AUTHENTIC ASSESSMENT DEVELOPMENT SCIENCE TO ASSESS STUDENT COMPETENCY

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Abstract. This study aims to: to find authentic models of science assessment in assessing the competence of senior high school students who meet the criteria: (1) validity, practically, effectiveness, (2) The results of students in the high category, and (3) The response of students and teachers on the implementation of positive science authentic assessment models. The model used is the development of a general educational development of Plomp, T (Fauzan et al., 2013) and the theory of quality material (product) Nieveen (Tjark Huizinga et al., 2013). The result of the development of science authentic assessment (SAS) models meet the following criteria: (1) validity, practically, effectiveness, (2) the learning outcomes of students in the category of high, (3) a positive student response. Model of authentic assessment is very worthy science applied in teaching science for assessing the competence of senior high school students.

Keywords: science authentic assessment, validity, practically, effectiveness,

Contribution/ Originality: This research produces an authentic assessment that meets validity, practicality, effectiveness

1. Introduction

Teachers, often see the teaching and learning process, and assessment as separate tasks. They view that the curriculum is first taught, studied and then assessed. However, authentic assessment: teaching, learning, and assessment as something continuous, interrelated all happening at the same time, and both strongly influence each other. The assessment process as an integral part of learning and teaching. The assessment process as an integral part of learning and teaching.

Kurniawatia & Sukardiyono, 2018, assessment is seen only as a means for evaluation and the only tool for assessing classroom instruction is through paper and pencil tests. Student learning outcomes are measured based on what they have memorized at the expense of their conceptual understanding (Mohamed & Othman, 2017; Mongkuo & Meya, 2017 ; Susani, 2018; Suwartono & Cici, 2019; Alhouli & Khayatt, 2020). Authentic assessment as a better substitute for paper and pencil tests (Moria et al., 2017; Setyawarno & Atik, 2018; Inayah et al., 2019; Salirawati, 2021)

2. Theoretical Framework

2.1. Authentic Assessmens

Complexsituations authentica (Wiethe-Korprich, & Sandra Bley, 2017; Sutarto & Jaedun, 2018; Moria et al., 2018; Villarroel et al, 2020; Salirawati, 2021; Veugen et al., 2021; Centoni & Antonello, 2021);. Authentic assessment of educational achievement directly measures actual performance in the subject area (Sutarto & Jaedun, 2018; Syaifuddin, 2020; Fynn & Elias, 2022). Multiple choice tests only provide a superficial picture of what students have learned and do not show what students can do with what is obtained (Aiken, 2013). In general examples of techniques authentic assessments are shown in Table 1.

Table 1. Techniques Authentic Assessments (Sokhanvar et al., 2021)

Students can demonstrate that activity involves complex skills that are difficult to be assessed through paper and pencil tests.	
Plan and carry out experiments	Creating graph data
Writing stories, essays, poetry	Creating the chart
Give oral reports	Noting the observations
Being a peer tutor	Asking question
Creating of Journal	Improvise
interviewing informants	Creating computer programs
Being in a local travel guide	Searching for information in the library
Correspond with authors science	and etc

Organizing authentic assessments as in Figure 1 (Sokhanvar et al., 2021)

Invitation Stage Assessment
Discrepant event
Student materials manipulation/
Teacher Question
Concept Maping
Data Capture

Taking Action Stage Assessment
Story application
Creative drama
Production creation
Art work project
Demonstration
Model Building

Exploration Stage Assessment
Hands-on practical assessment
Student observation journals
Scientific processes observation checklist

All Stages Assessment
Portfolios
Cooperative group performance checklist
Teacher anecdotal records
Rubrics-Assessment scoring guides

Explanation/Solution Stage Assessment
Enhanced justified multiple choice Proposing plans
Communication assessment

Discovery/Interpretation Stage Assessment
Graphing from data
Essay interpretation of data
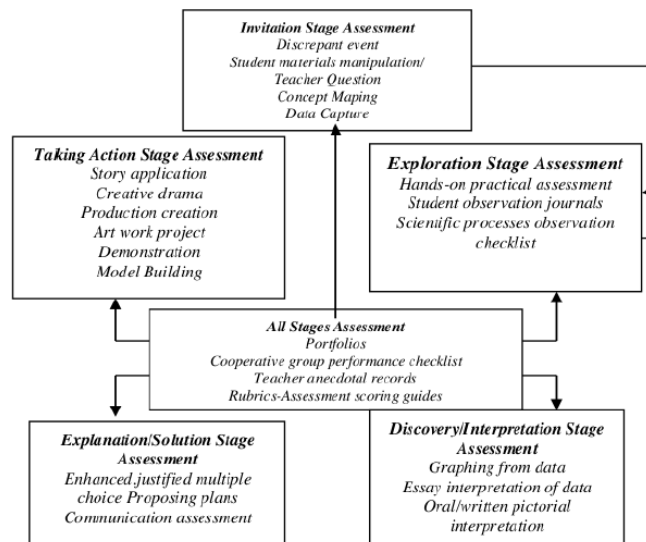Oral/written pictorial interpretation

