Game-Based Reading Instruction: Insights from Student Perceptions Using Digital Jigsaw Puzzles

Samsul Arifin [1], Alfiyatu Nuuriyyah Aa Minatul Imaamah [1], Dwi Rosita Sari [1]

[1] *Universitas PGRI Madiun, Setiabudi 85A, Madiun, Indonesia*

Abstract – **Indonesian students' reading literacy is still categorized as low, according to the PISA 2022 results. This fact improves efforts to familiarize reading at any educational level, including the school teaching-learning process. The research aims to discover students' perceptions of both affective and micro-skills of reading assisted with digital jigsaw puzzles. The study was a descriptive qualitative design involving junior high school students in Indonesia. In-depth interviews and observations collected the data. The data is analyzed through interactive analysis or three flows of thought. The findings show widespread affective perceptions of the learning reading using digital jigsaw puzzles. In addition, digital jigsaw puzzles raise students' positive perceptions of understanding the following reading macro-skills: the gist, main idea, explicit information, reference words, and inference. However, few students struggle to find implicit information and word meaning due to limited vocabulary mastery and rush time. All in all, digital jigsaw puzzles can be a preferential instruction to enhance students' reading literacy.**

Keywords – **literacy, reading, gamification, digital jigsaw puzzles, students' perception.**

1. Introduction

In the 2022 Program for International Student Assessment (PISA), Indonesia ranked 71st out of 81 participating countries. PISA measures students' reading, numeracy, and science skills at school levels. Although there has been an increase compared to 2018, Indonesia's PISA level has remained low and needs improvement. Indonesian students experience difficulties understanding foreign affairs, unfamiliar topics, and text formats, which reduces their motivation to read English texts [1]. The students are challenged to become strategic readers who can quickly comprehend textual information, develop reasoning, and include critical reflection on the text when reading [2].

On the other hand, reading plays a significant role in an individual's life success. Mastering reading skills allows students to access information from various sources better and acquire relevant new knowledge in education, science, economics, politics, and technology [3], [4], [5]. Reading skills are also essential for understanding explanations and smoothening business affairs, such as making a mutual understanding of business agreements [6], [7]. Thus, continuing to innovate and facilitate students' reading activities is essential.

Many reading instructions can assist students' reading activities, including game-based learning. Game-based learning is preferential since it encourages students to complete tasks in a fun way. It incorporates play elements in the learning context, which increases students' understanding, motivation, and engagement [8], [9], [10], [11]. Game-based learning facilitates knowledge acquisition and a better classroom environment [12], [13], [14].

With the advancement of technology trends in 21st-century teaching of reading, game-based learning with digital jigsaw puzzles can be an option. Digital jigsaw puzzles encourage effective learning, motivation, cognitive collaboration, and reading achievement [15], [16].

Digital jigsaw enriches students' understanding of the text by providing context visualization, offering access to various interactive reading exercises, and improving cognitive problem-solving skills, reasoning, memorization, and concentration [17], [18].

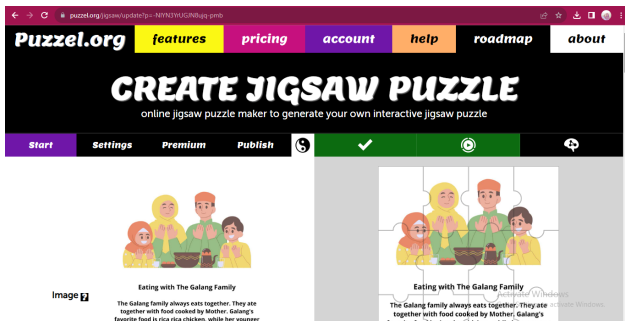Digital Jigsaw puzzles can be created from the following online web sources:

Figure 1. Digital jigsaw puzzle online sources

Figure 1 shows a tool for implementing game-based reading instruction. This digital jigsaw puzzle game can be created online using the puzzel.org website. Students can sort the pieces directly using electronic media such as laptops and mobile phones, which helps them familiarize themselves with the latest technology.

