievement Test or the Iowa Test of Basic Skills were obtained from student files. To compensate for the differences in administration dates between schools, z-scores were used rather than grade-equivalent scores.

Instrument Development

Item Generation. The extensive literatures on learning strategies and classroom motivation provided a list of both effective and less effective strategies from which an initial pool of items was developed. Effective strategies included identification of important information, (Adams, Carnine & Gersten, 1982; Baker & Brown, in press; Brown, Palincsar & Armbruster, in press), recall of problem isomorphs, self-checking and monitoring, planfulness (Brown et al., 1983; Paris & Meyers, 1981), and attempting to figure out problems on one's own (Corno & Mandinach, 1983). Less effective strategies included resource management, or relying on others to solve learning problems (Corno & Mandinach, 1983), "plunging in" in an attempt to complete the task as quickly as possible, without regard to quality of learning (Covington & Beery, 1976; Hansen & Johnson, 1985; Holt, 1982) and some other behaviors such as waiting to see if the information is needed for a test or assignment, and task avoidance strategies such as counting pages and problems prior to beginning, that were identified through classroom observation.

Next, a list of classroom situations was identified that would allow us to assess students' cross-situational knowledge of these strategies. These included things one could do while listening to the teacher-led discussion of new material, working on something one is not sure how to do, reading a science or social studies text, working on a math paper, answering hard questions, writing a report, and working in a small group. Items were then worded to fit the strategies to the specific situation (see Figure 1). Both effective and less effective strategies were included for each situation in which they seemed plausible ways of coping with a task.

Pilot Testing. This preliminary version of the questionnaire was

administered to 21 fifth-grade volunteers, who rated each strategy's helpfulness on a four-point Likert-type scale (see Figure 1) and made suggestions for additional helpful strategies. Based on these suggestions and on individual item variances, the questionnaire was revised, resulting in a survey of 48 items across seven instructional situations.

We next sought to identify those strategies which were perceived as clearly more or less helpful in specific situations. For this purpose, we asked a group faculty and graduate student volunteers in Educational Psychology to sort each item by how helpful they felt the strategy was in that situation. This informal sorting task also allowed for feedback which helped us to identify those items which were vaguely-worded, or which could be rated either way depending upon further situational factors.

Questionnaire Administration

The revised, 48-item version of LSQ was administered along with a battery of the other scales to our elementary subjects. The LSQ was also administered to 122 classroom teachers enrolled in summer graduate courses in Education at Purdue University. These teachers completed the questionnaire in their university classrooms, after a brief explanation of the purposes of the study.

Results

Descriptive Analyses of Item Frequencies

Initial data analyses involved comparing mean item scores and response frequencies within each previously-identified strategy category across the three samples: 194 elementary students, 51 high school students, and 122 classroom teachers. The purpose of this analysis was to identify possible subscale groupings based on the two older samples, and to begin looking at

differences between older and younger subjects. Mean scores and standard deviations are presented in Table 1.

Insert Table 1 about here

Items were initially grouped conceptually by category, (e.g., self-checking, resource management) as described previously. Although we expected some variability in students' perceptions of a given strategy across situations, item-total correlations were computed for items in each category. As expected, correlations were generally in the low to moderate range, possibly reflective of differences in the perceived utility of each strategy across different learning situations. Two categories seemed to show more cross-situational generalizability: recall of problem isomorphs and wait-and-see strategies, both of which had reliability coefficients of .74. Other categories had alpha coefficients ranging from .44 (self-monitoring) to .68 (jump in and get it over with).

The lack of internal consistency between situational applications of individual strategies pointed to a need to examine more global dimensions of students' perceptions. Patterns in the data indicated that there were several items clearly seen by the two older samples as more or less "helpful." In contrast, younger subjects seemed less able to make these discriminations. Thus, two subscales were constructed, one of effective strategies, the Effective Strategies Subscale (ESS) and one of less effective strategies, the Ineffective Strategies Subscale (ISS). (The use of the label "ineffective strategies" does not imply that we have shown in this study that such strategies are ineffective. We base our label on the results of previously

cited research and the opinions of older students and teachers.)

