Challenges in Developing Literacy Learning Models for Teachers to Develop Cognitive Strategies for Elementary School Students

Sri Tiatri[1,2,*] Jap Tji Beng[1,3,*] Claudia Fiscarina[1,2,*] Hartinah Dinata[1,2*]

[1]*Science, Technology, & Society Research Group, Universitas Tarumanagara, Jakarta*
[2] *Faculty of Psychology, Universitas Tarumanagara, Jakarta*
[3]*Faculty of Information Technology, Universitas Tarumanagara, Jakarta*
[*]Corresponding author. Email: sri.tiatri@untar.ac.id, t.jap@untar.ac.id, claudia.717182012@stu.untar.ac.id, hartinah.717182023@stu.untar.ac.id

ABSTRACT

Based on the awareness of the importance of literacy learning and the use of cognitive strategies, various countries have sought to develop various learning methods that are suitable for elementary school students. One of them is reciprocal teaching, which has been shown to improve students' thinking abilities, especially when reading. This study aims to examine the effectiveness of reciprocal teaching for teachers in Indonesia, in order to develop cognitive strategies for elementary students. Researchers conducted Reciprocal teaching Training for teachers, which are expected to implement what they have learned for student learning. The study participants were 74 elementary school teachers, consisting of 64 teachers from Tanjungpandan, and 10 teachers from Salatiga. The training includes the provision of materials and reciprocal teaching practice. Data were collected through observation and interviews during the training, as well as questionnaires. The result indicates that 70% of the teachers utilized reciprocal teaching simulations as expected. However, the remaining 30% of teachers failed to utilize cognitive strategies flexibly. There are teachers who are fixated on the steps of implementing reciprocal teaching, resulting in them not being able to develop thoughts about reading material adequately. The implication of this finding is that there is still a need to develop a more appropriate alternative teacher training programs, especially for teachers in Indonesia who tend to be rigid in implementing reciprocal teaching methods.

Keywords: cognitive, learning, reciprocal, teacher, elementary school

1. INTRODUCTION

The era of information technology is a period marked by the proliferation of digital media, which is also the cause of the formation of new relationships between individuals, including relationships between teachers, students, and things they learn. However, technology is not always able to optimize the learning process effectively [1]. Since elementary school, Indonesian children need to learn skills that will help them adequately compete. One of the core skills required is literacy competence. However, today, Indonesia is still lagging behind in terms of literacy.

A study [2] identified the quality of teacher-student interaction, which is related to the quality of teaching. A good teacher-student interaction can affect student achievement and motivation. This interaction pattern should be able to build positive emotional situations and students' sensitivity to the need to be independent and play an active role in learning.

Studies conducted in USA, China, and the Philippines [3], [4], [5] show that reading learning programs are influenced by the following factors: (a) age-appropriate reading materials; (b) environmental influences; (c) anxiety during reading comprehension; (d) interest and motivation; (e) word recognition speed; (f) health problems; (g) communication between teacher and parent; (h) how much time the parents spend with the children during the reading process; (i) teachers' support; (j) the number of reading materials the students read.

Teachers believe that students with academic problems have poor memory. For example, students may have difficulty remembering the sentence being read if the student has poor short-term memory. These students also struggle to remember the names and descriptions of characters in reading, and in previous lessons. Students with poor short-term memory will struggle to remember

the content of the reading material. This, in turn, causes the reading material to be viewed as difficult to understand [6]. Based on the awareness of the importance of literacy learning and the use of cognitive strategies, various countries have sought to develop various learning methods that are suitable for elementary school students. One of them is reciprocal teaching, which has been shown to improve students' thinking abilities, especially when reading.

