Bushra Ahmed Khurram[*]

Metacognition and Reading in Children: A State of the Art Review

ABSTRACT

The aim of this paper is to provide a review and synthesis of the literature on metacognition and reading in children. The paper begins with a brief discussion of what metacognition is and presents the components of metacognition. It then reviews the key studies that have been conducted on metacognition and reading in children. The first part of the review discusses the empirical studies which examine children's metacognitive knowledge. The second part considers the research concerned with children's monitoring of comprehension. The final part discusses the studies conducted on training of metacognition about reading in children. The paper concludes by reviewing the current research on metacognition.

Keywords: *Metacognition, Reading, Metacognitive Awareness, Monitoring of Comprehension, Metacognitive Training.*

Introduction

Good readers bring metacognition-in-action to the act of reading by planning, monitoring and evaluating their own cognitive processes (Baker, 2002). Research indicates that metacognitive acts promote reading comprehension as they

[*] Department of English, University of Karachi, Karachi

guide and coordinate thinking (Baker & Brown, 1984). A number of research studies establishe the centrality of the construct of metacognition in reading (e.g. Brown, 1987; Alexander & Murphy 1998). The importance of metacognition is therefore 'now firmly established in theories of learning and reading' (Baker, 2002, p.77).

Definition of Metacognition

Metacognition has been defined by a number of theorist. Armbruster, Echols and Brown (1983) has defined metacognition as the knowledge and control a reader has over his or her reading processes. Along similar lines, Mokhtari and Reichard (2002, p. 249) have defined metacognition as 'the knowledge of the reader's cognition about reading and the self-control mechanisms he/she exercises when monitoring and regulating text comprehension.' In other words, metacognition makes readers aware of their reading processes, comprehension break down and the strategies they could use to read successfully. This is why, the literature stresses that 'students without metacognitive approaches are essentially learners without direction or opportunity to review their progress, accomplishments, and future directions' (O' Malley et al. 1985, p. 561).

Components of Metacognition

Metacognition is usually conceptualized as having two fundamental components: 1) metacognitive knowledge and 2) regulation of cognition (Harris, Santangelo & Graham, 2010; Schraw & Moshman, 1995). Researchers are of the opinion that these two components are distinct but not

independent of one another (Griffith & Ruan, 2005; Schraw & Moshman, 1995).

The first component of metacognition, metacognitive knowledge, is 'that portion of the total knowledge base that pertains to a given area of cognitive activity' (Flavell 1985, quoted by Garner,1987). Flavell (1987) proposed that metacognitive knowledge includes knowledge we have about *ourselves*, the *tasks* we face and the *strategies* we employ in specific cognitive domains. In the cognitive domain of reading, research has indicated a casual role of metacognitive knowledge in reading comprehension (Pressley, El-Dinary, Gaskins, Schuder, Bergman, Almasi, & Brown, 1992).

The second major component of metacognition, regulation of cognition, refers to metacognitive activities that help control one's thinking or learning (Schraw & Moshman, 1995). Baker & Brown (1984b) indicate that regulation of cognition involves the ability to use the self-regulatory mechanisms such as checking, planning, evaluating, revising to ensure successful completion of the task.

Research on Metacognition in Reading

In the 1970s a number of studies was conducted related to metacognition and reading (e.g., Anderson, 1991; Carrell, 1989; Knight, Pardon, & Waxman, 1985). Although some of these studies had adults as subjects, most of the early research on metacognition and reading was carried out on children (El-Hindi & Amelia, 1993). This section reviews the empirical studies which examine children's metacognitive knowledge, monitoring of comprehension and training of metacognition about reading in children.

Studies of Metacognitive Knowledge

The early research in the area of metacognition and reading in 1970s was primarily of a descriptive and correlational nature (Baker, 2008). An early landmark study of metacognition and comprehension in young readers was carried out by Myers and Paris (1978) who assessed the knowledge of the person variable, task variable and strategy variable involved in reading of the children of the second and sixth grades. The results of their study showed that younger children had less understanding of reading: they took reading as a process of decoding text rather than meaning-making. In addition, the study showed that the older children were more cognizant of the reading strategies that are used to determine meaning of words or sentences, such as rereading to deduce the meaning from context, using a dictionary or asking for help from a knowledgeable other. Older children were also aware of the purposes of reading strategies as compared to the young children. A little later, researchers in the area of metacognition and reading started to investigate individual differences in students' metacognitive knowledge. A significant study that was carried out by Garner and Kraus (1981-82) investigated individual differences in the metacognitive knowledge of better and poorer readers. The results of the study demonstrated that as compared to the poor readers, better readers had more awareness and control of reading. It is noteworthy that the findings of these two early studies have been held up over time: older and successful readers show higher levels of metacognitive knowledge and more skilled regulation of reading (Baker and Beall, 2009, p 373).

