Development of Minimum Competency Assessment (AKM) Model Test for Learning Biology Excretion System Materials for Measuring Science Literacy in SMA Negeri 1 Bandar

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Article Info	Abstrak
	The results of the 2018 PISA study show that the ability of students in Indonesia in scientific literacy shows an average score of 389, so scientific literacy is still low. The Ministry of Education and Culture released the Independent Learning Program to replace the National Examination (UN) assessment system with a Minimum Competency Assessment (AKM) and character surveys. Therefore, it is necessary to develop AKM questions on the excretory system material to measure scientific literacy in students. The purpose of this study is to describe the characteristics of the AKM model questions, analyze differences in student learning outcomes and student responses related to the AKM model questions at SMA Negeri 1 Bandar, Batang Regency. This research refers to the development of questions according to Djemari Mardapi which consists of 7 stages that have been modified, The subjects of this study were students of class XI MIPA 4 (experimental class) and class XI MIPA 5 (control class). Analysis of the items on the test results of the AKM model test using Microsoft Excel software and SPSS v.19 software. That is to calculate validity, difficulty index, discriminating power and reliability estimation. Data on the results of differences in student learning averages were measured using a test instrument for the AKM model and student response data was measured using a questionnaire instrument. The results of the study obtained from 25 questions that were tested on students there were 23 valid questions and 2 invalid questions, the results of the difficulty level on the items obtained 12 very easy questions and 13 easy questions, the results of the differentiating power were in the good category and the results of the reliability estimation of items The questions are included in the very high category, and the results of the difference in the average learning outcomes in the experimental class and control class are 73.61> 61.44. Based on the results of student responses to the AKM model questions, a percentage of 83% was obtained in the experimental class and 69% in the control class. Thus it can be concluded that the development of AKM model test questions can measure students' scientific literacy abilities.

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INTRODUCTION

The Independent Learning Program is an assessment with the National Examination (UN) system replaced with a Minimum Competency Assessment (AKM) and a character survey. The essence of the policy of independent learning according to the Minister of Education and Culture of the Republic of Indonesia for the Advanced Indonesia Cabinet, among others, are the provisions that must be met in the competence of student achievement through appropriate learning. The interpretation given is in accordance with the assessment of the school or teacher, where the teacher is closer to the students and more familiar with the culture of learning needs that applies in the area where the teacher and students are (Purnomo, et al 2019). In connection with this, in learning, teachers are needed who are not only able to teach well but are also able to evaluate well. Optimization of the evaluation system according to (Djemari Mardapi, 2003) has two meanings, the first is an evaluation system that provides optimal information. The second is the benefits achieved from the evaluation.

The Minimum Competency Assessment (AKM) should be part of the government's target in preparing students to meet the XXI century with various skills that must be achieved. These skills are contained in four competencies abbreviated as 4C, namely Critical thinking and problem solving (students are able to think critically and are able to solve problems), Creativity (students have creativity), Communication skills (students have the ability to communicate), and Ability to work Collaboratively (students can work together). Students are required to be able to build understanding, be able to work together, be able to solve problems, be able to work by utilizing ICT (Information and Communication Technology) and be able to build creativity (Riordan et al., 2002).

The concept of independent learning also brings literacy to be one component of the assessment. Scientific literacy can be improved in schools through scientific learning (Asyhari, 2015). In the subject of Bology, students are required to master various basic competencies. according to (Toharudin, 2011) scientific literacy is the ability to use scientific knowledge in an effort to solve problems. To assess scientific literacy skills, various understandings can be used, one of which is measurement, one of which is applying knowledge of scientific processes in their daily lives. In this case, the evaluation of scientific literacy with the International by the Organization for Economic Co-operation and Development (OECD) in the form of the Program for International Students (PISA).

AKM, which is a government program, begins with the holding of socialization on social media and print media, then continues with training and the provision of an information forum for teachers in the form of a web, namely Pusmenjar. All teacher respondents stated that the AKM had been applied to biology learning as well as the implementation of formative and summative exams. Through AKM the teacher can make various questions so that students are better able to understand the material. The AKM model questions are different in construction compared to the questions that are usually made by the teacher. So in this case the biology teacher of SMA Negeri 1 Bandar must make more mature preparations to face AKM in school. AKM questions always require students to think more deeply. The development of the AKM model of biology questions requires steps as usual for the development of questions. The development stage includes activities to reduce KD to competency indicators, reduce indicators to question grids (for test assessment), and prepare questions and answer keys as well as rubrics containing indicators of scientific literacy ability. Furthermore, the creation of validation guidelines to assess the feasibility of the product before implementation.

