Development of Metacognitive Knowledge of Reading Strategies and Attitudes Toward Reading in Early Adolescence: The Effect on Reading Comprehension

Kolić-Vehovec, Svjetlana; Rončević Zubković, Barbara; Pahljina-Reinić, Rosanda

Psychological Topics 23 (2014), 1, 77-98

Original scientific paper – UDC – 159.946.4.072-053.6

Development of Metacognitive Knowledge of Reading Strategies and Attitudes Toward Reading in Early Adolescence: The Effect on Reading Comprehension

Svjetlana Kolić-Vehovec, Barbara Rončević Zubković, Rosanda Pahljina-Reinić

Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, Croatia

Abstract

The aim of the present study was to examine developmental changes in metacognitive knowledge of reading strategies and attitudes toward reading during early adolescence (from 10 to 14 years), taking gender into account. A secondary aim was also to test a model of the relationships among gender, attitudes toward reading, metacognitive knowledge of reading strategies, and reading comprehension. The sample for this longitudinal study consisted of 175 students. The first data collection took place when the students were enrolled in grade 4 (10 years old), and the follow-up measurements were conducted in grades 6 and 8. At each measurement point, measures of metacognitive knowledge of reading strategies and attitudes toward reading were applied in addition to text comprehension tasks. The obtained results indicated that metacognitive knowledge of reading strategies continuously improved during early adolescence, while attitudes toward recreational reading showed continuous decline from the fourth to the eighth grade, and attitudes toward academic reading dropped significantly between sixth and eighth grades. Girls consistently demonstrated better metacognitive knowledge, as well as more positive attitudes toward both recreational and academic reading when compared to boys. The model that included only attitudes toward recreational reading fitted the data better than the model comprising both academic and recreational reading attitudes. The findings of the path analysis indicated that gender had an effect on recreational reading attitudes that consistently predicted text comprehension directly and indirectly through metacognitive knowledge during early adolescence. The model fitted the data better as students got older.

Keywords: metacognitive knowledge, reading strategies, attitudes toward reading, text comprehension

✉ Svjetlana Kolić-Vehovec, Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, 51000 Rijeka, Sveučilišna avenija 4, Croatia. E-mail: *svjetlana.kolic.vehovec@ffri.uniri.hr*

Introduction

Reading literacy is believed to be one of the key competencies for full participation in modern societies. In longitudinal studies in Australia, Canada and Switzerland, performance in reading on the PISA assessment at age 15 was a strong predictor of future educational attainment and success in the labour market (OECD, 2010a). However, international surveys such as PIRLS and PISA continuously show that most children do not reach the highest levels of text comprehension (Mullis, Martin, Foy, & Drucker, 2012; OECD, 2010a). These levels require *constructively responsive reading* (Pressley & Afflerbach, 1995), which involves reading with a purpose and active construction of meaning from the text. This implies the reader's orchestration of a number of skills and strategies during reading. Metacognitive knowledge of the reading strategies is a prerequisite for successful monitoring and control of reading with the purpose of good text comprehension. The student needs to know reading strategies, and he/she must be willing to use them appropriately. The knowledge and use of various (meta)cognitive strategies help students to effectively learn from texts (Flavell, Miller, & Miller, 1993). Metacognitive knowledge of strategies contributes to an awareness of the ways to attain a learning goal. The conscious use of these strategies during reading helps the reader to recognise the relevant information in a text and to activate relevant background knowledge, as well as to monitor and regulate learning strategies in order to enhance comprehension.

Flavell (1979) recognised *strategy* knowledge, which is knowledge about the types of strategies likely to be most useful in the cognitive task. It represents an aspect of metacognitive knowledge, along with *person* knowledge and *task* knowledge. The same components are recognised in reading (Baker & Brown, 1984; Paris, Lipson, & Wixson, 1983). Metacognitive knowledge of reading strategies refers to the declarative, procedural and conditional knowledge of strategies: i.e., what reading strategies are, how they should be used, and when they can be used (Pressley, 2002). Reading strategies include a broad variety of specific behaviours, which can be classified based on their goals (e.g., to activate or use prior knowledge, to infer information not explicitly stated in text, to identify the main idea of a text, to process a text additionally after reading it; see Pressley, 1995) and based on the phases of reading (strategies used before reading, during reading and after reading; see Paris, Wasik, & Turner, 1991). There are many strategies that can be applied during reading, but some strategies have been validated in several research studies (Pressley, 1995), such as text summarisation, question generation and answer explanation, student-generated elaborations, and organising strategies. These strategies promote active processing of text information and comprehension monitoring. Willson and Rupley (1997) found that strategy knowledge of how to read text and what to read in text begins to dominate the prediction of reading comprehension for both narrative and expository text during secondary school.

Development of Metacognitive Knowledge of Reading

Kuhn (2000) characterised the development of metacognition as the very gradual progress of acquiring better cognitive strategies to replace inefficient ones. The literature on metacognitive development in reading suggests that metacognitive knowledge about reading develops first, and control and regulation of reading develop later (Paris et al., 1991). Children learn a lot about reading before they start schooling, through their exposure to print and through reading with their parents. Reading awareness continues to develop past the age of seven. Myers and Paris (1978) have examined the metacognitive knowledge of children between 8 and 12 years old and found that older children knew more about text structure, various reading goals and reading strategies than younger children. Pazzaglia, De Beni, and Caccio (1999) reported that metacognitive knowledge of strategies continuously improved from the age of eight to the age of twelve. During secondary education, metacognitive knowledge of the nature of reading becomes more refined, but even 12-year-olds have neither a well-defined knowledge about reading nor effective strategies that enhance reading comprehension.

Kolić-Vehovec and Bajšanski (2003) explored the relationships between metacognitive knowledge of reading and reading comprehension on a sample of third-, fifth- and eighth-graders (9, 11, and 14 years of age, respectively). Their results showed a significant grade effect on metacognitive knowledge at the upper elementary school level, after the age of 10. In a recent study (Kolić-Vehovec, Pečjak, Ajdišek, & Rončević, 2008; Kolić-Vehovec, Pečjak, & Rončević, 2009; Pečjak, Kolić-Vehovec, Rončević, & Ajdišek, 2009), the age differences in metacognitive knowledge of reading strategies and reading motivation were examined in samples of fourth and eighth grade students from Croatia and Slovenia. In both samples, eighth graders showed greater metacognitive knowledge than fourth graders. Moreover, metacognitive knowledge of reading strategy use was consistently related to reading comprehension scores in both age groups and in both samples. Metacognitive knowledge of reading strategies continues to develop in high school, as O'Reilly and McNamara (2007) found significant effects of grade level on metacognitive reading strategy knowledge in high-school samples (ninth grade to 12th grade). Although age differences in metacognitive knowledge related to reading are well documented, most of those findings were obtained in cross-sectional studies, and there is a need for further confirmation based on longitudinal data.