The research outcomes of recent L2 studies look remarkably similar to earlier studies. This can be seen in the study by Eme, Puustinen, and Coutlet (2006) with third and fifth grade students in France. Their study showed that fifth graders as compared to third graders were more likely to consider understanding as a characteristic of a good reader. For third graders, a skilled reader was the one who read the text quickly without making any mistake.

Most of the research on developmental changes in metacognition is cross-sectional. However, the literature indicates that longitudinal studies replicate the results of earlier studies on metacognitive knowledge. For instance, Annevirta & Vauras (2001) undertook a longitudinal study to examine the metacognitive knowledge of Finnish children from preschool through the third grade. Interviews were conducted to tap knowledge about memory, learning and comprehension. Results of the study showed that children had understanding of memory processes even at the preschool level. By the first grade children recognized the active role of the self in learning. However, metacognitive understanding of comprehension was not evidenced before the second or third grade. And it was not until the third grade that students described evaluating and monitoring their understanding. In sum, when children were younger they did not show understanding of reading as a meaning-getting process.

Recently, researchers have started investigating if there is stability in metacognitive knowledge over time and if the relations between reading comprehension and metacognition are consistent over time. For example, Roesch-Heils, Schneider, and van Kraayenoord (2003) followed up children who had participated in a study conducted earlier by van

Kraayenoord & Schneider (1999). In the study the researchers reassessed metacognitive knowledge of Grade 7 or 8 German children in relation to reading comprehension and reading motivation that was first examined in Grades 3 or 4. Results of the study showed that students who scored higher on assessment of metacognitive knowledge in Grades 3 or 4 continued to score higher in Grades 7 or 8. The study also indicated important links among reading interest, motivation and metacognition at both time points. Children who were more interested in reading had better metacognitive skills and performed better on reading assessments in Grades 3 or 4 and in Grades 7 or 8. Moreover, metacognitive knowledge was a significant predictor of reading comprehension in Grades 3 and 4 as well as in Grades 7 and 8. Similarly, Bouchard (1998) conducted a longitudinal study that focused on similar questions. She examined interrelations between self-system, reading achievement and metacognitive knowledge when children were in the fourth grade and then when they were in grade 6. Results indicate that there was a correlation between self-system and reading measures at each time point. In addition, the patterns of relations were similar over time.

Research conducted in the area of metacognitive knowledge indicates that metacognitive knowledge precedes metacognitive control (Baker & Brown, 1984a). This implies that students need to have 'a sufficient level of internalized metacognitive knowledge before they can use it effectively to guide their own learning' (Baker, 2008a). However, the literature also indicates that it is not sufficient for students to only have metacognitive knowledge to regulate their cognition. For instance, Annevirta & Vaurus (2006) in their longitudinal study discussed previously Annevirta & Vaurus

(2001) studied metacognitive skills of a subset of sample for three years, preschool, first grade and second grade. For this purpose, they selected three groups of children representing low, intermediate and high levels of metacognitive knowledge. The results indicate that low or average metacognitive knowledge group did not demonstrate comprehension monitoring at any grade over three years. On the other hand, out of the sample a few children whose metacognitive knowledge was demonstrated comprehension monitoring in preschool and first year. However, more demonstrated comprehension monitoring in second year. In addition, children with high metacognitive knowledge showed considerable growth in metacognitive control. In contrast, children with low metacognitive knowledge showed very little growth in metacognitive control. Furthermore, whereas no children with low metacognitive knowledge showed good metacognitive control, some children with high metacognitive knowledge did not demonstrate metacognitive control either. Similarly, Hacker's (1997) study with adolescents in grades 7, 9 and 11 also indicates that although some students in his study have the necessary knowledge to monitor their understanding of the text, they did not use that knowledge. Baker (2008a) indicates that these studies illustrate the 'importance of *will* in addition to *skill*' for metacognitive monitoring (p. 32, emphasis in original)

Studies on Monitoring of Comprehension

In the 1970s researchers also started documenting developmental and individual differences in students' comprehension monitoring abilities (Baker, 2008b). For this

purpose, researchers studied self-correction, an evidence of comprehension monitoring (Baker & Brown, 1984a), made by readers in an attempt to understand the reading process. The findings from these studies showed that when good readers, whether first graders or adults, made an error that distorted meaning they corrected themselves. However, poor and average readers did not correct themselves even if the errors distort meaning.

