

Analysis Validation and Practicality of Crossword Puzzle Learning Media in Science Subjects for Class VII in Junior High Schools

Yulia Nofriza^{1*}, Zelhendri Zen¹

¹ Program Studi Magister Teknologi Pendidikan, Sekolah Pascasarjana Universitas Negeri Padang, Padang, Indonesia.

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Corresponding Author:

Yulia Nofriza

yulianofriza@gmail.com

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Abstract: This research aims to develop Crossword Puzzle Learning Media in Science Subjects for Class VII in Junior High Schools that are valid and practical for use in science learning. The learning tools were developed using the ADDIE model which includes Analyze, Design, Develop, Implement and Evaluate. The finished media is then tested for product validity, practicability and effectiveness, before it meets the requirements to be used as a learning aid. The validity test results show that the learning media has a percentage value between 83% and 98%. This shows that the device is categorized as very valid for use in science subjects for class VII in Junior High Schools. Apart from that, the results of the teacher and student practicality tests show that the learning media has a percentage of 92% and 91% in the very practical category.

Keywords: ADDIE; Crossword puzzles; Learning media

Introduction

The Science is a type of science that serves as a forum for exploring knowledge about the world around us in more depth and encourages students to develop creative thinking about life and the natural environment (Gresinta et al., 2023; Jannah et al., 2021). Apart from that, learning can also be an opportunity for students to collaborate in planning, implementing, communicating experimental results and various findings in a systematic, interesting and scientific manner (Constantinou et al., 2018). By applying a scientific approach, students are expected to be able to hone critical thinking skills such as processing and compiling relationships between various information, analyzing, evaluating, concluding, and applying concepts learned in the context of new situations (Wahyuningsih et al., 2019). It is hoped that the recent rapid development of science and technology will be able to motivate students to adopt a critical thinking attitude towards subject matter, not just follow what is in books or what the

teacher teaches. Therefore, student involvement in science learning activities plays an important role in achieving learning objectives (Luckin et al., 2019; Ramdani et al., 2021; Suryawati et al., 2017).

Based on the results of observations and interviews conducted by researchers in August 2023 with UPTD teachers at SMP Negeri 1 Luak District, it appears that the learning carried out still tends to be centered on the role of the teacher. Of the 28 existing teachers, it was found that only 9 (32%) teachers used science and technology-based media in the learning process, namely in the form of PowerPoint slides and learning videos downloaded from YouTube. In general, the learning media used so far are textbooks, charts and models that are available at school, as well as the use of objects directly around the school. Learning strategies like this occur repeatedly for each subject matter which can possibly lead to student boredom. Even though media has been used, this condition has not been able to improve learning outcomes significantly. It was found that the number of students who achieved or exceeded

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the specified Learning Goal Completion Criteria (KKTP) was still limited, generally only around 5-10 people out of a total of 28 students in each class VII.

During the observation process, it was seen that the implementation of learning activities in the classroom did not fully reflect the creation of a learning atmosphere that focused on students. The material is delivered through existing media using the lecture method. Students are generally passive, they pay attention to the teacher's explanation and follow the teacher's instructions. If they are shown a learning video, they are fixated on observing, but after being asked questions only a small number are able to answer. When discussing, students find it difficult to ask questions, provide responses, let alone convey ideas. This happens because students' learning readiness in terms of understanding the material is far from perfect. The lack of prior knowledge has a significant impact on the way students understand the following material. Initial knowledge will not be created if students are lazy about repeating previous lessons, let alone lazy about reading the lesson material before the lesson starts. In general, reading activities are activities that are less interesting for students. They are more likely to be interested in playing online games rather than focusing on learning activities, as a result of online learning during Covid-19. In general, the learning process has not created an interactive atmosphere, either between teachers and students or among students. Teachers also do not optimize the use of other learning resources. Teachers need to diversify learning media to improve students' thinking abilities and encourage their active participation.

Interviews with science teachers indicated that students' attention and interest in science subjects was still lacking, especially in the material on the classification of living things. They consider that the material contains many new terms and Latin that need to be memorized in addition to mastering concepts. There are abstract concepts such as microscopic living creatures, their characteristics are difficult to detect so they are overwhelmed in classifying these living creatures. This makes students lazy to study. As a result, the expected student competencies cannot be achieved properly. Therefore, it is necessary to use media that can facilitate students' understanding, attract their attention in following the science learning process, and create an interactive and enjoyable learning atmosphere.