The development of the Minimum Competency Assessment model test to measure scientific literacy skills in this study resulted in a test instrument used to measure the level of understanding of students. According to (Fitroh 2018), each student has a different learning experience, so that students have various levels of understanding. The Minimum Competency Assessment model test developed is in the form of multiple choice, complex multiple choice, and matching questions accompanied by discourse related to the material of the human excretory system.

The variety of questions also gives the teacher a view of the extent to which students have a deep understanding of the material. Variations of questions include multiple choice questions

with one answer, multiple choice questions with more than one answer, matching questions, true false questions, short description questions and long descriptions. are required to be able to develop AKM model questions and implement them in learning. This is intended so that students get used to and are finally ready to face AKM. The purpose of this study is to describe the Minimum Competency Assessment model questions, to analyze differences in learning outcomes of the Minimum Competency Assessment model test and to analyze student responses to the Minimum Competency Assessment model test.

RESEARCH METHOD

Research is a type of research designed with reference to the method of developing questions according to Djemari Mardapi. The purpose of this research is to produce or develop a product in the form of AKM (Minimum Competency Assessment) model questions on the Excretion System Material. According to Djemari, the development of questions uses 7 stages, including:
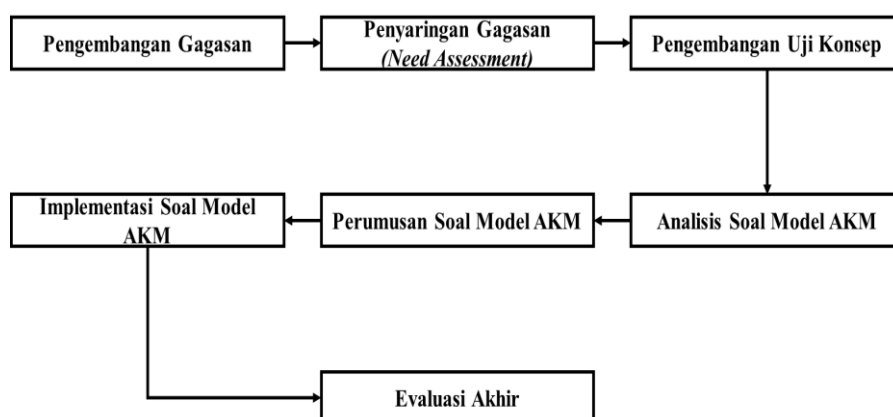

Figure 1 Stages of problem development (Djemari Mardapi)

This research was conducted in the even semester of the 2021/2022 academic year at SMA Negeri 1 Bandar, which is located at Jalan Raya Sidayu Km. 3, Bandar, Bandar, Kekejing, Tumbrep, Batang, Batang Regency, Central Java from March 14 to March 28, 2022. The research subjects used only two XI MIPA classes at SMA Negeri 1 Bandar, Batang in the 2021/2022 academic year. Class XI MIPA 4 as the experimental class and class XI MIPA 5 as the control class.

This research process is conducted fully online, although for students, hybrid learning (online-offline) has been carried out. The development model used is the development of questions according to Djemari Mardapi. The data taken are the results of testing the AKM (Minimum Competency Assessment) model and the results of teacher interviews and student response questionnaires. For this reason, instruments are needed in the form of interview sheets, AKM model tests, and student response questionnaires.

Data collection techniques are processed from the results of the validation carried out by the validator. By processing the validation results from the AKM model questions and Student Response Questionnaires, namely in the form of input suggestions, criticisms of improvements contained in the validation sheet. The data obtained were analyzed in the form of percentage analysis. Analysis of student response questionnaires using a Likert scale. Validation is carried out on the validator by answering the statement in the questionnaire with a score of 4 = very feasible, score 3 = feasible, score 2 = quite feasible, and 1 = less feasible. The determination of the score is based on the selected criteria, then the score is calculated using the equation. Determination of the category of item difficulty level and student ability level is based on the logit value. The final analysis stage is analyzing supporting data in the form of student response questionnaires quantitatively in the form of a percentage of the comparison of the answer scores obtained with the maximum total score (Sugiyono, 2015).