Attitudes Toward Reading

Motivation and affect are relevant for activating metacognitive knowledge of reading strategies with the aim of better comprehension. Although motivation for reading has been investigated widely, the affect related to reading is less explored. Fox and Alexander (2009) recommended greater consideration of the role of

affective processes in reading. Affect can be in the form of attitudes and emotions (Efklides, 2011). Attitudes represent how students feel about a task, but they also have a cognitive component (i.e., beliefs) and are reflected in behavioural dispositions toward the task. Alexander and Filler (1976) defined reading attitude as "a system of feelings related to reading which causes the learner to approach or avoid a reading situation" (p. 1). McKenna and Kear (1990) differentiate attitude toward recreational reading and attitude toward school-related, academic reading. It was documented that recreational reading has been related to positive reading attitudes (Guthrie & Alvermann, 1999), which are linked to better achievement in reading (McKenna & Kear, 1990). Reading amount and reading achievement are thought to be reciprocally related – as reading amount increases, reading achievement increases, which in turn increases reading amount (Cunningham & Stanovich, 1998). In PISA study (OECD, 2002), which explored the reading habits of 15-year-olds in 32 countries, it was found that those students who were high achievers in reading literacy were much more likely than low achievers to read for enjoyment. Similar results were obtained ten years later, in a 2009 PISA study (OECD, 2010b)

There is some evidence that reading for pleasure at home and reading for school are predicted by different variables. For example, Cox and Guthrie (2001) found that motivation predicted reading for enjoyment over and above other variables, such as past reading achievement and cognitive strategy use. By contrast, motivation did not predict amount of school reading, which was predicted only by the use of cognitive strategies. The school context, with its emphasis on assignments and assessments, places particular demands on cognitive competence and strategy use. With reading for enjoyment, however, individual interests prevail, and reading amount is determined most strongly by motivation.

McKenna (1994) argues that an individual's attitude toward reading will develop over time principally as the result of three factors: beliefs about the desirability of reading outcomes, beliefs about the expectation of others, and specific reading experiences. The proposed model predicts that as children mature, more leisure options are available to them in addition to reading. Therefore, students' attitudes toward reading will become less positive because they may find other activities more appealing. Research has repeatedly shown that pupils' attitudes towards reading get worse with age. McKenna, Kear, and Ellsworth (1995), on a large national stratified U.S sample of students from the first to the sixth grade, found that recreational and academic reading attitudes become gradually, but steadily, more negative throughout the elementary school years, beginning at a relatively positive point and ending at relative indifference.

A large longitudinal UK study (Sainsbury & Schagen, 2004) also indicated that fourth and sixth graders' reading attitudes had declined significantly from 1998 to 2003, but the results were not replicated in the period from 2003 to 2007, as children's enjoyment of reading stopped declining sharply and remained relatively

stable in that period (Sainsbury & Clarkson, 2008). The results from the 2009 PISA study (OECD, 2010b) showed that a large proportion of 15-year-old students read only to get information they need (46% reporting agree or strongly agree) or only if they had to (41% reporting agree or strongly agree), and one-quarter of the students reported that reading was a waste of time. Only one-third of the students considered reading to be one of their favourite hobbies.

Gender Differences

Gender differences in text comprehension have been consistently found in most studies. The meta-analysis of the results obtained in large-scale studies between 1975 and 2002 (Lietz, 2006) showed that girls, on average, score 1.19 standard deviations higher than boys in text comprehension. The results from the PISA study (OECD, 2002, 2010a, 2014) also consistently point to better reading comprehension in girls than boys. Research results show that some of these differences might stem from neuropsychological and other biological processes (Sauver, Katusic, Barbaresi, Colligan, & Jacobsen, 2001); however, this is certainly not the major cause of the gender differences (Wallentin, 2009).

Although the gender differences in reading comprehension have been well documented, gender differences in metacognition in reading are not as evident. In a study by Kolić-Vehovec and Bajšanski (2003), no significant gender differences were found in metacognitive knowledge of reading in third, fifth and eighth graders. However, in a recent study conducted on a sample of fourth and eighth graders (Kolić-Vehovec et al., 2008, 2009; Pečjak et al., 2009), the girls demonstrated greater metacognitive knowledge than the boys. Van Kraayenoord, Beinicke, Schlagmüller, and Schneider (2012) did not find significant gender differences in third and fourth graders' metacognitive knowledge of reading strategies, although girls outperformed boys on reading comprehension measures. However, O'Reilly and McNamara (2007) found that high-school girls scored significantly higher than boys on measures of both reading strategy knowledge and reading skill, although the effect sizes were small. Gender differences in awareness of effective reading strategies were also observed in the PISA study (OECD, 2010b).

The results are much more straightforward when gender differences in attitudes toward reading and reading enjoyment are considered. The results of the PISA study (OECD, 2010b) indicated that girls were much more likely than boys to read for enjoyment. Chiu and McBride-Chang (2006) found that reading enjoyment is the most important variable that differentiates between boys and girls: it mediated 42% of the gender effect in the PISA study. PISA 2009 results (2010b) showed that "almost 70% of the difference in reading performance between boys and girls is the indirect result of disparities in how much boys and girls reported

enjoying reading and knowing about effective strategies to summarise information." (p. 88).

McKenna et al. (1995) found that, at all grade levels, girls possessed more favourable attitudes than boys toward both recreational and academic reading. In the case of recreational attitude, this gap widened with age, while in the case of academic attitude, it remained relatively constant. Kush and Watkins (1996) also found that girls consistently showed more positive attitudes toward recreational reading than boys at different grade levels in elementary and middle school. McKenna (1994) argues that the expectations of significant others play a formative role in the development of attitudes. If a child's environment encourages, models, and reinforces reading, more positive attitudes should result. Gender-specific beliefs concerning what others expect about reading may explain consistent findings that girls tend to possess more positive attitudes than boys. OECD (2010b) also stresses the importance of socialisation issues on gender differences in reading attitudes because reading is considered to be a feminised activity (Clark & Burke, 2012).

As Baker (2005) has noted, students in upper elementary education are cognitively prepared for metacognitive improvement, but their intrinsic motivation for learning decreases at this time. It is possible that boys are not motivated enough to use reading strategies, while girls persist with reading (and probably also with the use of reading strategies) and show good reading performance even if the text is not interesting (Ainley, Hillman, & Hidi, 2002; Oakhill & Petrides, 2007).