Subscale Construction and Reliability

On the basis of previous research and our pilot work, items selected for the Effective Strategies Subscale (ESS) included self-monitoring, recall of problem isomorphs and identification of important information. Items selected for the Ineffective Strategies Subscale (ISS) included waiting to see if the information will be required before trying to learn it, and starting without understanding the task and hoping for the best. Because we were interested in the students' motivational orientations we also included items reflective of a willingness to try and solve problems on one's own (ESS), as opposed to dependence upon others for executive help and feedback (ISS).

Item response frequencies of the teacher sample were inspected to identify other items consistently rated as effective or less effective. Four items rated as helpful (those given a 3 or 4 rating) by more than 75% of the teachers were added to the effective strategies scale and tested for their contribution to internal consistency. Those items which did not appear to be related to the total score were dropped, leaving a final subscale of 15 items with a reliability coefficient of .83. A similar procedure was followed for items consistently rated as less effective (those given a 1 or 2 rating by more than 75% of the teachers). One item was added to the subscale and one dropped, leaving a total of 13 items with a reliability coefficient of .77. Reliability of these two subscales was checked for the elementary and high school samples. Reliability coefficients for the ESS for these two groups, respectively, were .79 and .79; and for the ISS, .82 and .79. The final set of items comprising the ISS and ESS subscales are indicated in Table 1.

One item which was rated as helpful by the teachers was not added to the

subscale for theoretical reasons. In the situation "reading a science or social studies textbook," 80% rated "looking up all the words they don't know" as being helpful. Research has shown that skilled readers use the context to figure out the meanings of many unfamiliar words, instead of immediately turning to the dictionary (Baker & Brown, in press). The fact that the teachers thought this a very helpful strategy (mean rating = 3.17), although interesting, was not sufficient to warrant its inclusion in the effective strategies subscale.

Scale Validity

Discriminant Validity. If our subscales adequately measure knowledge of the utility of various learning strategies, previous research suggests that they should reflect a developmental difference between younger and older subjects. Subscale scores were first created for each subject by averaging item ratings in each scale. A two-way Grade (3) X Sex (2) analysis of variance was then performed on scores on the ESS and the ISS (see Table 2). Although some previous researchers have reported sex differences in strategy knowledge (see Waters, 1985), no effects or interactions involving sex were significant.

Insert Table 2 about here

Given that no sex by grade interaction was found, our next set of analyses tested the effects of grade or age level alone. A one-way analyses of variance for grade was conducted on the mean item scores of the two subscales using subjects from all three samples. No differences between fifth- and sixth-grade students; therefore, these two groups were collapsed,

yielding four levels of Grade: fourth grade, fifth & sixth grades combined, high school, and graduate (teachers). A Grade effect was found for both subscales: ESS ($F_{3,363}$=28.84, p<.0001) and ISS ($F_{(3,363)}$=20.26, p<.0001). Newman-Keuls sequential range test was used to explore the differences between means. The results showed that ratings decrease for less effective strategies as a function of age, although the difference between upper elementary and high school students was not significant at conventional levels. The results for the other subscale were somewhat less clearcut. Upper elementary students were the most conservative in their ratings, followed by fourth-graders and high school students, between whom there was no significant difference. Teachers were by far the most positive in their ratings of the effectiveness of these strategies.

At this point we investigated the possible utility of a score to measure the degree of differentiation between students' ratings of effective and ineffective strategies. This score was derived by subtracting the mean item response on the ISS from that on the ESS and another one-way analysis of variance was then performed. The Grade effect was again significant ($F_{(3,363)}$=40.92, p<.0001). Although this score did not reliably discriminate between grades at the upper elementary level, Newman-Keuls range tests showed significant differences between teachers, high school students and elementary students; the magnitude of differential scores increased with grade level.

