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Validity of the Role-Playing Game (RPG) Educational Game Thermochemical Concepts as an Independent Learning Media

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Abstract

Technological advances can be used to simplify the learning process. This use includes the use of games as a product of technological progress. Games make the concepts presented interesting. One type of game that can be used is a role-playing game (RPG). RPG games are games that focus on story and character development. Students often lack the motivation to learn. Apart from that, students also have difficulty learning thermochemical concepts. This study aimed to describe the validation of thermochemical concepts RPG game learning media based on the assessment of material experts and media experts. Assessment is carried out using a validation sheet. This study used a research and development (R&D) method. Then the results obtained are divided into very valid, valid, quite valid, invalid, and very invalid. Based on the material expert's assessment, the thermochemical concepts RPG game learning media was rated very valid (89%), and based on the media expert's assessment, it was rated as valid (80%), so the learning media developed could be implemented.

Keywords: RPG Game, Validation, Thermochemical

INTRODUCTION

The world of education has developed rapidly. This development can be seen from the large use of technology in learning. Technological developments provide teachers with the opportunity to develop learning media that involves delivering messages (concepts) from the instructor (teacher or lecturer) to the recipient (students) (Ismayanti et al., 2024; Panggabean et al., 2022). Learning media can help make the delivery of concepts interesting and improve the quality of learning (Lubis et al., 2023). In addition, learning media can help interactions between teachers and students so that learning activities will be more effective and efficient (Hazumi, 2020).

The use of technology in learning can be found in the use of games as an alternative learning medium that is more interesting and fun. Games are not a new concept. Specifically, the concept that emerged following technological advances gave rise to the term educational games, special games that contain concepts, so that players' ability to learn concepts increases (Wibawanto, 2020). In the context of learning, games can increase student motivation through challenges, curiosity, and fantasy (Narawati, 2025). Students can also learn independently while improving their understanding of the subject matter by providing direct feedback, rules, and setting, to achieve some form of goal and opportunities to learn from failure (Atoulloh et al., 2024; Allsop & Goldsmith, 2015).

At home and abroad, games have been widely used by educators as a learning medium. The game is repetitive and addictive, making the concepts presented to the players interesting (Wibawanto, 2020). The two steps of learning are supported by the game-based learning approach: First, encouraging students to integrate information from many fields and apply it to their decision-making process; and second, assessing students by varying the game results according to their choices and decisions (Adipat et al., 2021).

One type of game used as an alternative learning medium is RPG games. Role Playing Game (RPG) is a type of game that has a complex storyline, where the player plays the role of the main character in the game (Harianto & Yenti, 2021; Rahman & Angraeni, 2020). RPG games can be a resource with the potential to help the teaching and learning process, considering the context of learners immersed in digital culture (Alves et al., 2023). And also based on research (Prager, 2019), students who play educational RPGs tend to have high interest and levels of independent learning. Wildana et al. (2020) said RPG games are also effective in learning. Apart from that, the use of RPG games can also increase students' level of proficiency in chemistry (Chen et al., 2014). Based on research on the development of RPG game learning media for reaction rate material conducted by Harianto & Yenti (2021), the material validity percentage was 80% and the media validity percentage was 75%. The learning media were declared valid.

The study of matter, energy, and their interactions is known as chemistry (Sausan et al., 2020). Chemistry learning includes two aspects, namely aspects that can be observed directly through the senses as real facts, and aspects that cannot be seen by the senses but can only be understood logically (Khoiorni et al., 2023). This makes chemistry a complex subject (Sa'adah, 2023). Chemistry concepts are generally abstract (Liana, 2021) and require strong reasoning skills to understand (Kurniawan & Hidayah, 2021).

One of the basic concepts of chemistry is thermochemistry (Inayati et al, 2022). The abstract concept in thermochemistry is illustrated by the concept of heat transfer accompanied by chemical reactions, where the heat transfer cannot be observed directly (Babys et al., 2024). This makes most students tend to feel confused in understanding it, resulting in students being lazy about studying chemistry. The lack of variety in learning media also makes students easily bored and less motivated. To overcome this problem, efforts are needed to develop interesting and enjoyable learning media. Because if students are interested in learning, learning activities will be carried out effectively (Anggraemi et al., 2023).

Based on the results of an interview with one of the class XI chemistry teachers, it is known that students lack motivation to learn. Apart from that, students also have difficulty

learning thermochemical concepts. This is because the media that have been used in chemistry teaching and learning activities are still dominated by conventional learning using student worksheets and occasionally PPT. This is in line with (Suri et al., 2022), who stated that students are not motivated to learn because teachers carry out the learning process without utilizing technology. Meanwhile, the time available tends to be limited to accommodate all concepts that must be studied. As a result, many students feel lazy about studying or repeat lessons they find difficult during free time or at home, even though they were exposed to gadget usage (Nuñez, 2024). This causes students' low understanding of thermochemical concepts (Verdina et al., 2018)

Referring to the background that has been explained, researchers feel it is necessary to study the use of RPG games on Android smartphones as a learning medium, especially for chemistry learning. By developing this Thermochemical concepts RPG Game, it is hoped that students will be able to understand the concepts independently, easily, and in fun.

METHOD

This research used research and development (R&D) method. Apart from producing products, the R&D method is also used to test the effectiveness of a product (Sugiyono, 2018). The approach in this research is the quantitative approach. A quantitative approach is taken to measure a phenomenon using quantitative values (Pandey et al., 2023). The researcher maintains as much distance as possible from the research subjects. The relationship between the researcher and the observed subjects (respondent group) is bridged solely by the structure of the questionnaire. Data collection and analysis are not based on perceptions, value judgments, or attitudes toward the observed subjects (Djafar et al., 2024).