Relationships Between Metacognition, Attitudes, and Reading Comprehension

The interplay of metacognition, motivation and affect has been described in several models of self-regulated learning (SRL). Most of the proposed SRL models could also be applied to the self-regulation of reading. Initial models of SRL (Bandura, 1986; Zimmerman, 1986) emphasised cognitive and metacognitive processes in learning. More recently, the role of motivational and affective processes was recognised (Boekaerts, 1996; Efklides, 2011; Pintrich, 2000; Winne, 2004). However, research on the relationship between metacognition and affect is still scarce. Efklides, in her Metacognitive and Affective Model of Self-regulated Learning (MASRL, 2011), explained how metacognition, motivation and affect interacted in SRL on a Person level, as well as on the Task-specific level, and on the Person x Task level, emphasising the mechanisms that connect top-down and bottom-up self-regulation. For the present research, top-down processes guided by the person metacognitive and affective characteristics are of interest. The person builds a framework of action through goal-setting and planning in the forethought phase of SRL, using metacognitive knowledge of task and strategies, and reflections on the past experiences, feelings and thoughts during task processing. It is also proposed that affect in the form of attitudes should be related to

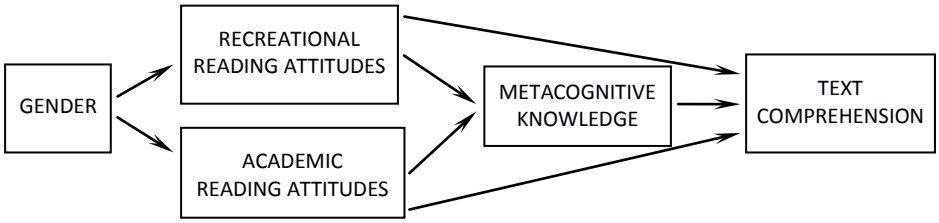
metacognitive knowledge of self, task and strategies because attitudes have cognitive and behavioural components in addition to affective components.

One study that has explored the relationship of both metacognition and motivation with reading comprehension while considering developmental trends and gender differences was a study by Roeschl-Heils, Schneider, and van Kraayenoord (2003). For the first point of measurement (van Kraayenoord & Schneider, 1999), conducted in grades 3 and 4, the results revealed significant correlations between reading motivation, metacognitive variables, and reading comprehension. Four years later, similar results were obtained (Roeschl-Heils et al., 2003). Most of the relationships between the assessed variables were found to be stable over this period. In grades 3 and 4, there were no significant gender differences in any of the variables examined, and this was also true for grades 7 and 8, although there was a tendency for girls to outperform boys on most reading and metacognitive measures. However, the researchers did not apply the same measures at the two assessment points, so developmental changes could not be examined.

Aim and Hypotheses

The aim of the present study was to examine developmental changes in metacognitive knowledge of reading strategies and in attitudes toward reading during early adolescence (from 10 to 14 years), taking gender into account. The variables were assessed on three measurement points, in grades 4, 6, and 8. Based on previous findings (Kolić-Vehovec et al., 2008, 2009; Pazzaglia et al., 1999), it was expected that metacognitive knowledge would grow during that developmental period. It was also expected that attitudes toward reading would become less positive during the same period, especially boys' attitudes toward recreational reading, as was previously observed (McKenna & al., 1995). This study also aimed to test the proposed model of the relationships among gender, metacognitive knowledge of reading strategies, attitudes toward reading, and reading comprehension. Based on the MASRL model (Efklides, 2011), it was hypothesised that attitudes toward reading directly, and indirectly through metacognitive knowledge, predict reading comprehension (see Figure 1). We also postulated that the effect of gender on reading comprehension would be mediated by reading attitudes and metacognitive knowledge. In Croatia, where gender disparities in the PISA reading assessment (2010b) were above the OECD average, enjoyment of reading and awareness of effective learning strategies explained approximately half of the overall gender differences in reading performance. It was expected that the model would fit the data better as students got older.

Figure 1. *The Proposed Model of the Relationships Among Attitudes Toward Reading, Metacognitive Knowledge, and Reading Comprehension*



Method

Participants

The sample for this longitudinal study consisted of 175 Croatian-speaking students from three elementary schools in Rijeka, divided over nine classes. The average age of the students, measured at the time of the first data collection, in grade 4, was 10.6 years. The gender distribution of the sample was 44% boys and 56% girls. Due to missing values, we could only use 66.86% of the original sample for data analysis. Some students were not present across all three measurement time points, and some students did not give valid answers. The gender distribution remained almost the same as in the original sample (44.4% boys and 55.6% girls).

Procedure

This study was a part of a larger longitudinal investigation of a broader set of cognitive, metacognitive, motivational and affective aspects of reading comprehension in elementary students conducted over three waves. The first data collection took place in the spring term of 2007, when the students were enrolled in grade 4. The two follow-up measurements were performed in the spring terms of 2009 and 2011, when the students were in grades 6 and 8, respectively. At each wave, the questionnaires and tasks were group-administered in the students' respective classrooms and supervised by a research assistant. The first data collection (grade 4) was performed during 135-min class sessions at two occasions about two weeks apart. The follow-up measurements in grade 6 and 8 were performed during one 90-min class session each.

For the purposes of this analysis, metacognitive knowledge and attitudes toward reading were assessed in each of the three waves. In addition, across all measurement time points, students read narrative and expository text and completed the corresponding text comprehension tasks. The order of the narrative

and expository text reading was varied. Within each class, half the students participated first in the narrative text reading and narrative text comprehension task, and second in the expository text reading and expository text comprehension task. The other half took the test in the reverse order. The students were allowed to look back at the text passages while answering the comprehension questions.

Instruments

For the purpose of this study a 14-item measure of *Metacognitive knowledge of reading strategies* was designed. The items were designed based on the questionnaires developed by Miholic (1994) and by Schmitt (1990). The designed measure was aimed to have a shorter questionnaire format given the age of the participants and the large range of other self-report measures and tasks applied in this study. At the same time, it was designed to include items addressing various aspects of the student's metacognitive knowledge about strategic reading processes.

In particular, the items assessed the student's knowledge about the strategies they could use before, during, and after reading a narrative text as well as knowledge about the strategies used before, during, and after reading an expository text. Furthermore, the items also assessed the student's knowledge about purpose setting, rereading and overcoming problems with word and sentence comprehension. Students were asked to choose one answer among four possible response options that best described the most appropriate strategic reading process (e.g., "When you don't understand the meaning of a sentence as a whole, it's a good idea to: (a) continue with further reading, (b) read aloud every word again, (c) think about the content of the entire paragraph, (d) stop reading until someone explains the meaning of the sentence to you."). The total score was calculated as a composite of correct answers on each item and could range from 0 to 14.