Researchers in the early 1980 studies started using an error detection paradigm to study comprehension monitoring while reading rather than waiting for readers to make and correct their reading errors. In this paradigm errors or problem are introduced in the text. Researchers use various indices such as asking readers to underline or report detected errors to find out whether readers noticed the problem and made attempt to resolve them. An early study that used the error detection paradigm was conducted by Baker (1979). This study investigated college students' comprehension monitoring. The results of the study showed that the college students do not consistently monitor their comprehension. On the other hand, the study by Baker (1984) on children's comprehension monitoring using the same paradigm showed that many children of the fourth and sixth grades who were given specific instructions regarding the type of problem identified more problems overall as compared to those who were not given such instructions. However, the problems that were identified were at the word level only. This finding confirmed the results of Myers and Paris's (1978) study that showed that children regard reading as a decoding process. Interestingly, contemporary advances in cognitive development work have informed us that such children are called 'word callers' (Cartwright, 2009). It is now

known that beginning and struggling readers are less flexible and they consider only one aspect of print, usually graphophonological information and do not consider other important aspects of print, like meaning (Pressley, 2002c). Other early important studies on comprehension monitoring by Harris, Kruithof, Terwogt, and Visser (1981), Paris and Myers (1981), Winograd and Johnson (1982), and August, Flavell and Clift (1984) showed that more skilled and older readers demonstrated better monitoring of comprehension as compared to less skilled and younger readers. However, these studies did not show that there is a casual link between ineffective monitoring and poor comprehension (Baker and Brown, 1984a). A study that showed such a link was carried out by Bereiter and Bird (1985) which will be discussed later.

Another approach used in early research and continued through the present is to ask readers to reflect on their reading process either during or after reading. Several studies used this approach. For instance, Collins et al (1980) used protocol analyses to understand how adult readers processed a short, difficult-to-understand passage he gave them. The study findings showed that adult readers used complex processes such as evaluating text for completeness and interconnectedness to understand it.

Research in students' comprehension monitoring abilities continues today. However, researchers in their studies now examine other contributors to reading comprehension along with comprehension monitoring. For instance, recently Zinar (2000) carried out a study to examine the contribution of the skill of word-identification and strategies used for monitoring reading comprehension. He used error detection paradigm to measure fourth grade children's online comprehension monitoring. Results showed that word identification was the

strongest predictor of reading comprehension. However, comprehension monitoring behaviour was the significant additional variable in reading comprehension and can be used to compensate for weakness in word-identification skills.

Researchers have also examined the contribution of comprehension monitoring along with working memory and other contributors of reading comprehension. For instance, Cain, Oakhill, and Bryant (2004) examined the contribution of comprehension monitoring to comprehension along with working memory and inference making. In their study they assessed the comprehension monitoring of English children ages 8-11 with error detection tasks. Results of the study showed that comprehension monitoring and working memory were significant predictors of text comprehension. In addition, the results showed that comprehension monitoring accounted for unique variance after controlling working memory and other background variables. Other studies also showed link between comprehension monitoring and working memory. For instance, Oakhill, Hartt and Samols's (2005) study showed that working memory limitations were responsible for students' difficulties in identifying inconsistencies in text. Another study by Walczyk, Marsiglia, Johns, & Bryan (2004) indicate that young readers can compensate for limited processing abilities by pausing to understand a phrase or sentence, rereading and looking back to reprocess the text more often than efficient readers.

Studies on Training of Metacognition

The early descriptive studies that demonstrated differences in metacognitive knowledge and control led to

the design and implementation of training studies since 'they stimulated interest in the possibility that metacognitive skills might be deliberately fostered' (Baker, 2008b, p. 67). In these studies, students were divided into groups that received or did not receive instruction to promote metacognitive knowledge and/or control. Results of these studies quite consistently showed that students did become cognizant of their reading processes and improved their comprehension monitoring ability. For instance, a study conducted by Bereiter and Bird (1985) taught a set of strategies to seventh-grade students. The results of the study showed that students increased their use of strategies through training. More importantly, it showed that students' reading comprehension also improved.

