JEC Journal of Educational Chemistry
Journal of Educational Chemistry (4 (2), 2022, 133-144)
Website: https://www.journal.walisongo.ac.id/index.php/jec
ISSN 2715-3029 (p) 2685-4880 (e)
DOI: 10.21580/jec.2022.4.2.12347

Development of Interactive Learning Video at Grade X Senior High School

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Abstract

The lack of development of learning media in schools causes students to have difficulty understanding chemical bonding material. The use of chemistry textbooks in the study of chemical bonds is not enough to reduce the abstraction of the object of the study. The lack of use of the technology-based website in developing interactive video learning media is a major problem. Measuring the student's responses to the interactive learning video on the chemical bonding material. This study uses the ADDIE development model. This study begins by analyzing the problems and limitations encountered in chemistry learning. The quality of interactive video learning media with an assessment percentage of 92.5% by media experts, 91.66% by material experts, and 88.12% by teacher practitioners. Based on the results of testing on 31 students, the percentage of assessment was 84.66% which had a very good category. Web-Based Interactive Learning Videos on Chemical Bonding Grade X in Senior High School were declared valid based on expert and practitioner assessments. Results of the assessments of these experts consistently categorize H5P as very good or good. The general assessment of this video is very good and can be used. It consists of the background, objective, methods, results, and conclusion of the research.

Keyword: ADDIE; interactive learning; video; chemical bonding

Abstrak

Kurangnya pengembangan media pembelajaran di sekolah menyebabkan siswa kesulitan memahami materi ikatan kimia. Penggunaan buku ajar kimia dalam pembelajaran ikatan kimia tidak cukup untuk mereduksi abstraksi objek kajian. Minimnya pemanfaatan website berbasis teknologi dalam pengembangan media pembelajaran video interaktif menjadi masalah utama. Mengukur respon siswa terhadap video pembelajaran interaktif pada materi ikatan kimia. Penelitian ini menggunakan model pengembangan ADDIE. Penelitian ini diawali dengan menganalisis permasalahan dan keterbatasan yang dihadapi dalam pembelajaran kimia. Kualitas media pembelajaran video interaktif dengan persentase penilaian 92,5% oleh ahli media, 91,66% oleh ahli materi, dan 88,12% oleh guru praktisi. Berdasarkan hasil pengujian terhadap 31 siswa diperoleh persentase penilaian sebesar 84,66% yang memiliki kategori sangat baik. Video Pembelajaran Interaktif Berbasis Web Ikatan Kimia Kelas X SMA dinyatakan valid berdasarkan penilaian ahli dan praktisi. Hasil penilaian para ahli tersebut secara konsisten mengkategorikan H5P sebagai sangat baik atau baik. Penilaian secara umum terhadap video ini sangat baik dan dapat digunakan. Ini terdiri dari latar belakang, tujuan, metode, hasil, dan kesimpulan penelitian.

Kata kunci: ADDIE; pembelajaran interaktif; video; ikatan kimia

Introduction

The achievement of educational goals is an important social aspect of national development aspects. Education for Sustainable Development (ESD) is an idea presented from the environment and the human crisis issues which are faced in the present time and in the future. The term ESD in Indonesia is known as *Pendidikan Pembangunan Berkelanjutan*. This program is organized by the United Nations (UN) directly under UNESCO (United Nations Education Scientific and Cultural Organization). One of the targets of implementing ESD is to educate and prepare the young generation to face the challenges in the world of challenges as a form of responsibility towards the future (UNESCO, 2020). Education for Sustainable Development (ESD) is a lifelong learning process with the aim of informing and engaging society to be creative, to have problem-solving ability, to have both social and scientific literacy, and also commit to be bounded to the personal and group responsibility. Such action will ensure an economically prosperous environment in the future.

