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Chem is Fun: Animation Learning Media Based on Quantum Learning on Atomic Structure

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Abstract

Good learning media are media that can facilitate students to understand the material. The selection of learning media must be in accordance with the characteristics of the teaching material. To facilitate explaining the atomic structure material that is abstract, we need a medium that can realize the material. This study aimed to develop an interactive animation learning media Chem is Fun based on quantum learning and determine the quality of the product. The development model used was the ADDIE model by adapting the development procedures, namely the analysis, design, development, and evaluation stages. This study involved one media expert, one material expert, three peer reviewers, and five reviewers to assess product quality. The instrument used in this study consisted of an advice sheet and a questionnaire. The results of the study state that the learning media product Chem is Fun based on quantum learning has good quality, so it can be used as a learning medium to help students' learning process on atomic structure material.

Keywords: interactive animation; chem is fun; interactive learning media; quantum learning

Abstrak

Media pembelajaran yang baik adalah media yang dapat memudahkan peserta didik dalam memahami materi. Pemilihan media pembelajaran haruslah sesuai dengan karakteristik materi ajar. Untuk mempermudah penjelasan materi struktur atom yang bersifat abstrak diperlukan suatu media yang dapat merealisasikan materi tersebut. Penelitian ini bertujuan untuk mengembangkan media pembelajaran animasi interaktif Chem is Fun berbasis quantum learning dan mengetahui kualitas produk yang dihasilkan. Model pengembangan yang digunakan adalah model ADDIE dengan mengadaptasi prosedur pengembangan yaitu tahap analisis, desain, pengembangan, dan evaluasi. Penelitian ini melibatkan 1 ahli media, 1 ahli materi, 3 peer reviewer dan 5 reviewer untuk menilai kualitas produk. Instrumen yang digunakan pada penelitian ini terdiri atas lembar masukan dan angket berupa daftar isian. Hasil penelitian menyatakan bahwa produk media pembelajaran Chem is Fun berbasis quantum learning memiliki kualitas yang baik, sehingga dapat digunakan sebagai media pembelajaran untuk membantu proses belajar siswa pada materi struktur atom.

Kata kunci: animasi interaktif; chem is fun; media pembelajaran interaktif; quantum learning

Introduction

Learning is an effort made intentionally by educators to convey knowledge, organize, and create environmental systems with various methods to carry out learning activities effectively and efficiently and with optimal results (Sugihartono, et al, 2007). The development of the era that enters industrial era 4.0 certainly affects education, conventional learning that only relies on teachers and textbooks can no longer be implemented in the classroom (Yanuschika, Pakhomovaa, & Batbold, 2015).

Chemistry subject requires more thinking activities because it contains abstract concepts. The abstract concepts are about materials that are difficult to analogize with daily life. The particulate nature of the material is one of the abstract concepts that need to be appropriately studied in chemistry at a basic level. The atomic model that is submicroscopic and cannot be seen directly makes it difficult for students to visualize the concept in their minds (Tsaparlis & Papaphotis, 2009; Yavuz & Açıkalın, 2018).

Based on a survey that has been conducted in several senior high schools in Yogyakarta, the delivery of atomic structure teaching materials by teachers more often uses the lecture method to explain the theory. The teacher only explains the concept of atomic structure by showing the atomic structure visually through pictures. In addition, the history of the development of the atomic structure is also explained through lectures, or students are given assignments to make summaries. If the teacher only uses the lecture method without using interactive media, students will experience boredom in the learning process, which can affect students' interest in learning chemistry.

To attract students' interest in understanding abstract material, using interactive and interesting learning media can be done. Researchers agree that interactive learning media has the potential to create a high-quality learning environment that can actively involve students to encourage more meaningful learning (Cairncross & Mannion, 2010). Learning media is anything that can convey information to students, such as the use of software, computer hardware, interactive videos, and virtual media (Heinich, et al, 2005).

According to Kustandi and Sutjipto (2011), media in the teaching and learning process tends to be interpreted as graphic, photographic, or electronic tools to capture, process, and rearrange visual and verbal information. Meanwhile, according to the Guidelines for Bibliographic Description of Interactive Multimedia cited by Prastowo (2012), interactive teaching materials are a combination of two or more media (audio, text, graphics, images, and video) that users manipulate to control the commands and or natural behavior of the user in a presentation.