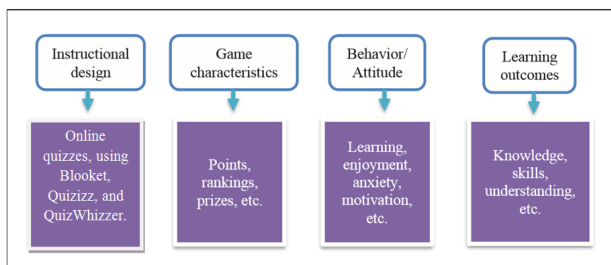The framework of reading instruction through game-based learning is presented:

Figure 2. The framework of game-based reading instructions

Figure 2 shows the stages of game-based reading instructions. Continuously maintaining students' learning interests is crucial during the teaching-learning process. Students should keep reading to achieve knowledge, skills, and understanding. Points, rankings, and prizes can be implemented to run challenging activities. Furthermore, reading excitement can be created with group discussion to win the games of reading.

Thus, the research aims to understand students' perceptions of implementing game-based learning with digital jigsaw puzzles to teach reading.

The perceptions are divided into students' affective feelings once they get involved in reading activities and their expressions of how the digital jigsaw puzzle affects their macro reading skills.

2. Methodology Section

The study was conducted using a qualitative research design. The participants were thirty-four-eight graders of a junior high school in Madiun, East Java, Indonesia. They varied from the age of thirteen to fourteen years old. The data were obtained through observation and interviews conducted over about six months. The observation activity was carried out internally, where the researcher got involved in the learning process along with the participative students. The other three observers took part in the learning process. Researchers also used electronic aids to record student interactions during learning. The records supported additional data, got in-depth data from complex settings, and eased the analysis process. The interview session was conducted with sixteen students. They were selected using a non-probability sampling technique. The participants belonged to members of four groups: the winner, the fastest task completion, the last task completion, and the enthusiastic ones. The researcher used a structured interview to formulate and arrange the questions. The details of these interview questions were presented as follows:

Table 1. The interview questions

No.	Aspects	Interview Questions
Q1.	Gist	How does game-based learning using digital jigsaw puzzles affect your reading skills in finding the topic?
Q2.	Main Idea	How can game-based learning with digital Jigsaw puzzles help you convey main ideas better?
Q3.	Explicit Implicit Information	Does game-based learning with digital jigsaw puzzles assist you in finding explicit and implicit information?
Q4.	Word Meaning / Synonym	After practising reading activities using game-based learning with digital jigsaw puzzles, can you find synonyms for words quickly?
Q5.	Reference Word	Is finding reference words using game-based learning with digital jigsaw puzzles easy?
Q6.	Inference	Can you find the conclusion better after practising reading using game-based learning with digital jigsaw puzzles?

Table 1 shows the interview questions adapted from six aspects of micro-reading skills from Brown [19]. The aspects include gist, main idea, explicit and implicit information, word meaning, reference word, and inference. The data gained from the interview were then analyzed using data reduction, presentation and display, and conclusion/ verification techniques [20]. Reduction is done by making summaries and writing notes to eliminate irrelevant data/information. The data reduction was taken from the record of the teaching-learning process, class observation, and the results of the students' interviews. The data presentation displayed annotations in narrative text, diagrams, and graphs. Moreover, the researchers concluded with the results of the analysis. The researchers used triangulation to verify the result of observation and interview.

3. Results

3.1. The School Settings

The selected sample, a junior high school in Madiun whose name was unpublished, was accredited with a grade A issued by the Indonesian National Accreditation Board. It is labelled as a school that continuously maintains academic quality, assists students' productivity, and collaborates with various parties to support the teachers' and students' development. The teaching and learning process runs with the assistance of technological advancements such as laptops and mobile phones. There are 714 students divided into 202 seven-graders, 198 eight-graders, and 211 nine-graders.