Indonesia is currently facing the global COVID-19 pandemic which changes all human activities and habits, including in the education sector. March 2020, Minister of Education and Culture Nadiem Makarim issued a round letter variety four of 2020 regarding the implementation of emergency training rules for the unfold of Corona Virus Disease (COVID-19). One of them is education for getting to know from domestic via the online / distance getting to know the process. As a result, many educators discover it tough to stand this drastic change. Meanwhile, there may be no different manner to reduce the unfolding of Covid-19 apart from restricting human encounters in huge numbers. However, the media used is relatively dependent on verbal symbols (words) which might be very abstract. Therefore, it can make things difficult for the learner." (Siagian et al., 2014). The sudden transformation in the learning process certainly brings new challenges to the world of education. Teachers and students must immediately change styles, learning methods, and learning resources (Apsari, 2020).

Learning media has a critical role. That is, enhancing the system of training and studying. In addition to the primary purpose, the blessings of media withinside the studying system are: (1) Learning can appeal to college students` interests and encourage them to analyze, (2) The learning method will be more varied because it is not only verbal communication, (3) The means of the coaching substances might be clearer, simpler for college students to understand, and college students might be capable of acquiring higher studying goals. (4) Students have interaction in greater studying together with observations, practices, demonstrations, etc. The second purpose is associated with the learner's degree of thinking, from the real (concrete) to the summary. We analyze lots via way of means of the use of media, so summary matters may be concrete and complicated matters may be simplified. (Sanaky, 2013). There are 4 indicators of capabilities of getting to know media, especially visible media, particularly: (1) The characteristic of visible media interest is the core, particularly attracting and directing student's interest to pay attention on getting to know content material associated with the visible that means displayed or accompanying the textual content of the problem matter; (2) The affective characteristic of visible media may be visible from the extent of leisure of students while reading or analyzing illustrated texts; (3) The cognitive characteristic of visible media may be visible from visible symbols or pictures to facilitate the fulfillment of desires to apprehend and recollect the records contained inside the pictures; and (4) the compensatory characteristic of getting to know media may be visible from the effects of studies that visible media that offer context for expertise texts assist students who're vulnerable in analyzing to arrange records withinside the

textual content and recollect it again (Sanaky, 2009).

Interactive learning media is a combination of several media (video, animation, text, images, audio, graphics) whose use is manipulated by the user in terms of commands. Interactive learning media was developed using several editing applications in designing the media to produce interesting learning media. Majid (2009) explains approximately one of the interactive coaching substances which could help interactive getting to know, namely, interactive media that's an aggregate of or greater media (audio, text, graphics, images, animation, and video) which customers control to manipulate instructions the verbal conduct of a presentation. If interactive media is utilized in a lesson, then this interactive getting to know media is a getting to know medium that makes teachers, students, and the media used interrelated and have interaction to gain getting to know objectives. So, interactive getting to know media is a getting to know media this is prepared with a controller that may be operated via way of means of the person so that the person can select what he needs for the following process. In addition to designing virtual classrooms, teachers need to design digital-based learning materials and multimedia learning (Efendi, 2018). Of course, at times like this, the teacher must be more creative and varied in presenting learning material (Atsani, 2020). Not only relying on one source of teaching materials, such as textbooks. Therefore, teachers must be able to design instructional media by utilizing the use of technology, information, and communication (Khusniyah, 2019). The main Internet customers are teenagers (64%), with students aged 15-19, The Internet is a community that connects many computer systems around the world (Safira, 2019).

