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Development of assessment instruments assisted by iSpring quizmaker to measure students' conceptual understanding

Desfion Mayuri *, Prima Aswirna, Hurriyah

Study Program Tadris IPA Concentration in Physics, Faculty of Tarbiyah and Teacher Training, Imam Bonjol State Islamic University, Padang

* Coressponding Author. E-mail: desfionmukai@gmail.com

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Abstract This research is to produce an ISpring Quizmaker Application Assisted Assessment Instrument that is valid, practical and effective on traveling and stationary waves, sound and light waves. The assessment instrument development model used in the Plomp model includes three stages of development, namely: preliminary research, the development of prototype phase, and the assessment phase. The results of the study have been in an assessment instrument assisted by the ISpring Quizmaker application that is valid, practical and effective. The instruments used are validity questionnaires, practicality questionnaires, and effectiveness questionnaires. The validity test of the quiz questions assisted by the iSpring Quizmaker application was given to 6 validators who were assessed from the aspects of material, construction, media and language. Quizmaker practical test assisted by the iSpring suite 8 application was given to 2 physics teachers and 20 students of class XI IPA 1 SMA Negeri 3 Solok City assessed from the aspect of ease and pleasure in using the test instrument. The effectiveness test was tested on 20 students of class XI IPA 1 SMA Negeri 3 Solok City by providing questions assisted by the iSpring Quizmaker application. The instrument is valid both in terms of material, construction, media and language with an average value of 78.76% with a very valid category.

Kata Kunci: Instrument Assessment, iSpring quiz maker, concept understanding

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INTRODUCTION

Bahar and Salempa (2018, p.71) state that education is a complex process, but its complexity always changes along with human development. Through education various aspects of life are developed through the learning process. Various problems in the learning process need to be harmonized and stabilized, so that learning conditions are created in accordance with the objectives to be achieved and can be obtained as optimally as possible. To find out the strengths and weaknesses in the learning process, it is necessary to pay attention to a good and planned assessment system, so that it can be used as a basis for making decisions, whether the learning process is good and can be continued or still needs improvement and refinement.

Assessment of learning outcomes by educators in Permendikbud No. 104 of 2014 Article 1 paragraph 1 is the process of collecting information/evidence about the learning achievements of students in the competence of spiritual attitudes and social attitudes, knowledge competencies, and skills competencies which are carried out in a planned and systematic manner, during and after the learning process. Learning assessment activities are held to measure the ability of students to master competencies in aspects of attitudes, knowledge, and skills.

Alzughaibi et al. (2016, p. 108) stated that assessment is considered an educational tool that enhances learning. Tempelaar et al. (2018, p.5) states the classic function of testing is summative assessment or learning assessment: students demonstrate their mastery of certain subjects to their educators after completing the learning process. Formative assessment or assessment for learning takes place during learning, and has a completely different function: to provide ongoing feedback to learners, to improve student learning and educators to improve teaching (Spector et al, 2016, p.59).

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Assessment is an activity that helps in developing student learning. Assessment provides an opportunity for educators to evaluate teaching to improve the quality of student learning. The important role of assessment for educators is that assessment can be used as a reference in achieving learning objectives and can provide input about the condition of students. The findings show that students have strong views about various assessment and evaluation formats (Struyven et al, 2005, p.331).

Atia, et al (2018, p.18) Quizzes and assignments, as teaching aids, have been shown to have a positive impact on students' attendance, reading, and self-confidence. In addition, feedback from regular quizzes allows students to distinguish the areas that are the focus of the exam.

This is supported by research by Dwi and Utiyah (2012) which states that the role of assessment for educators is to be used as a reference in the learning process as well as to provide input about the condition of students. Meanwhile, for the students themselves, the benefit of the assessment is to find out the extent of their ability to follow the lesson. Educators need to develop an assessment tool that can be used to measure the completeness of student learning outcomes as seen from the indicators of learning outcomes and learning objectives. The assessment tool can ultimately be used as a reference for educators in making the right decisions for students.

From the results of the assessment, educators can find out the extent to which students' mastery of the concept of the subject matter. Concept understanding is a competency shown by students in understanding concepts and in accurate, efficient and precise procedures (Herimanto et al, 2018, p.44). The application of the conceptual understanding process goes beyond a single topic in the curriculum and has the potential to influence many areas of education. The term conceptual understanding is analyzed to determine how educators can help students achieve understanding in a concept-based curriculum (Mills 2016, p.546).