External validity. Scores were obtained on a number of other measures for the students in the elementary sample. These included the Scale of Intrinsic vs. Extrinsic Motivation in the Classroom (Harter, 1981), the Perceived Competence Scale for Children (Harter, 1982), composite scores on the California Achievement Test or the Iowa Test of Basic Skills. If the LSQ

adequately measures students' knowledge of learning strategies, subscale scores should relate in theoretically predictable ways to these other measures. Because we were interested in developing a measure of younger populations, only the elementary sample of students was used in subsequent analyses to test the external validity of the LSQ. The relationships between these other measures and scores on the two subscales were computed using Pearson's product-moment correlations (see Table 3).

Insert Table 3 about here

Previous research on learning strategies has shown that better students have a more accurate idea of the utility of various learning strategies than do poorer students. Thus, a fairly strong positive correlation was expected between scores on the ESS and composite scores on standardized achievement tests. Conversely, a negative correlation was predicted between scores on the ISS and achievement, as better students would have given these strategies lower ratings.

In our sample, only the latter prediction was borne out. The correlation of standardized test (z)scores with scores on the ESS was -.07 (p=.157), and with the ISS scores was -.24 (p=.001). Students at all ability levels seemed to be able to recognize effective strategies, but better students at all three grade levels were more likely to rate less effective strategies accurately than were less able students.

The correlations between subscale scores and mean item response on the Cognitive Competence subscale of the Perceived Competence Scale for Children (Harter, 1982) followed a pattern similar to that of the achievement data. As

shown in Table e, children who rated their academic competence were likely to give low ratings to less effective strategies (r=-.17, p=.01). This relationship was stronger for the older subjects, with fifth-graders showing the highest correlation (-.32).

To the extent that mastery-oriented children develop a repertoire of effective learning strategies, these variables ought to be related to a measure of strategy knowledge. Both the Mastery and Intrinsic subscales of the Scale of Intrinsic vs. Extrinsic Motivation in the Classroom (Harter, 1981) showed significant negative correlations to students' rating of less effective strategies (-.28 and -.23, respectively, both p=.001). Scores on the effective strategies subscale were reliably but less strongly related to these two variables (.12, p=.043 and .17, p=.011, respectively) when the sample was analyzed as a whole. Individual correlations with the ESS at each grade level showed a relationship only for the Mastery subscale in the sixth-grade sample (r=.24, p=.026).

Although the differentiation scores (computed by subtracting each student's mean item response on the ISS from that on the ESS) did not distinguish statistically between grades within the elementary sample, it seemed likely that they would be sensitive to individual differences in achievement level and motivational orientation. Correlational analysis confirmed this prediction (see Table 3). Although not quite as sensitive to differences in achievement level as the ISS scores alone, differentiation scores were more highly correlated with measures of cognitive self-concept for fourth- and fifth-graders (.26 and .23, respectively), mastery orientation for all elementary grades (.19, .35 and .43) and intrinsic orientation for fourth-graders (.36). Correlations for the other grades were comparable to

those found for the ISS alone (except for intrinsic orientation, which correlated with the ISS -.42 and the differentiation score .36 for sixth-graders).

Discussion

Our goals in developing the Learning Strategy Questionnaire (LSQ) were to devise a valid and reliable survey that could be group administered to fourth-, fifth-, and sixth-grade students and that would provide a profile of children's declarative knowledge of strategies for classroom learning. The results of this study indicate that we were fairly successful in meeting these goals.

First, we were interested in developing a scale that would assess children's knowledge of both effective and less effective strategies across different classroom learning situations. Our grouping of strategies into these two categories was supported by data obtained from older students and teachers, and by fairly high estimates of internal consistency of items within scales across samples.