H5P makes it clean to create, proportion, and reuse HTML content material and applications. H5P empowers absolutely each person to create wealthy and interactive internet reviews extra efficaciously all you want is an internet browser and an internet web page with an H5P plugin, H5P content material is responsive and cellular friendly, this means that customers will revel in the equal wealth, interactive content material on computers, smartphones, and drugs alike. Through H5P.com, H5P content material can be embedded in any platform that helps embedded content material (iframes). H5P.com additionally gives integrations for LMSs like Canvas, Brightspace, Blackboard, Moodle, and different structures that aid the LTI standard. In addition, H5P has plugins for WordPress, Moodle, Drupal, and numerous different publishing structures. The lack of development of learning media in schools causes students to have difficulty understanding chemical bonding material. The lack of use of the technology-based website in developing interactive video learning media on chemical bonding is a problem. The use of chemistry textbooks in the study of chemical bonds is not enough to reduce the abstraction of the object of the study of chemical bonding. Research is limited to the development of interactive video learning media using the H5P website. The material used is chemical bonds in the form of simple interactive learning videos. This research was conducted on students of SMA Dharmawangsa Medan in grade X in the odd semester of 2022/2023. The formulation of the problem in this study, how is the feasibility of developing the developed interactive learning video based on the H5P web? and how do students respond to the interactive learning video based on the H5P web on the chemical bond material. The objectives of this study are to know the feasibility of developing the developed interactive learning video based on the H5P web. Measuring the student's responses to the interactive learning video based on the H5P web on the chemical bond material. H5P was founded nine years ago on January 25, 2013.

H5P stands for HTML 5 Package and aims to make it easy for everyone to create, share, and reuse interactive HTML 5 content. Interactive videos, interactive presentations, quizzes, interactive timelines, and much more that H5P has shared and developed at H5P.org. H5P has been used by 17,000

websites. As of June 2018, H5P has been financially supported by the Mozilla Foundation in the MOSS program (Petterson et al., 2019). H5P.org is a community website where H5P libraries, apps, and content types can be shared. H5P apps and content work the same way on all H5P-compatible websites. There are currently four integration platforms, one for Drupal, WordPress, Tiki, and one for Moodle. Platform integration includes general H5P code as well as the implementation of the platform-specific interfaces and code required to integrate H5P with the platform. The goal is to make it easier to integrate H5P with new platforms. The file format consists of metadata in JSON (JavaScript Object Notation) format, a number of library files that provide features and designs for content, and content folders where text content is stored in JSON format, and multimedia is stored as files or links to files on external sites. The H5P framework consists of a web-based content editor, a website for sharing content types, plugins for existing content management systems, and a file format for combining HTML5 resources.

Okta et al., (2020), Miftahul et al., (2019), Budi et al., (2017) and Herdini et al (2018) made an Interactive learning Media. Okta et al., (2020) made Interactive Learning Media using Autoplay Studio 8 for Hydrocarbon Material of Class XI Senior High School. Meanwhile, Miftahul et al., (2019) developed Interactive Learning Media using Autoplay Media Studio 8 for Colloidal Chemistry Material. Meanwhile, Budi et al (2017) developed Chemistry Interactive Instructional Media Based on Mobile Learning on Oxidation-Reduction Reactions Herdini et al., (2018) developed interactive multimedia based on Lectora Inspire in chemistry subject in junior high school or madrasah tsanawiyah. In the research of Okta et al., (2020), Miftahul et al., (2019), Budi et al., (2017), and Herdini et al., (2018) provide suggestions for developing an interactive learning media for chemistry with different materials and the same or different grade levels. Therefore, researchers will develop an interactive video on chemical bonds based on the H5P web, explanations related to chemical bonds, and the importance of its material in real life.

Method

The type of research that will be conducted is Research and Development (R&D). The Research and Development research method is a method used to produce a product and validate it (Sugiyono, 2019, p.28). The main purpose of research and development is to improve a product or to create a new product. The various tools that we use so far are the result of development research. Research development in the field of education in the form of creating useful products that can help improve the quality of education. This study uses the ADDIE development model. This study begins by analyzing the problems and limitations encountered in chemistry learning. In this study, a product in the form of an interactive learning video based on an H5P website is being developed on chemical bond materials.

The development process involves a data collection process and a literature search. After the first product is created, it is handed over to experts for evaluation and revision to create a feasible product. After the experts validate the product, the next step is to conduct the test to determine the feasibility and responses of the students. In this research, the population will be students of grade X MIPA Dharmawangsa Senior High School. So that the sample will be selected, namely grade X MIPA 4 with 31 students in the class.