Educators have an important role in teaching and learning as they are responsible for preparing scientifically literate citizens for the 21st century (Akcay and Akcay 2015, p.43). It is important for educators to ensure that students' basic knowledge is strong to understand important concepts (Husin et al, 2019, p.1). Understanding concepts is the most important part of learning physics. Concepts in physics include the principles, laws and theories of physics along with their application in life.

Aswirna (2018, p.507) Comprehension is a cognitive ability that is at a higher level than knowledge. The ability possessed by students at this level is the ability to obtain meaning from the subject matter that has been studied. Students are required to understand or understand what is being taught, know what is being communicated and be able to take advantage of its contents. Several categories of students are considered to understand a learning material, for example, students can explain in their own sentences something that is read and heard and also students can give other examples of what has been exemplified or use application instructions in other cases.

Students who have high ability in learning generally have an above average level of intelligence. Efforts that can be made to help them are by placing them in special groups or being given additional tasks. Students who have medium and low abilities generally need longer time to understand the subject matter. Students of this group often fall behind in learning (Rahmadani, et al 2019, p.863).

Of course, to design and implement innovative learning oriented to the development of conceptual understanding and thinking skills, educational tools or learning media are needed. The application of learning media must be able to train ways to develop the ability to understand concepts and thinking skills, one of which is implementing learning tools that are integrated with computer simulations. Computer simulation is software that can be used as the main medium in learning to improve learning understanding of concepts and thinking skills (Palloan and Swandi, 2019,p.).

Park (2020) Incorporating computer simulations into formative assessments for use in science classrooms, and showing positive effects on student performance compared to students undergoing only traditional assessment (Paper and pencil tests). In addition, the teaching and learning philosophy shift is gradually moving towards the use of computers and information and communication technology to introduce an effective teaching environment. This teaching environment has special attention to activities that generate awareness, initiative, inquiry, collaboration, and contribution to new knowledge in a computer-based clear way (Al-Hakeem and Abdulrahman, 2017, p.9).

Cakiroglu et al. (2017, p.133) the role of students in theassessment process online can provide insight for educators to build an efficient learning environment and to determine the role of assessment in the learning process. There are different ways to help improve student learning outcomes, but applying online tools is one of the best options.

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The reality found in the field today shows that conditions are far from ideal. There are three aspects of the assessment, namely cognitive, affective and psychomotor. Natalina et al, (2015, p.112) stated that the current condition of educators tends to only judge from the cognitive realm. This happens due to the inability of educators to develop assessment instruments based on the demands of KI/KD in the curriculum. Among the three aspects of cognitive assessment, it is the one that greatly influences the assessment aspect. In addition, it is the cognitive aspect that affects the understanding of students' concepts.

The implementation of physics learning is still considered unattractive, physics learning in general is still seen as a difficult lesson, because the packaging of physics is less attractive. Students are expected to understand the main concepts of classes and how these concepts are interrelated, that is, they must do so develop knowledge structures (knowledge of how to different concepts are intertwined (Stoen et al. 2020, p.1)

Often, tests are structured and made in paper form resulting in a large amount of paper waste. On the other hand, teachers also need a long time to assess the results of paper-based student evaluations, especially if the number of students is large (Abdurrahman and Masor 2019, p. 177).

The results of preliminary observations in class XI conducted by researchers on physics learning at SMA Negeri 3 Solok City show that: The assessment instrument used by teachers at SMA Negeri 3 Solok City to test students' understanding of students' concepts on cognitive aspects is usually taken from various books or a collection of questions exam. The evaluation carried out by the educators themselves still uses an ordinary test question assessment instrument with paper in the form of questions. Evaluation using a computer is only carried out during the National Examination. The questions that test the aspects of analyzing and assessing have not been tested much. In the material of traveling waves, stationary waves, sound waves and light, most students still have difficulty in solving problems related to these materials. Problems in the matter of traveling waves, stationary waves, sound waves and light have a lot to do with the application of technology in everyday life. Questions related to this technology need to be developed because they can train students' conceptual understanding.

One of the roles of theassessment instrument Quizmaker in the learning process is to measure students' conceptual understanding in learning. Media is also needed in learning physics. Physics is concerned with systematically finding out about natural phenomena. Physics education is expected to be a vehicle for students to learn about themselves and their surroundings, as well as prospects for further development in applying science in everyday life.

