

FEASIBILITY OF A STRUCTURED ASSIGNMENT SHEET BY RATIFYING SOCRATES AND RENE DESCARTES STATEMENTS ON THE SUB-MATERIAL OF FACTORS THAT INFLUENCE REACTION RATE

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Abstract: The purpose of this study resulted in a Structured Assignment Sheet (SAS) on sub-material factors influential on the rate of reaction that ratified the statements of Socrates & Rene Descartes. The Structured Assignment Sheet is associated with SAS-RSRS. Eligibility criteria include validity, effectiveness, and practicality. SAS-RSRS development uses research and development (R&D) methods. The trial was conducted on a limited basis to students at Y Lamongan High School with a total of 15 people. The research instruments used to consist of validation sheets, skill test sheets ratifying Socrates & Rene Descartes statements, and student response questionnaire sheets. Data is analyzed in a quantitatively descriptive manner. SAS-RSRS is declared to meet the criteria for validity if the Mo value ≥ 4 for each problem and $R \geq 75\%$. SAS-RSRS is declared to meet the effectiveness criteria if the N-gain score is ≥ 0.7 . It is said to meet the criteria of practicality if the percentage of student response results is $\geq 61\%$. The SAS-RSRS developed was declared to have qualified eligibility reviewed from validity, effectiveness, and practicality criteria.

Keywords: *Structured Assignment Sheet, Socrates & Rene Descartes Statements, Influence Reaction Rate*

INTRODUCTION

Education has an essential role in human life and life, especially in today's modern times known as the cyhematica century. Education is recognized as a force that determines achievement and productivity in other fields [1]. Education is an activity carried out consciously and planned to develop their potential to have spiritual abilities actively, intelligence, noble morals, and various useful skills for themselves and others, nations, and countries [2].

Today the world is entering the 21st century where technology is growing very rapidly, and the currents of globalization have entered all areas of life, including education. Education today is also expected to prepare learners to have 21st-century abilities. The skills needed in the 21st-century include learning and innovating skills that include critical thinking and being able to solve problems, creatively and innovative, and communicating and collaborating [3].

Learners also need the skill of ratifying the statement of Socrates & Rene Descartes in improving their abilities. Socrates has one meaningful statement in learning. Learners are required not to stop answering questions but constantly question the answers until they understand. Rene Descartes states that to seek the truth, it is necessary once in the course of human life to doubt [4].

Chemistry is one of the fields of natural science studies closely related to everyday life. Knowledge in chemistry is acquired based on discoveries or experiments in the laboratory [5]. Chemistry studies the structure of matter and the

changes experienced in natural processes and in planned experiments [6]. Chemistry is a branch of natural science developed empirically, rationally, and pragmatically for good. The benefits of chemistry are obtained when the science is studied and applied to solve a problem. Chemistry is taught to learners in High School through chemistry subjects [7].

Education and Culture No. 59 of 2014 on The Curriculum 2013 High School that the burden of learning structured assignments and independent activities is a maximum of 60% of the time of face-to-face activities of the subjects concerned. The burden of studying chemistry subjects in grade XI high school is four hours per week, with 45 minutes for one hour of lessons. Based on the obligations of learners that have been outlined, learning tools must be used to emphasize the deepening of the material by utilizing structured assignments. Therefore, developers strive to develop Structured Assignment Sheets (SAS) [8].

A structured assignment sheet is a worksheet that is structured for learners to achieve a goal in learning with some help from educators [9]. This learning includes structured tasks where these tasks are curricular activities to achieve learning goals. Structured tasks can be given to learners outside of face-to-face hours in the classroom. The purpose of providing structured tasks is to support the implementation of intracurricular programs. The goal is also to live more live the lesson materials they have learned and train learners to carry out their duties responsibly.

Based on interviews conducted by developers with six chemistry subject teachers, it was found that the teacher did not fully know what a

Structured Assignment Sheet (SAS) was and had never applied it in chemistry learning. The results of an interview with a chemistry teacher in ABC high school stated that the learning outcomes of learners in chemical learning are still low or have not reached the Minimum Completion Criteria (MCC) [10]. Interviews with chemistry teachers in class XI high school in Pekanbaru obtained the result that learners are less able to connect the concepts that have been obtained with problems or phenomena in everyday life, especially in the field of chemistry [11].

Based on the above description, the author intends to conduct a study entitled "Development of Structured Assignment Sheet by Ratifying Socrates & Rene Descartes Statement on Sub-material Factors That Affect Reaction Rate." This learning device is synchronized with SAS-RSRS.

