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#### THINK E-READER: PEDAGOGY-LED OPEN EDUCATIONAL RESOURCES FOR METACOGNITIVE COMPREHENSION SKILLS

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#### *Abstract*

Research has indicated that reading is a multifaceted, dynamic and meaning-making process, which entails the use of reading strategies and the types of reading materials. In that sense, the presentation of reading text is a critical and valuable component in developing metacognitive comprehension skills. Studies have found that elementary readers encountered difficulties in comprehending conventional printed texts which contain static and rigid presentation of information. Furthermore, both descriptive and experimental studies claimed that metacognitive comprehension skills play a significant role in enabling readers to be aware of what they read and make connections to the reading texts for meaningful understanding. With the ever-growing significance of metacognitive comprehension skills, this study mainly aimed at developing the skills among elementary readers through the innovation of Think e-Reader. Building upon the Experiential Learning Theory of David Kolb, Think e-Reader consolidates Open Educational Resources (OER) by transforming reading experiences for deeper cognitive processing. The findings of this study suggested that Think e-Reader has considerably engaged the elementary readers and developed their metacognitive comprehension skills by enabling them to respond rationally on interview questions related to planning, monitoring and evaluating cognitive processes. The participants were also able to perform in written tests consisting of arranging pictures in sequence and short comprehension questions. The findings have implications on learning and teaching reading comprehension practice of the learning centre in this study by optimising Think e-Reader that contains Open Educational Resources to address the educational gap.

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**Keywords:** Think e-Reader, pedagogy-led, open educational resources, metacognitive comprehension skills.



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## 1. Introduction

Reading is regarded as one of the primary means to acquire new information. In order to stay informed with the latest updates, to increase new knowledge and to have in-depth understanding of certain issues, we read, either through the conventional printed text or through digital media. Reading, however, involves multidimensional experience and multifaceted process which correlate with cognitive and affective engagement. Reading is an interactive, a dynamic and complex cognitive process (Karbalaee, 2010). It is also a meaning construction process (Fitrisia, Tan, & Yusuf, 2015). Readers interact with the text to derive meanings from it by integrating the new information with background knowledge and experiences. Skilled readers know how to make use of the contextual information to help them comprehend reading texts, even texts with unfamiliar vocabulary. They are able to make prediction and connection. They think aloud and continually monitor their own understanding while interacting with the texts. When they encounter problems in understanding what they read, unintentionally they are able to alternate the reading strategy to help them build connection with the meaning of the text for further comprehension. It is reported that skilled readers are active and reflective. They are more able to monitor and evaluate their cognitive processes when engaging in reading (Çakıcı, 2017).

In that, reading is an active and a reflective process by involving the writer, the reader, the text and the strategy in constructing meaning, which requires metacognitive comprehension skills. It is clearly evident that successful comprehension is associated with the effective use of metacognitive comprehension skills that interplay between the reading text and the thinking process. Metacognitive comprehension skills allow readers to control their cognition and experience through using functions such as planning for reading task, organising reading materials or resources, monitoring reading strategies used, and evaluating reading comprehension (Ahmadi, Ismail, & Abdullah, 2013). In other words, metacognitive comprehension skills provide an alternative for readers to coordinate their own cognitive process to construct meaning with the texts for deep understanding. It is essentially a higher order thinking skill that not only enables readers to capture the essence of what they read but also to analyse, control and evaluate their cognitive processes. It is thinking about thinking rather than passively receiving the message (Fisher, 1998).

Flavell (1979) and Brown (1978) are respectably regarded as the founders of metacognitive skills. They began their earliest studies on metacognition in the 1970s. Their profound theoretical and empirical studies provided insightful discovery on readers' reflective processes and how individuals' cognition affected their self-regulation in developmental progression and learning phases. The findings of their studies highlighted that elementary readers were rather incompetent in aspect of cognitive facts related to metacognitive skills, compared to skilled readers (Larkin, 2009).

To obtain comprehension at a desired level, it is necessary to improve metacognitive skills which involve planning, controlling and evaluating one's own cognitive processes. Readers with improved metacognitive comprehension skills can focus their attention better on reading tasks, distinguish between important and superfluous information, know how to apply various techniques to store information in memory, assess whether comprehension is achieved and make necessary adjustment. For instance, if a reader realises that he/she is having problem to understand a text, he/she may then make attempts to address this issue by employing different approaches such as re-reading the text, re-connecting the meaning of the

text, sourcing for background information or contextual clues that might make it easier to understand the overall purpose of the reading text.