Figure 1. Authentic Assessments Organization in the learning cycle stage

2.2. *Implementation of authentic asssessment*

Implementation of authentic assessment at each stage can be described briefly (Kurniawatia & Sukardiyono, 2018)

1. *Invitational stage*

   Authentic assessments aimed to obtain information about the initial understanding of the students on a particular topic or concept. The technique can be used, among others, asking questions orally or in writing teacher-oriented to provoke students' opinions, presenting photos or illustrations that demonstrate a process or a particular situation.

2. *Exploration stage*

   At this stage, the assessment aims to explore the ability of science process skills in students. Assessment used may be hands-on/minds-on activity includes the assessment of student activities and student observation journal.

3. *Explanation stage*

   Authentic assessment done on the competence of students in observation, analysis, and communication.

4. *Actions stage*

   At this stage, the assessment aims to uncover the student's ability to apply his understanding of a concept in other situations. The resulting product can be student demonstrations, role playing, oral or written communications, handicrafts, and others.

3. Method

3.1. Types of research

This research includes developmental research. The development of authentic assessment models or SAS models and instruments required. The development of research-oriented products SAS models qualified in the aspect of validity, practically, and effectiveness.

3.1. Research Sites

This research was conducted in senior high school Sungguminasa in accordance with the needs of the development of science authentic assessment (SAS) models.

3.2. Participants

The subjects were students of class X senior high school Gowa in South Sulawesi academic year 2020/2021. Number of research subjects in the test phase as many as 30 students.

3.3. Development operational

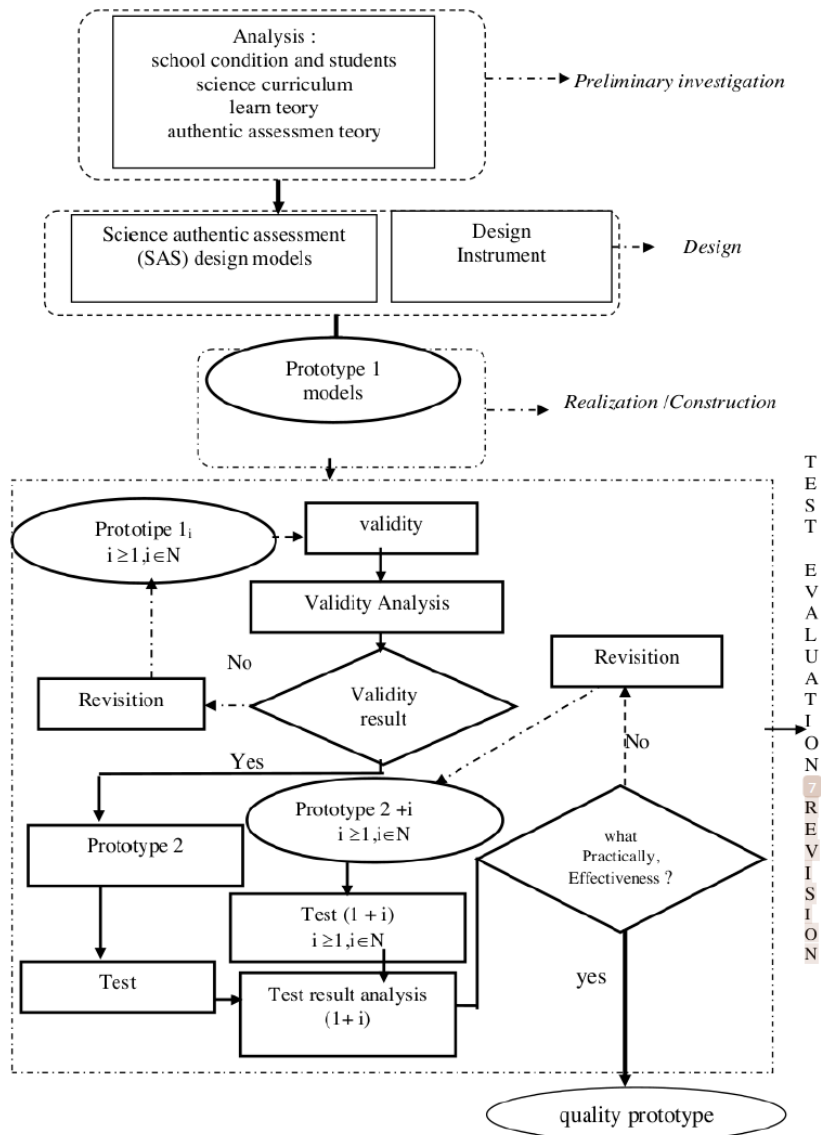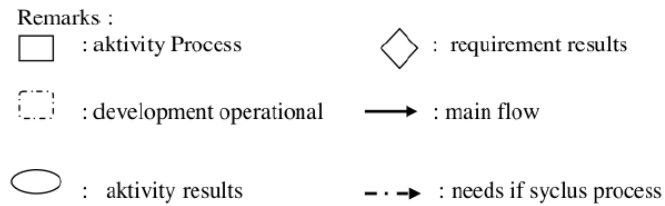Operational development of authentic models of science assessment fig. 2.