METHOD

The type of research used is development research, which is developing a Structured Assignment Sheet (SAS) on sub-material reaction rate factors in ratifying the statements of Socrates and Rene Descartes. Borg and Gall [12] state that development research attempts to develop and validate products to be used in education.

The study was conducted in February 2022 at Y Lamongan high school. The subjects or targets in this study were class XI learners of the MIA program with 15 people.

The method used in this study is Research and Development (R&D). In education and learning, R&D methods are used to develop, validate, and test the effectiveness of products [13]. The steps of R&D research methods are as follows: (1) analysis of potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revisions; (6) product trials; (7) product revisions; (8) trial of use; (9) product revisions; (10) Mass production. The study was limited to seven steps until post-trial product revision. SAS-RSRS drafts that have been designed, developed, and examined further tested their validity, effectiveness, and practicality.

The data obtained from this study is quantification data and quantitative data that includes validity, effectiveness, and practicality. Validity data was obtained by filling out validation sheets by three validator lecturers from the department of chemistry Faculty of Mathematics and Natural Sciences Faculty of Mathematics and Natural Sciences at Surabaya State University. Effectiveness data is obtained from the results of pretest-posttest learners who contain questions compiled based on indicators in ratifying the statements of Socrates & Rene Descartes on sub-material reaction rate factors. Practicality data is obtained based on the filling of response questionnaire sheets by learners who are the subject of the study.

The instruments used in the study were

validation sheets, skills test sheets ratifying Socrates & Rene Descartes statements, and student response questionnaire sheets.

Validation data is analyzed using quantitative descriptive methods based on a calculation of assessment score criteria using the Likert Scale, which can be seen in Table 1 [14].

Table 1 Likert Scale

Score	Rating Category
5	Very valid
4	Valid
3	Quite valid
2	Less valid
1	Invalid

Validity data is analyzed descriptively quantitatively using the most frequently appeared score/modus (Mo) obtained from expert judgment. Validation score is obtained from three validators so that the calculation of understanding of the three validators is required based on the score given. The understanding is obtained by calculating the percentage of agreement (R) as follows:

$$R = \left[1 - \frac{A - B}{A + B} \right] \times 100\%$$

A and B are the scores obtained from validators (A is the highest score and B is the lowest score). Validity score is obtained from three validators so that each R calculated percentage, then obtained (R)1,2; (R)1,3; and (R)2,3. Validity data is declared reliable if $R \geq 75\%$ [15]. SAS-RSRS is declared valid if each question has a minimum Mo of 4 and no disagreement is found between validators.

SAS-RSRS effectiveness data obtained based on calculations of the value of the results of the skill test sheet ratified the statement Socrates & Rene Descartes. A pretest is given to find out the initial ability of learners, and posttest is given to find out the effectiveness of using SAS-RSRS. Student test results data is analyzed using N-gain score with the following calculations:

$$(g) = \frac{[\%(\text{Sf}) - \%(\text{Si})]}{[100\% - \%(\text{Si})]}$$

Information:

- (g) : Improved learning outcomes
- (Sf) : Average posttest
- (Si) : Average pretest

The result of the value calculation (g) is then interpreted in the criteria in Table 2 [16].

Table 2 Interpretation of N-Gain Score

(g)	Category
≥ 0.7	High
$0.7 > (g) \geq 0.3$	Medium
$(g) < 0.3$	Low

Based on the above criteria, SAS-RSRS is declared effective if obtained an N-gain score ≥ 0.7 with a high category.

SAS-RSRS practicality data is obtained through response questionnaires filled out by learners. The percentage of student response data is analyzed based on the Guttman scale. The learner's response sheet contains several questions with a choice of answers of "Yes" or "No."

The results of the student response data will be analyzed quantitatively by describing in the form of percentages obtained by the formula:

$$\text{Percentages (\%)} = \frac{\sum \text{total score}}{\sum \text{criteria score}} \times 100\%$$

The calculation results are interpreted into criteria that can be viewed based on Table 4.

Based on these criteria, if obtained a percentage of student response data $\geq 61\%$, all learners agree and have a positive response to SAS-RSRS developed for the learning process.

Table 4 Response Score Interpretation Criteria

Score	Criteria
0-20	Very impractical
21-40	Impractical
41-60	Less practical
61-80	Practical
81-100	Very practical

RESULT AND DISCUSSION

A structured assignment sheet is a worksheet that is structured for learners to achieve a goal in learning with some help from educators [9].