Data collection techniques are the way researchers obtain data in research. Data collection that researchers do to support the accuracy of the information in web learning media, data collection for this research are observation, interview, expert validation, and questionnaire technique. To collect the data, the first is the Analysis of Validation Sheet, the expert team's validation sheet is used to find out the validator's opinion on web-based learning media. Data analysis was obtained based on a questionnaire from media and material experts to determine the feasibility and

validity of the developed media, in the form of a score done using a percentage (Arikunto, 2008). The second is Analysis of the Questionnaire Sheet, questionnaire sheets were used to find out the opinions of students on web-based learning media. The learning media developed in this study is good category if the average score obtained from the questionnaire responses of students who receive learning using the developed media reaches a minimum presentation of 51% or in the good category. So that the resulting learning media can be used in the chemical bonding learning process at grade X senior high school.

Result and Discussion

In this study, six aspects are measured, namely aspects of content quality, motivational aspects, aspects of media display design, interaction usability, accessibility, and reusability. The number of statements developed is following the needs and objectives to be obtained. Validation was carried out by 2 experts consisting of an expert (two lecturers of chemistry at Medan State University) and a practitioner (high school teacher). In addition to these aspects, validation is also carried out with a general assessment using LikertScale.

The results of the media assessment validation consist of (1) content quality aspects, (2) motivational aspects, (3) media display design aspects, (4) Interaction Usability, (5) accessibility, and (6) reusability. In the aspect of content quality, an average value of 4.75 was obtained from the average maximum score of 5, the motivational aspect obtained a value of 5 from the average maximum score of 5. The display design aspect obtained a value of 4 from the average maximum score of 5, the usability aspect obtained the average score is 4.5 from the maximum average score of 5, and in the aspect of accessibility, the average score is 4.5 from the average maximum score of 5, and the reusability aspect, the score is 5 from the average maximum score of 5. In the aspect of content quality, the percentage value of 95% is obtained which indicates that the quality of the content contained in the learning media is feasible. The motivation aspect is obtained by the percentage value of 100% indicating that the motivational aspect contained in the learning media is very feasible.

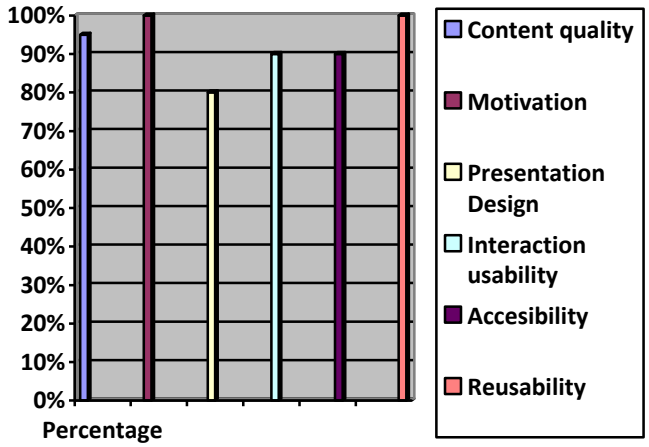
Table 1.
The Percentages of Average Media Validity

No.	Aspect	Percentage
1	Content Quality	95%
2	Motivation	100%
3	Presentation Design	80%
4	Interaction usability	90%
5	Accessibility	90%
6	Reusability	100%
Average Percentage of Media Validity		92.5%

Table 1. shows the average percentage of 92.5% which states that the validated media is categorized as feasible from media expert. The results of the media assessment by media experts can be seen in Figure 1.

Based on the diagram above, it is known that the quality of learning media developed based on aspects of content quality, motivational aspects, media display design aspects, interaction usability, accessibility, and reusability has been declared valid with a very feasible category. The total percentage of all aspects obtained is 92.5%. Based on the assessment obtained, it can be concluded that interactive learning video based on H5P.web is feasible to use in learning in terms of content quality, motivational aspects, media display design aspects, interaction usability, accessibility, and reusability.