Metacognitive comprehension skills involve the cognitive processes of planning, monitoring, and evaluating (Ahmadi, Ismail, & Abdullah, 2013; Çakıcı, 2017; Chamot & O'Malley, 1994; Dirkes, 1985; Djudin, 2017). Planning enables readers to plan and arrange their own comprehension process and make predictions about the text, while monitoring requires readers to check their comprehension, and evaluating assesses readers' comprehension level. The readers think aloud and review what they already know, what they still do not know, and how they can gain better understanding and apply what they know. Metacognitive comprehension skills ensure the readers have the capacity to build connections and make meaning from the reading texts. They are able to reflect on their own understanding, identify appropriate reading strategies while engaging in reading and manage their comprehension processes. When these elements of metacognitive comprehension skills are activated, readers will be able to comprehend the text, analyse critically and build connections to their background knowledge and experiences.

In the light of metacognitive comprehension skills play an outstanding role in effective reading comprehension, it is important to explore innovation that helps to improve the skills in order to determine how elementary readers who are yet to be skilled and competent can be directed to better monitor and control their cognitive process for active and in-depth understanding.

## **2. Problem Statement**

Studies on metacognitive comprehension skills demonstrated that elementary readers with low reading skills encountered difficulties in identifying key information, main ideas, supporting details and in making inferences when reading. They seemed to have limited ability to extract important points, to interpret messages delivered and to use contextual clues to help comprehend texts (Fitrisia et al., 2015; Kuruyer & Özsoy, 2016; Razi & Çubukçu, 2014).

This similar phenomenon occurred in a learning centre (homeschool) in Penang. The approach of reading fluently and correctly is much emphasized, however, the process of constructing meaning from the texts is neglected. The elementary readers in this learning centre do not attempt to examine the problem of the reading texts in depth. They ignore the importance of making connections or relating the information they read to their lives. More importantly, they focus on fluency and accuracy in reading. Therefore, most often, after reading a page or the whole text they realize they have not comprehended a single message.

Self-based learning is employed in this learning centre. The students are working individually in their own small cubicles on various packets of learning materials. They work according to their own pace and they do self-evaluation. Typical students work daily on one packet in each subject and may be performing at varying level for every subject depending on the diagnostic test. They have to complete 144 packets in the period of 12 years schooling. Conventional printed texts including books and worksheets are provided.

The conventional printed texts without much interactive features contain rigid and static presentation of information. This is found to be less popular among elementary readers especially when they need to work on the packets on their own. They are unable to interact with the texts and their active processing in thinking is inhibited. The texts seem irrelevant and meaningless to them as they are unable to establish the

association. To them, working through the pages they do not understand without much aid provided is deemed to be boring and dry.

How the reading materials promote active learning with metacognitive processing is a major concern in the reading lessons of the learning centre. In this 21<sup>st</sup> century, the world is changing rapidly and the use of technology is inevitable. Therefore, the potential of technology can be optimised for active learning especially among these self-based elementary readers who only possess low knowledge level, low reading skills, limited vocabulary and short attention span. They are in need of innovation that can help facilitate their learning to construct meaning by themselves and to interlink the message with their background knowledge on their own. Their capability of reasoning is yet to be maturely developed. Therefore, it is hardly possible for them to internalise information, actively relate the information to their daily experiences and reflect upon it by themselves with merely the rigid and static materials.

An innovative solution is therefore much needed to engage these self-based learning elementary readers so that they can interact with the reading texts in order to develop their metacognitive comprehension skills and to become active readers. The reading materials need to be made meaningful to them and filled with fun interaction so that the elementary readers can engage in reading cognitively and emotionally. In consideration of interactive and exploratory features are able to engage elementary readers for deeper cognitive processing, Think e-Reader (as illustrated in Figure 01) was designed and developed in this study to hyperlink stories to interactive Open Educational Resources (OER) of similar theme to facilitate deep learning and metacognitive comprehension skills development. Think e-Reader engages the elementary readers to continually process the contents from different aspects by interacting with information associated with arts and crafts, virtual tours, video clips, animated explanation, games, online quizzes, picture galleries, and virtual experiments, which offer a variety of learning activities related to similar theme.