In this study, the average difference test was carried out using the SPSS 19.0 for Windows program using the Independent Sample T-Test with the assumption that both variances were

homogeneous (equal variance assumed). Furthermore, the decision making whether Ha or Ho is accepted or rejected is by looking at the t value in the Independent Sample T-Test column. N-Gain test is used to determine the increase in student learning outcomes. The data used in the N Gain test is learning outcomes data using the SPSS 19.0 for Windows program.

RESULTS AND DISCUSSION
Results of the Characteristics of the AKM Model Question Test (Minimum Competency Assessment)

Through testing the AKM model questions by experimental and control class students, it was found that the data results were in the form of validity, reliability, difficulty index, and data discriminating power. In analyzing the results of the AKM model test trials in this study, using Microsoft Excel software and SPSS v.19 software. The results of the calculation of the validity test, discriminatory difficulty index and reliability will be discussed in the following description:

a. **Validity Results**

From the results of the calculation of the Pearson correlation coefficient on the question with a significance level of 0.05, the r-table was 0.3961. Based on the validity test of the 25 AKM questions that will be given to students, they have been tested. With the value of r-table, obtained 23 valid questions and 2 invalid questions. This is in accordance with the stipulation criteria that if r-count > r-table, then the data is valid. Items that have a negative index of discrimination should not be issued in future tests because they are of poor quality. Then the research conducted by Lestari & Setyarsih (2020).

b. **Difficulty Level Results**

Based on the calculation of 25 questions given to class XI MIPA 4 (experimental class) and class MIPA 5 (control class), all questions were obtained in the range of 0.00 – 1.00, with 12 questions included in the easy category and 13 questions included in the medium category.

c. **Distinguishing Power Results**

The terms of the different power of questions are good if they have a DP of more than 0.3 (DP > 0.30). The results of the calculation of the discriminating power of the 25 items given to class XI MIPA 4 and class XI MIPA 5 obtained data for all items at 0.3333 to 0.4444. Based on these data (DP > 0.30) so that the distinguishing power of each item is included in the good category.

d. **Results Reliability/Fitness**

Based on the calculation results, the index r11 = 0.9932 was obtained. The criterion is reliable if the value of r11 is greater than 0.70. So it can be concluded that the question is reliable. Research on the development of this instrument is also in line with research conducted (Murti et al., 2021) the content validity of the developed instrument is in the very feasible category, both in the realm of material, construction, and language. The results of the empirical validity test consisting of the level of difficulty of the questions, discriminatory power, reliability, and item validity, obtained 9 out of 16 items that were declared empirically feasible.

Average Difference Test
After the two classes are normally distributed and have homogeneous variances, then the average difference test is carried out with a two-party t-test using the SPSS 19.0 for Windows program using the Independent Sample T-Test with the assumption that the two variances are homogeneous (equal variance assumed) with a level 0.05 significance. After processing the data using the SPSS 19.0 for Windows program, the output display can be seen in Table 1 below:

Table 1. Group Statistics Kelas Kontrol dan Kelas Eksperimen

Group Statistics

AKM question results	N	Mean	Std. Deviation	Std. Error Mean
Experiment Class	36	87,00	10,637	1,258
Control Class	36	66,22	15,237	2,526

Source: processed data

Based on the amount of data from the AKM model test results for class XI MIPA 4 as the experimental class with class XI MIPA 5 as the control class. The average value of student learning outcomes for the experimental class is 87.00 while the control class is 66.22. Thus, statistically descriptive, it can be concluded that there is a difference in the average student learning outcomes between the experimental class and the control class. Furthermore, to prove whether the difference is significant or not, it can be interpreted in the output results presented in Table 2 below:

Table 2. Uji Independent Sampels Kelas Eksperimen dan Kelas Kontrol

		Levene's Test for Equality Variances		of t-test for Equality of Means		
		F	Sig.	T	Df	Sig. (2-tailed)
AKM question results	Equal variances assumed	18,227	0,000	-4,281	70	0,000
	Equal variances not assumed			-4,281	51,506	0,000

Source: processed data

Based on Table 2, it is known that the value of Sig. Levene's Test for Equality of Variances is 0.000 < 0.05, it can be concluded that H0 is rejected and Ha is accepted. While the t-count value shows a negative value, which is -4.281, this shows that the t-count value is negative. It is known that the value of the degree of freedom (df) with the n-k formula is 24, then a one-tailed (one-tailed) test will be used to obtain a df value of 1.711. Then it is necessary to calculate the t value by ignoring the negative symbol of 4.281 > 1.711, it is concluded that H0 is rejected and Ha is accepted. Thus there is a significant difference between the average student learning outcomes in class XI MIPA 4 as the experimental class and XI MIPA 5 as the control class.