Figure 1.
Graphic of Assessment Diagram by Media Expert



The results assessed at the material expert validation stage are (1) content quality, (2) learning goal alignment, (3) feedback and adaptation, (4) motivation, (5) media display design, and (6) reusability. In the aspect of quality, the percentage value is 85%, which indicates that the quality of the content contained in the learning media is feasible. Aspects of the alignment of learning objectives obtained a percentage value of 85%. Aspects of feedback, media display design, and motivation obtained a score percentage of 100% which indicates that the two aspects contained in the learning media are very feasible. In the reusability aspect, the percentage obtained is 80% and shows the category is feasible.

Table 2.
The Score of Average Material Validity

No.	Aspect	Percentage
1	Content Quality	85%
2	Learning Goal Alignment	85%
3	Feedback and Adaption	100%
4	Motivation	100%
5	Presentation Design	100%
6	Reusability	80%
Average Percentage of Material Validity		91.66%

Table 2 shows the average percentage of 91.66% which states that the validated materials are categorized as feasible from material expert The results of the media development assessment by material experts can be seen in Figure 2.

The results aspects assessed at the teacher practitioner validation stage are (1) Quality Content (2) learning goal alignment, (3) presentation design, (4) interaction usability, (5) Accessibility, (6) feedback and adaptation, (7) motivation, and (8) reusability. This trial or validity was carried out to determine the feasibility of the material as well as consideration for improving the quality of the content of the material in the teaching media that was developed on chemical bonding material for grade X senior high school. In content quality, Interaction Usability, and learning goal alignment, the percentage value is 85%, which indicates that the quality of the content contained in the learning media is feasible. Aspects of presentation design obtained a percentage value of 80%. Aspects of accessibility obtained a score percentage of 90% which indicates that the aspect

contained in the learning media is very feasible. In the feedback and adaption, the motivation aspect obtained a two-score 100% which means that the aspect contained in the learning media is very feasible. Aspect reusability obtained a score of 80% and also shows the category is very feasible.

Figure 2.
Graphic of Assessment Diagram by Material Expert

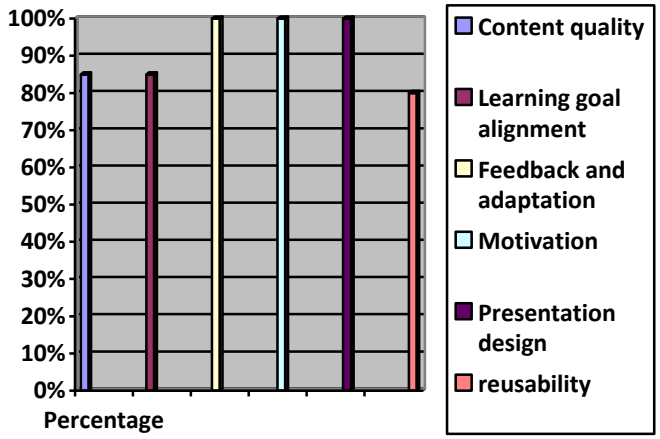


Table 3.
The Score of Average Material and Media Validity

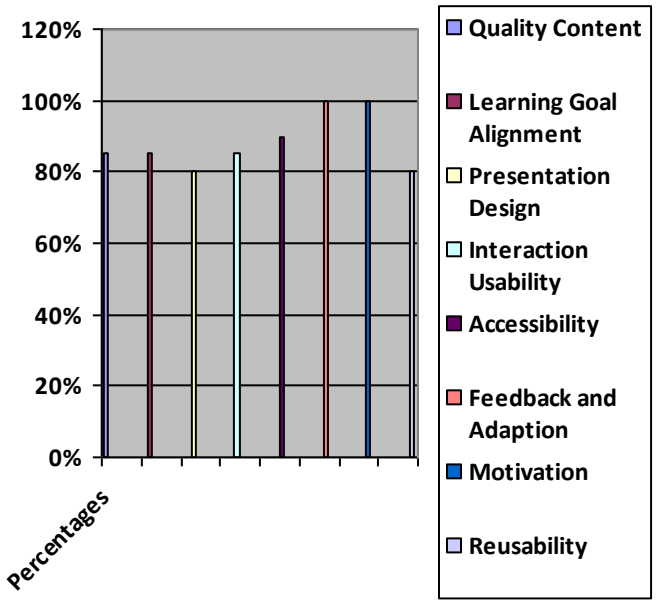
No.	Aspect	Percentage
1	Content Quality	85%
2	Learning Goal Alignment	85%
3	Presentation Design	80%
4	Interaction usability	85%
5	Accessibility	90%
6	Feedback and Adaption	100%
7	Motivation	100%
8	Reusability	80%
Average Percentage of Material Validity		88.12%