**Figure 01.** Think e-Reader

### 3. Research Questions

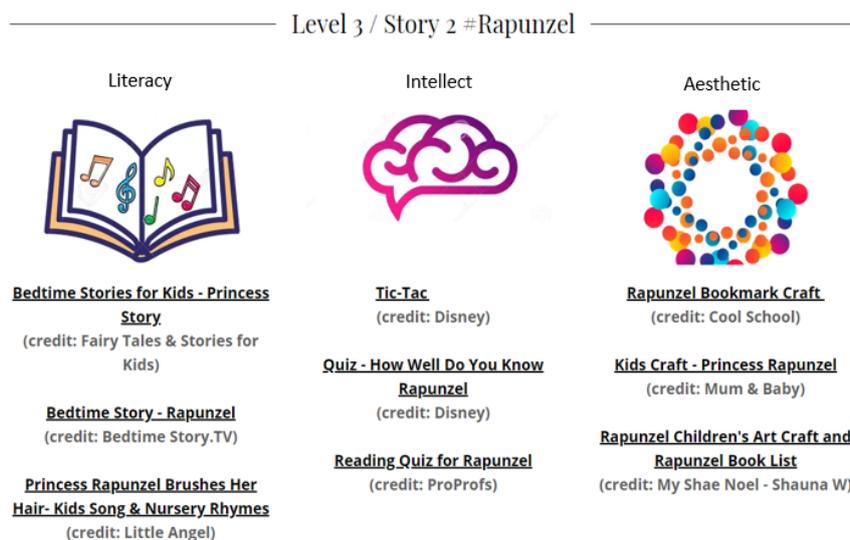
The aim of the study was therefore to investigate the following questions:

Research Question 1: Can elementary readers answer questions related to planning, monitoring and evaluating cognitive processes after using Think e-Reader?

Research Question 2: Does Think e-Reader improve elementary readers' reading comprehension?

### 4. Purpose of the Study

The overall aim of this study was to contribute to developing metacognitive comprehension skills among elementary readers through the innovation of Think e-Reader. Think e-Reader is an open platform that consolidates the Open Educational Resources (OER) by pedagogically selecting quality and relevant resources, and arranging the resources to encompass the three distinct domains of holistic development, which are literacy, intellect and aesthetic, as illustrated in Figure 02. Holistic development that focuses on wholeness is taken into consideration to promote more balanced reading experiences.



**Figure 02.** Holistic Development

In the design and development of Think e-Reader, Open Educational Resources (OER) are the main intended contents to be used. In considering OER are available at minimum cost or at no cost, the accessibility rate is much higher as it is more affordable for small-scale educational institutions to make use of the resources to improve their learning and teaching practice. According to UNESCO, OER refer to any printed or digital learning and teaching materials, and even research materials that are shared in the public domain or released with an intellectual property license which allows for open access, adaptation and distribution with fewest restriction possible. The provision of OER is to overcome the educational gap and to foster educational justice. It is hoped that small-scale educational institutions, such as the learning centre (homeschool) in this study can make use of the carefully selected and pedagogically arranged OER in Think e-Reader to address the gap of metacognitive comprehension skills among elementary readers. In

the strong wave of OER, this little learning centre with only approximately 35 students in total should not be marginalised.

Looking at the current advanced Internet infrastructures where broad coverage and high usage can be supported at extremely low cost, the vast resources are now easily accessible. Internet-based resources should be utilized at optimal level in education for non-commercial purpose. Since the birth of the Web in 1990, open access to online courses, books, scholarly publications, images and artwork have uncontrollably expanded. The number of available free resources have been lost count, and there are more and more institutions join the waves of producing OER at their own capacity. In 2013, there is already a record of more than 2900 institutional and cross-institutional open access repositories registered in the Registry of Open Access Repositories (ROAR), hosted by the University of Southampton (Tuomi, 2013). To-date, the repositories have rapidly grown larger, including OASIS, Merlot, Connexions, OER Commons, Orange Grove, and many more. In addition, there are also multimedia open access repositories available, such as TED, Khan Academy, PhET Science Simulations, Jamendo, and so on.