Analysis :
school condition and students
science curriculum
learn teory
authentic assessmen teory

Preliminary investigation

Science authentic assessment
(SAS) design models

Design
Instrument

Design

Prototype 1
models

Realization /Construction

Prototipe 1_i
$i \geq 1, i \in N$

validity

Validity Analysis

No

Revision

Validity
result

Yes

Revision

No

Prototype 2 +i
$i \geq 1, i \in N$

Prototype 2

Test $(1 + i)$
$i \geq 1, i \in N$

Test

Test result analysis
$(1+ i)$

what
Practically,
Effectiveness ?

yes

T E S T E V A L U A T I O N 7 R E V I S I O N

quality prototype

Figure 2. Develompment Operational SAS Models

Remarks :
□ : aktivity Process ◇ : requirement results

⌐ ⌐ : development operational ⟶ : main flow

⬭ : aktivity results – · ➔ : needs if syclus process

Operationally the development of SAS models done simultaneously, so that when the validity of the model SAS criteria have not been met, then when revising the devices (partially or completely) done simultaneously revise SAS models support device and related instruments. Suppose revisions subject matter, it is done simultaneously revisions to the plan of teaching, and performance assessment tasks and rubrics.

3.4. *Instrument*

Instruments consisted of (1) SAS models validation sheet; (2) science achievement test; (3) questionnaire; and 4) the observation sheet. Instrument is validated by five experts associated with the evaluation and validation of the content of the construct validation. The tests showed that these instruments eligible for use in research.

3.5. *Data Analysis*

Data validity analysis, practicaly, and effectiveness analysis using the theory Neveen (Tjark et al., 2013) in Table 2.

Table 2. Material Quality

Quality Aspects		
Validity	Practicality	Effectiveness
Intended (idea+ Formal :	Consistency between	Consistency between
-state of the art knowledge	-intended ↔ Perceived	intended ↔ Experiential
-Internally consistent	- intended ↔ Operational	intended ↔ Attained

Criteria for the categorization of quality SAS models using criteria by Bloom, (Fauzan, A, et al, 2013). with the following steps.

a. Calculate average results of the validation of formula ki = $\dfrac{\sum_{j=1}^{n} V_{ji}}{n}$ with k_i = average, the results

b. Calculate average of formula A_i = $\dfrac{\sum_{j=1}^{n} k_{ij}}{n}$

   kij : average sub-aspke i to j

   n : the number aspect sub-aspects of the aspects of the i-th

c. Calculate for a mean total (VR) with the formula VR = $\dfrac{\sum_{j=1}^{n} A_i}{n}$,

Table 3. SAS Models Validity Criteria (Chakraborty et al, 2021)

Scor interval	Validity Criteria
$4 \leq VR \leq 5$	very high
$3 \leq VR < 4$	high
$2 \leq VR < 3$	less
$1 \leq VR < 2$	low

A Data analysis and the students' response to the implementation of the supporting components of SAS models and data from questionnaires to determine the A positive response, meaning that students support, feel happy, interested in the components and the learning process through the implementation of SAS models. A negative response otherwise. To determine the achievement of the objectives of the activity implementation of SAS models in terms of the students' responses, when the the number of studied.

This is the degree of achievement of competence is the percentage of student mastery of the content and performance of the basic competencies of 80% of the basic competencies that have been set can be achieved (Kristina et al., 2021).

States, a program of teaching and learning activities otherwise very effective, if to reach benchmark reference value set beforehand. Because the matter refers to

the indicators, the values obtained by the students representing the student's mastery of the indicator is represented by the question, so that the control indicators can be expressed as the total value obtained by the students.

The criteria stated mastery learning with application of SAS models are a minimum score 80 (the maximum is 100). Interval score determining the level of student mastery (LSM) categorized (Kristina et al., 2021).