The model chosen in this development research is ADDIE, which includes five phases: Analysis, Design, Development, Implementation, and Evaluation (Paramata et al., 2024; Kurniasih & Suningsih, 2025; Aldoobie, 2015). These phases must be carried out sequentially and cannot be done randomly. In this article, we will only discuss the analysis phase until the development phase.

The initial phase in this research is analysis, namely analyzing problems and potential. At this phase, researchers analyze problems and potential. To find these two things, we conducted interviews with teachers at one of the Islamic senior high schools in Banjar, Banjarmasin. Then, proceed to the design phase, namely creating a product design. In this case, the product being developed is an RPG game learning media with thermochemical concepts. The next phase is development. The product was developed using RPG Maker MZ software. After that, referring to research (Perdana et al., 2023), the product was validated by

material experts and media experts (validators) using a validation sheet. The instruments used in validation were in the form of questionnaire sheets, namely material validation sheets and media validation sheets with indicators prepared by the researcher (Handican et al., 2022). The validation sheet is arranged according to a Likert scale. The scale consists of four scales, which are given a score of 1 to 4 with certain levels of answers.

Then the validation results obtained from the experts are converted into percentages. The percentage results are then interpreted in a qualitative sense based on the criteria in Table 1.

Table 1. Categorization Criteria for the Validity of RPG Game Results

Interval (%)	Category
81 - 100	Very Valid
61 - 80	Valid
41 - 60	Quite Valid
21 - 40	Invalid
0- 20	Very Invalid

RESULTS AND DISCUSSION

This research aims to develop an RPG game learning media (Figure 1 and Figure 2) with thermochemical material through the ADDIE (analyze, design, development, implementation, evaluation) model. In the analysis phase, researchers interviewed chemistry teachers at an Islamic Public School in Banjar, Indonesia. Then it was discovered that students lacked motivation to learn. Apart from that, students also experience difficulties learning thermochemical concepts. In the study (Uyun & Lutfi, 2022), it was also found that MAN 1 Gresik students experienced difficulties in learning Thermochemistry concepts. The students stated difficult because Thermochemistry is abstract, complicated to memorize. This is because there is no variation in learning media. Based on this, a thermochemical learning medium is needed that can increase students' learning motivation.

At the design stage, researchers prepare product designs related to problem-solving efforts (Arzfi et al., 2025). In this case, the product being developed is an RPG game learning media with thermochemical concepts. In this phase, researchers formulate KI and KD, design storyboards, and determine gameplay. This RPG game contains 4 sub-materials, namely energy, heat, system, and environment; thermochemical equations; standard enthalpy change (ΔH) for various reactions; and determining the enthalpy change of a reaction.

Then the next phase is development. The product was developed using RPG Maker MZ software. The resulting product is an application in .apk format, approximately 45 MB in size, that can be installed and accessed independently by students via smartphones (Hakiki et al., 2022). In (Lestariningsih et al. 2023), the selection of application format for this learning

media began with the rapid development of video games as an alternative media in learning activities.

After that, the next stage is product validation. Validation is carried out by material experts and media experts using validation sheets (questionnaires). The validators are lecturers at a public university in Banjarmasin, Indonesia including material experts and media experts.

Table 2. Validation Results of the Development of Learning Media for RPG Game on Thermochemistry Concepts

Expert Validation	Validation Percentage	Information
Material Experts	89%	Very Valid
Media Experts	80%	Valid

Based on Table 2, the validation results from material experts, a percentage of 89% was obtained, with the media information developed being in the very valid category. This is in line with research (Kurniasih & Suningsih, 2025), which shows that the results of the media expert assessment obtained a score of 97% based on the validity level category and were in the very valid category. Material experts suggest that the writing of reaction equations should be consistent, and the narrative used should use standard language. Apart from that, correct sentences with typos and some punctuation marks that are not placed correctly.

The media expert validation results reached 80%, with the developed media information categorized as valid. The media expert suggested adding NPC names and directions during missions to help players know where to go next. Revisions were then made based on comments and suggestions from the validation of the material and media experts (Oktavia & Agustin, 2019). Once the product was refined, it could proceed to the next stage to test its feasibility (Perdana et al., 2023). The

Figure 1. Main Menu Display

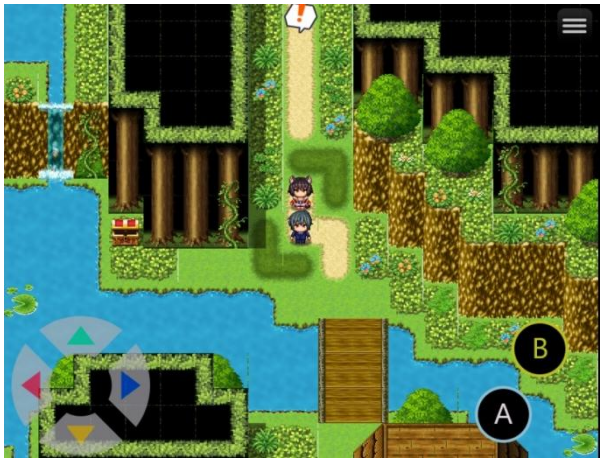

Figure 2. In-game Display

CONCLUSION

Based on the research conducted, the results obtained were in the form of RPG game learning media for thermochemistry concepts, developed using the ADDIE R&D model method, which was declared very valid by material experts with a percentage of 89% and was declared valid by media experts with a percentage of 80%. It can be concluded that the media that has been developed is suitable for use and is then tested at the implementation stage.

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