The emergence of freeware and shareware in the software community began in the 1980s. With the legitimate use of copyright practices, the open access of software grew tremendously. This idea of tapping the legitimate use of copyright for open access enlightened David Wiley to use it in the educational context. The term 'Open Content' was then coined by him in 1998 (Grossman, 1998). Given the value of Open Content, the Creative Commons initiative was rapidly developed. Lawrence Lessig and his collaborators formally launched it in 2002 (Plotkin, 2002; Tuomi, 2013). The term 'Open Educational Resources (OER)' was created at the UNESCO forum 2002. Open Educational Resources (OER) refer to any types of educational materials released under the open license either in printed or digital forms, such as handouts, images, books, online quizzes, and the like. No-cost access is permitted and depending on the creators' desires the materials are allowed for 5Rs (retain, reuse, revise, remix and redistribute) with no or limited restrictions. With the options of more affordable and more accessible OER as the main contents, Think e-Reader was designed and developed to benefit the global readers to enhance their metacognitive comprehension skills and it is particularly beneficial to small-scale educational institutions which lack of funding to enrich their English reading lessons.

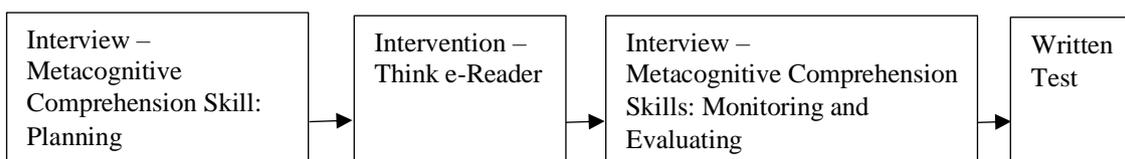
Think e-Reader is built upon Experiential Learning Theory (Kolb, 1984) which emphasizes on the learner's internal cognitive processes. Learning is the process whereby comprehension is achieved through the transformation of experience. Taking Think e-Reader as example, the readers build their concrete experiences by interacting with the OER related to the reading theme through listening to the songs, watching video clips, reading ebooks, doing arts and crafts, and other activities. This is the monitoring cognitive process of metacognitive comprehension skills. Readers are aware of the strategies used. They then review and reflect their experiences through the online quizzes in Think e-Reader. By engaging with the quizzes, they conceptualise their understanding. Ultimately, they relate their learning to the events and people in their daily lives. This is the evaluating cognitive process of metacognitive comprehension skills where the readers are able to internalise the information, to analyse and make judgement independently.

## 5. Research Methods

Action research was employed in this study to reflect on the current learning and teaching practice of the English reading lesson in the learning centre (homeschool) in Penang, Malaysia and to improve it for further enhancement by investigating the implementation of Think e-Reader and its effects on the cognitive processes of metacognitive comprehension skills of the elementary readers. Action research is commonly used by practitioners including counsellors, school principals, teachers and other stakeholders to address concerns closest to them by examining their own practice and improve it in the context where they belong to. It is a form of systematic self-reflective inquiry. Action research is different from traditional research in which the practitioner and the researcher of the study are the same person with the purpose of self-improvement to achieve learning outcomes. The research findings are particularly applicable within the context of the practitioner's environment. For instance, teachers involved in action research making attempts to understand their own educational practice, monitoring continually the engagement and progress of students, and then making adjustment accordingly for further improvement. In contrast, the main research aim of traditional research is to contribute to new body of knowledge of the particular field by testing a theory and making generalisation about the research findings (Efron & Ravid, 2013).

This study was carried out on a group of ten students aged between seven and eight years from the elementary level of the learning centre (homeschool) in Penang, Malaysia. The elementary students engaged interactively in five sessions of 30-minute reading lesson by exploring the OER of similar theme contained in Think e-Reader until they completed the whole module. There were two cycles of action research being conducted on two stories that have similar word count and of the same level. The first cycle was done on the story of 'Hansel and Gretel'; while the second cycle was done on the story of 'Rapunzel'.

Interviews were conducted with the ten participants before and after the intervention. The interview questions were formulated based on the three metacognitive comprehension skills. Before the intervention, the participants were interviewed on question pertaining to planning cognitive process. Then, they proceeded with the intervention for five sessions. After the intervention, the participants were then interviewed on questions related to monitoring and evaluating cognitive processes. A written test was conducted at the end of the interview to assess their comprehension towards the story. There were two parts in the test. In Part A, participants were asked to re-arrange the pictures according to the sequence of the story; while in Part B, participants were required to answer four short comprehension questions. The research procedure is illustrated in Figure 03.