The structured assignment sheet developed in this study is "Structured Assignment Sheet by Ratifying Socrates & Rene Descartes Statements on Sub-material Factors That Affect Reaction Rate." SAS-RSRS is given to learners outside of face-to-face hours to improve learners' skills, especially in ratifying the statements of Socrates & Rene Descartes.

The skills/abilities to ratify Socrates & Rene Descartes' statements trained to learners in SAS-RSRS have been adapted in Table 5 by synthesizing opinions submitted by Mahfud & Patsun [17] and Yogiswari [18].

Table 5. Indicators Ratifying the Statement of Socrates & Rene Descartes

Number	Indicators	Indicator Statements
1	Compiling inductive conclusions	Learners can arrange inductive or withdrawal of conclusions from special circumstances
2	Compiling Deductive Conclusions	Learners can arrange deductive or conclusion withdrawal from common circumstances
3	Finding/Creating Doubt	Learners create doubts about the phenomenon/data of the results of experiments presented
4	Stringing together New Ideas	Learners can write a new idea from previous statements
5	Writing a definition	Learners can write the definition of the predetermined
6	Doing analysis	Learners can write the results of analysis of the phenomenon/data of the results of the experiment presented by describing it in detail
7	Verify	Learners can verify by writing down evidence or data obtained from a definite and reliable source to justify the doubts that arise.

SAS-RSRS developed needs to be tested with three criteria: eligibility for validity, effectiveness, and practicality before being implemented in chemical learning. The three intended eligibility criteria correspond to Nieveen's statement [19], which states that the feasibility test consists of three criteria: validity, effectiveness, and practicality. Before the feasibility test was conducted, SAS-RSRS was examined first by lecturers majoring in chemistry at the Faculty of Mathematics and Natural Sciences Surabaya State University. The study data is advice and input for

improving SAS-RSRS in terms of content and language before the feasibility test. Language is one of the important keys in the study of chemistry. The appropriate use of language can affect learners' success in understanding a material [20].

The cover of SAS-RSRS (figure 1), which includes the purpose of the development of SAS-RSRS is to ratify the statement Socrates & Rene Descartes with illustrations that show that the material studied is the reaction rate.



Figure 1 SAS-RSRS Cover Design

SAS-RSRS Validity Test

Nieveen argues that one of the three eligibility criteria is validity. The validity components in a validation sheet refer to the assessment instructions of the National Education Standards Agency, including the validity of the contents, constructs, presentation components, and language. The validity test was conducted expert judgment involving three validators who are lecturers in the chemistry department at the Faculty of Mathematics and Natural Sciences Surabaya State University. Validity data is obtained from filling in validation sheets by the three validators. Recapitulation of the content validity score is shown in Table 6.

Table 6. Recapitulation of SAS-RSRS Content Validity Score

Number	Score			Mo	Criteria
	V ₁	V ₂	V ₃		
1	5	4	5	5	Very valid
2	4	4	4	4	Valid
3	4	4	4	4	Valid
4	4	3	4	4	Valid
5	5	4	5	5	Very valid
6	5	4	5	5	Very valid

Based on Table 6, the modus on the numbers 1, 5, and 6 is 5 with a very valid category. In other matters, namely the numbers 2, 3, and 4, the modus is obtained by 4 with a valid category. Based on these results, it can be stated that SAS-RSRS has qualified reviewed from the validity of the contents. It shows that the SAS-RSRS has complied with the content feasibility criteria, including material accuracy, updating, and the skill dimension of ratifying Socrates & Rene Descartes statements.

Furthermore, the percentage of each of the third R validators is (R)_{1,2}; (R)_{1,3}; and (R)_{2,3}. Here are the calculations of the percentage of agreement (R):

Table 7. Percentage of Agreement (R) Recapitulation of Content Validity of Assessment

Number	Score			Percentage of Agreement (R) (%)		
	V ₁	V ₂	V ₃	R _{1,2}	R _{1,3}	R _{2,3}
1	5	4	5	89	100	89
2	4	4	4	100	100	100
3	4	4	4	100	100	100
4	4	3	4	86	100	86
5	5	4	5	89	100	89
6	5	4	5	89	100	89

Based on Table 7, it can be seen that the percentage of agreement (R) or the percentage of understanding of the three validators is in the range of 86% - 100% so that it can be stated that the three validators agree with the decision on the validity of the contents of SAS-RSRS.

Construct validity is also assessed through an expert judgment of the three validators. Recapitulation of construct validity score is shown in Table 8.