Reciprocal teaching is a learning method that has been implemented in various countries, and is proven to be effective in improving students' reading comprehension [7]. One experiment [8] taught four reading strategies to 210 elementary school (SD) students, which were: (a) concluding, (b) questioning, (c) clarifying, and (d) estimating. The training was conducted in 2 different groups: (a) the experimental group (reciprocal teaching) which was further divided into 3 groups, the small group (a1), the pair group (a2), and the small group with the instructor (a3), and (b) the group control with traditional teaching methods. During follow-up after the intervention, the group receiving the reciprocal teaching intervention show higher scores on the reading comprehension task and strategy use, compared to the control group who received traditional instruction. The results also revealed that students who practiced reciprocal teaching in a small group (a1) showed better performance than the control group (b), the pair group (a2), and the small group guided by an instructor (a3) on a standardized test of reading comprehension. [8].

Since elementary school, Indonesian children need to possess digital-based literacy competency which will help them compete adequately. However, at this time, Indonesia still struggle to compete in this area. The STS group study [9] also found that intervention programs through technology can increase cognitive competence, and even improve engagement in learning new things.

A study at D.I. Yogyakarta and Salatiga [9] found that the challenges from the students' perspective are (a) students failing to focus on reading because they are influenced by their friends, they are absorbed in play; (b) students failing to write down their thoughts after reading and are unable to retell the reading as expected, during story telling session; (c) students only mentioning one or two words due to limited vocabulary; (d) students finding it difficult to convey both orally and in writing about what they read. Meanwhile, the challenges from teacher's perspective are (a) teachers are overwhelmed with tasks, making it difficult to monitor student progress; (b) teachers needing to pay attention to learning outcomes in a class as a whole, leaving little attention to individual performance; (c) sometimes teachers need to leave the classroom because of a large amount of administrative work.

Based on the results of previous research [10], one of many efforts to improve students' literacy skills is by implementing reciprocal teaching in elementary schools. For that, it is necessary to train teachers so that they can implement reciprocal teaching in the classroom. The problem of this study is how effective a model of reciprocal teaching training in developing cognitive strategies for elementary students, for teachers in Indonesia.

To answer this question, it is necessary to first study the concepts and characteristics of reciprocal teaching. Reciprocal learning was first introduced in the field of literacy by Palincsar and Brown in 1984 [11].

Based on the study of reciprocal learning conducted in various contexts [11]; [7]; [12]; [13], as well as recent studies referring to Reciprocal Teaching (for example [14]; [15]) conclusions can be drawn in the form of principles in reciprocal learning which consists of five principles, namely (a) teachers or tutors and students actively interacting with each other in studying a reading material; (b) during reading, the teacher and students take self-tests to identify important information, themes and ideas in the text and turn them into meaningful statements; (c) after reading, the teacher and students ask each other questions related to the part of the reading they read; (d) the teacher and students summarize the contents of the reading, discuss and tell each other the difficulties encountered during reading; (e) make predictions of what will be studied or read next by combining the reader's previous knowledge, new knowledge from the reading and the structure of the test to create hypotheses related to the purpose of the reading.

In implementing reciprocal teaching, cognitive flexibility is required. Cognitive flexibility is defined as the ability to freely change cognitive settings to perceive or respond to the external environment in various ways. Individuals with cognitive flexibility can think of various solutions when faced with a problem. In addition, cognitive flexibility is also shown by the ability to switch freely between knowledge categories, as well as the ability to control potentially disruptive responses so that the individual can achieve certain goals [16], [17] Cognitive flexibility has the greatest strength as a predictor of reading comprehension, a linguistic ability. [18].

As a learning method, reciprocal teaching requires cognitive flexibility. Reciprocal teaching also implies the application of one of the principles in the learning process, namely the principle of neurocognitive learning approach. The Neurocognitive Learning approach was developed by O. Roger Anderson from Columbia University. Based on studies on neurocognitive learning (for example [19]–[23]) it can be concluded that the principles of neurocognitive learning approach are: (a) that learning needs to be based on individual neurological conditions, which are also related to the overall health of students (including physical); (b) learning needs to involve the five human senses; (c) learning must enable students to construct their

own meaning from their experiences; so that (d) the learning environment needs to provide conditions that allow all three points to be met.

