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METACOGNITION AS A FUNCTION OF GRADE LEVEL AND GENDER AMONG ADOLESCENTS

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Abstract

The study investigated the influence of grade, gender, and their interaction on metacognition of adolescent students. Data were collected from 200 adolescent students. Metacognitive Questionnaire developed by Swanson (1990) was used to assess the metacognition of adolescent students. The data were analyzed using 3 x 2 ANOVA. Metacognition of grade X students was found to be significantly better than grade VIII and IX students, while no significant differences exist at grade VIII and IX levels. And, metacognition was not found be related with gender.

1. Introduction

Educational researchers and psychologists have shown considerable interest in metacognition (Flavell, 1979; Brown, Bradford, Ferrara, & Campione, 1983; Jacob, & Paris, 1987; Swanson, 1990; Zabel, 2005; Roebers, Schmid, & Roderer, 2009). Metacognition has been generally conceived as thinking about thinking or cognition about cognition (Flavell, 1979; Metcalfe, & Shimamura, 1994; Lin, 2001; Cardelle-Elawar, Irwin and Lizarraga, 2007; Dawson, 2008; and Lai, 2011). Swanson (1990) after analyzing number of definitions defined metacognition as the knowledge and control one has over one's thinking and learning activities.

Educational psychologists have long promoted the importance of metacognition for regulating and supporting student learning (Lai, 2011). Studies have shown the importance of metacognition in effective performance on problem solving and mathematical tasks (Hart, 1965; Flavell, 1979; White, & Frederiksen, 1998; Masui, & Corte, 2005; and Roebers, Schmid, & Roderer, 2009). Researchers have also recommended some specific instructional approaches for enhancing metacognition (Cross and Paris, 1988; Schraw, 1998; Hennessey, 1999; Kramarski, & Mevarech, 2003; Kuhn, & Dean, 2004; Martinez, 2006; McLeod, 1997; Paris, & Winograd, 1990; Schraw, & Moshman, 1995; and Schraw, Crippen, & Hartley, 2006). But, for having proper understanding and development of metacognition, the correlates of the metacognition are needed to be studied. Metacognition is related with

number of cognitive abilities, like, intelligence, memory, reading, mathematics, metamemory, critical thinking, and motivation (Ajchenbaum, 1983; Borkowski, 1985; Sternberg, 1984, 1986a, 1986b Borkowski, Carr, & Pressley, 1987; Swanson, 1990; Allon, Gutkin, & Bruning, 1994; and Lai, 2011). Several researchers have concluded that metacognitive abilities appear to improve with age (Cross, & Paris, 1988; Schraw, & Moshman, 1995; Hennessey, 1999; Kuhn, & Dean, 2004; Schneider, & Lockl, 2002; and Schneider, 2008). However, Sperling, Howard, Miller, and Murphy (2002) and Mok, Fan and Pang (2007) found that younger students have better metacognition scores than older students. However, studies have not been found in which relation between grade level and metacognition is explored. The present study was an attempt to explore the relationship between metacognition and grade level. Moreover, previous studies (Otero, Campanario, & Hopkins, 1992; Sperling, Howard, Miller, & Murphy, 2002; Kolić-Vehovec, & Bajšanski, 2006; and Topçu, & Yilmaz-Tüzün, 2009) are also inconclusive about the gender differences existing in metacognitive knowledge of students. Keeping this in mind it was thought to study the influence of grade, gender and their interaction on metacognition of adolescent students. The specific research questions addressed were as follows:

a. Whether metacognition is correlated with grade?
b. Is there any difference in the metacognition of males and females?
c. Whether there is any influence of interaction between grade and gender on metacognition of adolescent students?

2. Method

Sample

Two hundred participants were drawn from five government and private secondary schools in Shaheed Bhagat Singh Nagar of Punjab State. Participants varied by gender (female, 53%), and grade (VII, 30%; IX, 35%, and X 35%). The age of the students ranged from 13-17 years.

Measure

Metacognition of the students was assessed with the help of Metacognitive Questionnaire (MQ) developed by Swanson (1990). There were 17 items. As in the try out stage students were not at ease with the English version of MQ, so the MQ was translated into the regional language, namely, Punjabi. The independent interrater reliability for each item of MQ was above 90% and the measure of internal consistency (cronbach alpha) was 0.87.

Procedure

After getting institutional approval the participants were given proper instructions for giving a response on MQ in each school. The responses were scored as per the scoring principle.

3. Results and Discussion

The 3 × 2 (grade × gender) ANOVA conducted on the metacognition scores indicated significant main effects for grade, $F(2, 194) = 6.88$, $p < 0.01$. No significant effect for gender and interaction was found. The mean scores for factors are presented in Table 1.