The 20-item *Elementary Reading Attitude Survey* (ERAS; McKenna & Kear, 1990) was adapted and administered. Students estimated how they feel during reading, using a 4-point Likert scale ranging from 1 (*very bad*) to 4 (*very good*). In the first wave (grade 4), a pictorial response format (four black-line, camera-ready poses of the comic strip character Garfield, ranging from very happy to very upset) was used because of its natural appeal for children and because of its comprehensibility by the younger students.

The principal factor analysis with oblimin rotation yielded the two-factor solution. The first factor included 10 items and referred to the attitude toward recreational reading (e.g., "How do you feel about reading for fun at home?"). Cronbach's alpha coefficients were .85 at fourth grade, .89 at sixth grade and .89 at eighth grade. The second factor contained 10 items reflecting students' attitudes toward academic reading (e.g., "How do you feel about reading in school?"). Cronbach's alpha coefficients were .87 at fourth grade, .89 at sixth grade and .89 at

eighth grade. The total scores could range from 10 to 40 for each of the two subscales.

Text comprehension was examined using one narrative and one expository text, representing two broad types of texts: literary texts read for literary experience or enjoyment, and informative texts used to acquire and use information. Each text was followed by seven multiple-choice items and by six short-answer constructed-response questions.

In the first wave (grade 4), two texts from the IEA Progress in International Reading Literacy Study (PIRLS, 2001) were used (Mullis, Martin, Gonzales, & Kennedy, 2003). The narrative text contained 406 words and the expository text 441 words. For the purpose of the sixth-grade assessment, age-appropriate narrative (449 words) and expository (532 words) texts were used, and corresponding comprehension questions were designed patterned on the PIRLS 2001 assessment framework. In the third wave (grade 8), the narrative (536 words) and expository (625 words) texts from the IEA's Reading Literacy Study 1991 were used (Elley, 1992).

For all texts used in the present study, the questions were designed to capture different aspects of reading comprehension, mostly in line with the comprehension processes used for item development in PIRLS 2001, including the retrieval of the explicitly stated information, making straightforward inferences, interpreting and integrating ideas and information and evaluating content. The multiple-choice items provided students with four possible answers, one of which was correct. Each multiple-choice item was worth one point. Constructed-response items could yield one, two, or three points. They were used to allow students to explain their interpretations and evaluations of the text, to show their reasoning and to find the textual evidence that supported these views and reasons. The total score was calculated as a composite of scores received on each multiple-choice and constructed-response item and could range from 0 to 18.

Results

Descriptive statistics and intercorrelations of assessed variables at the three measurement points are presented in Table 1. The results of measures assessing the same constructs were significantly related throughout the three assessment points (with the exception of academic reading attitudes), and relationships are stronger between sixth and eight grades. Although the intercorrelations between recreational and academic reading attitudes were high and positive at all three points of measurement, the strength of the relationship became less strong during students' development. Attitudes toward recreational and academic reading, metacognitive knowledge and text comprehension had positive intercorrelations in sixth and eighth grades. In fourth grade, metacognitive knowledge was not related to

attitudes toward reading. Metacognitive knowledge and text comprehension in fourth grade had moderate positive correlations with recreational reading attitudes, metacognitive knowledge, and text comprehension in the sixth and eighth grades.

Table 1. *Descriptive Statistics and Intercorrelations of Attitudes Toward Reading, Metacognitive Knowledge and Text Comprehension in Fourth, Sixth, and Eighth Grades*

		1	2	3	4	5	6	7	8	9	10	11	12
Fourth Grade	1 Recreational reading attitude	-	.77**	.12	.24**	.46**	.07	.09	.06	.53**	.39**	.27**	.21*
	2 Academic reading attitude		-	.03	.12	.34**	.10	.05	-.03	.41**	.29**	.13	.15
	3 Metacognitive knowledge			-	.34**	.24**	.01	.29**	.18*	.20*	.07	.24**	.23**
	4 Text comprehension				-	.19*	.03	.41**	.53**	.28**	-.01	.34**	.40**
Sixth Grade	5 Recreational reading attitude					-	.66**	.27**	.40**	.54**	.24**	.31**	.32**
	6 Academic reading attitude						-	.25**	.25**	.16	.14	-.01	.16
	7 Metacognitive knowledge							-	.50**	.27**	.31**	.50**	.39**
	8 Text comprehension								-	.20*	.10	.30**	.38**
Eight Grade	9 Recreational reading attitude									-	52**	.40**	.37**
	10 Academic reading attitude										-	.35**	.22*
	11 Metacognitive knowledge											-	.41**
	12 Text comprehension												-
M		31.18	30.51	5.95	19.15	28.77	29.29	8.01	26.43	26.59	26.63	9.09	17.67
SD		5.87	6.20	2.10	5.60	6.82	6.07	2.46	6.47	6.80	5.68	2.66	5.54

*$p<.05$, **$p<.01$.

To investigate whether there are gender differences and developmental changes in attitudes toward reading and metacognitive knowledge about reading strategies during early adolescence, a series of two-way ANOVAs (Gender x Grade level) was performed. The results are shown in Table 2.

Table 2. *The Results of Two-way ANOVAs (Gender x Grade Level) for Recreational and Academic Reading Attitudes and Metacognitive Knowledge About Reading Strategies*

		Grade level						ANOVA		
		Fourth		Sixth		Eighth		Grade Level $F_{2,115}$	Gender $F_{1,115}$	Gender x Grade $F_{2,115}$
		Boys	Girls	Boys	Girls	Boys	Girls			
Recreational reading attitude	*M*	29.23	34.29	26.94	32.04	22.87	28.84	31.74^{***} η^2=.29	25.32^{***} η^2=.25	.23
	SD	5.62	4.90	6.56	5.15	7.74	6.32			
Academic reading attitude	*M*	29.65	31.65	28.81	31.29	23.94	27.10	20.56^{***} η^2=.21	8.30^{**} η^2=.10	.26
	SD	6.20	6.67	5.55	5.21	7.22	4.70			
Metacognitive knowledge	*M*	5.46	6.08	7.42	8.40	8.21	9.48	72.16^{**} η^2=.39	8.62^{**} η^2=.07	.77
	SD	2.01	2.19	2.53	2.23	2.82	2.49			

$^{**}p<.01$, $^{***}p<.001$.