**Figure 03.** Research Procedure

## 6. Findings

The responses of the interviews on the first cycle were presented in Table 01.

**Table 01.** Interview Responses on ‘Hansel and Gretel’

<b>Student No.</b>	<b>Metacognitive Comprehension Skill: Planning</b> <i>Look at the picture of the story. Do you think you will learn ‘something’ once you have finished the reading?</i>
1	Maybe, if the story is easy to understand.
2	I don’t know. What’s the story about?
3	Yes, I have read it before.
4	Teacher, I think I remember the story.
5	Not so sure worrr... maybe, I can learn more words.
6	Yes, I want to be like the children, to always think, think, think.
7	Sure, I remember it. It is so interesting. They can escape.
8	Maybe no, Teacher. The names are difficult.
9	I think so...
10	The children looked smart.
<b>Student No.</b>	<b>Metacognitive Comprehension Skill: Monitoring</b> <i>What is the most difficult part to understand this story?</i>
1	In the forest.
2	Their house because of the bad stepmother.
3	To kill the witch.
4	The witch.
5	Find the way home and go to the witch house. And go home.
6	The witch tried to eat Hansel.
7	In the forest and candy house.
8	It is when Hansel and Gretel got stuck in the forest.
9	They don't have money.
10	Hansel and Gretel to help protect my sister and take my family and go home.
<b>Student No.</b>	<b>Metacognitive Comprehension Skill: Evaluating</b> <i>Do you like this story? Why?</i> <i>What is the moral of the story? What do you learn about this story?</i>
1	Yes, because story was fun. I want to be like Hansel and Gretel. Don’t give up.
2	Yes, because the story is good. I learn to use the rock to find my way to go home.
3	No, because it is simple. (Yes, because of the treasure!) I learn to be independent.
4	Yes, because I like Gretel and she is good. and pretty. And this story says not to follow strangers. Need to be careful of bad people.
5	Yes, because I like Hansel and Gretel. I learn to take care of my sister.
6	Yes, because I like Gretel she is smart. Learn who is good and who is bad.
7	Yes, because I like the candy house. Hansel and Gretel candy house. I wish to have one.
8	Yes. Because it teach to be smart. I won't be bad like the witch. I will not wander alone.
9	Yes, because Gretel is very clever. Cannot simply eat anything that people give to me.
10	Yes, because it is awesome Hansel and Gretel help each other like me and my sister. My father and my mother. Look like Hansel and Gretel. Have four family. I will not eat people give me bad things. Need to know the way home.

The responses of the interviews on the second cycle were presented in Table 02.

**Table 02.** Interview Responses on ‘Rapunzel’

<b>Student No.</b>	<b>Metacognitive Comprehension Skill: Planning</b> <i>Look at this picture and the title. Have you ever read this story before? Yes - Do you remember what it was? Was it interesting? Why? No - Do you think it will be interesting? Why?</i>
1	Yes, about a princess with golden hair. I don't like the story. It's scary.
2	Yes, the long hair girl. No. It's not nice. Got the witch.
3	I have not seen it. I think I'll like it. I want to have long hair.
4	Yes, I see before. But, I can't remember. Teacher, what is it about?
5	I think got. I think got long hair and tall tower.
6	No, I haven't read yet. I don't know the story nice or not.
7	I think so. I think it is a sad story...
8	Yes. About prince and princess.
9	No. What' is that? It is so adventure. Can climb with hair.
10	Got. The prince died.
<b>Student No.</b>	<b>Metacognitive Comprehension Skill: Monitoring</b> <i>When you go through the activities, do you think they help you understand the story better? Why?</i>
1	Yes, I can keep watching.
2	I like the arts and craft.
3	I made the princess with very long hair.
4	Yes, I can remember the story again.
5	I like computer. I can click.
6	The song is nice. I can do the exercise.
7	Yes. I can do many things.
8	Yes, it is fun.
9	Got movie, story, song. I can make the princess.
10	Yes. I like it. Got youtube.
<b>Student No.</b>	<b>Metacognitive Comprehension Skill: Evaluating</b> <i>Do you think you learned something from the story? What is that? Do you think there is someone that loves you just like how the Prince loved Rapunzel? Why?</i>
1	The prince never gave up. My Daddy always tells me never give up. He is my prince.
2	Don't believe the witch. Yes, my mummy. I make her angry. She still buy me toys.
3	Need to be strong. To win the witch. My mum. She said I am her precious.
4	I want to be the prince. Protect my JieJie. I always fight with her. But, she still help make my bed.
5	Love. Cannot be like the witch. Won't be happy. Yes, it's my mummy. She loves me so much, and I love her too.
6	The prince try his best. Papa. He is my super papa. He try to fix things for me.
7	Need to protect children. Yes, my Dad. He always plays with me. And, my mummy. She always cooks nice food.
8	Don't mix with bad friends, like the witch. I have many best friends. They like me.
9	Cannot be greedy like Rapunzel's mummy. My mummy love me. But, Rapunzel's mummy don't love her.
10	Rapeunzel's papa love the mummy. My papa also loves us. He always work hard.