Research that has developed an assessment instrument has been carried out by Istiyono and Subroto (2017, p.89), which is about the development of a computer-based physics knowledge assessment instrument to improve students' readiness in facing the computer-based national exam (UNBK). Students give positive responses to computer-based tests. In addition, computer-based tests are also accurate for measuring test takers with moderate to high abilities. The research that developed the next assessment instrument was Firmansyah et al (2016, p.1) who developed the development of an assessment instrument (assessment) using the Wordershare Quiz Creator on the mole concept material for class X students of SMK Negeri 7 Pontianak. The results of the research are an assessment instrument that is suitable for use and is able to provide assistance to students in analyzing questions. Research conducted by Zakaria, et al (2017, p.182) shows that the use of themedia ISpring QuizMaker can be developed for the development of assessment instruments.

Rusanova and Sazanova (2019, p.162) Theprogram was ISpring QuizMaker used as an alternative to the Power Point program. The ability to embed images, audio and video allows teachers to further expand the range of student assessment, not to mention the fact that the presence of all these options makes it possible to create tests and exercises for almost any aspect of teaching.

The main objective is to present the design and implementation of Quiz Maker the proposedand Management System for educational organizations, which supports the educational process and conducts scientific competitions and selections (Elshafey 2018,p.518).

ISpring QuizMaker can create and arrange various forms and different levels of questions, namely true/false (True/False), multiple choice (Multiple Choice), multiple choice with multiple choices (Multiple Response), essay (Type In), match (Matching), sorting (Sequence), numbers (Numeric), filling in words (Fill in the Blank), multiple choice (Multiple Choice Text), inserting words into paragraphs (Word Bank), and determining points in the image (Hotspot). The advantages of iSpring QuizMaker are that it is more efficient, minimizes human error, questions can be scrambled quickly so

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that it can reduce cheating in the exam, the time allocation is determined according to the plan. ISpring QuizMaker can answer questions and find out the answer scores directly (Yulianti, 2015, p.). It can be concluded that the computer-based assessment instrument has an effect on students' conceptual understanding.

Eades & Rizvi (2016, p.2) state format online quiz iSpring's makes it possible to take what works from a paper quiz and place it online. The program does not take much time for the teacher to master. This program has a simple and convenient interface that is in accordance with international standards (Odinokaya and Zhigadlo 2018, p.156) The

development of assessment instruments can make it easier for educators to correct assignments and tests, make student learning outcomes better, and train students' readiness to face exams with the system. on line. These various problems motivated the authors to develop evaluation techniques that will make students take the test calmly, honestly and enthusiastically, and educators can assess student learning outcomes according to their respective abilities, assessing in a short time, and without paper. And what distinguishes this research from previous research is that the questions tested can be sent to the phones students' android. The use of theapplication ISpring Quizmaker is very suitable for traveling waves, stationary waves, sound waves and light. Based on this, the researcher is interested in raising the title of the research to develop an ISpring Quizmaker Application Assisted Assessment Instrument to Measure Student Concept Understanding at SMA Negeri 3 Kota Solok.

METHOD

This research is a research and development (studyR&D). According to (Sugiyono 2011) defines research and development methods are methods used to produce certain products, and test the effectiveness of these products. Research and Development (R&D) aims to produce new products through the development process. Products of research and development in the field of education can be in the form of models, media, tools, books, modules, evaluation tools and other learning tools. (Sugiyono 2011). In this study, the product developed was aassessment instrument Quizmaker using theapplication ISpring Quizmaker on traveling waves, stationary waves, sound and light waves.

Model Development

Carrying out the development of learning tools required development models that are in accordance with the education system. Model development in this research is a model of Plomp (2013) which includes three stages of development, namely: a preliminary study(Preliminary reseach),or prototype development phase(development of prototype phase),and the assessment phase (phase Assessment) as seen in Figure 1.

Preliminary research (preliminary research)

This stage aims to analyze the main problems that underlie the importance of developing aassessment instrument quizmaker physicsassisted by the ISpring Quizmaker application on the material of traveling waves, stationary waves, sound waves and light to encourage understanding of students' learning concepts and prepare a conceptual framework that is used as a reference for conducting studies. next.

Development and Prototyping Phase

This stage is a continuation of the first stage, aiming to produce a prototype for the development of aassessment instrument quizmaker physicsassisted byiSpring Quizmaker application a valid. This stage consists of three activities, namely: designing a prototype, conducting formative evaluation, and revising the prototype.