Reading attitudes dropped significantly for both recreational and academic scores during early adolescence. Post-hoc comparison indicated that there were significant declines in attitudes toward recreational reading from fourth to sixth grade and from sixth to eight grade. A significant decline in attitudes toward academic reading occurred from sixth to eight grade. At all three grade levels, girls had more positive attitudes toward both recreational and academic reading. Girls also had higher metacognitive knowledge about reading strategies at all three assessment points. In contrast to reading attitudes, metacognitive knowledge increased from one assessment point to the next one. There were no interactive effects of gender and grade level on reading attitudes and metacognitive knowledge. The effect sizes for grade effects were larger than those for gender effects.

The hypothetical model depicting relation between reading attitudes, metacognitive knowledge about reading strategies and text comprehension at three assessment points was tested using LISREL for Windows.

Chi-square was significant at all three assessment points, indicating significant differences between observed data and the hypothesised model (χ^2=120.80, *df*=3, *p*<.01 in the fourth grade; χ^2=63.46, *df*=3, *p*<.01 in the sixth grade; χ^2=41.76, *df*=3, *p*<.01 in the eighth grade). However, the model fitted the data better as grade level increased (GFI=.77, RMSEA=.49 in the fourth grade; GFI=.87, RMSEA=.35 in the sixth grade; GFI=.90, RMSEA=.29 in the eighth grade).

The results of path analyses showed that gender had significant effects on reading attitudes at all three grade levels. The effect of attitudes toward reading on metacognitive knowledge and text comprehension was evident for recreational reading attitudes but not for academic reading attitudes. The only significant, though small, effect of academic reading attitudes on metacognitive knowledge was found in the eighth grade. The direct effect of recreational reading attitudes on text comprehension was moderately strong, while the indirect effect was very weak.

Metacognitive knowledge had a moderately positive effect on text comprehension at all three assessment points. Because the effect of academic reading attitudes on metacognitive knowledge and text comprehension is negligible, we tested whether omitting academic reading attitudes from the model would improve the model fit. Models without academic reading attitudes showed a better fit to the data, although Chi-square was still significant in the fourth (χ^2=18.56, *df*=2, *p*<.01) and sixth grades (χ^2=17.37, *df*=2, *p*<.01). In the eighth grade, Chi-square indicated good fit (χ^2=1.72, *df*=2, *p*>.05). Most of the fit indices indicate good fitting of the model at all three assessment points (GFI=.95, RMSEA=.23 in the fourth grade; GFI=.95, RMSEA=.21 in the sixth grade; GFI=.99, RMSEA=.00 in the eighth grade). Therefore, only models without academic reading attitudes as predictors are presented in Figures 2, 3, and 4.

Figure 2. *The Model of the Relationships Among Attitudes Toward Reading, Metacognitive Knowledge, and Reading Comprehension for Fourth Grade Students*

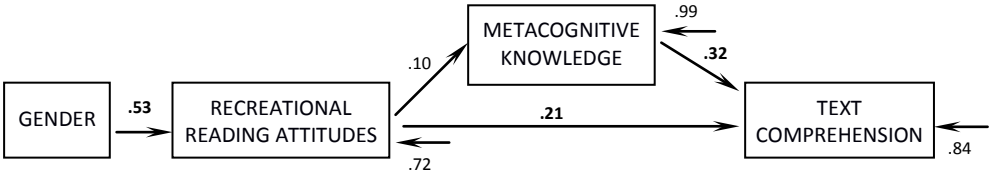


Figure 3. *The Model of the Relationships Among Attitudes Toward Reading, Metacognitive Knowledge, and Reading Comprehension for Sixth Grade Students*

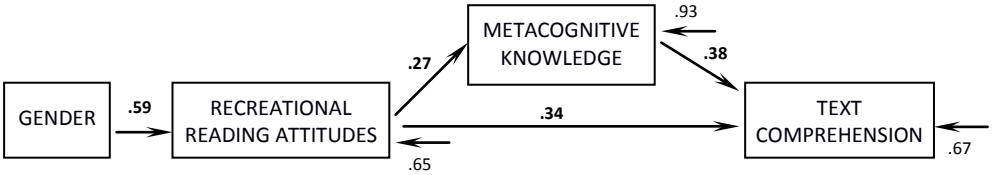
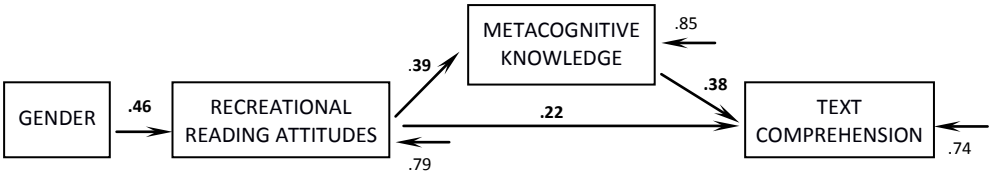


Figure 4. *The Model of the Relationships Among Attitudes Toward Reading, Metacognitive Knowledge, and Reading Comprehension for Eighth Grade Students*



Discussion

The present study investigated the developmental changes in metacognitive knowledge of reading strategies and attitudes toward reading in male and female students from the fourth school grade (10 years) until the eighth grade (14 years). The students were assessed three times, in the fourth, sixth, and eighth grades. Additionally, the model depicting attitudes toward reading and metacognitive knowledge of reading strategies as predictors of text comprehension was examined at the three measurement points.

The results of this study indicated that metacognitive knowledge of reading strategies continuously improved during early adolescence, but girls consistently demonstrated better metacognitive knowledge than boys. The finding that points to developmental changes in metacognitive knowledge of reading strategies aligns with the results of the majority of cross-sectional studies that have found significant grade effects in secondary grades (Kolić-Vehovec & Bajšanski, 2003; Kolić-Vehovec et al., 2008; Paris et al., 1991; Pazzaglia et al., 1999). Those results strongly support the claim that an important improvement in metacognitive knowledge of reading occurs at the secondary school level, after the age of 10. This improvement may be related to interactive effects of cognitive development during early adolescence and accumulated reading practice, allowing students to gain relevant knowledge about different actions that can improve text comprehension. Kuhn (2000) asserted that cognitive development implied more frequent use of appropriate strategies. Comprehension monitoring, which develops intensively during early adolescence (Pazzaglia et al., 1999), leads to an enhanced metacognitive awareness of the reading goal and improves insight about the extent to which the goal is being met by different strategies. Furthermore, it enhances awareness and understanding of the reading strategies themselves. The selection of strategies that best serve various functions while reading different texts and the skilful application of suitable strategies results in better text comprehension.