Based on the literature review above, reciprocal teaching training for teachers must include the principles of implementing reciprocal teaching. Teachers also need to practice implementing reciprocal teaching with fellow teachers, so that they can utilize reciprocal teaching in the classroom. Through practice, teachers actively involve the five senses and construct their own meaning from their experience. Thus, it is hoped that this training will be effective in helping teachers to implement the reciprocal teaching method when teaching students to read.

2. METHOD

Researchers conducted a quasi-experiment with one group post-test design. Reciprocal teaching was taught to teachers, which was then expected to be implemented by the teachers for student learning. The study involved 74 elementary school teachers, 64 teachers from Tanjungpandan, and 10 teachers from Salatiga. The training included the provision of materials and reciprocal teaching practice. Data were collected through observation and interview during the training, as well as questionnaires. The data used in this study are mainly based on observations and interviews during the training process. Researchers implemented an intervention program through lectures, discussions, questions and answers regarding reading and reciprocal teaching, as well as exercises in implementing reciprocal teaching with fellow teachers.

3. FINDINGS

Intervention in the form of training was given to elementary school teachers and principals in Salatiga and Tanjungpandan. In Salatiga and Tanjungpandan, the training was divided in 2 stages. In the first stage, the researchers provided material on the basics of reading and thinking process, as well as learning methods including "Reciprocal Learning" (Predict, Clarify, Summarize, Question). In the second stage of training, the teachers practiced the learning method that was taught in the first stage, which is Reciprocal Learning. Learning materials were provided to participants through books specially printed for training participants.

In Reciprocal Learning practice, participants were divided into small groups consisting of about 5 people per group. One person per group was appointed to be the group leader who organized the discussion. Participants were then asked to discuss a reading together. One of the readings was about clouds. As a group, the participants were asked to discuss each paragraph by applying the four strategies (Predict, Clarify, Summarize, and Question).

The first step was predicting what will be discussed in the reading based on the title of the reading. Each participant in the group put forward his/her prediction in turns. The second step was allowing the teachers to read the first paragraph, and letting them try to understand the meaning conveyed by the author in that paragraph. If there were unfamiliar words, participants must try to find the meaning of the word, by reading the context around the word, or if necessary, they could search for the meaning of the word using the internet.

After the meaning of the first paragraph was understood, in the third step, participants summarized the content of the first paragraph in turns. Lastly, at the fourth step, participants asked questions related to the content of the first paragraph. They could ask any questions, even outside of the content of the reading, although they were expected to remain relevant to the content of the reading.

After the group had thoroughly discussed the first paragraph, the same four steps were applied to the second, third, and so on. Flexibility in the group is expected to occur, so that discussion of the material takes precedence over discussion of steps that must be taken. The discussion no longer has to be rigid, but each member of the group gets approximately the same opportunity to state their thoughts. The reciprocal process that occurs is generally not dominated by one person.

Observation of the on-going process showed that the intervention done through discussions generated various ideas from the teachers, but not always as expected as best-practices that have been tested in developed countries. Based on interviews and collected questionnaires, it was found that teachers were happy to learn Reciprocal Teaching method that was relatively new for them. They were eager to implement the reading learning methods they have learned.

However, some teachers also stated that there is a possibility that they will not have the opportunity to apply reciprocal teaching, on the grounds that they face demands in achieving the standard curriculum. Thus, for teachers, reciprocal teaching has not been considered a means to achieve the objectives of the standard curriculum.

Based on observations during the implementation of the reciprocal teaching training, 70% of participants could apply reciprocal teaching as expected. These teachers made the best use of the reciprocal teaching simulation. However, the rest of the participants seem to struggle in using cognitive strategies flexibly.

Furthermore, some teachers were fixated on the "sequence" of reciprocal teaching implementation which resulted in them developing thinking process that is less about the reading material.