The material on the classification of living things discusses the characteristics of living things, classifying living things, the use of determination keys, the scientific nomenclature of living things according to the Binomial Nomenclature system, as well as classifying the five kingdoms consisting of monera, protista, fungi, plantae, and animalia. To carry out classification, students must

be able to identify the characteristics of living things first. Considering the variety of living things, from the simplest level to the most complex level, the many scientific terms that need to be memorized and understood, students are required to be serious about reading literature repeatedly. However, the activity of reading subject matter is an activity that students are less interested in.

In general, this situation is reflected in the UPTD education report for SMP Negeri 1 Luak District in 2022, that students' literacy skills are in the medium category (67.39%) of students have reached the minimum competency for literacy (reading). The data above indicates that literacy problems are also an aspect that needs to be improved in all subjects, including science subjects. From the results of an interview with the head of UPTD SMP Negeri 1 Luak District, it was revealed that in order to improve students' literacy competence, the school through the learning community conducted training for teachers in formulating literacy questions. All subject teachers are advised to get into the habit of giving questions that can improve students' literacy skills. Literacy skills should be able to support the implementation of active and effective learning, foster critical thinking skills, develop creativity, increase self-confidence and communication skills, and can even foster leadership skills (De la Hoz et al., 2021; Gómez-García et al., 2020; Muijs et al., 2017). Teachers are required not only to be ICT literate (Information, communication, Technology) but also to be able to follow trends in student behavior in using ICT as a whole (Lawrence et al., 2018). One solution that can be implemented to overcome this problem is through the development of relevant and effective learning media.

Learning media is anything that can be used to convey messages from the sender to the recipient, with the aim of stimulating students' thoughts, feelings, interests and attention so that a learning process occurs (Efendi, 2023; Faishol et al., 2022; Haleem et al., 2022). Along with this, Abdulrahman et al. (2020) stated that the existence of learning media has the potential to facilitate teaching and learning activities, which in turn can improve the quality of the learning process and students' learning achievements. Thus, teachers need to continue to update their knowledge about technological trends and use them wisely in the learning context (Burbules et al., 2020). This will not only provide new insights to students regarding the use of technology, but can also create a learning environment that is dynamic and relevant to their needs (Liu et al., 2022; Thurzo et al., 2023; Tsankov et al., 2019).

In this digital era, the use of technology in learning has become a necessity (Raja et al., 2018). However, simply relying on technology alone is not enough. It is important for teachers to understand how to utilize

technology effectively to enhance learning (G. S. S. Lin et al., 2023). In addition, efforts need to be made to create an inclusive learning environment, where every student feels heard and valued. A student-centered approach, collaboration between students, and the use of relevant resources are also key to enriching the learning experience. In order to achieve this, researchers are trying to develop learning media that is tailored to students' interests which will enable them to stimulate their involvement in the learning process. The media development is in the form of a Crossword Puzzle (Kaynak et al., 2023).

Crossword Puzzle is a game that is of interest to various levels of society, both men and women of various age groups (Kalkan et al., 2022; Shawahna et al., 2020; Tosunöz et al., 2023). Thomas et al. (2020) stated that one learning approach that focuses on students involves the use of games in implementing teaching and learning activities, including Crossword Puzzles in both paper and digital form. These games create a competitive environment in which students follow established rules, while attempting to achieve challenging goals. Through this game, students quickly become actively involved in the learning process, while helping to attract their attention to understanding topics or developing certain skills (Hsu et al., 2023; M.-H. Lin et al., 2017; Niculescu et al., 2022).