Assessment Phase (Assessment)

The purpose of this stage is to conduct in-depth assessment of the prototype II development of an assessment quizmaker instrument-assistedphysics iSpring application Quizmaker revised. The instrument used to see the practicality of the product is a practicality questionnaire filled out by 2 physics teachers and a practicality questionnaire filled out by students. The instrument used to see the effectiveness is the test answers by students.

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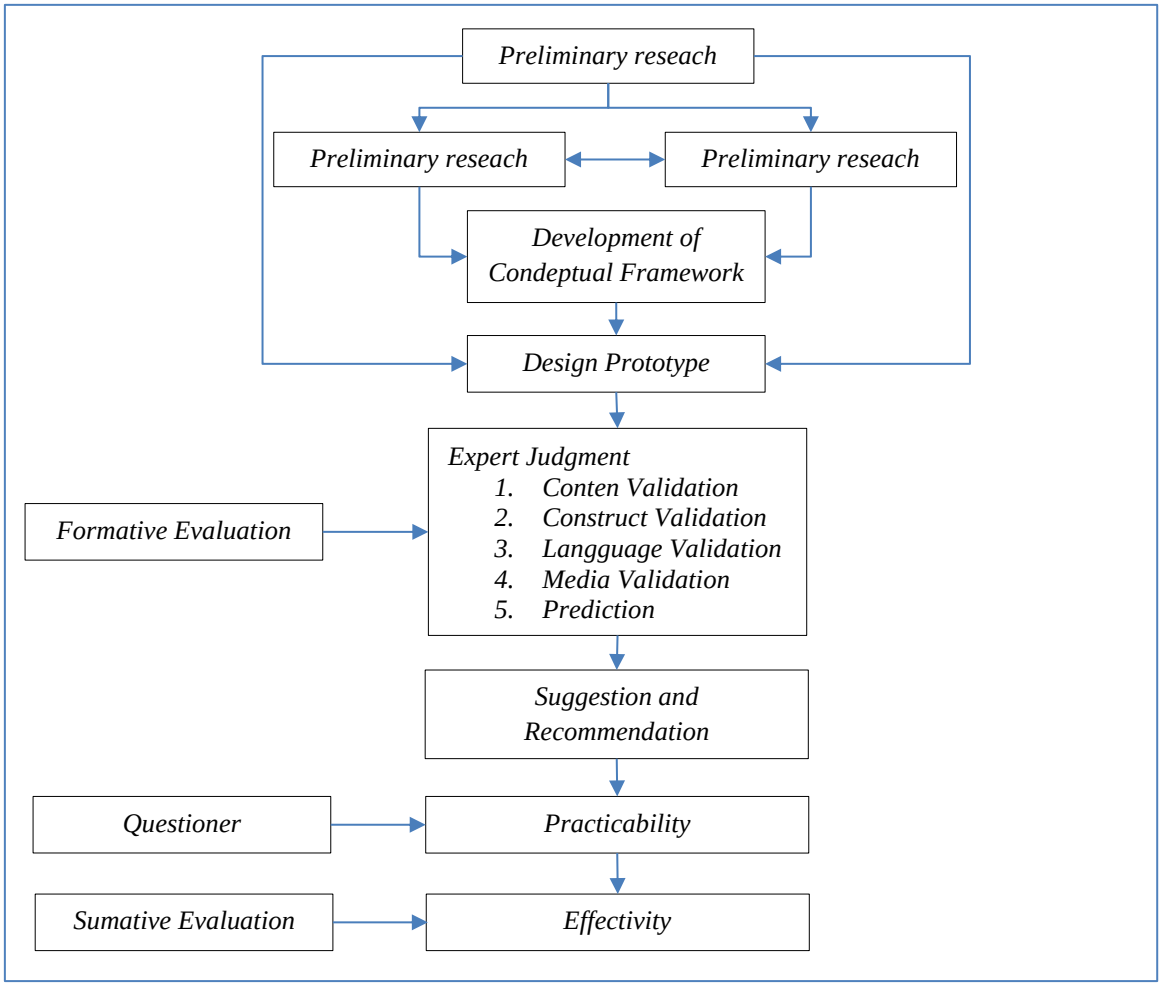

Figure 1. Plomp's Development Procedure

Product Trial

Product trials were carried out to improve prototype II of the development of an assessment instrument assisted by the ISpring Quizmaker application as a result of the validation. Product trials are carried out through limited trials at the Assessment phase. This limited trial is part of a formative evaluation to test the practicality and effectiveness of the developed product. The trial was conducted on 20 students and 2 physics educators. After the limited trial was completed, revisions were made to the development of an assessment instrument assisted by the iSpring quizmaker application, in order to obtain the development of an assessment instrument assisted by the iSpring quizmaker application on the material of traveling waves, stationary waves, sound waves and light to measure the understanding of effective student learning concepts.

