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ABSTRACT

Korean children's knowledge of appropriate self-regulated behaviors related to the solving of school-based or nonschool-based programs was studied. An attempt was made to determine the grade level (kindergarten, first, third, and fifth) differences in perceptions of appropriate problem-solving behaviors from the perspective of self-regulation research. Twenty male and 20 female South Korean children in Seoul in each of the four grades were interviewed during normal school hours. Primary findings are that Korean children exhibit relatively high levels of self-regulation responses on the interview across all age levels and that for nonschool settings, older children exhibit greater understanding of self-regulation in problem solving than younger children. These age trends suggest an improvement in metacognitive knowledge about self-regulation. The greater awareness of older children in nonschool settings may be an indicator of their more natural responses than responses associated with schooling. An appendix contains the problem-solving interview questions. (Contains 3 tables and 24 references.) (SLD)

Self-Regulated Problem-Solving Awareness Among Korean Children

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Self-Regulated Problem-Solving Awareness Among Korean Children

This study investigates Korean children's knowledge of appropriate self-regulated behaviors related to the solving of school-based or non-school-based problems. As part of a cross-cultural investigation of self-regulated learning, this study seeks to determine the grade-level (kindergarten, first, third, and fifth) differences in perceptions of appropriate problem-solving behaviors from the perspective of self regulation research.

The active and often complex nature of meaningful learning requires that learners employ a variety of self-regulation processes in order to achieve certain goals or to solve problems that involve multiple and often over-lapping sequences of strategies and steps (Corno, 1986; Iran-Nejad, 1990; Schunk, 1986; Zimmerman, 1986, 1990, 1994). While conceptions of self-regulation include motivational processes (Schunk, 1994; Zimmerman, 1990), conceptions of self (McCombs, 1986), sense of self-efficacy (Bandura & Cervone, 1983), social learning (Bandura, 1986; Meichenbaum, 1990), interest (Hidi, 1990), and self-evaluation (Spates & Kanfer, 1977), there are important cognitive elements in self-regulated learning as well (Bjorklund, 1989; Corno & Mandinach, 1983; Ghatala, 1986; Pressley, Borkowski, & Schneider, 1987).

Research on children's self-regulation depicts effective learners as those who employ a variety of metacognitive, motivational, and behavioral strategies during learning (Pintrich & degroot, 1990; Pressley, Borkowski, & Schneider, 1987;

Zimmerman, 1990). As active participants in all phases of learning, self-regulated learners engage in such activities as self-evaluation, goal-setting, planning, seeking information, self-monitoring, environmental restructuring, rehearsing and memorizing, seeking peer assistance, and seeking teacher or adult assistance (Zimmerman & Martinez-Pons, 1986). These activities may be available to learners at different times of their lives and under differing learning conditions. For example, goal-setting becomes appropriate for tasks that involve relatively undefined goals at their onset or for which there are different, competing goals. Information seeking, also, may be necessary for certain kinds of problems that do not contain readily apprehended information, but may be unnecessary for situations where the tasks are simple, straightforward, and contain all the relevant information.

Children's increasingly sophisticated use of learning strategies (Garner, 1990; Pressley, Snyder, & Cariglia-Bull, 1987) and their development of metacognition (Kreutzer, Leonard, & Flavell, 1975; Schneider & Pressley, 1989), suggests that they should also increase in their recognition of and employment of self-regulation of learning as they become older. This should be particularly true in cultures that encourage autonomous problem solving and independent effort in learning both in the home and in school. Additionally, in cultures that emphasize schooling at early and later ages should instill in children proclivities toward persistence and sustained effort during learning and problem solving. Because of the high premium placed upon education in South Korea, it is of interest to learn the degree to which Korean children recognize the value of certain problem-solving

behaviors in their daily experiences. This study of children from such a strongly education-oriented society as South Korea was conceived as a means of adding to our understanding about cultural differences and similarities in the development of self-regulated learning.

Method

Instrument

The self-regulated problem-solving interview contains specific questions related to the child's understanding of effective and ineffective methods of solving problems, based upon prior studies of self-regulated learning in children and based on a format for metamemory research developed by Kreutzer, Leonard, and Flavell (1975). Each item in the interview asks the child to indicate one of two possible courses of action and his or her reasons for choosing it. There are ten basic issues depicted in the interview: Self-evaluation, goal-setting, planning, seeking information, self-monitoring, environmental restructuring, rehearsing and memorizing, seeking peer assistance, and seeking teacher or adult assistance. Examples of situations that might call for appropriate problem-solving are structured for both school and non-school settings, resulting in 20 separate situations probed by the interview. Choices that are consistent with self-regulated behavior are scored as a one; Choices that are not consistent with self-regulated behavior are scored zero. Scores on the instrument may range from zero to 20.