Table 4. Criteria for Mastery Level Students'

Interval Scor	Category
$90 \leq LSM \leq 100$	Very high
$80 \leq LSM < 90$	high
$70 \leq LSM < 80$	less
$60 \leq LSM < 70$	low
$0 \leq LSM < 60$	Very low

4. Result

4.1. Environmental Needs Analysis

Based on the results of the response to 350 parents, about the implementation of the assessment Scinece in schools found that almost all parents want their information on the progress of the learning progress sisiwa from time to time and comprehensively, namely the development in cognitive, affective, and psychomotor aspects. This trend indicates that the marking system "paper and pencil test" (written test) conducted in schools during this time should be time takes a form of alternative assessment as a complementary system of written test. It is very urgent to do given that written tests can not assess all students' abilities, on the other hand people have a tendency to get information about the three aspects. This is in accordance with the opinion of (Svidzinskaya et al., 2019), which states that by applying the assessment, the student's attitude competence can be measured

The assessment system that can address the needs of this community one of them is a model of SAS, it is quite reasonable, therefore, SAS models is one kind of assessment that has a philosophy of continuous assessment. The philosophy states that people eat to get the picture on the profile of the students, then of course the

student should be photographed from all sides, not only in terms of cognitive, but affective, and psikomotornya aspects need to be considered. These three aspects of this ability is absolutely developed simultaneously, as required in the curriculum of 2013.

On the results of this survey also found the information interesting to observe. First, in general, people wish that the assessment criteria used in the school to be communicated to students. It means that the assessment criteria used in assessing performance results (assignments, papers, daily tests) in school it was time delivered to students. Second, the public generally believes that students need to be included in assessing performance outcomes, it means that the community is aware of their students need to be trained assess themselves against the results of its performance. Therefore with melatihkan this ability, the students will be able to determine the "weakness" and "strength" has, so that in the end the students can have the ability to overcome the problems faced in everyday life. This is in accordance with the opinion of (Alhouli et al., 2020), which states that by applying the assessment, student skill competencies can be measured

The public need information about the assessment criteria can be answered by applying SAS models, because in this SAS model of the assessment criteria for every aspect of the student's performance has been set and similarly about self assessment. In the model of SAS students assess themselves, both self-assessment and assessment of the results of their performance themselves against participation in the group. Assessment of student' performance results in SAS models, teachers and students kduanya provided a score for performance results.

The results of survey studies the response of parents as one of the elements in the community, it can be said that people's needs is in accordance with the benefits rather than the model SAS, namely by applying the SAS models in the school, the parents/guardians of students able to: (1) identify the weaknesses and strengths students in learning. This can be achieved, because each performance results achieved by students, the parents make comments/response to the achievements of the son/daughter. Parents have the opportunity to provide motivation and expression of expectations to be achieved; (2) penentukan kind of guidance to be

done by the parents of students for achievement son/daughter, and (3) improvement of communication with the school in educating students.

The questionnaire results of five teachers of science in senior high school Sungguminasa, obtained information that in general teachers do not do the "feedback" to the results of performance (tasks, daily tests, and repeat the semester) their students, sometimes giving information on the assessment criteria, and never give a chance to students to assess themselves against the results of its performance. It means that there is a gap between the needs of the community with the implementation of the system of assessment in schools. Society nowadays need information how the learning progress of students in the school from time to time and in a comprehensive manner, the criteria used in the assessment, and trained students assess themselves, on the other hand it turns out these needs are not fully met.

The survey results mentioned above, this information reinforces the need to develop SAS models questionnaire results from 350 students showed that the suitability of the information contained on the teacher and the information from students, and students in general have a tendency to know the progress of learning results. It means that all the results of student performance over time needs to be informed, so that students can find out how their learning progress. The survey results of laboratory equipment, it still needed some laboratory equipment to support the implementation of SAS models. Laboratory equipment needed are: (1) tools calorimeter; (2) technical balance tool, and (3) expansion tool agent. The equipment is borrowed from Physics Laboratory, State University of Makassar. This can be realized because of the cooperation between the senior high school Sungguminasa and the University of Makassar. While the means of tables, benches, and laboratory equipments to support the implementation of SAS models. Therefore the form of tables, rectangular practicum students then setting the seating positions facing each other in the student made scientific activities (activities observing and experimenting). From the survey result means seating and tables that show the ingredients lab strongly supports the implementation of SAS models.