Table 1 Mean scores of Metacognition

Grade	Gender	N	M
VIII	Male	27	39.30
	Female	33	37.64
	Total	60	38.33
IX	Male	30	37.03
	Female	40	37.03
	Total	70	37.03
X	Male	37	45.38
	Female	33	40.24
	Total	70	42.96
	Male	94	40.97
	Female	106	38.33
	Total	200	39.51

In order to find the differences among grade levels with respect to metacognition, Scheffé's post hoc analysis was conducted. The post hoc analysis suggested significant differences among grade X and VII; and grade X and IX. But, no significant mean difference was found between grade VIII and IX. Further, it can be seen from Table 1 that the mean score of metacognition of grade X students (42.96) was significantly higher than mean scores of metacognition of grade VIII (38.33) and grade IX (37.03) students respectively. So, it can be said that metacognition of grade X students was found to be significantly better than grade VIII and IX students respectively, while no significant differences exist at grade VIII and IX levels. This suggests the role of age in the development of metacognition. The finding is in line with the results reported by Cross, & Paris, 1988; Schraw, & Moshman, 1995; Hennessey, 1999; Kuhn, & Dean, 2004; Schneider, & Lockl, 2002; and Schneider, 2008. Moreover, in Indian scenario, the students in grade X have to appear in the board examination as well as have to take decision(s) about their future course of life vis-à-vis studies/job. They need to make concerted efforts. This may requires some serious thinking. It may have encouraged them to become aware and control their thinking. And, it may be the reason of better metacognition of grade X students as compared to grade VII and IX. However, the authors believe that some qualitative studies are needed to find the exact cause of difference in metacognition of students with respect to grade.

The second finding of the study was that gender is not related with metacognition of adolescent students. The finding is consistent with the results reported by Otero, Campanario,

& Hopkins, 1992; Sperling, Howard, Miller, & Murphy, 2002, but inconsistent with the findings of Kolić-Vehovec, & Bajšanski, 2006; Topçu, & Yilmaz-Tüzün, 2009. These days both males and females get equal opportunities at home as well as school for their development. There are few cases of gender discrimination in the middle and upper class strata. This might be the reason for the present finding.

Lastly, metacognition was found to be independent of interaction between grade and gender. This is a novel contribution to the literature on metacognition as previously no study was done in this context.

References

Ajchenbaum, M. H. (1983). The Relation between Metacognition and Intelligence in Adolescents. ETD collection for university of Nebraska – Lincoln. Retrieved from http://digitalcommons.unl.edu/dissertations/AAI8404819

Allon, M., Gutkin, T. B., & Bruning, R. (1994). The Relationship between Metacognition and Intelligence in Normal Adolescents: Some Tentative but Surprising Findings. Psychology in the Schools, 31(2), 93-97.

Borkowski, J., Carr, M., & Pressely, M. (1987). "Spontaneous" strategy use: Perspectives from Metacognitive Theory. Intelligence, 11, 61-75.

Borkowski, J. G. (1985). Sign of intelligence: strategy generalization and metacognition. In S. R. Yuseen (Ed.), The Growth of Reflection. New York: Academic press.

Brown, A. L., Bransford, J. D., Ferrara, R. A., & Campione, J. C. (1983). Learning, remembering, and understanding. In J. H. Flavell, & E. M. Markman (Eds.), Carmichael's manual of child psychology (Vol. 1, pp. 77-166). New York: Wiley.

Cardelle-Elawar, M., Irwin, L., & Lizarraga, M. L. S. (2007). A cross cultural analysis of motivational factors that influence teacher identity. Electronic Journal of Research in Educational Psychology, 5(3), 565-592.

Cross, D. R. & Paris, S. G. (1988). Developmental and instructional analyses of children's metacognition and reading comprehension. Journal of Educational Psychology, 80(2), 131-142.

Dawson, T. L. (2008). Metacognition and learning in adulthood. Developmental Testing Service: Northampton. Retrieved from https://www.devtestservice.org/PDF/Metacognition.pdf

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. American Psychologist, 34(10), 906-911.

Hacker, D. J. (1998). Metacognition in educational theory and practice. New Jersey: Lawrence Erlabaum Associates.

Hart, J.T. (1965). Memory and the feeling-of-knowing experience. Journal of Educational Psychology, 56(4), 208-216. doi: 10.1037/h0022263

Hennessey, M. G. (1999). Probing the dimensions of metacognition: Implications for conceptual change teaching-learning. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston, MA.