One of the interview questions (related to self-evaluation) is as follows: "Cindy and Beth have been working together, making their new Halloween

costumes for a party tonight. Beth feels that she is satisfied with her costume and is ready to wear it now. Cindy feels that before wearing the costume she wants to look at the costume to make sure that it fits well. Which would be better to do? Why?"

Subjects

There were 160 South Korean children in the study: 20 males and 20 females in each of four grades, kindergarten, first, third, and fifth. Children were randomly selected from schools in Seoul, representing a normal range of ability for their grades.

Procedure

Trained interviewers interviewed the children at their schools during normal school hours. Care was taken throughout the interview to give no indication of what would be considered the appropriate or "right" answer. If a child had no answer to any item, the researcher prompted him or her to by saying, "Can you think of anything at all?" If the child did not understand a question, it was repeated or paraphrased in simpler language, but still no examples or suggested answers were given. If it helped the child to understand certain questions, the situation described in the question was reworded from the 3rd person to the 2nd person. For example, saying, "Well, if you had to give instructions on kite making, which would it be easier for you to do?"

Follow-up questions in the interview were used in order to encouraged more responses from the child. Examples of the follow-up comments are as follows: (a)"Is there anything else you can think of?," (b)"Can you add any more?," (c)"What do you mean by .....?," and (d)"What else can you tell me?." All prompts or follow-up questions were open-ended. Interviewers did not suggest answers to the child nor indicate that the child is wrong or right.

Results

A 2 (non-school and school-based problems) x 2 (male and female) x 4 (kindergarten, first, third, and fifth grades) mixed-design MANOVA performed on total responses in the interview resulted in a statistically significant within-subjects (school-based and non-school-based problems) main effect for type of problem, $F = 4.01$, $p. < .05$, and a statistically significant interaction between grade and type of problem, $F = 3.80$, $p. < .01$. There was no statistically significant main effect for sex, nor a statistically significant interaction ($p. > .05$). Univariate F-tests for grade revealed a statistically significant difference for the non-school portion of the interview. Post hoc analysis (Tukey, $p. < .05$) revealed that the third and fifth grade children had higher self-regulation scores than the kindergarten children; means for the four groups were 7.45, 7.88, 8.38, and 8.30, respectively. Means for the school portion were 7.60, 8.10, 7.78, and 7.33, respectively. See Table 1 for means of the school and non-school self-regulation scores.

A MANOVA performed on each of the 20 items for all of the grades (kindergarten, first, third, and fifth) in the interview resulted in a statistically

significant multivariate effect for grade, $F = 2.72$, $p. < .001$. Univariate F-tests revealed statistically significant differences for 9 of the items, using the Roy-Bargman Stepdown F-tests. Significantly different items related to non-school settings are as follows: organizing and transforming, goal-setting, planning, seeking information, self-monitoring, and seeking teacher or adult assistance; the general trends are for children in higher grades to indicate higher levels of self-regulation knowledge on those items. For school settings, the significant differences are associated with organizing and transforming, planning, and rehearsing and memorizing; for these items, the trends were for children in the first and third grades to reveal higher levels of self-regulation awareness than children in kindergarten and fifth grade. Tables 2 and 3 show the means for significantly different items on the home and community and on the school sections of the interview. Follow-up analyses (Tukey, $p. < .05$) revealed that, while there were general trends with regard to the separate portions of the interview, no grades were significantly different from any other for the total score on the interview. Post hoc analyses (Tukey, $p. < .05$) for the nine univariate analyses reveal general age-level trends in improvement of self-regulation scores.

Discussion

Primary findings from this study are that Korean children exhibit relatively high levels of self-regulation responses on the interview across all age levels (means of about 16 with a maximum score of 20) and that for non-school settings, older children exhibit greater understanding of self-regulation in problem solving

than younger children. There is some evidence of age-related trends on about half of the individual items, but there is not a completely consistent pattern across those items.