Other than Bereiter and Bird's (1985) study, several training studies that incorporated metacognitively-oriented instruction were implemented in reading classrooms in 1980s. The goal of these studies was to enhance metacognitive knowledge and comprehension monitoring skills of skilled and unskilled readers. For instance, Paris, Cross and Lipson (1984), trained third and fifth grade children to use various comprehension and comprehension monitoring strategies over a period of 12 weeks. In this study students learnt about reading strategies and how and when to use them. The findings of the study showed that metacognitive-oriented instructions promoted metacognitive knowledge about reading and comprehension monitoring successfully. However, it did not yield gains on reading comprehension test. Another illustrative study that was conducted by Palinscar and Brown (1984) using reciprocal teaching approach showed that strategy use and comprehension monitoring can be promoted in students by making them aware of comprehension monitoring processes. The general conclusion that emerged from these and other early studies of the relationship between metacognition and

reading (e.g. Baker and Zimlin, 1989; Bereiter and Bird, 1985; Miller, 1985, 1987) was that metacognitive knowledge and regulation of reading could be fostered. The literature also indicates that providing explicit metacognitive information about strategies increases their use (Pressley, Borkowski, & O'Sullivan, 1984, 1985; Pressley and Gaskin, 2006). However, research also indicates that the transfer of metacognitive understandings about strategies depends on providing students guided practice on the use of strategies, and encouraging student reflection on the application of strategies (e.g., Fogarty, Perkins, & Barell, 1992, cited in Pressley and Gaskin, 2006, p. 104). In sum, it can be seen from the above review that metacognitive knowledge and regulation of reading strategies could be fostered in children. Despite this, Pakistani children have not been afforded metacognitive reading strategies instruction to date since no published paper has reported implementing such instructions at the school level in Pakistan. Hence, teachers and researchers need to carry out research to understand the teaching practices that could be applied to Pakistani classrooms to foster metacognition about reading in children. Put another way, practitioners in Pakistan need to understand *how* they could promote metacognition about reading in children since metacognitive reading instructions are 'new' to Pakistani context (Edge & Mann, 2013).

Current Research on Metacognition

The current literature on metacognition recognizes the importance of motivation, self-efficacy, and peer collaboration. Some researchers assert that the 'self-system' underlies the development of metacognitive system (e.g., Borkowski, Carr, Rellinger, & Pressley, 1990, cited in Baker and Beall, 2009). Researchers have also examined the role motivation and attributional beliefs play in the deployment

of metacognitive strategies (Borokwski, Chan, & Muthukrishna 2000). For instance, De Sousa & Oakhill (1996) demonstrated that level of interest plays a role in comprehension monitoring. To elaborate, in their study of 8-9 years' old who had similar vocabulary and single-word reading skills but different comprehension skills were asked to participate in two tasks. To perform these tasks children had to read short passages to identify embedded problems in them. One of these two tasks was a typical school-like reading task, whereas the other was a more game like task that children later rated as more interesting. Results of the study showed that children who were poor in comprehension performed significantly better on the task they found interesting as compared to the school-like traditional task. On the other hand, performance of good comprehenders remained same across tasks. This study has important implications for research and practice since it suggests that poor comprehenders can show higher levels of ability than they otherwise would provided they are sufficiently motivated. Other previously discussed studies by Roeschl-Heils et al (2003) and Bouchard (1998) also point towards strong and stable correlations among metacognition, comprehension and motivation. Therefore, some researchers consider metacognition and motivation to read to be directly linked with each other (Dunlosky & Metcalfe, 2009; Guthrie et al., 2004).

Conclusion

The review of the literature reveals an overwhelming amount of information on metacognition and reading in children. Some trends in this literature are apparent. The first

trend emerging from this body of literature is that older and successful readers show higher levels of metacognitive knowledge and more skilled regulation of reading (Baker and Beall, 2009, p 373). To elaborate, it appears from studies that when children were younger they did not show understanding of reading as a meaning-getting process. Second, the literature indicates that students who scored higher on assessment of metacognitive knowledge in earlier grades continued to score higher in later grades. Third, the literature also shows important links among reading interest, motivation and metacognition. Children who were more interested in reading had better metacognitive skills and performed better on reading assessments in earlier grades as well as in later grades. Lastly, it also appears from the literature that the research has yet not determined how to help students apply strategies independently to texts 'in millions of diverse classrooms around the world' (Block & Duffy, 2008). For instance, as mentioned earlier, no research has yet been carried out to foster metacognition of reading strategies in Pakistani children. Perhaps this is why research still shows 'familiar student limitations in metacognitive knowledge and control that were characteristic of students studied 30 years ago' (Baker, 2008b, p. 76). Hence, the review of the literature would suggest that there is a need for further research on training of metacognition about reading in children in different context, including that of Pakistan.

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