4.2. Analysis Curriculum

4.2.1. Analysis front end

SAS model development is done to enhance the assessment system in cooperative learning and assessment models Hibbard. In the cooperative learning, assessment component is still some weaknesses. The weaknesses include more emphasis on the assessment of learning outcomes achieved by students at the end of the lesson and less emphasis on assessment of student performance results. To complement these weaknesses SAS models then developed a model based on the model asesesmen Hibbard. However, on the model of Hibbard's assessment there are still some weaknesses that need to be improved, including the absence of a self assessment against the group and there is no element of motivating both teachers and parents/guardians of students. On the other hand, this element is one element that is needed by the community in accordance with the results of surveys that have been described previously.

SAS models development is needed grounding theories were strong and intertwined between the theory and other theories. Based on the results of the literature review obtained several theories that support the development of models of SAS include: (1) understand kognitivistik; (2) understand konstruktivistik: learning theory Piaget, learning theory Vygotsky, learning theory Bruner, learning theory Polya; (3) learning theory Ausebel; (4) Malmivuori learning theory; (5) theory class assessment (Herman, Ascbacher, and Winter), (6) theory class assessment Webb; (7) the theory of authentic assessment. According to his assessment of education experts and scientific experts who becomes validator in this study stated that these theories are very powerful and interlinked between the theory and other theories. These theories are very eligible as supporting theory in the development of SAS models.

4.2.2. Analysis of students

The results of the initial analysis of the ability of mastering the concept of temperature and heat of 371 students, obtained information that many concepts of temperature and heat are not yet mastered by the student. It is shown from the results of the initial test material temperature and heat, the average score was only 4.85. There are only two classes who gets an average score above six. Based on this

information, the concepts are not yet mastered by the student still needs to be given to the student book.

Students in participating in the implementation of SAS models are divided into groups, each group consisted of five students. In this group division is based on ability, gender, and type of parts. Information about the ability, gender, and type of tribal students obtained from the survey results. The data obtained from the student's ability documentation data Certificate of Examination Results. On the distribution of group members based on the theory of the division of Lie groups (2005). The group division based on gender, and type of parts it is possible to do, because based on the data from the survey found that the ratio between the number of female students and male almost as many, nor about the type of clan (Bugis and Makassar tribe).

In this study, in addition to the information level of student ability, gender, and ethnicity are also needed information on the work of parents. The data about the job of parents is needed, because in the implementation of SAS models include aspects of the comments of parents on student achievement that has been accomplished. Based on the survey results, the work of parents/guardians support the implementation of SAS models, because in general the parents/guardians of students have a higher education. It means that all parents/guardians of students able to provide comments / feedback on the performance of their child.

The questionnaire results from 350 students, obtained information that the desire of the parents/guardians of students and students themselves have the same tendency, which both require assessment of learning outcomes of physics in schools is done from time to time and thoroughly (cognitive, affective, and psychomotor), the need for "feedback" immediately, and the assessment criteria used by teachers need to be delivered to students.

4.2.3. Analysis material

In the analysis phase begins with the material provides the initial test to 390 students. Initial test material is the material temperature and the heat that has been studied by students. This initial test aims to determine the concepts of temperature and heat. Which has not been mastered by the students as a prerequisite to the

concepts of temperature and heat the material. Results from this information, as a basis model of SAS software development by incorporating these concepts into their teaching.

Based on the results of this initial test, there are some concepts and understanding of the material and the temperature of heat required to be disclosed in the students' books. Concepts that still need to be "suppression" in the implementation of SAS models are: (1) the concept of temperature; (2) comparative scale thermometer, thermometer function concept, and the concept of the type of liquid in a thermometer; (3) the concept of water anomaly; (4) The heat unit concept, the concept of heat transfer; (5) the concept of specific heat, and the heat capacity; (6) the sense heat of evaporation, condensation understanding, and understanding the melting heat.

The results of the analysis of the structure of the content that was developed based on the contents of Curriculum 2013, in particular temperature and heat the material, it was found that the 2013 science curriculum senior high school is no longer the elaboration of indicators. It means that teachers are required to create indicators and specific learning objectives. Based on this information, it is in the development of learning tools described pembelajarn indicators and objectives specific to each Lesson Plan, and in each of the learning plan comes with authentic assessment sheet.

The task analysis was conducted to identify the stages of completion of tasks in accordance with the temperature of the material and heat. Analysis of these tasks include the analysis of the content and concept analysis. The final result of the analysis contained in the task of "student 'performance, and authentic assessment sheet).