3.2. The Result of the Observation

The classroom learning runs sequentially following the teaching module. The teacher started with a trigger question to motivate students to participate actively. Before the game began, the teacher asked students to divide into several groups. Each group consisted of four students, with six groups formed. The teacher shared the link to a digital jigsaw puzzle. The teacher explained the instructions for playing, earning points, and the game rules. After that, the students played online digital jigsaw puzzles. They were allowed to discuss with friends to complete the task. The teacher decided the game-winner by showing each group and individual score. Lastly, the teaching reflection was carried out together.

The observation result showed that the teacher enthusiastically ran the teaching-learning process. The students experienced the same feeling during the lessons. They were actively challenged to get many points.

Students showed confidentiality following the activity. They could easily find the gist/ topic, main idea, explicit and implicit information, word meaning, reference word, and inference.

3.3. The Result of the Interview

The student's perception toward the implementation of the digital jigsaw puzzle is presented as follows:
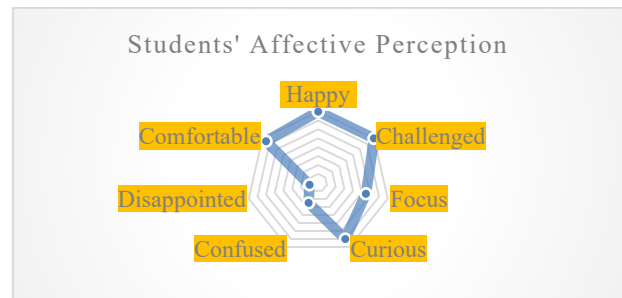

Figure 3. The students' affective perception

Figure 3 shows that students precepted differently, one after another. All interviewed participants expressed happiness, challenge, and focus. The student's curiosity and focus varied in number. Almost none of the respondents indicated disappointment and confusion. The details are:

3.3.1. Happy

The students experienced reading happiness by using digital jigsaw puzzles. Some data shows:

> "Yes… happy… because I like to play games. It is easier to understand the text." (Participant No. 3)
> "Because it is fun to read and easier to understand. The brain quickly finds the story's topic." (Participant No. 5)

The results show that digital media brings learning pleasure and creates a sense of love for reading. The participants experienced simplicity in comprehending the passage. They also enthusiastically interacted with friends while smiling and laughing.

3.3.2. Challenged

Digital jigsaw puzzles caused students to feel challenged and made learning more exciting. Several participants responded:

> "When we start reading, we challenge ourselves to finish the game immediately. We focus more on reading the text to find the appropriate pieces of puzzles." (Participant No. 1)
> "Competing against other groups, we must immediately understand the reading." (Participant No. 6)

Participants felt challenged to complete the task faster than other groups. They could complete the game well by arranging the puzzle pieces correctly.

3.3.3. Curious

Conducting game-based learning with digital jigsaw puzzles led to curiosity. Two of the responses are displayed.

> "We are fastening to assemble the puzzle ourselves, making remembering and understanding the story easier." (Participant No. 2)
> "The learning makes curious about the information in the puzzle pieces." (Participant No.3)

The students read the text continuously. They were curious about the text and how to arrange the information, which was separated into puzzles.

3.3.4. Focus

The students could focus on reading better with digital jigsaw puzzles. Few data show:

> "We have to answer the questions immediately and get points, focusing on finding a reading topic to correct the answer." (Participant No. 9)
> "It is more helpful than regular learning because we are focused on reading the puzzle, so you know how to play with the idea." (Participant No. 13)

Students read the text with focus, comprehend the text better, and answer questions quickly.