In addition, some teachers seemed rigid in following the stages of Reciprocal Teaching Training. Based on observations and interviews, some teachers are afraid of making mistakes while following these stages. Teachers

kept asking about the next stages, which led to them having to be guided step-by-step. When participants were given the freedom to practice reciprocal teaching, they were afraid of being wrong and instead chose to wait for instructions. The Reciprocal Teaching Training program is difficult to implement on rigid teachers.

Teachers who are rigid in thinking, who wait for guidance, and lacking the courage to try has the potential to hinder the Reciprocal Teaching process which fundamentally allows freedom to think about ideas in reading, based on their thoughts and prior knowledge. Freedom requires cognitive flexibility. In a literature [24] it is stated that the cognitive flexibility of teachers can be observed by students. Teachers who are seen by students as having cognitive flexibility are generally rated by students as teachers who show more engagement. Meanwhile, teachers who are seen by students as having less cognitive flexibility are considered to show less engagement as well as having a rigid mindset [24].

The reading process involves mental representations at various levels, such as phonological, orthographic, morphological, lexical, and semantic. Reading requires cognitive flexibility [25]. This cognitive flexibility is used in managing the types of information being read. Individuals with high cognitive flexibility appear to be more skilled at reading or managing information, compared to individuals with low cognitive flexibility.

Apart from the reading process, cognitive flexibility is also needed in teaching reading. When teachers teach reading, teachers need to coordinate information from multiple sources, information about teaching goals, and simultaneously, teachers need to respond to student responses, activity effectiveness, and student understanding. Effective literacy teachers can successfully perform these activities, and are able to adapt on-going learning to student responses flexibly. [25].

4. CONCLUSION

The results of the implementation of teacher training show that about 70% of teachers can use reciprocal learning in accordance with the expectations of the researchers. This is evident during the simulation of reciprocal learning training. However, the researchers also found that around 30% of teachers were less effective in implementing reciprocal learning. This is because they are less flexible in using cognitive strategies. These teachers were hampered in thinking about reading material due to their fixation on the sequence of steps in reciprocal learning. Thus, further efforts are needed to find training programs that are more suitable and adequate for teachers who are less flexible in thinking.

REFERENCES

[1]   D. Laurillard *et al.*, "A constructionist learning environment for teachers to model learning designs," *J. Comput. Assist. Learn.*, vol. 29, no. 1, pp. 15–30, 2013.

[2]   J. P. Allen, R. C. Pianta, A. Gregory, A. Y. Mikami, and J. Lun, "An interaction-based approach to enhancing secondary school instruction and student achievement," *Science (80-.).*, vol. 333, no. 6045, pp. 1034–1037, 2011.

[3]   D. Zhang and K. Koda, "Home literacy environment and word knowledge development: A study of young learners of Chinese as a Heritage Language," *Biling. Res. J.*, vol. 34, no. 1, pp. 4–18, 2011.

[4]   D. V. Dennis, "Are Assessment Data Really Driving Middle School Reading Instruction? What We Can Learn From One Student's Experience," *J. Adolesc. Adult Lit.*, vol. 51, no. 7, pp. 578–587, 2008.

[5]   A. B. Abeberese, T. J. Kumler, and L. L. Linden, "Improving Reading Skills by Encouraging Children to Read in School:," *J. Hum. Resour.*, vol. 49, no. 3, pp. 611–633, 2014.

[6]   H. L. Swanson and O. Jerman, "Working Memory, Short-Term Memory, and Reading Disabilities," 2009.

[7]   B. Rosenshine and C. Meister, "Reciprocal Teaching: A Review of the Research," *Rev. Educ. Res.*, vol. 64, no. 4, pp. 479–530, 1994.

[8]   N. Spörer, J. C. Brunstein, and U. Kieschke, "Improving students' reading comprehension

skills: Effects of strategy instruction and reciprocal teaching," *Learn. Instr.*, vol. 19, no. 3, pp. 272–286, 2009.