Jacobs, J. E., & Paris, S. G. (1987). Children's metacognition about reading: Issues in definition, measurement, and instruction. Educational Psychologist 22, 255–278.

Kolić-Vehovec, S., & Bajšanski, I. (2006). Age and gender differences in some aspects of Metacognition and reading comprehension. Društvena istraživanja: Journal for General Social Issues, 15(6-86), 1005-1027. Retrieved from http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=28656

Kramarski, B., & Mevarech, Z. R. (2003). Enhancing mathematical reasoning in the classroom: The effects of cooperative learning and metacognitive training. American Educational Research Journal, 40(1), 281-310.

Kuhn, D., & Dean, D. (2004). A bridge between cognitive psychology and educational practice. Theory into Practice, 43(4), 268-273.

Lai, E. R. (2011). Metacognition: A Literature Review. Pearson Assessment & Information. Retrieved from http://www.pearsonassessments.com/hai/images/tmrs/Metacognition_Literature_Review_Final.pdf

Lin, X. (2001). Designing metacognitive activities. Educational Technology, Research, & Development, 49, 23-40.

Martinez, M. E. (2006). What is metacognition? Phi Delta Kappan, 696-699.

Masui, C., & De, C. E. (2005). Learning to reflect, to attribute constructively as basic components of self- regulated learning. British Journal of Educational Psychology, 75(3), 351-372.

McLeod, L. (1997). Young children and metacognition: Do we know what they know they know? And if so, what do we do about it? Australian Journal of Early Childhood, 22(2), 6-11.

Metcalfe, J., & Shimamura, A. (1994). Metacognition: Knowing about knowing. Cambridge: The MIT Press.

Mok, Y. F., Fan, R. & Sun-Keung, N. (2007). Development Patterns of School Students' Motivational and Cognitive- Metacognitive Competencies. Educational Studies, 33(1), 81–98.

Otero, J., Campanario, J. M., & Hopkins, K. D. (1992). The Relationship between Academic Achievement and Metacognitive Comprehension Monitoring Ability of Spanish Secondary School Students. Educational and Psychological Measurement, 52, 419-430.

Paris, S. G., & Winograd, P. (1990). Promoting metacognition and motivation of exceptional children. Remedial and Special Education, 11(6), 7-15.

Roebers, C. M., Schmid, C., & Roderer, T. (2009). Metacognitive monitoring and control processes involved in primary school children's test performance. British Journal of Educational Psychology, 79(4), 749-767.

Schneider, W., & Lockl, K. (2002). The development of metacognitive knowledge in children and adolescents. In Perfect, T., & Schwartz, B. (Eds.), Applied metacognition. Cambridge, UK: Cambridge University Press.

Schneider, W. (2008). The development of metacognitive knowledge in children and adolescents: Major trends and implications for education. Mind, Brain, and Education, 2(3), 114-121.

Schraw, G., & Moshman, D. (1995). Metacognitive theories. Educational Psychology Review, 7(4), 351-371.

Schraw, G. (1998). Promoting general metacognitive awareness. Instructional Science, 26(1-2), 113-125.

Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science education: Metacognition as part of a broader perspective on learning. Research in Science Education, 36, 111-139.

Sperling, R. A., Howard, B. C., Miller, L. A., & Murphy, C. (2002). Measures of children's knowledge and regulation of cognition. Contemporary Educational Psychology, 27, 51-79.

Sternberg, R. J. (1984). What should intelligence tests test? Implications for a triarchic theory of intelligence for intelligence testing. Educational Researcher, 13 (1), 5-15.

Sternberg, R. J. (1986a). Inside intelligence. American Scientist, 74, 137-143.

Sternberg, R. J. (1986b). Intelligence applied. New York: Harcourt Brace Jovanovich,

Swanson, H. L. (1990). Influence of metacognitive knowledge and aptitude on problem solving. Journal of Educational Psychology, 82(2), 306–314.

Topçu, M. S., & Yilmaz-Tüzün, Ö. (2009). Elementry Students' Metacognition and Epistemological Beliefs Considering Science Achievement, Gender and Socioeconomic Status. Elementary Education Online, 8(3), 676-693. Retrieved from http://ilkogretim-online.org.tr/vol8say3/v8s3m5.pdf

White, B. Y., & Frederiksen, J. R. (1998). Inquiry, Modeling and Metacognition: Making Science Accessible to all Students. Cognition and Instruction, 16(1), 3-118.

Zabel, S.A. (2005). Metacognitive Strategies in a Web-Enhanced Environment: The Effects on Achievement in Problem-Solving for Engineering Undergraduates (Doctoral dissertation, University of South Florida). Retrieved from http://scholarcommons.usf.edu/etd/927