3.3.5. Comfortable

Digital jigsaw puzzles made students comfortable in the classroom and made learning more accessible. Respondent's state:

> "If you find a piece in order correctly, you can find the reference word. It is comfortable to work together because we can ask another friend without worrying about being scolded by the teacher." (Participant No. 12)

Students found it easy to participate in learning. Intensive communication between group members created comfort.

3.3.6. Confused and Disappointed

Most students expressed their satisfaction with the implementation of the digital jigsaw puzzle. They mostly had no problem with the learning.

3.4. The Strengths and Weaknesses of Digital Jigsaw Puzzle to Teach Reading

The researcher formulated the analysis results from in-depth interviews into several reading objectives. They discover the gist, main idea, explicit and implicit information, word meaning, reference words, and inference. The data is presented as follows:
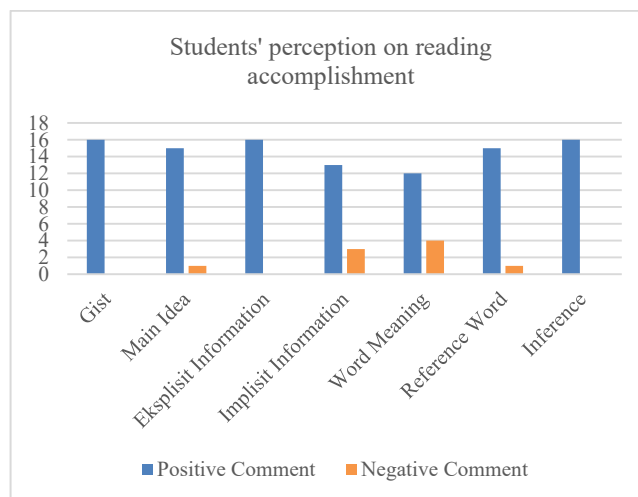

Figure 4. The students' perception of reading accomplishment assisting with digital jigsaw puzzle

Figure 4 shows the students' perception of using digital jigsaw puzzles as an assistance tool to teach reading. The figure shows that most students commented positively on five aspects (71% indicators of reading comprehension): finding out the gist, main idea, explicating information, reference word, and inference. Meanwhile, a few students found it difficult to understand the implicit information and word meanings with the assistance of digital jigsaw puzzles. The detail was described as:

3.4.1. Gist

All respondents, 16 students, gave positive comments on the assistance of digital jigsaw puzzles to ease finding out the gist of the text. The data from the interview shows:

> "Because I like to play games, it is easier to understand and find the topic of reading while arranging the puzzle." (Respondent No. 3)

It can be concluded that digital jigsaw puzzles help students understand the text. After successfully compiling puzzles, students can quickly grasp the gist.

3.4.2. Main Idea

Students' success in discovering main ideas with the assistance of a digital jigsaw puzzle reached 15 positive and one negative comment. Several responses are presented.

> "It makes us remember the story better when looking for puzzle pieces." (Respondent No. 4)
> "We can know the idea correctly if we find the right puzzle piece." (Respondent No. 10)
> "It is more helpful than ordinary learning because we focus on reading to know the main idea and find the correct pieces." (Respondent No. 14)

However, one of the students provided negative comments, which also showed the weaknesses of using digital Jigsaw Puzzles in reading activities.

"I had difficulty finding it because the time given was too fast, and there were too many readings." (Respondent No. 11)

It shows that digital jigsaw puzzles foster the student's ability to find the main ideas, but they are weak because they require too much time.

3.4.3. Explicit Information

All 16 students expressed that they could find explicit information about the text using the digital jigsaw puzzle. The obtained data from interviews shows:

"The learning makes us curious about the information in the readings in the puzzle pieces." (Respondent No. 3)

"It is beneficial, as each piece connects to the other and shows that explicit information is quickly found." (Respondent No. 8)

"I read it focusing on finding the right piece, and it looks informative." (Respondent No. 9)

"Each puzzle piece can help me remember the content because they have interconnected reading content." (Respondent No. 16)

The data shows that the digital jigsaw puzzle helped students find explicit information in the text.