The observed gender differences in metacognitive knowledge are consistent with the PISA results (OECD, 2010b) and certain other previous studies (Kolić-Vehovec et al., 2009; O'Reilly and McNamara, 2007). However, the effect size obtained in the present study was small, as was that in the O'Reilly and McNamara study (2007). Because gender differences were more noticeable in some educational contexts then others, it seems that educational practice and expectation might be important for gender differences (OECD, 2010b). That assumption is also supported by the finding of Kolić-Vehovec et al. (2009) that gender differences in metacognitive knowledge were not significant in Slovenian eighth graders in an urban area (although they were present among fourth graders), which might be due to continuous efforts of educational authorities to enhance reading practices among Slovenian students in early adolescence. In contrast to metacognitive knowledge, attitudes toward recreational reading showed continuous decline from the fourth to

the eighth grade, while attitudes toward academic reading dropped significantly between the sixth and eighth grades. These results are consistent with the findings of the large longitudinal studies (McKenna et al., 1995; Sainsbury & Schagen, 2004). McKenna's model (1994) predicted that the drop in reading attitudes could be a consequence of new and appealing leisure activities that become available to children during early adolescence in addition to reading. Furthermore, previous findings have suggested that adolescents define reading as a school-based activity (Pitcher et al., 2007) and often do not perceive their activities outside of school (reading magazines, newspaper and on-line materials) as *reading*. In the present study, recreational reading activities referred almost exclusively to reading books, and other types of reading materials were not taken into consideration. Therefore, negative attitudes might be even more prominent because students in Croatia read both fiction and non-fiction books for enjoyment less often than their peers in OECD countries, but they read magazines, and especially newspapers more often (OECD, 2010b).

Although the intercorrelations between recreational and academic reading attitudes were high and positive throughout the study, the strength of this relationship became weaker as students grow older, indicating that, during early adolescence, students gradually differentiate between recreational and academic reading. Recreational reading becomes predominantly related to pleasure because it is motivated mostly by individual interest, while academic reading becomes associated mostly with assignments and assessments (Cox & Guthrie, 2001).

At all three grade levels, girls had more positive attitudes toward both recreational and academic reading, which is in line with the results of McKenna et al. (1995), as well as with Kush and Watkins's (1996) findings. The obtained results align with the assumption that societal expectations lead to more positive attitudes toward reading in girls. Adolescent boys in an English study are more prone to report that they would be embarrassed if their friends saw them reading than girls (Clark & Burke, 2012). The gender gap in reading attitudes might also at least partially stem from the types of texts used in the secondary level curriculum. Although some studies show that content of secondary curriculum does not reflect gendered interest (at least in England; Clark & Burke, 2012), or even might be more male-inclined (i.e., women were under-represented in Croatian literature textbooks both as authors of texts and as characters mentioned in these texts; Baranović, Doolan, & Jugović, 2010), most of the reading materials in Croatian literature text-books are narrative, fictional texts and poems. Girls are more likely than boys to read those types of texts (OECD, 2010b).

Irwin (2003) proposed that adolescents' engagement in reading was reflective of their conceptions of themselves as readers related to their understanding of gender. Namely, they see reading as a feminine activity. That may be one of the reasons why females value reading more than males do. Pitcher et al. (2007) found that students' self-concepts as readers and their valuing of reading were associated

with their general enjoyment of reading and with their specific reading choices. Reading interests often did not seem to include any form of academic reading, but they derive from perceived personal connections to a topic and from individual interests, as well as from recommendations from friends and family members. The results from the PISA study (OECD, 2010b) indicate that boys could be encouraged to enjoy reading more and to read more for enjoyment because there was considerable variation among countries in boys' enjoyment in reading.

Although in some studies (McKenna et al., 1995) the gap in attitudes toward recreational reading between boys and girls became wider with time, this was not the case in the present study, as there were no interaction effects of grade and gender. These differences might be attributed to different study designs: previous studies were cross-sectional, and the present study was longitudinal. Moreover, the studies assessed students in different age ranges and different socio-cultural settings.

In addition to examining developmental changes in metacognitive knowledge of reading strategies and attitudes toward reading, we also explored the relationship of these constructs to text comprehension, taking gender into account. In the proposed model, it was hypothesised that attitudes toward reading would predict reading comprehension both directly and indirectly, through metacognitive knowledge, while gender would affect reading attitudes, and therefore have an indirect effect on metacognitive knowledge of reading strategies and text comprehension. Generally, the findings of the path analysis indicated that, during early adolescence, gender predicted recreational reading attitudes, which consistently predicted text comprehension both directly and indirectly through metacognitive knowledge. These results are consistent with the MASRL model (Efklides, 2011). As expected, the model fitted the data better as students got older, which can be attributed to a greater reliability of self-assessments in older students then younger ones.

The relationship between metacognitive knowledge and text comprehension grew stronger from fourth grade to sixth grade but did not strengthen later on. The obtained predictive effect of metacognitive knowledge on text comprehension is consistent with the findings of Roeschl-Heils et al. (2003), as well as van Kraayenoord et al. (2012). However, they only tested their models on samples of students in grades 3 and 4.

The results of the correlation analysis showed that attitudes toward reading were not related to metacognitive knowledge of reading strategies in the fourth grade, but correlations became significant in sixth grade and strengthened in eighth grade. The relationship was more pronounced for recreational reading attitudes than for academic reading attitudes. Attitudes toward academic reading did not predict metacognitive knowledge until eighth grade. Moreover, the model that included only attitudes toward recreational reading fitted the data better than the model comprising both academic and recreational reading attitudes. We could assume that

this relationship between reading attitudes and metacognitive knowledge is probably mediated by the amount of reading. Positive attitudes toward recreational reading were found to be positively correlated to the amount of reading (Guthrie & Alvermann, 1999), which is in turn linked to reading performance (McKenna & Kear, 1990; OECD, 2010b).

Reading amount and reading achievement are thought to be reciprocally related to each other: as reading amount increases, reading achievement increases, which in turn increases reading amount (Cunningham & Stanovich, 1998). Exploration of the reading habits in PISA research (OECD, 2002, 2010b) showed that those students who were high achievers in reading literacy were much more likely than low achievers to read for enjoyment. Enjoyment in reading explained 14% of variations in text comprehension of Croatian students in PISA research (OECD, 2010b), as well as in our study, indicating the stability of this relationship and the consistency of results.

The effect of gender on attitudes toward reading, which was stable over the early adolescent period, suggests that more favourable attitudes toward reading promote an advantage of girls over boys in acquiring reading skill, and this difference in reading aptitude then helps girls to maintain more positive reading attitudes. The results of the present study indicate that acquired reading skill is at least partly affected by the development of metacognitive knowledge of reading strategies.