Trial Subject

The subjects of the product trial developed in this study were students of class XI IPA 1 at SMAN 3 Solok City.

Types of Data

The type of data to test the validity of developing an assessment instrument assisted by the ISpring Quizmaker application is quantitative data obtained from the results of the validation sheet assessment by the validator. Qualitative data in the form of suggestions and comments from the validator. The type of data for the practicality test of developing an assessment instrument assisted by the ISpring Quizmaker application is quantitative data obtained from the results of questionnaires from students and physics educators. Qualitative data was obtained from the suggestions and comments of students and physics educators on the development of an assessment instrument assisted by the iSpring quizmaker

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application. The type of data to test the effectiveness of developing an assessment instrument assisted by the ISpring Quizmaker application is quantitative data obtained from the results of learning test questions to measure students' conceptual understanding.

Research Instruments

Data collection instruments in this study were carried out using several techniques as follows:

Table 1. Data Collection

Criteria	InstrumentsInstrument
Valid	a. Validation instrument assessment sheet b. Practical instrument assessment sheet c. Effectiveness instrument assessment sheet d. Validation sheet Development of an assessment instrumentapplication *based on the iSpring Quizmaker* to measure students' conceptual understanding at SMA Negeri 3 Kota Solok
Practical	a. Practicality questionnaire by educators b. Practicality Questionnaire by Students
Effective	Concept Understanding Indicator

Table 1 above shows that each of the measured aspects consists of different instruments. These instruments have been adapted to the existing theory. The data collection instruments in this study were:

The instrument was in the form of validation sheets from material experts, construction experts, media experts, and linguists science educators (Physics), as well as students. The material expert validation sheet for the validity stage is used to find out how deep the material is delivered and its relevance to the expected competencies. The construction expert validation sheet for the validity stage is used to determine the feasibility of the question to be used in learning evaluation. The media expert validation sheet for the validity stage is used to find out which products are developed according to the application used. The linguist validation sheet for the validity stage is used to determine the effectiveness of the sentences used in the questions. The validation sheet for science educators (Physics) and students at the practical stage is used to find out how useful and appropriate the questions are with theapplication *iSpring Quizmaker* in the learning evaluation process. The validation sheet at the effectiveness stage is used to determine the validity, reliability, level of difficulty and discriminating power of questions assisted by theapplication *ISpring Quizmaker* to measure students' conceptual understanding. The research instrument was validated theoretically, in consultation with the research supervisor. The results of the validation are instruments that are ready to be used for research data collection. Data presentation and data analysis of validity questionnaire validation assessment, practicality questionnaire validation, effectiveness validation as follows:

Implementation of teaching materials adopted from the assessment criteria for the development of physics assessment instruments and several other references for the achievement of student competence in the material of traveling waves, stationary waves, sound waves and light.

The data collection technique to determine the validity of the product is by distributing questionnaires to 6 experts as validators, namely 2 physics educator lecturers, 2 physics lecturers, 1 Media lecturer, 1 Language lecturer and then recapitulated. Validation questionnaires were used to determine the feasibility of the material, construction, and conformity with technical requirements for the product designed as an implementation of physics questions assisted by theapplication *ISpring.*

The instrument used to determine the practicality of developing physics assessment instruments is to use a questionnaire. Data collection techniques to determine the practicality of the product is by distributing questionnaires to physics teachers and students of SMAN 3 Solok City. The educator's practicality questionnaire was filled out by 2 physics teachers at SMAN 3 Kota Solok on the use of the development of physics assessment instruments assisted by *the ISpring Quizmaker application* on the material of traveling waves, stationary waves, sound and light waves, while the students' practicality questionnaire was filled out by 20 students on the use of developing assessment instruments. with *the help of the iSpring Quizmaker application* on the material of traveling waves, stationary waves, sound waves and light.

