

ANALYSIS OF NEEDS FOR THE DEVELOPMENT OF LEARNING GAME MEDIA ON CELL RESPIRATION MATERIALS

Istuti^{1*}, Sutarno², Slamet Santosa³

¹²³Master Program in Biology Education, Faculty of Teacher Training and Education, Sebelas Maret University, Surakarta, 57126, Indonesia

*istie@student.uns.ac.id

ABSTRACT

To find out the appropriate learning media used by a teacher when teaching, it is necessary to do a needs analysis. The rationale for this study was to analyze the needs of students and teachers for learning media for cell respiration. This research is descriptive quantitative research using a questionnaire. The population and sample are 72 grade 12 students and 20 Biology teachers in Wonogiri Regency for the 2021/2022 academic year. Questionnaires were developed from indicators of learning media needs and difficulties in learning cell respiration material. The results of the questionnaire were analyzed using the formula $P=F/N$, where P is the percentage of student scores; F is the frequency of student scores; and N is the number of students. The results of the study revealed that (1) 70% of the teachers said that cellular respiration is a difficult subject to teach; (2) As many as 75% of teachers said that learning media was the most dominant problem in teaching cell respiration material; (3) As many as 75% of students admit that cellular respiration is difficult to understand; (4) As many as 83% of students chose game learning media to assist in mastering cell respiration material.

Keywords: *Game Learning, Cell Respiration, Learning Media, Needs Analysis*

1. INTRODUCTION

Based on data on the results of grade 12 students' odd semester SMA Negeri 1 Pracimantoro in 2019, 2020, and 2021, it shows that the lowest score is Cell Respiration material. Especially in 2020 and 2021, student scores show a very significant decline. The author's initial assumption after making observations is that there is an effect of the Covid-19 pandemic which forces students to study online from home. Parents are forced to provide learning facilities for their children, either in the form of laptops, computers, cell phones, or internet networks. Students who carry out learning from home are not able to follow it well. Most of them are taking advantage of the momentum of this pandemic to satisfy themselves by playing with their respective devices.

According to research by Chang & Yeh (2021), game media attracts students more to engage in learning, interaction, and sharing knowledge, thus contributing a lot to increasing learning motivation and critical thinking. Chang added that the game approach has many advantages, including more focused concentration, practising brainstorming, active participation, logical thinking, and student interaction. This game-based learning can be used as a good approach to learning to increase students' motivation, share knowledge, and think critically (Chang & Yeh, 2021).

This study aimed to analyze students' needs for learning cell respiration material, explore the factors that cause low student learning outcomes, and provide appropriate learning media according to needs. In the future, it is hoped that researchers can develop learning games into fun media for students, to improve Biology learning outcomes, especially Cell Respiration material.

2. LITERATURE REVIEW

2.1 Learning Game Media

Research results from Zairi *et al.* (2021) the use of games in learning can develop critical thinking and problem solving for students. According to Snyder and Snyder in Zairi *et al.* (2021), students must have a lot of training, practice, and patience to produce critical thinking skills. Critical thinking allows students to develop other skills, such as increased concentration and deeper analytical skills.

Games are works of art that aim to entertain, intrigue, challenge, and sometimes cause addiction. Game Learning is an application or game software designed for educational and learning needs, to be able to improve certain skills in students. Game learning is made with certain steps and sequences to motivate students to follow the procedures and rules of the game in a disciplined manner to improve their skills (Novayani, 2019).

Game learning aims to stimulate thinking and increase focus in solving a problem. The characteristics of students who have high curiosity make it easier for them to jump-start their potential through game learning (Widyastuti & Puspita, 2020). According to Rahardja *et al.* (2019), characteristics game learning is a technology product that is usually used for entertainment, leisure, for study. Game learning can also be used to record and strengthen students' memories of theories and scientific concepts obtained from the school. Game learning which is based on Android, allows students to install it on their cell phone devices to be stored and accessed at any time without time limits.

Game learning can also be used for the assessment process directly through analytic data that can be accessed by the teacher, as long as students are enjoying their games. Visual information dashboards can be used by teachers to keep control over student progress and actions, without disturbing their activities, so that evaluation of student knowledge can be known after playing games (Calvo-Morata *et al.*, 2019).

In their research, Chen & Wu (2021) found that digital games (digital games) improve students' critical thinking significantly. Kong in Chen & Wu (2021) claim that game learning is the most ideal, a game that is taken from students' daily lives. How to design games learning can make students focus and get into the game.

2.2 Cell Respiration

Cell respiration is an essential material in grade 12. This material is considered difficult for students to understand. The low-test score on this material is because the material concept of cell respiration is very complex and abstract. Students have difficulty associating one concept with another concept. Except for Biology, cellular respiration also involves other disciplines, namely Chemistry and Physics. Machshunah (2019) mentions concepts that students often complain about in understanding cellular respiration and tend to generate misconceptions, namely the stages of aerobic respiration, the function of the oxidative decarboxylation stage of pyruvic acid, the Krebs cycle, and anaerobic respiration.

Cellular respiration is a biology material that discusses chemical reactions that involve changes in organic and inorganic compounds that occur in the body (cells). This process takes place in the body with the help of enzymes which involve basic concepts of energy changes, biochemistry, and anatomical physiology (Saputri et al., 2019).

Cell respiration has biochemical concepts, which are difficult for students to understand. The number of chemical formulas and reactions makes students find it difficult to master this material. The concept of cellular respiration has different characteristics from other Biology material concepts so students have difficulty adapting to the concept. Students find it difficult with new information, theories, techniques, concepts, and new terminology, so most of them prefer to remember concepts without understanding them (Fauzi, 2018).