Finding at all ages relatively high levels of self-regulation understanding suggests that, at least for relatively constrained and simple daily issues associated with solving problems, young Korean children find it easy to recognize appropriate choices related to achieving their goals. The age trends for non-school settings suggest an improvement in metacognitive knowledge about self-regulation, which is consistent with prior research on children's metacognition.

It is interesting to find Korean children in later grades (3rd and 5th) exhibiting higher levels of understanding about self-regulation for non-school problems while younger children (kindergarten and first grade) exhibit slightly higher awareness of self-regulation for school-based problems. Such differences may be due to Korean parents' expectancies that their children to achieve in a wide variety of activities in addition to school, which may lead to older children having more experiences in planning and organizing problem-solving activities out of school. This finding may be understood in terms of the differential demands for goal-directed behavior associated with school and non-school situations, where non-school situations are more variable and do not contain as many expectations of living up to specific standards of performance. Thus, older children's greater awareness in non-school settings may be a stronger indicator of their more natural responses than those associated with schooling.

The trend for children in the first and third years of school to have higher self-regulation awareness is intriguing. One possible interpretation of the results is that there may be certain types of self-regulating activities that actually are more adaptive and supportive at certain ages and in certain situations, while the same activities may be perceived as being unnecessary or irrelevant to children at other ages. For example, the trend for children to select rehearsing as a preferable strategy for following mathematical problem-solving steps (see item 8 for school setting situations, "rehearsing and memorizing,") increases dramatically from kindergarten (.775) to first (.950) and third grade (1.00) and then drops more dramatically for the fifth grade (.700). Children in kindergarten have few mathematic problems to solve, so they may see little less need to memorize mathematics steps, while children in the fifth grade may have progressed in their mathematics problem solving to a point where they need this supportive activity less than they might at earlier grades.

The combination of situational expectations and of developmental increases in memory and problem solving could account for the inverted U trend. Such a difference in children's responding could actually be a sign of many older children's capabilities to select appropriate strategies for regulating their learning as opposed to persisting with general strategies that are not as necessary as in the past. In other words, some of the differences found in trends for children in different grades can be understood as differences that occur when children are given

opportunities to engage in meaningful problem-solving activity in or out of school settings and when they adapt their strategies to fit the situations.

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Table 1

Means and Standard Deviations on Self-Regulated Problem-Solving Awareness by Year in School

	Non-School Setting		School Setting		
Grade	M	SD	M	SD	n
K	7.45	2.01	7.60	2.01	40
1	7.88	1.20	8.10	1.41	40
3	8.38	0.98	7.78	1.70	40
5	8.30	1.27	7.33	1.64	40

Table 2

Means for Home and Community Interview Items by Grade

Grade	1	2	3	4	5	6	7	8	9	10
K	.950	.150	.800	.575	.825	.865	.950	.700	.900	.725
1	.900	.100	.775	.850	.925	.950	.975	.550	.925	.925
3	.950	.200	.975	.750	.950	.850	1.000	.750	1.000	.950
5	.925	.600	.975	.875	.775	.950	.975	.575	.775	.875

NOTE: 1 = Self-evaluation

2 = Organizing and transforming

3 = Goal-setting

4 = Planning

5 = Seeking information

6 = Self-monitoring

7 = Environmental structuring

8 = Rehearsing and memorizing

9 = Seeking peer assistance

10= Seeking teacher or adult guidance

Table 3

Means for School Interview Items by Grade

Grade	1	2	3	4	5	6	7	8	9	10
K	.975	.400	.800	.900	.975	.600	.675	.775	.725	.775
1	1.000	.375	1.000	1.000	1.000	.625	.725	.950	.625	.800
3	1.000	.275	.925	.850	.850	.775	.700	1.000	.500	.750
5	.925	.525	.825	.875	.875	.650	.750	.700	.575	.725

NOTE: 1 = Self-evaluation

2 = Organizing and transforming

3 = Goal-setting

4 = Planning

5 = Seeking information

6 = Self-monitoring

7 = Environmental structuring

8 = Rehearsing and memorizing

9 = Seeking peer assistance

10= Seeking teacher or adult guidance

Appendix A: Problem-Solving Interview Questions

Home and Community Settings

1. Self-evaluation

Cindy and Beth have been working together, making their new Halloween costumes for a party tonight. Beth feels that she is satisfied with her costume and is ready to wear it now. Cindy feels that before wearing the costume she wants to look at the costume to make sure that it fits well. Which would be better to do? Why?