[9]   M. Tiatri, S., Jap, T., Mawardi, V.C., Kumala, "Pengembangan dan Implementasi Sistem Cognitive-Based Reading Reconstruction Untuk Penanganan Anak dengan Kesulitan Membaca (Studi 2: Pengkajian Terhadap Penanganan Anak Berkesulitan Membaca).," Jakarta, 2016.

[10]   M. Tiatri, S., Jap, T., Mawardi, V.C., Kumala, "Pengembangan Program Pembelajaran Resiprokal dengan Pendekatan Neurocognitive Learning untuk Meningkatkan Kompetensi Literasi Berbasis Digital Siswa Sekolah Dasar Guna Rekomendasi Kebijakan Pendidikan," Jakarta, 2019.

[11]   A. S. Palincsar and A. L. Brown, "<Palincsar Reciprocal Teaching.pdf>," no. 2, pp. 117–175, 1984.

[12]   C. J. Carter, "Why Reciprocal Teaching?," *Educ. Leadersh.*, vol. 54, no. 6, pp. 64–68, 1997.

[13]   P. Doolittle, D. Hicks, C. Triplett, W. Nichols, and C. Young, "Reciprocal teaching for reading comprehension in higher education: A strategy for fostering the deeper understanding of texts," *Int. J. Teach. Learn. High. Educ.*, vol. 17, no. 2, pp. 106–118, 2006.

[14]   J. A. Kulik and J. D. Fletcher, "Effectiveness of Intelligent Tutoring Systems: A Meta-Analytic Review," *Rev. Educ. Res.*, vol. 86, no. 1, pp. 42–78, 2016.

[15]   D. S. McNamara, "Self-Explanation and Reading Strategy Training (SERT) Improves Low-Knowledge Students' Science Course Performance," *Discourse Process.*, vol. 54, no. 7, pp. 479–492, 2017.

[16]   C. Johnco, V. M. Wuthrich, and R. M. Rapee, "Psychological Assessment Reliability and Validity of Two Self-Report Measures of Cognitive Flexibility Reliability and Validity of Two Self-Report Measures of Cognitive Flexibility," *Psychol. Assess.*, vol. 26, no. 4, pp. 1381–1387, 2014.

[17]   B. Rende, "Cognitive flexibility: Theory, assessment, and treatment," *Semin. Speech Lang.*, vol. 21, no. 2, pp. 121–132, 2000.

[18]   P. Colé, L. G. Duncan, and A. Blaye, "Cognitive flexibility predicts early reading skills," *Front. Psychol.*, vol. 5, 2014.

[19]   O. R. Anderson, "Neurocognitive bases for constructivism in education.," in *International Conference on Thinking & Education, Ponce, Puerto Rico*, 1999.

[20]   O. R. Anderson, "Progress in Application of the Neurosciences To an Understanding of Human Learning: the Challenge of Finding a Middle-Ground Neuroeducational Theory," *Int. J. Sci. Math. Educ.*, vol. 12, no. 3, pp. 475–492, 2014.

[21]   C. Brandoni and O. R. Anderson, "A new neurocognitive model for assessing divergent thinking: Applicability, evidence of reliability, and implications for educational theory and practice," *Creat. Res. J.*, vol. 21, no. 4, pp. 326–337, 2009.

[22]   C. Treagust, D., Mthembu, Z., Chandrasegaran, "Evaluation of the Predict-Observe-Explain Instructional Strategy to Enhance Students' Understanding of redox reactions," Iztok Devetak, Sasa Aleksij Glazar, 2014.

[23]   O. R. Anderson, "A neurocognitive perspective on current learning theory and science instructional strategies. Science Education," vol. 81, no. 1, pp. 67–89, 1997.

[24]   K. Cooper, S. K., Andrew, M., Tara, "Teachers'Cognitive Flexibility on Engagement and Their Ability to Engage Students: A Theoretical and Empirical Exploration.," 2018.

[25]   K. B. Cartwright, "Literacy Processes: Cognitive Flexibility in Learning and Teaching," New York: Guilford Press, 2008.