Table 3. shows the average percentage of 88.12% which states that the validated materials are categorized as feasible by media and material practitioners. The results of the media development assessment by material experts can be seen in Figure 3.

After the media has been validated and revised according to the advice and input of the expert team, the next step is to conduct a trial for grade X MIPA 4 to determine student responses to interactive learning videos based on H5P.web. Implementation The use of interactive learning videos based on H5P.web was carried out for 1 meeting. The implementation of the H5P.web-based interactive learning video was carried out for 30 minutes. The researcher applied the media to the students of grade X MIPA 4 at SMA Dharmawangsa Medan with the offline method in the class. At the beginning of the learning process, the researcher gave instructions to the students to activate their smartphones. Next, all students go to the interactive video link that will be shared with students. Then, in the learning video, interactive questions are presented in the form of questions to determine student understanding. Before students answer

questions on the learning video, the student must pay attention to special instructions when the learning video is paused. When students answer correctly, the video can be continued, if not, students can choose to re-watch the learning video or continue the learning video and answer further and submit the answers to the questions in the video. The following are the questions presented and the results of student answers to the questions presented in interactive learning videos. During the learning process, the teacher also observes the continuity of these activities to find out how the activities carried out by researchers are on students. After the H5P.web-based interactive learning video was tested, the researcher then gave a student response questionnaire to determine student responses to the learning media presented.

Figure 3.
Graphic of Assessment Diagram by Media and Material Practitioners



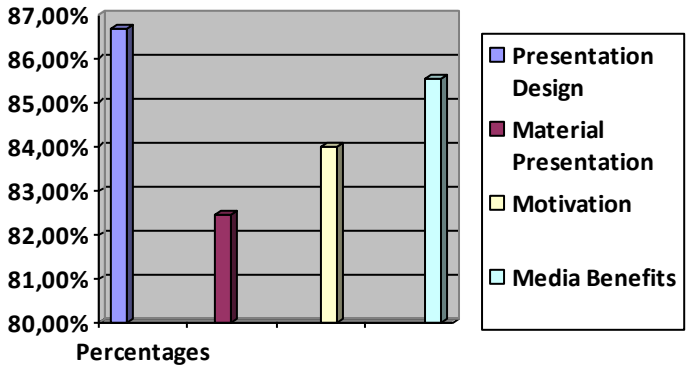
Analysis of student responses to this interactive learning video was conducted to determine if a learning media developed was categorized as very good, good, not good, and very bad. In this case, the analysis of student responses was carried out by providing response questionnaires to students who were the research sample. The learning media developed is said to be good if it gets a positive response from students with the criteria having a value interval of 51% to 74.99% (Arikunto, 2008). This trial consisted of 31 students. This trial aims to find out again the assessment and interest of students in H5P.web-based learning video products and to identify the shortcomings of the learning media that have been developed. The results can be seen in Table 4.

Table 4. shows the average percentage of 92.5% which states that the interactive learning video can be categorized as very good. The results of Students responses can be seen in Figure 4. Based on the results of data analysis on student response questionnaires that have been filled out by 31 students, the results obtained from the criteria for the results of student responses with an average percentage of 84.66% with the criteria "Very Good". Overall, the interactive learning video does not need to be revised again.