Table 8. Recapitulation of SAS-RSRS Construct Validity Score

Number	Score			Mo	Criteria
	V ₁	V ₂	V ₃		
1	4	4	4	4	Valid
2	5	5	5	5	Very valid
3	4	5	5	5	Very valid
4	5	5	5	5	Very valid
5	4	4	4	4	Valid
6	5	4	5	5	Very valid
7	4	4	4	4	Valid
8	4	3	4	4	Valid
9	4	4	4	4	Valid
10	4	4	4	4	Valid
11	4	4	4	4	Valid

Table 8 shows that the mode for numbers 2, 3, 4, and 6 is 5 with a very valid category. In other questions, namely numbers 1, 5, 7, 8, 9, 10, and 11, mode 4 is obtained with a valid category. Based on these results, it can be stated that SAS-RSRS has qualified review from the validity of the construct. Construct validity is used to determine the suitability between the substance of the question and the indicator of the skill of ratifying the statement of Socrates & Rene Descartes. This proves that SAS-RSRS has represented indicators of skills to ratify Socrates & Rene Descartes statements, namely arranging inductive conclusions, making deductive conclusions, finding/creating doubts, stringing new ideas, writing definitions, doing analysis, and verifying. SAS-RSRS is considered to have a good consistency to train the skills to ratify Socrates & Rene Descartes statements.

Furthermore, the percentage of each of the third R validators is (R)1,2; (R)1,3; and (R)2,3. Here are the calculations of the percentage of agreement (R):

Based on Table 9, it can be seen that the percentage of agreement (R) or the percentage of understanding of the three validators is in the range of 86% - 100% so that it can be stated that the three validators agree upon the decision on the validity of the SAS-RSRS construct.

Table 9. Percentage of Agreement (R) Recapitulation of Validity of Constructs

Number	Score			Percentage of Agreement (R) (%)		
	V ₁	V ₂	V ₃	R _{1,2}	R _{1,3}	R _{2,3}
1	4	4	4	100	100	100
2	5	5	5	100	100	100
3	4	5	5	89	89	100
4	5	5	5	100	100	100
5	4	4	4	100	100	100
6	5	4	5	89	100	89
7	4	4	4	100	100	100
8	4	3	4	86	100	86
9	4	4	4	100	100	100
10	4	4	4	100	100	100
11	4	4	4	100	100	100

The assessment of validity in terms of presentation components is done through the expert judgment of the three validators. Recapitulation of the validity score of the serving component is shown in Table 10.

Table 10. Recapitulation of SAS-RSRS Presentation Component Validity Score

Number	Score			Mo	Criteria
	V ₁	V ₂	V ₃		
1	4	5	5	5	Very valid
2	4	4	4	4	Valid
3	4	5	5	5	Very valid
4	4	5	5	5	Very valid
5	5	5	5	5	Very valid
6	4	5	5	5	Very valid
7	4	4	4	4	Valid

Table 10 shows the mode on question numbers 1, 3, 4, 5, and 6 is 5 with a very valid category. In another matter, the numbers 2 and 7 are obtained mode 4 with valid category. Based on these results, it can be stated that SAS-RSRS has qualified review from the validity of the presentation component.

Calculation of the percentage of each of the third R validators is (R)1,2; (R)1,3; and (R)2,3. Here are the calculations of the percentage of agreement (R):

Table 11 indicates the percentage of agreement (R) or the percentage of understanding of the three validators is in the range of 89% - 100% so that it can be stated that the three validators agree upon the decision on the validity of the SAS-RSRS presentation component.

Assessment of validity in terms of language is also done through the expert judgment of the three validators. Recapitulation of the language validity score is shown in Table 12.

Table 11. Percentage of Agreement (R) Recapitulation of Validity of Presentation Component

Number	Score			Percentage of Agreement (R) (%)		
	V ₁	V ₂	V ₃	R _{1,2}	R _{1,3}	R _{2,3}
1	4	5	5	89	89	100
2	4	4	4	100	100	100
3	4	5	5	89	89	100
4	4	5	5	89	89	100
5	5	5	5	100	100	100
6	4	5	5	89	89	100
7	4	4	4	100	100	100

Table 12. Recapitulation of SAS-RSRS Language Validity Score

Number	Score			Mo	Categori
	V ₁	V ₂	V ₃		
1	4	5	5	5	Very valid
2	4	4	4	4	Valid

Based on Table 12, the mode on problem number 1 is large 5 with a very valid category. In another matter, the number 2 problem is obtained mode 4 with a valid category. Based on these results, it can be stated that SAS-RSRS has qualified from the validity of the language.