The questions assisted by theapplication *ISpring Quizmaker* on the understanding of students' concepts is obtained from the results of the analysis of the questions. The results of the question analysis

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consist of validity, reliability, level of difficulty and discriminating power. The instrument grid can be seen in Table 2 below:

Table 2 The concept understanding effectiveness instrument grid

No	Aspect of Condeptual Understanding	indicators Question
1	Interpreting	Presented a question and a picture, students can interpret the correct answer to the question.
2	Exemplifying	A statement is presented to students, students can give an example from the question
3	classifying	Some questions related to traveling waves, stationary waves, sound and light waves are presented. Learners can classify.
4	Concluding	Presented a statement that is assumed to be true to students and one possible conclusion, students can determine the conclusion.
5	Comparing	Presented statements with which students can compare the correct answers.
6	Explaining	Questions are presented, students can explain the answers to these questions

RESULTS AND DISCUSSION

Validity Analysis

Based on the validity assessment instrument given to the validator, there are 4 assessment variables, namely material validity, construction validity, media validity, and language validity. The average value of the validity ofquestions quizmaker assisted by theapplication iSpring suite 8 the four validity variables can be seen in the Table 3.

Table 3. The validity of questions quizmaker assisted by iSpring

No	Validity	Value (%)	Category
1	material	82,625	Very valid
2	construction	71.2	Valid
3	media	90.2	Very valid
4	languages	71	Valid
Average number		78.76	Very valid

Practical Data

Analysis of practicality data onquestions quizmaker assisted by theapplication iSpring suite 8 by educators and students. Practicality assessment instruments given to teaching practitioners and student practitioners have 3 assessment variables, time saving, ease of use of tests and pleasure in using test instruments. The average practical value of physics questions based on flash animation of the three practicality variables is in the Table 4 bellow.

Table 4. Feedback of Media Testing

No	Practicality	Value (%)	Category
1	Educator	92,708	Very practical
2	Students	79, 464	Practical
Average number		86,086	Very Practical

Analysis of the effectiveness of understanding the concept

The effectiveness assessment instrument given to students in the form of quizmaker questions assisted by theapplication iSpring suite 8. The distinguishing analysis carried out on the questions was validity, reliability, level of difficulty andpower.

Table 5. The Average Score of Effective Problem-aided quizmaker iSpring

Analysis	Problem Percentage Accepted(%)	Problem received	Problem With Accepted
Validity	100	1-20	0
Reliability Test	reliability of the questions is 0.70 and the reliability of the questions has a high interpretation.		
Level of difficulty	Medium	16	

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Analysis		Problem Percentage Accepted(%)	Problem received	Problem With Accepted
			1-7	
		Hard	4	
Different	Power	Good		
Problems		16	4	

Analysis of students' conceptual understanding based on student learning outcomes after using questions assisted by theapplication *iSpring quizmaker* can be seen in Table 6.

Table 6 Analysis of Student Concept Understanding

No	Indicator	Average	Category
1	Interpreting	70%	Effective
2	Exemplifying	68.30%	Effective
3	Classifying	65%	Effective
4	Concluding	61.67%	Effective
5	Comparing	65%	Effective
6	Explaining	60.71%	Effective
	Average	65.11%	Effective

Discussion

Product Validity

Validation is needed to test a research. The word valid is often interpreted correctly, correctly, validly, abash. So, the word validity can be interpreted with accuracy, truth, authenticity, or validity. The research product that has been developed is said to be valid if it meets certain criteria (Yusuf 2015).

Validity (the degree to which an instrument measures what it claims to measure, rather than something else) and reliability (the degree to which an instrument can be expected to give the same measurement results when measurements are repeated) in (Taber 2018).

Content validity is defined as the extent to which the items in the instrument reflect the content to be generalized or continued (Taherdoost 2016). To obtain high content validity, it is necessary to conduct an in-depth discussion, which is attended by people who are experts in the field of study concerned as well as experts in the field of measurement and assessment (Arifin 2009).

Validation is carried out by several experts or experienced experts to assess the advantages and disadvantages of the resulting product. Validators who assess a product consist of 2 material/content experts, 2 construction experts, 1 media expert, and 1 linguist.

The results of data analysis validation show that the Question instrument assisted by the iSpring Quizmaker application is declared valid because it has produced material variables with a value of 78.76% for traveling waves and stationary waves, sound waves and light waves. The validity was modified from (Sukardi 2003) which ranged from 78.76%, including the very valid category. This means that the questions assisted by the iSpring Quizmaker application that have been developed have fulfilled the KI, KD, learning indicators, and learning objectives. This is relevant to the research that has been done by Sasahan et al,. (2017) which produces material variables with a value of 81.06%.