In addition to learning media, the selection of learning methods also contributes to the learning process in the classroom. There are various kinds of learning methods that teachers can implement in the classroom. One of the learning methods that can be used is quantum learning. A'la (2012) states that quantum learning is a teaching method that crams material to students and creates an excellent emotional relationship. DePorter and Hernacki (1992) assert that quantum learning is a combination of suggestology, accelerated learning techniques, and NLP (Neuro-Linguistic Programming, which is a study of how the brain organizes information), which is adapted to its theories, beliefs, and adapted methods.

Based on this explanation, in the learning method of quantum learning, educators can function both the right and left sides of the brain in their respective functions. The use of quantum learning is expected to encourage teachers to connect abstract material into real knowledge that students can understand and bring up the

imagination of students. In addition, implementing this method can generate new desires and interests, improve motivation and stimulation of learning activities, and even have a psychological effect on students.

In developing the application of this interactive learning method, the use of innovative learning media has become one of the main priorities in the learning process (Yanuschika, Pakhomovaa, & Batbold, 2015). Teachers need to consider the use of learning media in accordance with the implemented learning methods. Learning media that can support quantum learning methods can be in interactive animation media. Media that presents the material in an attractive and visually real way so that students can better understand abstract material, such as the shape of atoms and the particles that make up atoms.

This study aimed to develop interactive animation learning media Chem is Fun based on quantum learning for teaching materials for the development of atomic theory and structure, determine the quality of the product, and determine students' interest in the learning media.

Research Method

The development model used in this study was the ADDIE model. The product development process was carried out based on adapting the ADDIE model development procedure, including analyzing, designing, developing, and evaluating without implementing. In this study, only media development was carried out to assess the quality of the developed media, while the implementation phase will be discussed in further research. The product quality assessment process involves one media expert, one material expert, and five reviewers of senior high school/Islamic senior high school chemistry teachers.

The instruments used in this study consisted of input sheets for material experts, media experts, peer reviewers, and a questionnaire in a checklist for reviewers. The product quality assessment questionnaire by reviewers consisted of 25 statements that were described based on five aspects of the quality criteria of learning media. The five aspects were content feasibility components, linguistic aspect, presentation aspect, youthfulness aspect of usage, and quantum learning content.

The research data consisted of qualitative data (product development) were in the form of suggestions from the material, and media experts, while quantitative data (product quality score) were in the form of category data converted into scores using the Likert scale. The data were tabulated in the form of scores, then the average score of the assessment results on the learning media was calculated. Determination of the qualitative criteria for interactive animation products Chem is Fun can be seen in Table 1.

Table 1
Criteria for Converting Quantitative Values to Qualitative data

Score Range (i)	Category
$X > M_i + 1{,}8\ SB_i$	Very Good
$M_i + 0{,}6\ SB_i < X \leq M_i + 1{,}8\ SB_i$	Good
$M_i - 0{,}6\ SB_i < X \leq M_i + 0{,}6\ SB_i$	Enough
$M_i - 0{,}6\ SB_i < X \leq M_i - 1{,}8\ SB_i$	Poor
$X \leq M_i - 1{,}8\ SB_i$	Very Poor

Results and Discussion

This study was started from the analysis step, namely, analyzing the main material included in the interactive animation learning media Chem is Fun. The second step was the design, where at this step, the systematic preparation of teaching materials and media design was carried out. After that, it was continued with the development step, creating learning media in accordance with the design that had been made previously. After the initial product finished, an assessment of product quality was carried out by one material expert, one media expert, three peer reviewers, and five reviewers of senior high school/Islamic senior high school chemistry teachers. In addition to assessing product quality, material experts, media experts, peer reviewers, and reviewers also provided suggestions to improve the final product. The last stage in this research was to refine the final product based on the recommendations obtained in the product quality assessment.

The results of this development research consisted of three types, namely the animation learning media Chem is Fun based on quantum learning as a product being developed, product development process data, and product quality data. The interactive animation learning media Chem is Fun based on quantum learning contains material and practice questions on the competence of the development of atomic theory and structure. The learning media Chem is Fun based on quantum learning has five main menus: basic competence menu, material menu, practice questions menu, poster gallery menu, and profile menu. Learning Media Chem is Fun is presented in Figure 1.