3. METHODS

3.1 Research Methodology

This research is descriptive quantitative research, using a random sample collection technique. The focus of this research is the analysis of students' needs for learning media on Cell Respiration material. The population and sample used were 72 grade 12 students and 20 Biology teachers in Wonogiri Regency for the 2021/2022 academic year. Data collection techniques in this study were observation, interviews, and questionnaires. The questionnaire used was in the form of a Google form and distributed via a link. Questionnaires are used to collect data on student needs in studying Cell Respiration material. Interviews were conducted with 20 Biology teachers in Wonogiri Regency to gather data relevant to students' needs.

3.2 Data Analysis

The questionnaire was developed from indicators of learning media needs and difficulties in learning Cell Respiration material. The results of the questionnaire were analyzed using the formula according to Sugiyono in Yunus & Fransisca (2020), namely:

$$P = \frac{F}{N}$$

Where:

Q: Percentage of student scores

F: Frequency of student scores

N: Number of students.

4. RESULTS & DISCUSSION

The results of the analysis of students' needs (table 1), obtained data 75% of students admit that cell respiration is material that is difficult to understand. The reasons put forward were that there were many Biology terms, lots of memorization, analytical nature, abstract nature, and lots of chemical reactions. As many as 92% of students admit that Biology teachers use Android-based learning media when teaching, but only 17% use it in Cell Respiration material. Students experience the benefits of using Android-based learning media in the learning process. They find it easier to understand the material, more interesting and can learn anytime and anywhere. As many as 83% of students chose game media to assist in mastering cell respiration material. Their reason is that game media is more fun, they can learn while playing so they can more easily understand the material and it's not boring.

Table 1. Results of Analysis of Learning Media Needs and Difficulties in Understanding Cell Respiration Material

| No. | Question | Alternative Answers | % |
|-----|--|---|----------------------|
| 1. | Has your biology teacher used Android-based learning media in the learning process? | Once Not yet | 92 8 |
| 2. | If so, in what material? | Genetics cell division biotechnology cell respiration | 36 27 18 17 |
| 3. | In your opinion, what are the benefits of using Android-based learning media in the learning process? | The material is easy to understand More interesting material Can study anywhere and anytime | 58 25 17 |
| 4. | Do you experience difficulties in metabolizing materials, especially cellular respiration? | Can No | 75 25 |
| 5. | Why is cellular respiration such a difficult material? | lots of biological terms many chemical reactions analytical abstract a lot of memorizations | 33 25 17 8 |
| 6. | What android-based learning media do you choose to assist in mastering metabolism material, especially cell respiration? | Game Video | 83 17 |
| 7. | Why choose this medium? | More fun | 33 25 |

| | | |
|--|--|----|
| | It's easier to understand the material | 25 |
| | Not boring | 17 |
| | Play while studying | |

Complex and abstract cell respiration material, of course, cannot be learned by relying solely on memorization. Students who think that biology is a rote subject will have difficulty finding relationships between concepts that are quite complicated in this material. Students' imagination in describing the abstractness of the concept of cell respiration, will not be sufficiently formed just by memorizing foreign terms and the complexity of chemical reactions (Machshunah, 2019).

One way to teach cell respiration material is fun learning. Balakrishnan et al. (2016) stated that games are a fun learning approach. In games, other approaches can be achieved from a cognitive aspect, namely analyzing and creating. In the end, the learning also trains higher-order thinking skills, creative thinking, analytical and reflection.

Table 2. Results of Interviews with Biology Teachers

| No. | Question | Alternative Answers | % |
|-----|--|---|----------------------|
| 1. | How long is the teacher's experience in teaching class XII biology? | 0-10 years 11-20 years 21-30 years > 30 years | 70 15 10 5 |
| 2. | While you were teaching biology, in your opinion, which material or KD was considered quite difficult to convey to students? | Cell respiration genetics photosynthesis evolution | 70 20 10 10 |
| 3. | What is the dominant thing that becomes a difficulty in the material/KD that you face? | Instructional Media Learning methods | 75 25 |
| 4. | Do students experience a decrease in learning motivation, curiosity, and learning outcomes during teaching the material/KD? | Can No | 80 20 |
| 5. | When face-to-face, what learning model did you use in teaching the material? | Discovery PBL Inquiry Other | 45 25 10 20 |
| 6. | What learning media do you use in teaching the material? | Video PowerPoint Books Game | 55 25 10 10 |
| 7. | It is hoped that in the development of which learning aspects do you need at this time? | Instructional Media Learning methods | 65 35 |

The results of the analysis of the needs of Class XII Biology teachers in Wonogiri Regency (table 2), as many as 70% of teachers admit that cell respiration is the most difficult material to teach. As many as 75% of teachers said that learning media was the most

dominant problem in teaching cell respiration material. Biology teachers in Wonogiri hope that there will be development in the aspects of learning media for cell respiration material by as much as 65%. In comparison, the other 35% want the development of learning methods.

The learning model that is often used is discovery learning, as much as 45%. The rest use inquiry learning models, problem-based learning, and others. Discovery learning is a learning model that is felt to be the most appropriate to be used to teach cell respiration material by Biology teachers in Wonogiri. The learning media that they usually use are videos as much as 55%, PowerPoint 25%, and books and games each as much as 10%.

Game learning can be used as an approach to effective learning because it can improve students' critical thinking skills and learning motivation. Inside characteristics game learning is to give assignments or questions that encourage students to use their thinking skills to solve problems systematically (Yenprem, 2022).

5. CONCLUSION

The results of the study revealed that as much as 70% of the teachers said that cell respiration is a difficult subject to teach. As many as 75% of teachers said that learning media was the most dominant problem in teaching cell respiration material. As many as 75% of students admit that cell respiration is a material that is difficult to understand. As many as 83% of students chose game learning media to assist in mastering cell respiration material.

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