The results of observations of two observers on the ability of the students in the psychomotor aspects included in the high category with average yield of psychomotor abilities of 91. Similarly, the tasks implemented on SAS models, in the form of task performance which consists of duty to report the results of observations or experiments, in general, students do well, it can be seen from the result of the ability of process skills which the average value of students reached 81

on the pilot phase of 90, the task doing the competency test in general students can do, it can be seen from the average results study on cognitive aspects in pilot phase 90. the task of the students assess themselves against the results of self-assessment of its performance and its participation in the group also generally do well, as seen in the learning outcomes in the affective aspects of 82 on the pilot phase of 90, and when analyzed data from observations of two observers show that all students are engaged in class discussions, conduct cooperation in scientific activities, ask the same friends and teachers, provide ideas. Similarly, data from the questionnaire results in the affective aspect of learning outcomes showed that the results were consistent with the observations and the results of the students' statements within the SAS models, all of which showed average values above 80. It was proved that the learning outcomes of students in a very affective aspects reliable. That is, there is a match between the observer and the statement of the results of a respondent. While the selection task, and the task of reflection also on the subject matter students are generally well done, but the results rather than the student's performance is not analyzed further, because the results of the performance of these tasks is the result of group work done at home. However, that does not mean it has no effect on the motivation of the students, because the value of the group is taken as a reference in awarding the prize to the group. This scenario is delivered to students, so that they are motivated to do the work of the group, both in completing observation or experiment, and perform tasks in the home.

The results of the analysis of the information indicates that some of the concepts of temperature and heat that previously have not been mastered by students based on the results of the initial tests (material temperature and heat in Junior high school) at the time participated in the implementation of the model SAS these concepts can already be controlled, which is reflected in the value of the average learning results obtained during the implementation of SAS models by 79 in the test phase at 90. While the average initial test results only 40.

The results obtained from the analysis of the concept of teacher responses indicate that 100 percent of teachers said that the analysis of this concept is very

helpful in implementing SAS models. It means that the analysis of the concept is practically implemented in SAS models.

4.3. SAS Models Validation Results

Data content includes the validation results supporting theories SAS models development and validation constructs include constructs linkages between components of SAS models in the category of valid and fit for use. The results of the validation content and construct models of the SAS in Table 5- 6.

Table 5. Data Validation Results Module SAS Content

No	Rated aspect	the Average aspect Ai
1.	Supporting theory model of SAS	4.1
2.	Step-by-step implementation model of SAS	3.9
3.	The social system in the implementation model of SAS	3.9
4.	The principle of the model management reaction SAS	4.0
5.	SAS models support system implementation	3.9
6.	Impact of the implementation and impact of the model companion SAS	4.0
7.	Implementation of the model of SAS	4.1
8.	The learning environment and management duties SAS models	3.8
9.	SAS models evaluation	3.9
	The average total (VR) = 3.9	

Expert commentary

Rate In general expert states that the theories that support the development of authentic assessment science is very solid and intertwined among the theories described in SAS models. The suggestions of the expert of which is in the handbook and supplements SAS models should be made more compact (without reducing essential things) that have high readability and acceptability. All devices are generally decent SAS models used in the field for data retrieval research. Revisions to the book model of SAS on the criteria for assessment of the results of scientific activity, namely criteria: create questions, formulate problems, make hypotheses, create tables, create graphics, reading charts, making predictions, designing experiments (formulate variable manipulation, response variables, control variables, manipulation variable definition, the definition of control variables) and make inferences.

Table 6. Data Validation Results Construct Components SAS Model

No	Rate Aspects	the Average aspects Ai
1.	SAS model components	3.9
2.	SAS models support the theory	4.1
3.	Step-by-step implementation of SAS models	3.8
4.	The social system in the implementation of SAS models	3.8
5.	Reaction principle management SAS models	3.9
6.	SAS models	3.8
7.	the implementation Bridesmaids SAS models	3.6
8.	Implementation of SAS models	4.1
9.	The learning environment and management duties models SAS	3.7
10.	SAS model evaluation	4.3
	The average total (VR) = 4.2	

Expert commentary

In general, states that the link expert contents of the components of SAS models are interrelated and do not find any contradiction between what the contents of the book with the device SAS models. Comments and suggestions from the expert including SAS models guidebook packed with modern learning theory is very relevant to the central theme of research. The handbook should be made more compact, attractive and avoid some mistakes topography.

Data validation results SAS model development support device consisting of Table 6: Planning for learning; Table 7: Task authentic assessment; Table 8: Result validity assessment authentic supplement, Table 9: Guidelines for teachers; Table 10: Guidelines for students, and Table 11: Book of students all supporting devices in the category of valid and fit for use.