Hapsari et al. (2023) in their research stated that the use of Crossword Puzzles as a learning medium can act as an effective learning tool. This media not only invites students to learn in a fun way, but also encourages the development of enthusiasm and interest in the learning process (Bawazeer et al., 2022; Chen et al., 2022). Apart from that, the use of Crossword Puzzles involves students in playing activities which in turn helps train students' patience and accuracy in completing assignments or solving problems (Qutieshat et al., 2022). In conclusion, the use of crossword puzzle media can make a positive contribution to increasing student enthusiasm for learning and achievement. In line with this, Yousof's (2023) research suggests that Crossword Puzzles as a medium in learning are able to generate direct competition and have an impact on students' motivation to always achieve the best performance, train critical thinking skills and other abilities. Students' active involvement in the learning process is emphasized through the activity of completing the crossword puzzle (Huang et al., 2020; Sari et al., 2023; Yousof et al., 2023). They are directly involved in the construction of their own knowledge through interaction with new information. This process can improve social interaction and communication skills because completing the game can encourage collaboration and cooperation among students (Wulandari et al., 2018). By integrating games into

learning activities, it is hoped that it can create an interesting and fun, interactive and effective learning atmosphere, with the aim of improving the quality of the learning process and outcomes in the science field.

Based on the description above, the author is trying to develop crossword puzzle learning media in science subjects for class VII in junior high schools. This development is expected to increase students' motivation and involvement in the learning process, facilitate understanding of the material through an interactive and creative approach, and support the development of science literacy skills and understanding of relevant vocabulary.

Method

Crossword puzzle learning media in science subjects for class vii in junior high schools was developed using the ADDIE model (Branch et al., 2023). ADDIE is an abbreviation for Analyze, Design, Develop, Implement, and Evaluate. The steps of the ADDIE model can be explained in Figure 1.

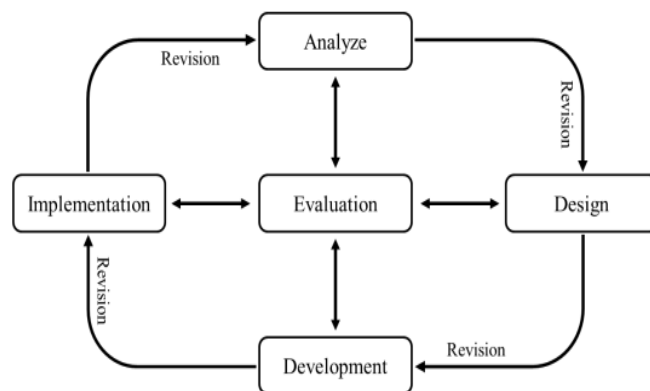


Figure 1. ADDIE model development procedure

The finished media is then tested for product validity, practicability and effectiveness, before it meets the requirements to be used as a learning aid. The data on the validity and activity of the media obtained were then analyzed to determine the level of suitability and activity of the media in facilitating students' understanding of science learning material, especially the content of the classification of living things.

The validity data was analyzed using Equation 1, then to determine the level of validity of the crossword puzzle learning media in science subjects for class VII in junior high schools, it can be seen in Table 1.

$$Validity\ value = \frac{Total\ score\ obtained}{Highest\ score} \times 100\ \% \tag{1}$$

Table 1. Criteria for Determining Validity Levels (Riduwan, 2013)

Achievement Rate (%)	Category	Criteria
81-100	Very valid	Very good to use
61-80	Valid	Can be used after minor revision
41-60	Valid enough	Can be used after major revision
21-40	Invalid	Cannot be used
0-20	Very Invalid	Cannot be used

The activity data was analyzed using equation 2, then to determine the level of practicality of the crossword puzzle learning media in science subjects for class VII in junior high schools, it can be seen in Table 2.

$$\text{The value of practicality} = \frac{\text{Total score obtained}}{\text{Highest score}} \times 100 \% \quad (2)$$

Table 2. Criteria for Determining Practicality Levels (Riduwan, 2013)

Achievement Rate (%)	Category	Criteria
81-100	Very Practical	Very good to use
61-80	Practical	Can be used after minor revision
41-60	Practical enough	Can be used after major revision
21-40	Not Practical	Cannot be used
0-20	Not Very Practical	Cannot be used

Result and Discussion

Validation of Crossword Puzzle Learning Media in Science Subjects for Class VII in Junior High Schools

After the learning media has been developed, the next step is to test the success of the media by validating the product. The product validation process is carried out after the initial product is created and involves three important aspects, namely: design validation by media experts, material content validation by material experts, and language quality validation by language experts.

