Development of My Chem My Adventure Game as a Learning Media in Class X Chemical Materials

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Abstract. This study aims to determine the feasibility of computer-based learning media in the form of the My Chem My Adventure game developed on chemical bonding material. Validity in learning media is seen from the assessment in the content validation sheet and construct validation carried out by expert lecturers. The type of research used is development research with research procedures in the form of research and development (RnD) methods with limited trials of 3 steps of research. The targets in this study were 15 students of SMAN 1 Krian Sidoarjo. The instrument used in this study is a validation sheet as a determinant of the validity of the game. The student response questionnaire sheet and observation sheet of student activities were used to determine the practicality while the pretest and posttest sheets as determinants of effectiveness in learning media. The data obtained were analyzed descriptively. The results of the validity obtained from the lecturers' assessment have very valid criteria with a percentage of 84.1% while the practicality of learning media has a percentage of 95.8% with very practical criteria. The effectiveness of the game from the pretest and posttest data showed an increase in learning outcomes with 100% completeness so that the game My Chem My Adventure developed was feasible as a learning media.

Keywords: My Chem My Adventure, chemical bond

1. Introduction

Education is the total process of developing human abilities and behavior, drawing on almost all life's experience, in which education is the whole stage of developing human abilities and behavior and the process of using almost all life experiences [1]. Based on government regulations on educational standards [2] states that in the learning process in educational units can be carried out inspiring, interactive, fun, and motivating students to be able to participate actively. So the task of an educator is expected to be able to create pleasant learning conditions and conditions and can motivate students.

Media is everything that can be used to channel messages from the sender to the recipient, so that it can stimulate thoughts, feelings, interests, and attention [3]. The use of learning media in the teaching and learning process can arouse interest, enthusiasm, and motivation, it can even affect the psychological learners in learning.

Based on the 2013 Curriculum [2], which is on Basic competence 3.5 comparing the processes of ion bond formation, covalent bonds, coordination covalent bonds and metal bonds and interactions between particles (atoms, ions, molecules), and their relationship to the physical properties of matter. According to Abraham [4] the material of chemical bonding is one of the basic concepts for studying chemistry, so it needs to be understood and mastered well by students. But in reality many students have difficulty understanding the material of chemical bonds, as evidenced by the results of the pre-research questionnaire conducted at SMAN 1 Krian Sidoarjo.

Based on the results of the pre-research questionnaire, 83% of students at SMAN 1 Krian Sidoarjo stated that chemical bonding material is a difficult material and only 17% stated that chemical bonding material is an easy material to understand. Therefore teachers as facilitators need to implement learning that can make students learn more fun, so that it can be applied

computer-based learning media that can make students interested and more eager to learn chemical bonding material.

Based on this background, the researchers wanted to develop a computer-based learning media in the form of the game My Chem My Adventure which can arouse the enthusiasm and motivation of students in learning. With the learning media of the My Chem My Adventure game, it is expected that students can better understand chemical bonding material easily. The formulation of the problem in this study is to determine the feasibility, effectiveness and practicality of the game My Chem My Adventure as a learning medium for chemical bonding material.

2. Method

This type of research in My Chem My Adventure computer-based learning media uses research and development (RnD) research and development methods. This research is only on limited trials of 3 steps, namely the first step is the preliminary study phase and then continued with the product design stage and the last stage of the development of learning media products in the form of the game My Chem My Adventure

The target of this study is computer-based learning media to facilitate students in understanding the material of chemical bonds. Sources of data obtained were 15 students of class X MIA 7 of SMAN 1 Krian Sidoarjo, chemistry lecturers, and chemistry teachers as reviewers and validators.

The research design used in the development of the game My Chem My Adventure is the RnD research method. The first stage is the preliminary study phase which includes potential and problems as well as information gathering, the next stage is the design study stage which includes the design of game products and game instruments, and the last is the development study phase which includes game design and game trials.

The research instrument used was in the form of a review sheet, validation, pretest posttest, student response questionnaire, and observation of student activities. The data collection method used was in the form of the results of the pretest posttest test and the results of the student questionnaire responses to the game media.

The results of the study data obtained are used to refine the draft product, while the data from the validation results are analyzed descriptively. Data from the validation results were analyzed using the Likert scale in table 1.