Table 7. Lesson Planning Data Validation Results

No.	Rate Aspects	the Average aspects Ai
1	Indicator	3.9
2	The contents of the subject matter	4.0
3	Language	3.8
4	Time	3.9
5	Teaching methods	**3.7**
6	Learning Closed	3.9
	Average Total (VR) = 3.8	

Table 8. Date of Validity Result Student' Aktivity Sheet

No	Rate Aspects	the Average aspects Ai
1	Organisation	4.0
2	Prosedure	3.7
3	Question/Problem	3.7
	Average Total (VR) = 3.9	

Table 9. Date of Validity Result Authentic Assessment Suplement

No.	Rate Aspects	the Average aspects Ai
1	Organisation	3.9
2	Prosedure	3.9
3	Question/Problem	3.9
	Average Total (VR) = 3.9	

Table 10. Data Validation Results Teacher Manual

No	Rate Aspects	the Average aspects Ai
1.	Introduction	3.9
2.	Science probelem representation	4.2
3.	Learning method	3.8
4.	Learning closed	3.9
	Average Total (VR) = 3.9	

Table 11. Data Validation Results Student Manual

No	Rate Aspects	the Average aspects Ai
1	Sub organization concept	3.6
2	Translation of troubleshooting steps temperature and heat	3.9
3	Activity	4.4
4	Learning closed	4.2
	Average Total (VR) = 3.9	

Table 12. Data Validation Results Student Book

No	Rate Aspects	the Average aspects Ai
1	Translation of material	3.9
2	Construction	3.9
3	Exercise	4.0
	Average Total (VR) = 3.9	

Science achievement test consisting of a test product, scientific knowledge tests, and performance tests at tested to 43 students. The test consists of 24 items of products, after testing produced 23 items that valid and an invalid item. The tests show that the contents of the item 23 to be able to represent all the material temperature and heat with the level of reliability .99. Scientific knowledge test consists of 23 items, after testing produced 23, is 0,99. The performance test of 10 items, after testing produced 0,72.

4.4. Effectiveness of Models SAS

Table 11 below shows the results of teacher feedback on the effectiveness of the implementation of SAS models. The teachers in assessing the effectiveness of using assessment scores: 1 (very low); 2 (low); 3 (sufficient); 4 (high) to 5 (very high).

Table 13. Data Execution Effectiveness SAS Models

No	Rate Aspects	the Average aspects Ai
1	Student learning outcomes	4.1
2	Student Response Against Components and Implementation Process SAS models	4.1
	Average Total (VR)= 4.1	

4.5. Practicality of Models SAS

Table 12 below shows the practicality of the model based on the observation SAS with implementation SAS models support device

Table 14. Data Implementation Device Supporting SAS Model

No	Rate Aspects	the Average aspects Ai
I	Measures Implementation of SAS models	3.1
2	Social Systems Implementation of SAS models	3.9
3	Reaction Principle Management SAS models	3.8
	IO Value or Value Average Total (VR) = 3.6	

Remarks:

IO is *intended* ⟺ *Operational*

Based on the results of the analysis of science achievement test scores found that the level of student mastery (LSM) of the subject matter of science high 90 and 100 percent of students completed. Students' response to the implementation of SAS models is a slight positive, according to the teacher's response to the ease of implementing SAS models is positive

Table 13 following several students comment on questions related to the implementation of SAS models support device.

1. Are you able to understand the language used in the book Student, Student Worksheet, Student Manual, and supplements SAS?

2. Are you interested in the appearance (text, large font, image, layout images, colors) books Student, Student Worksheet, Student Manual, and supplements SAS?

Table 15. Data Comments Student Questionnaire Response to The Question On

No.	Comment	
	first question	the second question
1	Yes, because all of a language that is very easy to understand	Yes, because in the book Student, Student Worksheet, Student Manual, and supplements SAS already written clearly accompanied by images that can allow me to learn.
2	Yes, the explanation of the book Student, Student Worksheet, Student Manual, and supplements SAS easy to understand and clear explanation	Yes, because the appearance of such a book Students, Student Worksheet, Student Manual, and supplements SAS students will be more interested in reading and with their images with easy to understand explanations.
3	Yes, because the language used is the language and its standard sentence too short and clear so easy to understand.	Yes, because with the article with pictures easier for students to understand the intent rather than the text.
4	Yes, I can understand the language used in the book Student, Student Worksheet, Student Manual, and supplements SAS	Yes, because if the appearance of text, large font, image, layout and color pictures in books Student, Student Worksheet, Student Manual, and supplements SAS, the learning atmosphere we will tdak boring and happy doing his work.

Table 16, below shows the results of the responses of six education experts regarding enforceability of SAS models theoretically in the field. Educational experts in assessing the enforceability of SAS models in the classroom by using assessment scores: 1 (very low); 2 (low); 3 (sufficient); 4 (high) to 5 (very high).