The construction validation obtained a value of 71.2% for the material of traveling waves and stationary waves, sound and light waves. According to the modified validity from Sukardi (2003), the value range of 71.2% is in the valid category. This means that the questions assisted by the iSpring Quizmaker application that have been developed have met the construction criteria/structure of the learning evaluation developed that are clear and functional.

Media validation obtained a value of 90.2%. According to the modified validity (Sukardi 2003) the range value of 90.2% is in the very valid category. Relevant to previous research conducted by Firmansyah et al, (2016) which resulted in media variables of 93.75% with a very good category.

Language validation obtained a value of 71%. According to the modified validity (Sukardi 2003) the range value of 71% is in the valid category. Language validity according to Setyosari (2016) is related to the use of language that is in accordance with the Enhanced Spelling (EYD). Relevant to the research conducted by Murtono and Miskiyah (2014) which resulted in the language variable with a value of 91.67% in the very good category.

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Analysis of the validity test questionnaire data was based on four aspects, namely material, construction, media, and language. The results of data analysis showed that the average value of the validity of the questions assisted by the ISpring Quizmaker application was 78.76%. According to the modified validity (Sukardi 2003) the range value of 78.76% is included in the valid category. Relevant research Liew et al. (2019) Development of Scoring Rubrics to Assess Physics Practical Skills. This is relevant to research by Zakaria, et al., (2017) regarding Development of CBT-Based Evaluation Instruments with ISpring QuizMaker Software on Chemical Equilibrium Materials. The instrument is said to be valid with a very high category, the instrument can be used for field trials. Thus, questions assisted by the iSpring Quizmaker application can be continued for practicality tests.

Product Practicality

A measuring instrument or instrument is said to be practical if the cost of the measuring instrument is easy and cheap (Yusuf, 2015). ISpring Quiz Maker is software that can facilitate students in learning assessment and evaluation activities (Radjibu and Kuswanto 2020).

Saarinen, et al (2019) stated that to build a quality instrument, we need strong questions. When selecting an instrument, or developing a new instrument, for a study, a researcher is expected to consider the relevance of the instrument to a particular research question.

The question instrument uses the ISpring Quizmaker application on the material of traveling and stationary waves and sound and light waves that have been declared valid by the validator, then a practical test is carried out. The practicality of the questions assisted by the iSpring Quizmaker application was seen through a questionnaire filled out by 2 educators and 20 students as users of the questions assisted by the iSpring Quizmaker application that was developed. Quizmaker questions assisted by the iSpring Quizmaker application obtained 92.708% practicality results in the very practical category. This shows that the questions are very practical to use in learning evaluation. Relevant to the research that has been done by Murtono and Miskiyah (2014) the average score obtained from all aspects by educators is 85.53%, which is included in the very good category.

The results obtained from the practicality questionnaire by educators obtained a practicality value of 79.464% with a very practical category. Based on the questionnaire that has been filled out by the students, in terms of the ease of use of the quizmaker and the pleasure in using the question instrument assisted by the ISpring Quizmker application, it is interesting because the questions can help students in understanding concepts in learning evaluation. Problems are also an assessment based on real situations in everyday life, where students are expected to be able to apply learning concepts in class to solve problems. This is comparable to the research conducted by Herpiana and Rosidin (2019) on the Development of Instruments to Train Critical and Creative Thinking Skills in Physics Assessment for High School Students' Learning. The results of the research can be concluded that this testing method is very helpful for students and teachers.

Product Effectiveness

Chodijah, et al., (2012) Effectiveness is the influence or impact that is the result of policies or steps taken, which of course are taken from the desires to achieve targets by looking at the reality on the ground. Effectiveness is an important factor in learning. Effective learning is a match between students who carry out learning with learning goals or objectives to be achieved. The effectiveness of a product can be seen if the goals to be achieved can be implemented properly.

The analysis of questions assisted by the ISpring Quizmaker application on questions that have been tested on 20 students of class XI IPA 1 SMAN 3 Solok City is based on validity tests, reliability tests, difficulty levels and differentiating abilities. The validity of the question is 100% valid. The result is a good instrument used to measure the concept that should be measured. Reliability test results obtained 0.855 and 0.808. Figures of 0.855 and 0.808 belong to the very high category. Relevant to the research conducted by Malik et al, (2018) with a reliability of 0.96, it belongs to the category of very high interpretation. Thus the question is said to be steady because all students in the upper class answered the questions correctly and the majority of students in the lower grades answered the questions incorrectly, even though the questions were tested on different students but produced the same score. So that the items on the assessment instrument assisted by the ISpring Quizmaker application are declared reliable.