Table 1. Likert Scale

Criteria scale	Criteria
5	Very good
4	Good
3	Good enough
2	Less Good
1	Not Good

The value obtained is calculated as the percentage of feasibility using formula (1):

$$P(\%) = \frac{total\ score\ of\ data}{Category\ score} x100\% \quad (1)$$

With description:
P(%)= Percentage (%).
Then, the percentage obtained is interpreted using Likert-scale criterion in Table 2:

Table 2. Likert scale criterion

Percentage(%)	Criteria
0 – 20	Very poor
21 – 40	Poor
41 – 61	Quite
61 – 80	Good Appropriate
81 – 100	Very Good/ Very Appropriate

The validity of the game media developed is said to be feasible if each component gets a percentage of ≥ 61%

The results of the student response questionnaire data were analyzed using the guttman scale, as in table 3

Table 3. Guttman scale:

Skala	Jawaban
1	Ya
0	Tidak

The data obtained is calculated to get the percentage of student response results using formula (2):

$$P(\%) = \frac{\sum Y}{\sum MY} x100\%$$

With description:
P (%) = percentage (%)
∑Y = total "yes" answer
∑MY = total respondent

The percentage results obtained are interpreted based on table 2, the practicality of the developed game media is said to be practical if it gets a percentage of ≥ 61%

Data from the pretest and posttest results were used to determine the effectiveness of learning media using my chem my adventure game. If the percentage obtained has a value of ≥ 61%, then the game media developed is effectively used as a learning medium.

3. Results and Discussion

3.1. Validity

The validity of the game media developed is included in the proper category if it has a percentage range of 66.7% - 86.67%. The validity of the game media is divided into content validity and construct validity.

a. Content validity

Components that include content validity are the truth of material concepts in learning media, and indicators of achievement of competencies. One component of content validity is the truth of the material on the game my chem my adventure has a percentage of 80%, while the component of achievement indicators of competence has a percentage of 93.3%. According to Riduwan [4], the percentage is classified as a very valid criterion.

So the computer-based learning media in the game that I developed my chem my adventure is very valid / feasible. According to the National Education Standards Agency / BNSP [5], the feasibility related to the content quality aspects of the learning media developed is said to be valid or feasible when viewed in terms of the material and the truth of the concept presented by the linkages between the indicators of competency achievement and the learning material presented.

b. Construct validity

There are 3 components in evaluating the validated construct quality, namely characteristics of science, game requirements, and media requirements. The characteristic component of the science in the game media has a percentage of 86.6% with very valid criteria, while the requirements of the game and media requirements have a percentage of 80% and 93.3%. The overall assessment of my chem my adventure game media has a percentage of 84.1%. According to Riduwan [4] the percentage obtained is classified as a very valid criterion which is where very valid criteria have a range of 81 - 100%. So the development of computer-based learning media in the form of a game of my chem my adventure developed was said to be very valid / feasible. According to Arsyad [6] on instructional quality aspects, namely about the learning media developed can have a positive impact both students and teachers that can increase motivation to learn and good interaction, so students can understand learning material easily.

3.2. Practicality

The practicality of the learning media developed can be seen through observation data on student activities and the results of student questionnaire responses. Observation of student activities in the use of learning media is generally included in standard criteria. The highest presentation is in the component of students actively participating by continuing to play, answering questions, and writing them into the game manual that has been provided.

Student responses in the media game on the aspects of the quality of media presentation can motivate and attract interest in learning having a percentage of 98.8% with very practical criteria.

Computer-based learning media in the form of my chem my adventure game is said to be practical, this is evidenced by the total assessment of the overall response of students who have a percentage of 95.8% with very practical criteria.

3.3. Effectiveness

The effectiveness of the learning media developed can be seen from the test data of students' understanding in the form of the pretest posttest. The results of tests conducted before using learning media in the form of a game of my chem my adventure showed that only 30% of students who had achieved competency were complete. While the results of tests conducted after the use of instructional media experienced a significant increase, namely 95.5% of students had attained complete competence.

Learning media in the form of my chem my adventure game is said to be effective, this is evidenced by the calculation of student learning outcomes that have increased understanding of the material. Percentage of overall student learning outcomes which experienced a learning increase of 100%.

4. Conclusion

Based on the results of the analysis of research data, it can be concluded that the game My Chem My Adventure developed is feasible to be used as a learning medium in chemical bonding material, with details as follows.

4.1 Validity

The developed My Chem My Adventure game has been shown to be valid with an overall percentage gain of 84.1% with very valid criteria.

4.2 Practicality

The My Chem My Adventure game that has been developed is stated to be practical as shown by the students' 95.8% response questionnaire with very practical criteria

4.3 Effectiveness

The game My Chem My Adventure that has been developed is stated to be effective with an increase in student learning outcomes. Based on the results of research on the game My

Chem My Adventure has been declared effective with increasing student learning outcomes reaching 100%.

Recommendation

Suggestions given for further research include:

a. In this study only until the trial phase is limited, to be able to be used effectively in mass, it is necessary to do so until the dissemination and implementation stage.
b. The game media is equipped with the sound of music, so during the learning activities using the media the computer should have a headset so that each student can listen to music without disturbing other students.

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