3.4.4. Implicit Information

Thirteen students, or about 81% of respondents, commented positively on how digital jigsaw puzzles helped them find the implicit information, and three students (19% of respondents) stated contractedly. The interview results presented:

"It is not easy because I need to learn what some words mean." (Respondent No. 11)

"Finding the implicit information is complex, and I need clarification about finding the answer." (Respondent No. 15)

The data shows that digital jigsaw puzzles benefit most students, even though some argue they do not significantly assist in finding implicit information due to only following friends' answers.

3.4.5. Word Meaning

Digital jigsaw puzzles increased students' awareness of word meaning with 12 positive commands among all 16 respondents. Meanwhile, 25% of respondents commented negatively. Some students found finding words with the same meaning in the text was challenging. The data was presented:

"It is easy because the game is fun, and you can look for the correct meaning by discussing it with friends." (Respondent No. 2)

"Yes, you can because you know what it means." (Respondent No. 10)

Furthermore, some negative comments were:

"It was difficult because I did not know the meaning of some English words, so I was even more confused." (Respondent No. 6)

"I did not find a synonym because I was confused about which part to look for, so I just joined my friend." (Respondent No. 11)

The data shows that most students had difficulties finding synonyms even with the assistance of digital Jigsaw puzzles.

3.4.6. Reference Word

Students' success in understanding reference words using digital jigsaw puzzles was expressed in 15 positive comments and one negative response. The interviews mention:

"It makes us remember more words related to the reading material when looking for puzzle pieces." (Respondent No. 1)

"It is easy to find synonyms because I remember the story posted earlier in the puzzles." (Respondent No. 10)

"Yes, because if you find the pieces in order, you can see the reference word correctly. Moreover, being together like this is comfortable, so you can ask friends without worrying about being scolded by the teacher." (Respondent No. 12)

The students expressed their delight in finding the word's meaning with digital jigsaw puzzles. Group discussions and puzzles helped the process of finding ideas run smoothly.

3.4.7. Inference

All students felt they could draw conclusions better after playing the game and structure the text correctly. The data are presented:

"…of course, I can find the conclusion because I know the essence of the story and how to assemble the puzzle." (Respondent No. 11)

"I can conclude the story more easily because I remember the story better after playing the game earlier." (Respondent No. 15)

It can be concluded that a digital jigsaw puzzle helps students compile inferences better because they understand the story better while playing the game.
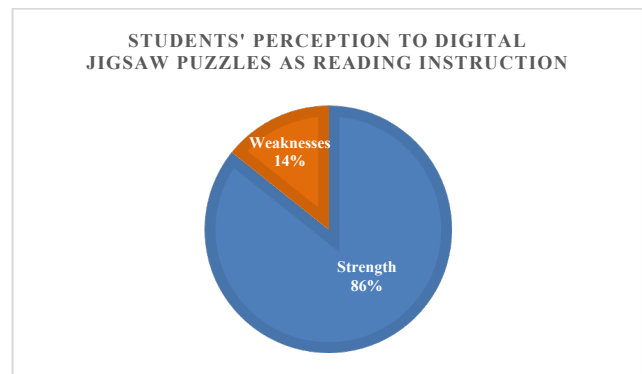

Figure 5. The strengths and weaknesses of digital jigsaw puzzles as a reading instruction

Figure 5 presents the benefits and drawbacks of digital jigsaw puzzles to teach reading. 86% of respondents expressed feelings of happiness, challenge, curiosity, focus, comfort, critical thinking, and creativity. In the goal of macro reading skills, students can easily find essential aspects, namely the discovery of the gist, main ideas, explicit information, reference words, and interference. As for weakness, 14% were found to have confused and disappointed feelings. Then, in the goal of macro reading skills, students have difficulty finding two critical aspects, namely the discovery of implicit information and word meaning or synonym.