Better metacognitive knowledge probably improves text comprehension, but it also enhances the perception of self-efficacy in reading, which then facilitates positive reading attitudes, especially toward recreational reading. Our results support that assumption because metacognitive knowledge in fourth grade was related with recreational reading attitudes and text comprehension assessed in subsequent years, and metacognitive knowledge in sixth grade was related to reading attitudes and text comprehension two years later. Engaging in reading activities, adopting effective reading strategies and being a proficient reader are mutually dependent: as students read more, they become better readers; when they read well and expect good performance in reading, they tend to read more and enjoy reading more (Nurmi, Aunola, Salmela-Aro, & Lindroos, 2003). Students who are highly engaged in reading and have knowledge of effective reading strategies are most likely to be proficient readers, and proficient readers are also those students who are most engaged and interested in reading. Failure to succeed in academic tasks may result in student disaffection, low levels of practice and failure to develop effective reading strategies (OECD, 2010b; Skinner, Kindermann, & Furrer, 2009).

Limitations and Implications of the Study

When interpreting the results of the present study, several issues must be considered. As the study was longitudinal, there was substantial attrition of the initial sample because many students were not present at least at one assessment point. Future studies should include larger sample sizes in order to obtain more reliable results and to test more complex longitudinal models. In addition, only three schools in one city were included in the study. However, because elementary schooling is obligatory, the assessed schools were public, and all of the students in one generation were assessed, we believe that the sample was heterogeneous and representative enough, at least for urban areas. However, future studies should also consider assessing students from both urban and rural areas and from more varied socio-cultural settings.

Longitudinal studies examining changes in reading-related variables are relatively rare, so the present study offers further insight into developmental trajectories of attitudes toward reading and metacognitive knowledge about reading strategies during early adolescence. This study contributes to the sparse literature of the relationship between metacognition and affect in reading. The obtained results are in line with the MASRL model (Efklides, 2011) and PISA findings (OECD, 2010a, 2010b). The suggested effect of reading attitudes on metacognitive knowledge of reading strategies was mainly supported. However, compared to academic reading attitudes, attitudes toward recreational reading were found to be more strongly related to metacognitive knowledge of reading strategies and text comprehension, especially when children were younger. Multiple educational policies have proven that encouraging recreational reading during early adolescence can improve attitudes towards reading and reading achievement. Given the importance of attitudes toward recreational reading for the development of metacognitive knowledge of reading strategies and reading comprehension, various educational practices focused on reading for enjoyment should be developed.

References

Ainley, M., Hillman, K., & Hidi, S. (2002). Gender and interest processes in response to literary texts: Situational and individual interest. *Learning and Instruction, 12*, 411-428.

Alexander, J.E., & Filler, R.C. (1976). *Attitudes and reading*. Newark, DE: International Reading Association.

Baker, L. (2005). Developmental differences in metacognition: Implications for metacognitively oriented reading instruction. In S. Israel, C.C. Block, K.L. Bauserman, & K. Kinnucan-Welsch (Eds.), *Metacognition in literacy learning: Theory, assessment, instruction, and professional development* (pp. 61-79). Mahwah, NJ: Erlbaum.

Baker, L., & Brown, A.L. (1984). Metacognitive skills and reading. In P.D. Pearson, M. Kamil, R. Barr & P. Mosenthal (Eds.), *Handbook of reading research* (Vol. 1, pp. 353- 394). New York: Longman.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Baranović, B., Doolan, K., & Jugović, I. (2010). Jesu li čitanke književnosti za osnovnoškolsko obrazovanje u Hrvatskoj rodno osjetljive? [Are Croatian primary school literature textbooks gender sensitive?]. *Sociologija i prostor, 187*, 349-374.

Boekaerts, M. (1996). Self-regulated learning at the junction of cognition and motivation. *European Psychologist, 1*, 100-112.

Chiu, M.M., & McBride-Chang, C. (2006). Gender, context, and reading: A comparison of students in 43 countries. *Scientific Studies of Reading, 10*, 331-362.

Clark, C., & Burke, D. (2012). *Boys' reading Commission*. *A review of existing research to underpin the Commission*. London: National Literacy Trust. Retrieved from: http://www.literacytrust.org.uk/assets/0001/4047/BRC-_Research_overview_-_Final.pdf

Cox, K.E., & Guthrie, J.T. (2001). Motivational and cognitive contributions to students' amount of reading. *Contemporary Educational Psychology, 26*, 116-131.

Cunningham, A.E., & Stanovich, K.E. (1998). What reading does for the mind. *American Educator, 22*(1&2), 8-15.

Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist, 46*, 6-25.

Elley, W.B. (1992). *How in the world do students read? IEA Study of Reading Literacy*. The Hague: IEA.

Flavell, J.H. (1979). Speculations about the nature and development of metacognition. In F. Weinert & R. Kluwe (Eds.), *Metacognition, motivation, and understanding* (pp. 21-29). Hillsdale, NJ: Erlbaum.

Flavell, J.H., Miller, P.H., & Miller, S.A. (1993). *Cognitive development*. Englewood Cliffs, NJ: Prentice Hall.

Fox, E., & Alexander, P.A. (2009). Text comprehension: A retrospective, perspective, and prospective. In S.E. Israel & G.G. Duffy (Eds.), *Handbook or research on reading comprehension* (pp. 227-239). New York: Routledge.

Guthrie, J.T., & Alvermann, D.E. (1999). *Engaged reading: Processes, practices, and policy implications*. New York: Teachers College Press.

Irwin, N. (2003). Personal constructs and the enhancement of adolescent engagement in reading. *Support for Learning, 18*, 29-34.

Kolić-Vehovec, S., & Bajšanski, I. (2003). Children's metacognition as a predictor of reading comprehension. In G. Shiel & U. Ni Dhalaigh (Eds.), *Other ways of seeing: Diversitiy in language and literacy* (pp. 216-222). Dublin: Reading Association of Ireland.

Kolić-Vehovec, S., Pečjak, S., Ajdišek, N., & Rončević, B. (2008). Razlike med spoloma v (meta)kognitivnih in motivacijsko emocionalnih dejavnikih bralnega razumevanja. [Gender differences in (meta)cognitive and motivational-emotional factors of reading comprehension]. *Psihološka obzorja, 17*, 89-116.

Kolić-Vehovec, S., Pečjak, S., & Rončević, B. (2009). Spolne razlike u (meta)kognitivnim i motivacijskim čimbenicima razumijevanja teksta adolescenata u Hrvatskoj i Sloveniji. [(Meta)cognitive and motivational predictors of text comprehension of adolescents in Croatia and Slovenia]. *Suvremena psihologija, 12*, 229-242.

Kuhn, D. (2000). Metacognitive development. *Current Directions in Psychological Science, 9*(5), 178-181.