N-Gain Test

The N-Gain test is used to determine the improvement of students' literacy skills. The data used in the N Gain test are the test results of the control group and the experimental group using the SPSS 19.0 for Windows program. The following Table 3 is the result of the N-Gain analysis:

Table 3. N-Gain . Test Results

	Kelas Eksperimen	Kelas Kontrol
Mean	58,2836	25,0869
Minimum	36,36	10,39
Maximum	90,32	45,16

Source: processed data

Based on the calculation of the N-Gain score test above, it shows that the average value of N-Gain for. for the average N-Gain value for the experimental class is 58.2836 or 58.3%, with a minimum N-Gain score of 36.36% and a maximum of 90.32%. While the control class is 25.0869 or 25.1% with a minimum N-Gain score of 10.39% and a maximum of 45.16%.

Description of Student Response Data

Response results obtained from class XI MIPA 4 (Experimental Class) and class XI MIPA 5 (Class Control), are described as follows:

a. Description of Student Response Data XI MIPA 4

The description of the result data from the responses of class XI MIPA 4 students can be seen in Table 4 below:

Table 4. Deskripsi Data Respon Siswa (XI MIPA 4)

N	Min	Max	Mean	Median	Modus	Standart Deviasi
36	49	64	57,1944	56	56	4,31

Source: processed data

In table 4 shows the number of students 36. The minimum score count is 49, the maximum score is 64, the average count is , Median and mode 56 obtained a standard deviation of 4.31. This shows the ideal value in the response data of class XI MIPA 4 students. Based on the results of the description of student responses, it is obtained categorization of student responses to the AKM questions. The following is presented in Table 5 regarding the categories of student responses in the experimental class.

Table 5. Kategori Respon Siswa (XI MIPA 4)

Skala Nilai (%)	Kategori	F	Presentase
81,25 % — 100 %	Very good	30	83%
62,50 % — 81,24 %	Well	6	17%
43,75 % — 62, 40 %	Pretty good	0	0
25 % — 43,74 %	Not good	0	0

Source: processed data

From Table 5 it can be seen that the student responses fall into 2 categories. Students fall into the category of strongly agree as many as 30 students or 83% and in the agree category as many as 6 students or 17%.

b. Description of Student Response Data XI MIPA 5

Description of the response data of MIPA class 5 students who were given AKM questions without using material reinforcement, can be seen in table 6 below:

Table 6. Description of Student Response Data (XI MIPA 5)

N	Min	Max	Mean	Median	Modus	Standart Deviasi
36	41	61	50,9722	51	52	4,64

Source: processed data

Table 6 shows that the total number of students is 36, the minimum score is 41, the maximum score is 61, the average count is 50.97, the median is 51, the mode is 52 and the standard deviation is 4.64. This shows the ideal value in the response data of class XI MIPA 5 students. Based on the results of the description of student responses, the categorization of the responses of class XI MIPA 5 students to the AKM questions is presented in Table 7 below.

Table 7. Category of Student Responses (XI MIPA 5)

Value Scale (%)	Category	F	Percentage
81,25 % — 100 %	Very good	30	83%
62,50 % — 81,24 %	Well	6	17%
43,75 % — 62, 40 %	Pretty good	0	0
25 % — 43,74 %	Not good	0	0

Source: processed data

From Table 7 it can be seen that the student responses fall into 2 categories. Students in the category of strongly agree as many as 11 students or 31% and in the agree category as many as 25 students or 69%.

CONCLUSION

Based on the results and discussion of the research, conclusions can be drawn based on the existing problems, namely as follows:

1. From the results of the description of the characteristics of the AKM model questions on validity, 23 questions are valid and 2 questions are invalid. Reliability item with 25 items in very good category. On differentiating power, 22 questions were found in the good category and 3 questions in the very good category. Then at the level of difficulty, there were 13 questions in the medium category and 12 questions in the easy category.

2. Based on the results of the descriptive analysis of student learning outcomes, the average in the experimental class was 87.00, while the control class average was 66. The difference in the achievement of learning outcomes was evidenced by the results of the Independent Samples test which showed the t-count value of $4.281 > 1.711$, it can be concluded that H0 is rejected and Ha is accepted.

3. In the results of the percentage of student responses to the AKM model questions that were worked on in the experimental class, 83% of the responses were in the strongly agree category, while in the control class there was a percentage of 69% in the strongly agree category.

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