In order to test the utility of the LSQ as a research instrument, we next examined its ability to discriminate among groups of subjects. The results of this analysis showed that the instrument had good discriminant ability. As expected, group level differences related to age and achievement level were found in students' ratings of good and poor strategies across situations. Setting the fourth-grade students aside for a moment, ratings of effective strategies increased with grade level, while ratings of less effective strategies decreased. Fifth- and sixth-graders had the lowest scores on the ESS and the highest on the ISS, indicating the least degree of differentiation among the various strategies. High school students were in the middle on both

subscales, and teachers showed the most differentiated conceptions of all. This developmental trend fits well with current theories on the development of strategy knowledge (see Brown, et al., for a review).

Our specific goal, however, was to develop a measure suitable for use with upper elementary students. For this age range, ratings of less effective strategies decreased with grade level. Ratings of effective strategies, on the other hand, did not show a clear developmental pattern. Fourth-grade students rated the utility of these strategies much higher than fifth- and sixth-graders. This pattern of findings indicates a possible response bias operating in fourth-graders to rate any strategy as potentially useful, and it may reflect a relatively undifferentiated conception of the utility value of various strategies.

Similar findings were reported by Paris and Meyers (1981) who found that poor readers were less aware of the negative effects of using less effective strategies than were better readers, and gave generally more positive ratings to both effective and less effective strategies. Consistent with these findings, correlational analyses in the present study showed significant positive relationships between student ability levels, as assessed by standardized tests of achievement, and scores on the less effective subscale. This relationship held across grade levels. Student achievement and ratings of effective strategies, on the other hand, did not appear to be related at these grade levels.

Finally, analyses involving the self-concept and motivation measures indicated that the LSQ had good external validity as well. Previous research had suggested that students with high concepts of their academic ability who were intrinsically motivated would be able to recognize the differing utility

value of various learning strategies. As before, however, a significant correlation was found for self-concept and motivation scales with scores on the ISS scale but not with scores on the ESS scale. Taken together, the results of both the analyses of variance and correlational analyses suggest that of the two scales, students' ratings of ineffective strategies seems to be more informative. Older, mastery-oriented and high achieving students seemed to be relatively more aware of the low utility value of these strategies.

Findings from the present study suggest some areas for future research. First, it is possible that over a large age range a measure that reflects students' developing abilities to discriminate between effective and less effective strategies may be quite useful. In this study, a differentiation score was derived by subtracting a student's mean scores on the ISS and ESS subscales. Preliminary analyses showed age related differences in this score indicating greater differentiation in students' conceptions of effective and less effective strategies with increasing age. This knowledge index does not seem as sensitive, however, in measuring achievement level differences between upper-elementary students. Our findings suggest that for these students, ratings of less effective strategies better discriminate between ability levels. Other researchers (e.g., Paris and Meyers, 1981) have reported similar findings in studies of elementary students' strategy knowledge. However, differentiation scores were, in most cases, more highly related to cognitive self-concept and motivational orientation than were scores on the ISS alone. Further exploration of this pattern of correlations may provide insights into the nature of the relationship between strategy knowledge and use.

Secondly, it is possible that the increase in ratings for items on the ESS found for older subjects is a reflection, not of greater understanding of the beneficial effects of using these strategies, but of differences in value systems between teachers and students. Teachers, hoping to foster self-reliance and efficient learning habits in their students, may consequently rate these strategies more helpful in producing learning. Upper elementary and high school students may not share these values, or may not see becoming an independent and efficient learner as major personal goals.

Nicholls, Patashnick and Nolen (1985) found, for example, that high school students do not all share the same goals and expectations for school learning. Although some students in their sample seemed to be interested in learning for its own sake, and felt successful when they had learned something new, others were more interested in school learning for its role in helping them achieve wealth or status in later life. It is likely that the strategies employed to satisfy these personal goals are vastly different from the strategic actions taken to enhance learning or problem solving abilities.