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Testing the difficulty level of the questions with the help of the iSpring Quizmaker application for traveling wave and stationary wave material, it was found that the questions were at the easy level of 10% and medium 90%. Generally, questions with the help of the ISpring Quizmaker application have a difficulty level of questions at an easy to moderate level. Then the level of difficulty of the questions assisted by the ISpring Quizmaker application for sound and light wave materials was found to be at an easy level of 20%, 70% moderate, and 10% difficult. Generally, the questions had difficulty levels at easy, medium and difficult levels.

The discriminatory power test for traveling waves and stationary waves is 10% very good, 70% good, 10% quite good and 10% bad. As for the material for sound waves and light waves, 10% is very good, 50% is good, 30% is quite good and 10% is bad. The differentiating power test is related to the ability of the question to distinguish students who belong to the smart group from students who belong to the less group. The result is 100% of the questions with traveling waves and stationary waves can be accepted and 100% of questions with sound and light waves are accepted.

In this study, the indicators of understanding the concepts used are interpreting, exemplifying, classifying, concluding, comparing, explaining. The results of the effectiveness show that the question instrument was developed with an effective category seen from the distributed questions, which can measure the ability to understand students' concepts.

Conceptual change has become one of the main goals in science education, with many studies seeking to advance our understanding of conceptual change (Mansour et al, 2016). Potvin et al, (2015) that learning scientific concepts is not always the result of knowledge that accumulates information. The next section will present the concepts and constraints associated with their use in the science classroom. According to Phanpphech et al, (2019) Conceptual understanding is an important goal in learning in general but is very relevant in science education because such understanding is needed to understand phenomena.

The main difference between conceptual and procedural knowledge assessment is the novelty of the task. As the children received repeated practice and feedback with number line problems during the intervention, this task became familiar and routine and thus made use of the children's procedural knowledge. In contrast, the tasks used to assess common fraction ideas, such as equivalent values, were new and not presented during the intervention, so these tasks assess conceptual knowledge (Rittle-Johnson et al., 2001).

The effectiveness of the assessment instrument assisted by the ISpring Quizmaker application on the material of traveling and stationary waves and sound and light waves is seen from the understanding of students' concepts. Aspects assessed from the concept understanding indicators are interpreting, exemplifying, classifying, concluding, comparing, explaining. Based on the test results from the concept understanding indicators, it can be concluded that 1) interpreting 70% in the effective category, 2) exemplifying 68.3% in the effective category, 3) classifying 65% in the effective category, 4) concluding 61.67 % with effective category, 5) comparing 65% with effective category, 6) explaining 60.71% with effective category. Based on the results of the effectiveness test questions according to the indicators of understanding the concepts of KD 3.9 and KD 3.10, the effectiveness scores for the assessment instrument assisted by the ISpring Quizmaker application for students of class XI IPA 1 were obtained with an average of 65.11% in the effective category. This shows that the assessment instrument assisted by the ISpring Quizmaker application can measure students' understanding of the concepts of students according to the needs of students and is effective for students' understanding.

The research on question instruments using the ISpring Quizmaker software was declared effective in terms of achieving the expected goals, namely being able to measure students' conceptual understanding abilities. Relevant Research Weintrop and Wilensky (2015) Using Commutative Assessments to Compare Conceptual Understanding in Blocks-based and Text-based Programs. Further research McInnes (2019) Developing multimedia collaboratively: Practical approaches for large-scale online curriculum development.

This is relevant to research by Palloan and Swandi (2019) Development of learning instrument of active learning strategy integrated with computer simulation in physics teaching and learning at Makassar State University. The results show that the results of the study show that the integrated computer simulation active learning strategy physics learning instrument is valid and reliable.

CONCLUSION

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The conclusion of the research is that the questions assisted by the ISpring Quizmaker application are valid both in terms of material, construction, media and language with an average value of 78.76% with a very valid category. Practicality shows that the questions developed in terms of the ease and pleasure of using the test for educators and students have an average score of 92.06% in the very practical category. The effectiveness of understanding the concept of physics based on the indicators of understanding the concept of 65, 11% with the effective category. The results of the effectiveness show that the question instrument was developed with an effective category seen from the distributed questions, which can measure the ability to understand students' concepts.

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