Kush, J.C., & Watkins, M.W. (1996). Long-term stability of children's attitudes toward reading. *The Journal of Educational Research, 89*, 315-319.

Lietz, P. (2006). A meta-analysis of gender differences in reading achievement at the secondary school level. *Studies in Educational Evaluation, 32*, 317-344.

McKenna, M.C. (1994). Toward a model of reading attitude acquisition. In E.H. Cramer & M. Castle (Eds.), *Fostering the life-long love of reading: The affective domain in reading education* (pp. 18-40). Newark, DE: International Reading Association.

McKenna, M., & Kear, D. (1990). Measuring attitude toward reading: A new tool for teachers. *The Reading Teacher, 43*, 626-639.

McKenna, M.C., Kear, D.J., & Ellsworth, R.A. (1995). Children's attitudes toward reading: A national survey. *Reading Research Quarterly, 30*, 934-955.

Miholic, V. (1994). An inventory to pique students' metacognitive awareness of reading strategies. *Journal of Reading, 38*, 84-86.

Mullis, I.V.S, Martin, M.O., Foy, P., &. Drucker, K.T. (2012). *PIRLs 2011 International results in reading*. Chestnut Hill, MA, USA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.

Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., & Kennedy, A.M. (2003). *PIRLS 2001 International report: IEA's study of reading literacy achievement in primary schools in 35 countries*. Chestnut Hill, MA: Boston College.

Myers, M., & Paris, S.G. (1978). Children's metacognitive knowledge about reading. *Journal of Educational Psychology, 70*, 680-690.

Nurmi, J.E., Aunola, K., Salmela-Aro, K., & Lindroos, M. (2003). The role of success expectation and task-avoidance in academic performance and satisfaction: Three studies on antecedents, consequences and correlates. *Contemporary Educational Psychology, 28*, 59-90.

Oakhill, J.V., & Petrides, A. (2007). Sex differences in the effects of interest on boys' and girls' reading comprehension. *British Journal of Psychology, 98*, 223-236.

OECD (2002). *Reading for change: Performance and engagement across countries. Results from PISA 2000.* New York: Organisation for Economic Cooperation and Development.

OECD (2010a). *PISA 2009 Results: What students know and can do: Student performance in reading, mathematics and science* (Volume I). OECD Publishing.

OECD (2010b). *PISA 2009 Results: Learning to learn: Student engagement, strategies and practices* (Volume III). OECD Publishing.

OECD (2014). *PISA 2012 Results: What students know and can do – Student performance in mathematics, reading and science* (Volume I). OECD Publishing.

O'Reilly, T., & McNamara, D. (2007). The impact of science knowledge, reading skill, and reading strategy knowledge on more traditional high-stakes measures of high school students' science achievement. *American Educational Research Journal, 44*, 161-196.

Paris, S.G., Lipson, M., & Wixson, K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology, 8*, 293-316.

Paris, S.G., Wasik, B.A., & Turner, J.C. (1991). The development of strategic readers. In R. Barr, M.L. Kamil, P.B. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 609-640). New York: Longman.

Pazzaglia, F., De Beni, R., & Caccio, L. (1999). The role of working memory and metacognition in reading comprehension difficulties. In T.E. Scruggs & M.A. Mastropieri (Eds.), *Advances in learning and behavioral disabilities* (Vol. 13, pp. 115-134). Greenwich, CT: JAI.

Pečjak, S., Kolić-Vehovec, S., Rončević, B., & Ajdišek, N. (2009). (Meta)kognitivni i motivacijski prediktori razumijevanja teksta adolescenata u Hrvatskoj i Sloveniji. [(Meta)cognitive and motivational predictors of text comprehension of adolescents in Croatia and Slovenia]. *Suvremena psihologija, 12*, 257-270.

Pintrich, P.R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P.P. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451-502). San Diego, CA: Academic.

Pitcher, S.M., Albright, I.K., DeLaney, C.J., Walker, N.T., Seunarinesingh, K., Mogge, S., ... Dunston, P.J. (2007). Assessing adolescents' motivation to read. *Journal of Adolescent & Adult Literacy, 50*, 378-396.

Pressley, M. (1995). More about the development of self-regulation: Complex, long term, and thoroughly social. *Educational Psychologist, 30*, 207-212.

Pressley, M. (2002). Metacognition and self regulated comprehension. In A.E. Farstrup & S.J. Samuels (Eds.), *What research has to say about reading instruction* (3rd ed.) (pp. 291-309). Newark, DE: International Reading Association.

Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Roeschl-Heils, A., Schneider, W., & van Kraayenoord, C. (2003). Reading, metacognition, and motivation: A follow-up study of German students in grades 7 and 8. *European Journal of Psychology of Education, 18*, 75-86.

Sainsbury, M., & Clarkson, R. (2008). *Attitudes to reading at ages nine and eleven: Full Report.* Slough: NFER.

Sainsbury, M., & Schagen, I. (2004). Attitudes to reading at ages nine and eleven. *Journal of Research in Reading, 27*, 373-38.

Sauver, J.L., Katusic, S.K., Barbaresi, W.J., Colligan, R.C., & Jacobsen, S.J. (2001). Boy/girl differences in risk for reading disability: Potential clues? *American Journal of Epidemiology, 154*, 787-794.

Schmitt, M.C. (1990). A questionnaire to measure children's awareness of strategic reading processes. *The Reading Teacher, 43*, 454-461.

Skinner, E.A., Kindermann, T.A., & Furrer, C. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement, 69*, 493-525.

van Kraayenoord, C.E., Beinicke, A., Schlagmüller, M., & Schneider, W. (2012). Word identification, metacognitive knowledge, motivation and reading comprehension: An Australian study of grade 3 and 4 pupils. *Australian Journal of Language and Literacy, 35*, 51-68.

van Kraayenoord, C.E., & Schneider, W.E. (1999). Reading achievement, metacognition, reading self-concept and interest: A study of German students in grades 3 and 4. *European Journal of Psychology of Education*, *14*, 305-324.

Wallentin, M. (2009). Putative sex differences in verbal abilities and language cortex: A critical review. *Brain and Language, 108*, 175-183.

Wilson, V.L., & Rupley, W.H. (1997). A structural equation model for reading comprehension based on background, phonemic, and strategy knowledge. *Scientific Studies of Reading, 1*, 45-63.

Winne, P.H. (2004). Students' calibration of knowledge and learning processes: Implications for designing powerful software learning environments. *Educational Research, 41*, 466-488.

Zimmerman, B.J. (1986). Development of self-regulated learning: Which are the key subprocesses? *Contemporary Educational Psychology, 11*, 307-313.

Received: January 12, 2014