The results of the written tests on ‘Hansel and Gretel’ and ‘Rapunzel’ are presented in Table 03.

**Table 03.** Results of Written Tests

Student No.	Hansel and Gretel - Scores	Rapunzel - Scores	Difference
1	50%	60%	10%
2	40%	90%	50%
3	70%	100%	30%
4	40%	60%	20%
5	70%	70%	0%
6	30%	60%	30%
7	50%	50%	0%
8	80%	90%	10%
9	70%	50%	-20%
10	60%	90%	30%

The findings from both the interviews indicated that thinking process was taken place. The responses reflected the participants thought through before answering the questions rather than simply provided any answers. Instead of telling they couldn’t remember, were unable to recall or just mentioned they did not know, deep thinking occurred. They were able to relate the story to their daily lives and integrate the new information with prior experiences. Internalisation of information happened. By interacting with Think e-Reader, they had more time to pause, think and interconnect. For instance, while the participants were doing the arts and crafts, their minds were processing the details of the story; while they were singing the song, they were actually summarizing and synthesizing the story. When the participants had doubts on the story, they selected other OER with different learning activities to help them interconnect the story with their prior knowledge and experiences. Think e-Reader provides a platform for the elementary readers to explore deeper level in their thinking process by developing the metacognitive comprehension skills. They are more able to plan, monitor, evaluate and reflect on their cognitive processes while interacting with Think e-Reader.

The results of the written tests demonstrated that the participants in overall performed better in the second cycle. In the first cycle, the participants might be over-excited on the new intervention which distracted their attention. They might be not so well-versed in navigating Think e-Reader in the first cycle. When coming to the second cycle, Think e-Reader had become part of their learning tool and they were more able to concentrate on their learning. The scores they achieved in the written tests considerably highlighted they were able to comprehend the stories and mastered the key information.

## 7. Conclusion

Overall, this study has demonstrated that Think e-Reader is a strategic channel for elementary readers to develop their metacognitive comprehension skills. With the OER on various learning activities encompassing literacy, intellect and aesthetic, the elementary readers are allowed to process the information from different aspects in deeper level. They are able to pause and reflect upon their understanding, and then select another learning activity to help them re-connect and reconstruct the meaning. Through the concrete

experience of interacting with Think e-Reader, the abstract conceptualisation is formed as postulated in Experiential Learning Theory (Kolb, 1984).

Furthermore, this study also emphasizes on the use of Open Educational Resources (OER). With the initiative of UNESCO on providing learning opportunities to all, educational institutions especially those operate in small-scale without much fund should make use of OER which are free to adopt and adapt by acknowledging the originators for the benefit of the learners. With this initiative, educational gap can be addressed and educational justice can be promoted. With OER philosophy as the main content of Think e-Reader, new learning opportunities to reach the global elementary readers for enhancing their metacognitive comprehension skills are unlocked.

The findings put forward the implication to the learning centre (homeschool) in this study to plan and design the reading lessons by integrating quality and relevant OER in the learning and teaching process to improve the current practice of being able to develop metacognitive comprehension skills among the learners so that they are able to internalise the information they read for deep processing. For future research, Think e-Reader is proposed to include other subjects with more levels to expand its potential.

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