This interpretation is also consistent with our findings of a positive relationship between strategy ratings and mastery orientation. Those elementary students who ascribed to themselves characteristics of a mastery orientation and high cognitive competence also tended to rate the utility value (i.e., helpfulness) of effective strategies higher and less effective strategies lower than did their less mastery-oriented classmates. These data suggest that in order to understand students' learning behavior in the classroom, we need to consider students' own goals for learning and to separate as much as possible the effects of strategy knowledge from those of motivational factors.

In conclusion, the results of this study indicate that the Learning Strategy Questionnaire, or scales like it, would be useful to investigators interested in establishing general levels of strategy knowledge in a variety of classroom situations. Information from this scale can be used in future studies to examine the conditions under which students put their knowledge to use. If, for example, a student demonstrated knowledge of the usefulness of several effective strategies and yet chose not to use them, other data could be examined for possible explanations. As this study has suggested, students vary in their perceptions of the utility value of different strategies depending not only on their own achievement level, self-competence, and motivation but also on their perceptions of the learning situation and its demands. Future studies that examine these sources of influence on children's strategy use will help shed greater light on the complex relationship between metacognition, motivation, and classroom learning.

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Table 1

Item means and standard deviations
(with abbreviated situation descriptors and item stems)

	Elementary	High School	Teachers
Teacher teaching something new			
1. Self-question to monitor understanding	2.91 (0.86)	2.78 (0.86)	3.40 (0.71)
**2. Try to recall something like this learned before	2.67 (0.93)	2.84 (0.83)	3.57 (0.63)
**3. Rehearsal of some teacher statements	2.97 (0.92)	3.22 (0.78)	3.16 (0.72)
*4. Wait and see if need to know for test or assignment	2.85 (1.06)	2.78 (1.05)	2.18 (1.03)
*5. Wait until teacher finished and ask friend to explain	2.06 (1.17)	2.00 (0.94)	2.25 (0.85)
6. Try to figure out what teacher wants students to learn	2.91 (0.95)	2.70 (0.95)	2.83 (0.92)
When not sure how to do something			
**7. Ask teacher to explain	3.37 (0.79)	3.55 (0.76)	3.77 (0.49)
8. Ask friend to explain	2.37 (0.91)	2.92 (0.87)	3.09 (0.73)
9. Figure it out on one's own	2.58 (1.01)	2.47 (0.86)	2.69 (0.82)
*10. Start anyway, hope for best	1.77 (0.94)	1.55 (0.67)	1.84 (0.77)
**11. Re-read directions	3.29 (0.88)	3.12 (0.82)	3.15 (0.75)
**12. Look at the example	3.10 (0.88)	3.39 (0.67)	3.44 (0.62)
*13. Make one's best guess and start	2.00 (0.99)	1.61 (0.72)	1.80 (0.77)

Table 1 (cont.)

	Elementary	High School	Teachers
Reading a content textbook			
**14. Self-question while reading to monitor understanding	2.87 (0.92)	2.77 (0.92)	3.44 (0.78)
15. Read slowly and carefully	3.29 (0.88)	3.35 (0.89)	3.48 (0.66)
16. Memorize important parts	3.18 (0.87)	3.20 (0.92)	2.73 (0.81)
17. Look up all unknown words	2.79 (1.03)	2.92 (1.00)	3.17 (0.80)
*18. Count the pages	1.67 (1.00)	1.59 (0.85)	1.25 (0.57)
**19. Try to select main ideas	2.97 (0.95)	3.55 (0.61)	3.71 (0.52)
*20. Wait to see if need to know for test or assignment	2.68 (1.01)	2.61 (1.12)	1.86 (0.88)
21. Try to remember everything about what one read	3.40 (0.87)	3.29 (0.86)	2.62 (1.02)
Working individually on math paper			
22. Figure out what to do on one's own	2.78 (1.02)	2.92 (0.85)	2.84 (0.88)
*23. Start because important to finish quickly	2.09 (1.10)	1.71 (0.88)	1.48 (0.68)
*24. Count problems	1.95 (1.09)	1.90 (0.96)	1.46 (0.68)
**25. Think about similar problems done before	2.96 (0.96)	3.20 (0.85)	3.50 (0.72)
**26. Check work as one goes along	3.28 (0.94)	3.10 (0.95)	3.58 (0.59)
*27. Just finish and wait for teacher evaluation	2.42 (1.09)	1.77 (0.74)	1.50 (0.65)

Table 1 (cont.)