Figure 1
Learning Media Chem is Fun

The interactive animation learning media Chem is Fun based on quantum learning was assessed for quality by five senior high school/Islamic senior high school chemistry teachers in the Special Region of Yogyakarta who has taught for at least five years as reviewers. The research assessment instrument provided to the reviewer was in the form of checklists(checklist)which contains five aspects and consists of 25 grains of indicators. The assessment results of the quality of the interactive animation learning media Chem is Fun based on quantum learning are presented in Table 2.

Based on the calculation results, the average score of the overall product quality is 102.8. Compared with the ideal assessment criteria, the average score is in the range of $85 < \overline{X} \leq 105$, so it is included in Good quality (B). The quality of the product, when viewed from every aspect, can be seen in table X. If the aspect of content feasibility is reviewed, the content feasibility

aspect obtains a very good quality category because the concepts in the learning media described are the developments and are in accordance with the concepts proposed by chemists.

In addition, the material in the learning media is in accordance with the standards of content, learning objectives, and the level of knowledge of students. In addition to presenting material on the development of theory and atomic structure, the learning media Chem is Fun also provides practice questions that can be used to test students' understanding. The practice questions consist of two kinds, namely multiple-choice questions: the final exercises per material and short practice questions, which are tests of understanding in each sub material.

The linguistic aspect gets a good category because the language used is communicative. Students can understand the teaching material well because there are no words that are difficult to understand. In addition, the language used does not cause multiple interpretations, so that students do not experience misconceptions when studying material concepts using media Chem is Fun.

The aspect of usage ease obtained good aspect because there were no hangs or sudden stops during operation, the accuracy in selecting the type of application, and the ease of operation of the media. The media application Chem is Fun is developed with Adobe Director software; this application is portable and can be operated using a laptop, notebook, or PC with the latest version of Windows specifications without installing it first

Table 2

Results of Quality Assessment of Interactive Animation Learning Media Chem is Fun Based on Quantum Learning

Reviewer	Assessment Aspect (number of indicators)					Total
	Content Feasibility (7)	Language (2)	Presentation (8)	Usage Ease (3)	Quantum learning content (5)	
I	32	9	30	11	20	102
II	30	8	31	14	20	103
III	27	8	31	12	20	98
IV	32	9	36	13	23	113
V	27	8	31	12	20	98
Total	148	42	159	62	103	514
Average score	29.6	8.4	31.8	12.4	20.6	102.8
Ideal maximum score	35	10	40	15	25	125
Category	Very good	Good	Good	Good	Good	Good

The presentation aspect gets a good category because it has an attractive appearance such as layout, color display, font display, image display, animation display, level of interactivity, sound clarity, and suitability of music selection. So that students are not disturbed by the appearance of the media Chem is Fun because the color selection used is not contrasting. The choice of colors that do not contrast will result in the eyes not getting tired quickly when learning using computer-based media. If the color used is a contrasting color, the eyes will accommodate the maximum, causing the eyes to become tired quickly. In addition, the selection of images and animations is in accordance with the teaching material and supports the explanation of the material. The selection of

music as background sound is also in accordance with the provisions of the quantum learning model, which uses music with a slow rhythm to stimulate the brain to work optimally.

Aspects of the charge of quantum learning get a good category because the media presentation is fun, can create a sense of pleasure in learning chemistry, can attract students' interest in learning chemistry. The music used can affect students' physiology and presented inspirational posters that can inspire students in learning. The choice of music as a background in the development of-based learning media quantum learning affects the psychology of students. Music can make students feel comfortable and relaxed while studying, making it easier for students to concentrate on learning. The music is a type of music with a tempo of 60 beats per minute, which is the same tempo as the human heartbeat. This type of music can synchronize the mind with the human body (DePorter & Hernacki, 1992). Therefore, with the music, students feel relaxed and easier to concentrate.

It is undeniable for teachers that learning in the digital era requires the help of interactive learning media. The application of learning media Chem is Fun can integrate information technology into chemistry subjects to help students in the learning process (Fibonacci & Sudarmin, 2014). Lin, Chen & Liu (2016) assert that it should be the responsibility of an educator to make learning more efficient and grow a new generation that can think critically and creatively with the help of technology.

Conclusion

The interactive animation learning media Chem is Fun based on quantum learning as a learning medium with the subject topic of atomic structure in chemistry learning of class X senior high school has been successfully developed. The quality of the learning media Chem is Fun-based quantum can be categorized as Good in terms of five aspects of learning media development. Therefore, learning media Chem is Fun can be used as a medium for learning chemistry in high school.

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