4. Discussion

Various feelings arise from different students' perspectives in implementing digital jigsaw puzzles in reading activities. Research conducted by Permatasari and Wienanda found that students' emotions significantly influence learning outcomes and motivation to participate in reading activities [21]. Implementing digital jigsaw puzzles prevents students from needing clarification about finding word meanings/synonyms. Even if some students respond negatively due to a lack of vocabulary mastery, discussions with friends can be an alternative to answering questions. After completing the game and the teacher showed the results of the points of each group or individual, some students cheered, "Yeah". Other groups declared to be defeated might show disappointment. However, students could still complete the reading activity despite losing the game. Students continue gaining new knowledge using game-based learning with digital jigsaw puzzles.

The results of positive comments from students showed that they were happy with learning, so they were more focused on finding the right pieces. This trains the brain to work more critically. This is supported by previous research by Yolida and Marpaung, concluding that applying puzzle media to learning reading can improve students' critical thinking skills [22]. By thinking critically, students can easily find the gist of the text while completing the puzzle pieces. The gist broadly refers to what is being discussed in the text, followed by the discussions later.

Most students can find the main idea quickly after successfully compiling the puzzle. The students had no difficulty remembering information after playing a digital jigsaw puzzle. The research supported them carried out previously by Nazilah et al. concluded that puzzle media can improve children's cognitive abilities, including students' ability to remember, process information, and connect it into a complete piece [23].

The use of puzzles has succeeded in producing cognitive skills, especially the ability to remember so that students can learn while playing in class. With the ease of remembering information and the feeling of joy experienced by students in class, it is easy for them to find the main ideas in reading texts. However, some students considered the time given too fast.

The positive comments from students showed that they were happy with learning. It leads them to be more focused and curious. With the emergence of this curiosity, they are actively preparing puzzles and searching for answers so that it is faster for them to find explicit information in the text. The finding aligns with Nasri et al., who found that puzzle learning media makes students actively participate in learning and discuss with friends [24]. The results of the research observation show that it is easy to get class participation by using puzzle learning media. The digital jigsaw puzzle causes students to be more active and provides a sense of curiosity and focus in compiling and finding something precisely and openly.

The students also had difficulty finding word meanings, as the observation records showed that some students used bots or Google Translate. The results of previous research by Styaningrum concluded that mastery of vocabulary and grammar significantly affects reading comprehension [25]. This means more vocabulary and grammar knowledge is needed in reading activities. A reference word is a way of expressing something using other words. This aspect requires students to understand several pronouns in the text. If students succeed in knowing who is meant in the mention, they will better understand the storyline in the text.

Digital jigsaw puzzles help students find reference words in the text. This aligns with research observations that show that students can discover references quickly after successfully compiling puzzles. The positive comments show that students were more comfortable as they could ask questions to friends more freely. This is supported by Calkins and Rivnay, who state that using puzzle games gives students the benefit of thinking comfortably through games to solve problems related to the subject being learned [26]. By thinking comfortably and having no worries, the students can easily find reference words in the reading text.

Digital jigsaw puzzles make it easy for students to find the inference. When students can review the conclusions or inferences obtained from reading activities, it indicates that the learning objectives can be achieved. The students' positive comments from students showed that they were more focused on finding the right pieces.

This trains the brain to work more critically. As supported by Hoerunisa and Suherdi, "students' creative process in the classroom using jigsaw puzzles leads them to make the correct conclusions according to their understanding" [27].

5. Conclusion

Students expressed happiness, challenge, curiosity, and focus when using the digital jigsaw puzzle to assist reading. None of the respondents indicated disappointment or confusion. The digital jigsaw puzzles also helped students better understand the text. The respondents comment positively on reading indicators of gist, main idea, explicit information, reference words, and inference. Meanwhile, few students express themselves differently regarding implicit information and word meaning. Thus, digital jigsaw puzzles are preferential to media instruction in teaching reading.

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