Table 16. Data Expert Responses Regarding the implementation of SAS Model

No	Aspects Observed and Judged	Average aspect Ai
1	SAS models implementation procedures	4.2
2	Social system implementation model of SAS	4.2
3	Principle reaction models management SAS	4.3
	Average Total = 4.2	

Table 16, below enforceability of data models in a class derived from the observation of two (2) people watchers. Observers in observing the implementation

of SAS models during seven meetings using assessment scores: 1 (very low); 2 (low); 3 (sufficient); 4 (high) to 5 (very high).

Table 17. Data Observations Observers On implementation of SAS Models

No	Aspects Observed and Judged	Average aspect Ai
I	SAS models implementation procedures	4.2
2	Social system implementation models of SAS	4.3
3	Principle reaction models management SAS	4.2
	Average Total = 4.2	

Ratings among experts on the implementation of SAS models is theoretically consistent with the observation observer SAS model implementation in the classroom sebear 4.2 it indicates that that the application of SAS models in practical classes.

5. Discussion and Conclusion

5.1. Discussion

The analysis of the validity and practicality found that SAS models support device is valid criteria and practical criteria applied in assessing student competence. Student competency can be assessed in a comprehensive and sustainable. Muho & Taraj, (2022), found that formative assessment practices affect students' motivation in learning English.

Student learning outcomes include cognitive aspects (products and processes), affective, and psychomotor aspects obtained from the authentic supplement the assessment indicates that results for students in the pilot phase already meets the standards of competence specified achievement. This is caused because all the planning done well. Similarly, the results obtained from the student learning achievement test at the end of the implementation of the model. This means that the device is SAS models meet the criteria effectiveness. Chi et al., (2021), conducted a study related to comparing student science, found for participants.

Results of student and teacher responses to the components and implementation of SAS models show a positive response. It shows that in the aspect of student and teacher responses to the components and implementation of SAS models meet the

criteria of effectiveness. That is, the entire device is SAS models support the implementation of learning in the classroom is expected that students will be more motivated to learn science.

Based on the results of this questionnaire are generally teachers found the necessary and feasible SAS models developed on the subject of how to do more with the device making training and accompanied by the provision of laboratory equipment in accordance with the required media in the implementation of the SAS models. Similarly, the teacher stated that the strategy of implementation of SAS models can be used as a primary strategy in learning science. Vahidnia et al., (2021), also developed and validated an instrument of student attitudes towards teachers to find differences in the level of student attitudes

Both results are very appropriate response to the comments of experts based on their knowledge and experience theoretically. It proved empirically SAS model implementation in the field which is derived from the observation of two (2) observers indicate that the average yield assessment scores of both observers in the high category and reliable. Thus, it can be said that the implementation of SAS models is theoretically supported by empirical data in the field with high reliability. That is, the implementation of SAS models although observed by different people and different conditions will give consistent results. Toma, (2020), developed Instrument and psychometric evaluation

Teachers initially still faces obstacles in implementing SAS models, it is because, as a model system SAS is a form of assessment and learning system innovation. As it like an innovation, then the SAS models requires a shift in perspective from teachers, the community, including a shift in perspective parents. Changing the way it is not an easy task, but requires hard work and commitment. Teachers are required to be able to pay attention to individual students, monitor progress, encourage them more activity, collecting every student work to be comments, and so forth. All it requires extra time and effort. Therefore, teachers lack strong motivation in their profession, it would be difficult to implement this SAS models. The difference between this study and that developed by Chen et al., (2020) is only Instrument Knowledge development.

In the next phase, the teachers have been able to overcome the obstacles perceived in the early stages. Teachers, giving students the opportunity to assess themselves to the task with a friend based on the guidelines asesment autgentic. Teachers keep checking on the results of this self-assessment. The impact than self assessment is that it will foster honesty of students in doing the job. SAS Models has some weaknesses in the implementation of the class are: (1) due to the limitations of the researcher, only two observers to observe social skills, psychomotor skills of students, and enforceability of SAS models. This is done with the consideration that if the use of many observers, it can affect the process of implementation of SAS models in the classroom; (2) observation of social skills, and psychomotor skills performed in all groups. This is done with the consideration that social skills and psychomotor skills a person can not be sampled for other people. All information to assess social skills and psychomotor skills, then observations were made only one group at each meeting. Since a lot of meetings in the implementation of SAS models as much as seven meetings either at trial. The disadvantage of this observation is the observation frequency becomes a little bit, but the excess all students accessed.

5.2. Conclusion

Conclusions of this study resulted in SAS models qualified products meet the criteria of validity; practicality and effectiveness. The results of students in the high category and the response of students and teachers on the implementation of positive SAS models. This is in accordance with the opinion of (Walter et al., 2021). which states that by applying the assessment, students' knowledge competence can be measured.

AUTHENTIC ASSESSMENT DEVELOPMENT SCIENCE TO ASSESS STUDENT COMPETENCY

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