Table 4.
Percentages of Students Responses

No.	Aspect	Percentage
1	Content Quality	86.66%
2	Material Presentation	82.44%
3	Motivation	84%
4	Media Benefits	85.55%
Average Percentage of Students Response		92.5%

Figure 4.
Graphic of percentages student's responses



This interactive video learning media based on H5P.web is used as a learning medium because today's students are included in Generation Z, which of course is very literate with technological developments. Therefore, the learning process should juxtapose the use of technology in it and be easy to access anywhere. In addition, 2022 is a must for educators to change the learning process to be digital-based. Learning innovations need to be done to improve the quality of learning in the classroom or outside the classroom. By using interactive video learning media, the material is easier to see and pay attention to through pictures or videos. Media can also make students more focused on following lessons because they are focused on the media displayed by the teacher.

Students admit that learning chemistry is less varied and it is necessary to develop more interesting media to pay attention to. Interactive video learning media where there are pictures, videos, texts, and interactions that are combined in one learning video that is designed to increase student interest in learning, especially chemical bonding material. This media helps students understand chemical bonding material by using interactive videos. In addition, it can improve students' understanding of chemical bonding material.

Assessment of product validity is carried out by material experts and media experts. The results of the expert's assessment, are categorized as valid based on the percentage level of validity of the learning media, if > 25% then the learning media is not very feasible in the sense that it is not feasible to be tested (total revision) if 25% 50% then the learning media is not feasible (partial revision and revision). material review), if 50% 75% then the learning media is feasible (can be tested with some revisions), if > 75% then the learning media is very feasible and can be tested (not revised). The quality of interactive video learning media developed is based on aspects of content quality, alignment of learning objectives, feedback and adaptation, motivational aspects, aspects of media display design, interaction usability, accessibility, and reusability. Based on the assessment aspect, interactive video learning

media has been declared valid with a very feasible category. With an assessment percentage of 92.5% by media experts, 91.66% by material experts, and 88.12% by teacher practitioners. The results of the validation that the researchers got were inseparable from the suggestions and inputs were given by media experts and material experts. In addition to providing validation scores, the validators also provide suggestions and comments for improving the media to make it even better when used in the learning process.

The response of students to interactive video learning media also received a good response. The results of student questionnaire responses as a representation of the assessment of an interactive video learning media. The interactive video learning media was tested in grade X MIPA 4 with a total of 31 students. The interactive video was piloted offline by meeting face-to-face at the research site. Based on the results of testing on 31 students, the percentage of assessment was 84.66% which had a very good category. Therefore, it can be concluded that the interactive learning videos developed are included in the very good category. So, it is feasible to be used as a source of learning media.

Conclusion

The results of the development in the form of H5P.Web-Based Interactive Learning Videos on Chemical Bonds Grade X in Senior High School were declared valid based on expert and practitioner assessments. The assessments of these experts consistently categorize H5P. Web-Based Interactive Learning Videos on Chemical Bonds Grade X in Senior High Schools in the valid category with a presentation of 90.76% and the general assessment of this video is very good and can be used. Student responses to Development of Interactive Learning Video Based on H5P.Web On Chemical Bond Material At Grade X Senior High School are an average of 84.66% (very good) with Display design 86.66% (very good), Material presentation 82.44% (very good), Motivation 84% (very good), Media benefits 85.55% (very good). Based on the conclusions stated above, several suggestions that need to be considered for improving the quality of school chemistry learning, for students, it is recommended to use this learning video in learning so that it can foster an interest in independent learning and encourage students to be more motivated in learning chemistry, For teachers, it is recommended to use technology in learning to help increase creativity to maximize the use of appropriate technology, namely interactive learning videos as a support system for learning models, For schools, it is recommended to use interactive learning videos so that they can be used as input in efforts to improve the quality of education related to the use of appropriate technology, namely web-based interactive videos, For researchers, the stage that becomes difficult is the development stage or the development stage. The development stage is the most difficult because at this stage interactive learning videos are designed which must be done very carefully so that valid interactive learning videos are created. It is recommended for researchers to focus on working on this stage and also suggestions for researchers to pilot research on a larger scale.

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