Product validation aims to evaluate whether the product that has been developed meets feasibility standards or still requires revision (Doyan et al., 2022). In developing this crossword puzzle media, validation involved 6 experts, namely 2 media experts, 2 material experts, and 2 language experts. Researchers provide four crossword puzzle learning media links with material on the classification of living things which consists of 4 parts, namely, Characteristics of living things (part 1), Classification of living things (Part 2), Classification of living things (Kingdom monera, protista and fungi) (Part 3), Kingdom plantae and Animalia (Part 4).

a) Results of learning media validation by media experts

Validation of crossword puzzle learning media by media experts was carried out to obtain media experts' views as a basis for improving or improving the quality of learning media. The media validation process involves two media experts. Validation by media experts includes aspects of media appearance, media elements, media readability and media use. Data regarding the validation results of crossword puzzle learning media in science subjects for class VII in junior high schools with a focus on material on the classification of living things by media experts can be seen in Table 3.

Table 3. Media Validation Results by Media Experts

Aspects assessed	Validator Media		Average
	1	2	
Media display	80%	93%	87%
Media elements	87%	93%	90%
Media readability	80%	85%	83%
Use of media	88%	96%	92%
Average	84%	92%	88%

Based on an evaluation carried out by 2 media experts on the crossword puzzle learning media, the validity level reached 88%, classified as very valid and the media is suitable for use, however several revisions are still needed to improve the quality of the media.

b) Results of validation of learning media by material experts

Validation of learning materials by material experts aims to use their point of view as a basis for improving the quality of the learning media being developed. The material validation process involves two material experts. Validation by material experts includes aspects of suitability to the curriculum, suitability to the level of student ability, media coverage, media presentation, and media advantages. Data regarding the results of material validation in crossword puzzle learning media in science subjects for class VII in junior high schools with a focus on material on the classification of living things by material experts can be seen in Table 4.

Table 4. Media Validation Results by Material Experts

Aspects assessed	Material Validator		Average
	1	2	
Conformity to the curriculum	100%	100%	100%
Suitability to the level of students' abilities	100%	100%	100%
Media coverage	100%	100%	100%
Media presentation	100%	93%	97%
Media advantages	95%	95%	95%
Average	99%	98%	98%

The results of the evaluation carried out by 2 material experts on the crossword puzzle learning

media, the validity level reached 98%, it can be concluded that the suitability level of the media is considered very valid and suitable for use, however there are still slight revisions to improve the quality of the media.

c) Results of validation of learning media by language experts

Validation of learning media by language experts aims to obtain views from language experts as a basis for improving the quality of learning media. The language validation process also involves two language experts. Validation by a linguist includes aspects. Data regarding the results of material validation in crossword puzzle learning media in science subjects for class VII in junior high schools with a focus on material on the classification of living things by material experts can be seen in table 5.

Table 5. Media Validation Results by Linguist Experts

Aspects assessed	Language Validator		Average
	1	2	
Conformity with Indonesian language rules	80%	90%	85%
Sentence appropriateness	75%	100%	88%
Suitability to the level of development of students	75%	80%	78%
Average	77%	90%	83%

Based on the evaluation carried out by 2 language experts on the crossword puzzle learning media, the validity level reached 83%. It can be concluded that the suitability level of the media is considered very valid and suitable for use, however there are still several revisions to improve the quality of the media.

Practicality of Crossword Puzzle Learning Media in Science Subjects for Class VII in Junior High Schools

After learning in class, students and teachers are asked to do a practicality test. The results of the practicality evaluation by teachers and students are shown in table 6.

Table 6. Recapitulation of Practicality Test Results

Respondent	Percentage	Category
Teachers	92%	Very practical
Students	91%	Very practical

From the evaluation carried out by the teacher, data was obtained regarding the practicality of the crossword puzzle learning media in science subjects for class VII in junior high schools regarding material on the classification of living things, the result was 92% in the very practical category. Likewise, the practicality evaluation by students showed an average score of 91%, also meeting the very practical criteria.

From the practicality evaluation by teachers and students, it can be concluded that the crossword puzzle learning media in science subjects for class VII in junior high schools on the classification of living things is very practical.

Conclusion

The development of crossword puzzle learning media in science subjects for class VII in junior high schools has been successfully carried out. The validity test results show that the learning media has a percentage value between 83% and 98%. This shows that the device is categorized as very valid for use in science subjects for class VII in junior high schools. Apart from that, the results of the teacher and student practicality tests show that the learning media has a percentage of 92% and 91% in the very practical category.

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