2. Organizing and transforming

Danny wants to make breakfast-in-bed for his mother on her birthday. He finds that there are many different things that he needs to make breakfast. The cooking tools and ingredients are in different places in the kitchen. Would it be better for him to get the things he needs all at once. Or should he get them out only when he is ready to use them? Why?

3. Goal-setting

Molly wants to accomplish something during her summer break. Should she set a goal for herself or just do things as they happen? Why?

4. Planning

Patrick will take a trip with his family and needs to get ready. Should he plan what he is to take? Or should he wait for his parents to tell him what clothes and other things he should pack for the trip? Why?

5. Seeking information

Brian was given instructions for making a kite but he does not understand all of the instructions. Although he thinks he knows how to make a kite, he is not sure. Should he try to figure out the instructions first? Or should he go ahead and make the kite? Which is better for him to do? Why?

6. Self-monitoring

Peter was trying to fix his broken bicycle. Every time he fixed a part, he then stopped and looked at it carefully to see if he was doing it right. Is it better for him to do things this way or should he continue straight through on his bicycle? Why?

7. Environmental structuring

Scott is building a small house for his puppy. The tools and lumber to build the house are in a small, crowded shed where it is difficult to work. Should he concentrate on getting the dog house built right where it is or should he try to clear some more room to work? Why?

8. Rehearsing and memorizing

Melanie has been learning how to cook spaghetti but it is difficult to remember all of the steps in the right order. Should she try to memorize those steps or ask her mother which ones she should take next? Why?

9. Seeking peer assistance

Rebecca is trying to figure out how to find her lost kitten. She has looked all over the neighborhood and in the places where her kitten usually goes. Should she ask her friends to help her think of places to look for the kitten or to continue looking for it on her own? Why?

10. Seeking teacher or adult assistance

Tamara's father gave her a place in his garden to grow vegetables. She know what vegetables to grow but she is not sure how to prepare the ground correctly. Her father knows how to do it. Should she prepare the ground by herself or ask her father to help her? Why?

School Settings

1. Self-evaluation

Lewis has been working on an activity for class for the last week and he now thinks that it is ready to give it to the teacher. When he examines it, he begins to wonder if he did the activity correctly. Should he give it to the teacher first or review it one more time before giving it to the teacher? Why?

2. Organizing and transforming

Julia is collecting things for an environmental project for her class. Some of them are easy to find and others have to be found in different parts of school. Would it be better for her to make changes in her project so that it will be easier to collect all of the things? Or should she go ahead with the project as it is? Why?

3. Goal-setting

When starting a new school activity, Lisa always thinks carefully about the project and her goals in doing it. Her friend Melissa prefers to begin quickly because she enjoys the excitement of the new activity. Which is a better way to begin the activity? Why?

4. Planning

Cameron is going to tell the class about growing vegetables. Since she has a lot of experience in growing vegetables, should she go to class and tell what she does, or should she first plan her presentation? Which would be better for her to do? Why?

5. Seeking information

Molly's teacher asks her to set up the science experiment. Molly knows what goes in the experiment, but she is not sure how to arrange it well. There is a book on the shelf with a picture of how to set up a science experiment. Should she look at information in the book? Or should she set up the experiment as best she knows how? Why?

6. Self-monitoring

Tim says that it helps him to stop sometimes in the middle of a math problem that he is trying to solve and consider other ways he might solve it. His friend says that this is wasting time and that it is better to keep on working to the end. Which is better to do? Why?

7. Environmental structuring

Carrie wants to finish her math problems correctly and on time, but she is sitting in a corner of the room that is very noisy, making it difficult for her to concentrate on the problems. Should she try to concentrate harder and not let the noise bother her or should she move to another place in the room? Why?

8. Rehearsing and memorizing

Jim wants to be able to get all of the math problems correct in class. However, sometimes it is difficult to remember all of the steps it takes to do certain math problems. Would it be better to practice some of those steps or to keep trying to get them right when he solving problems? Why?

9. Seeking assistance

Sam is trying to complete his assignments for math class but he is not sure the best way to go about it. Should he try to think of a good way o his own or ask his friends for some suggestions about ways to do the assignment? Why?

10. Seeking teacher or adult assistance

While trying to solve some math problems for class, Nick realized that he did not know the right ways to do it. He decided that he could either solve them the best way he knows how, or he could ask the teacher to show him how. Which would be better to do? Why?

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