	Elementary	High School	Teachers
28. Identify easy and difficult problems before starting	2.24 (1.08)	2.22 (1.09)	2.13 (0.80)
29. Ask for teacher feedback	2.95 (1.05)	3.28 (0.83)	3.10 (0.88)
30. Go slowly so as not to make any mistakes	3.28 (0.92)	3.29 (0.90)	3.00 (0.80)
Answering hard questions on one's own			
**31. Try to recall similar activity done before	2.89 (0.93)	3.04 (0.87)	3.57 (0.62)
**32. Think about teacher goals	2.94 (0.91)	2.71 (0.83)	3.31 (0.69)
**33. Check answers as one works to see if they make sense	3.30 (0.89)	3.24 (0.91)	3.57 (0.66)
*34. Ask a friend how to answer	1.96 (1.04)	2.10 (0.96)	2.06 (0.80)
*35. Write down first answer that comes to mind	1.76 (0.94)	1.63 (0.85)	1.73 (0.76)
36. Answering first question, then asking for teacher feedback	2.59 (1.12)	2.94 (0.95)	2.47 (0.90)
Writing a report			
*37. Just start writing because it's best to finish quickly	1.67 (0.89)	1.33 (0.78)	1.30 (0.51)
**38. Think about main ideas writing	3.33 (0.81)	3.43 (0.78)	3.86 (0.37)
**39. Think about what teacher wants students to learn	2.90 (0.93)	2.77 (0.89)	3.23 (0.76)
40. Write down as many things as one can remember	3.09 (0.99)	2.96 (0.87)	2.59 (0.93)
*41. Write until it's the required length	2.41 (1.11)	1.84 (0.84)	1.37 (0.53)

Table 1 (cont.)

	Elementary	High School	Teachers
**42. Write down the important things	3.35 (0.86)	3.61 (0.60)	3.64 (0.59)
Working in small groups			
43. Talk with other students about task	2.88 (0.95)	..42 (0.70)	3.49 (0.67)
44. Check each other's work	2.72 (1.08)	3.40 (0.76)	3.38 (0.70)
45. Divide up the work among members	2.48 (1.07)	2.32 (1.02)	2.84 (0.96)
46. Let smartest kid figure out answers	1.74 (1.08)	1.50 (0.91)	1.35 (0.60)
47. Discuss answers so all understand	3.31 (0.95)	3.50 (0.79)	3.80 (0.53)
48. Recall similar task done before	2.84 (1.02)	2.76 (1.00)	3.44 (0.71)

**Items included in the ESS scale
*Items included in the ISS scale

Table 2

Analysis of variance on ESS Scores: Grade x Sex
(Elementary Sample)

Source	df	F	p
Grade	2	4.27	.015
Sex	1	0.03	.863
Grade x Sex	2	1.63	.199
Within cells	188		

Newman-Keuls sequential range test: (Grade effect) $p < .01$

4th	5th	6th
(3.19)	(3.09)	(2.94)

Analysis of variance on ISS Scores: Grade x Sex
(Elementary Sample)

Source	df	F	p
Grade	2	6.89	.001
Sex	1	1.29	.257
Grade x Sex	2	0.36	.311
Within cells	188		

Newman-Keuls sequential range test: (Grade effect) $p < .01$

4th	5th	6th
(2.23)	(2.14)	(1.88)