Calculation of the percentage of each of the third R validators is (R)1,2; (R)1,3; and (R)2,3. Here are the calculations of the percentage of agreement (R):

Table 13. Percentage of Agreement (R) Recapitulation of Validity of Language

Number	Score			Percentage of Agreement (R) (%)		
	V ₁	V ₂	V ₃	R _{1,2}	R _{1,3}	R _{2,3}
1	4	5	5	89	89	100
2	4	4	4	100	100	100

Based on Table 13, it can be seen that the percentage of agreement (R) or the percentage of understanding of the three validators is in the range of 89% - 100% so that it can be stated that the three validators agree upon the decision on the validity of the language of SAS-RSRS.

SAS-RSRS Effectiveness Test

SAS-RSRS effectiveness data reviewed from the results of filling the test sheet ratified the statement Socrates & Rene Descartes by learners. The test sheet ratifies the statement Socrates & Rene Descartes contains questions compiled based on indicators ratifying Socrates & Rene Descartes statements on sub-matter reaction rate factors. The data obtained is then analyzed using pretest and

posttest methods. Learners are given a pretest sheet first before answering the questions in the SAS-RSRS, after which a posttest sheet is given. Pretest and posttest results data are processed using N-gain score calculations to find out the skills of ratifying Socrates & Rene Descartes statements and the knowledge of learners before and after being given SAS-RSRS. Here are the pretest and posttest results obtained from 15 learners:

Table 14. Recapitulation of Skills Test Results Ratifies Socrates & Rene Descartes Statement

Number	Name	Pretest	Posttest	N-Gain	Criteria
1	CSN	60	99	0,97	High
2	DDW	45	93	0,87	High
3	FDP	22	82	0,77	High
4	GDA	36	88	0,81	High
5	MFA	49	95	0,90	High
6	MNA	32	86	0,79	High
7	MFE	39	92	0,87	High
8	MFF	23	89	0,86	High
9	MKK	29	90	0,86	High
10	NV	25	90	0,87	High
11	RPK	40	96	0,93	High
12	RMN	50	96	0,92	High
13	RM	43	93	0,88	High
14	TPH	37	96	0,94	High
15	WS	27	90	0,86	High
Average		37%	92%	0,87	High

Based on Table 14, the average obtained from the pretest of 37% that all learners are not yet complete. The largest pretest value is 60, obtained by CSN. The pretest contains questions of all skill indicators ratifying the statements of Socrates and Rene Descartes. CSN of 99 almost perfect also obtained the largest posttest value. N-gain earned on average of 0.87 with high criteria indicates that SAS-RSRS can be declared effective.

SAS-RSRS Practicality Test

SAS-RSRS practicality data is reviewed from the response of learners. The learners' response is a response related to SAS-RSRS that has been implemented in the learning process. The stage of obtaining data on the results of the student's response

is reviewed from the response questionnaire sheet filled by the learners after using SAS-RSRS. The learner's response sheet contains several questions with a choice of "Yes" or "No" answers. Recapitulation of the results of the student response is shown in Table 15.

Based on the recapitulation of the results of the response questionnaire in Table 15, the SAS-RSRS developed is said to be very practical or easy for learners to use in practicing the skills of ratifying Socrates & Rene Descartes statements on sub-material reaction rate factors. It is evidenced by acquiring a percentage of 100% in each aspect assessed with a very practical category so that SAS-RSRS has met the practicality criteria.

Table 15. Results of Student Response Questionnaire based on Indicators against SAS-RSRS

Number	Indicators	P(%)	Criteria
1	Compiling inductive conclusions	100%	Very Practical
2	Compiling Deductive Conclusions	100%	Very Practical
3	Finding/Creating Doubt	100%	Very Practical
4	Stringing together New Ideas	100%	Very Practical
5	Writing a definition	100%	Very Practical
6	Doing analysis	100%	Very Practical
7	Verify	100%	Very Practical

CONCLUSION

Based on the discussion of the results of the study, the following conclusions were obtained: (1) the SAS-RSRS developed was declared to have qualified eligibility reviewed from the criteria of validity both content, construct, presentation component, and language, (2) SAS-RSRS developed was declared to have qualified eligibility reviewed from the effectiveness criteria, and (3) the developed SAS-RSRS was declared to have qualified eligibility reviewed from the practicality criteria. It suggests that the SAS-RSRS developed was otherwise feasible for use in chemical learning to practice the skills of ratifying Socrates & Rene Descartes statements on learners.

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