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EFFECTIVENESS OF APPLICATION OF DEMONSTRATION METHOD IN IMPROVING CHEMICAL LEARNING ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN CRISTAL

Agostinho dos Santos Gonçalves*, Ilidio Ximenes Moreira, Alcina Freitas
Jurusan Kimia, Fakultas Keguruan dan Ilmu Pendidikan,
Instituto Superior Cristal- Dili, Timor Leste

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ABSTRACT

The purpose of this study was to determine and analyze the effectiveness of the application of the demonstration method in improving the learning achievement of Class I Trimester I students of the Separação da Mistura Concept in Ensino Secundario Cristal 2012. The analytical technique used in this study was an analysis of qualitative description, to elaborate the Test Results Learning and the teacher's ability to manage learning activities. Based on the results of the study showed that the teacher can manage learning well and on time and all Special Learning Objectives are prepared thoroughly, with a proportion of completeness of 0.84. Where, students 'mastery learning for TRL was 0.55 with an increase in the proportion of students' correct answers from an average of 0.29 to 0.84. Thus, it can be suggested that the use of the demonstration method is very good and effective in learning, so it is recommended that chemistry teachers can apply it in learning to achieve optimal and efficient results.

INTRODUCTION

Education is one of the development sectors that largely determines the future of the nation and state. In other words, education is a school where teaching is held in schools as a formal educational institution. Here, the teacher is very instrumental in guiding students towards the formation of the desired person. Education has a strategic position in the context of increasing quality human resources (da Costa et

* Corresponding author.
E-mail addresses: agostinho@isc-tl.com (Agostinho dos Santos Gonçalves)

al., 2019). Education depends on how the teaching and learning process experienced by students. A teacher is required to be careful in choosing and applying teaching methods in accordance with the objectives to be achieved. Creating teaching and learning activities that are able to create effective learning outcomes is the duty and obligation of the teacher.

These components are involved directly without highlighting just one component, but the components are empowered together. The quality of education can be known from two things, namely the quality of the process and the quality of the product, (Sudjana, 2000). An education is said to be a quality process if the teaching and learning process take place effectively and efficiently by students in order to experience a meaningful learning process. Education is said to be of quality if the product learners show a high level of mastery of learning tasks according to the goals and objectives of education. The learning outcomes stated in the teaching and learning process. In studying chemistry required approaches and methods that are appropriate as well as supporting facilities and infrastructure in order to establish various chemical concepts in students to think using reason effectively and efficiently. Where in use do not look at the characteristics of the material but only look at what material is presented. Thus, students are not enthusiastic and do not feel interested in the material presented.

Chemistry is one of the natural sciences taught at the secondary school level. This material is very related to facts and realistic, so the way of presentation used must be with methods that are suitable in the teaching and learning process, not only the teacher who is the center of learning, but students themselves who seek and find solutions. Therefore, in the teaching and learning process we must change from the learning center to the teacher and students as the subject of learning.

The teacher has a very important role and function in teaching, because the teacher is a determinant of the quality of teaching. Thus, the teacher must always remind his role and competence in managing the components of teaching. Teachers who have high competence will be able to encourage students to achieve optimal performance. Achievement improvement achieved if existed a meaningful learning, such as actively learning involve students physically, mentally intellectually and emotionally. This depends on the teacher's ability to teach. Teachers will have teaching competence, if they have practical understanding and application of various teaching methods and their relationship to the material, in addition to other abilities that support.

Research Method Matrix

Purpose	Observed characteristics	Operational Definition of Observed Characteristics	Instrumen	Data source	Data Collection	Analysi
1. Describe the ability of teachers to manage chemistry learning Ensino Secundario class I cawu I in teaching and learning activities that apply the demonstration method	Teacher ability	Scores obtained by teachers in managing teaching and learning activities by applying demonstration methods	Learning management observation sheet	teacher	Observation	Deskriptive
2. Describe THB completeness in chemistry subject matter subject to material changes in teaching and learning activities that apply the demonstration method in class I students cawu I Ensino Secundario Cristal	Completeness	The proportion is a comparison between the number of students who achieve a specific learning goal with the total number of students	Learning Outcomes Test	student	Test	Deskriptive
3. Describe the learning outcomes of Class I students cawu I Ensino Secundario Cristal on chemistry subject matter Material changes in teaching and learning activities that apply the demonstration method	Student learning outcome	Proportion which is the ratio between the scores obtained by students in learning outcomes tests and the maximum scores of learning outcomes tests	Learning Outcomes Test	student	Test	Deskriptive
4. Describe the response of students to the implementation of teaching and learning activities that use demonstration methods in improving student learning achievement Class I cawu I at Ensino Secundario cristal	Student Response	Responses given by students after participating in teaching and learning activities by applying the demonstration method	Student Response Questionnaire	student	Questioner	Deskriptive

Table 1 Matrix

METHOD

This research has been carried out at 58 students from Secondary School of Cristal, Balide, Dili East Timor. The subjects in this study were students of the class I, Semester I Secondary School Cristal class in Dili. In this study, have several operational definitions of the observed characteristics including the ability of teachers to manage learning; Completeness of Specific Learning Objectives, Completeness of learning outcomes, and class completeness.

The tools that used in the teaching and learning process is applying the demonstration method. Student Teaching Materials, Learning Unit, Learning Plan Student Activity Sheet, and Learning Outcomes Test. To test the effectiveness of Teaching and Learning Activities by applying the Demonstration Method using the above tools, among others: Learning Management Observation Sheet, Learning Outcomes Test, Problem Grid and Student Response to the application of the demonstration method. To obtain data in this study, the authors used several data collection techniques, namely Observation, Test and Questionnaire. Data management in this study carried out using descriptive analysis techniques.

During implementing the teaching and learning activities, researcher was observing the learning approach. This step used to apply the demonstration method. There were two observers involved in this activity consisting of one teacher in chemistry class I and one chemistry student. The observer analyzes and evaluates the ability of the teacher to manage the demonstration method. To calculate the percentage of agreement technique needs to test the reliability of instrument. During the teaching and learning process there are two observers using the same instrument to observe the same variables. The formula used to calculate reliability is:

$$Precentage\ of\ agreement = \left(1 - \frac{A-B}{A+B}\right) x100\%$$

A and B showed the frequency aspects of the behavior observed. Observers provided high and low frequencies, respectively. An instrument of learning management was good if the reliability coefficient > 0, 75%. To determine the completeness of the indicators and the completeness of student learning outcomes used test instruments student learning outcomes. Determination of completeness based on benchmark reference assessment. The completeness reference used is the completeness of the Ministry of Education and Culture that utilized for junior and senior high School students to study thoroughly, if the proportion of students' correct answers is P ≥ 0.75. While a class is, complete if 75% or more students have the proportion of correct answers > 0.75. Researcher used the proportion equation to calculate the completeness of indicators of learning outcomes.

$$P = \frac{\text{Total student that answer correctly}}{\text{Number of the entire participant of test}}$$

The sensitivity of the items expressed in calculating the sensitivity of each item to determine the extent to which the items are able to measure the effects of learning. If any question answered correctly by all students before and after learning, then the item is able to measure the effects of learning. Conversely, if any problem did not answered correctly by all students before and after learning, then the problem does

not fulfill its function. Sensitive items answered by many students after learning compared to before. To calculate the sensitivity of items used a formula

$$\left(S = \frac{R_A - R_B}{T} \right)$$

RESULT

The implementation of learning tools applied to the subjects of the study, namely 58 Trimester I class students in Cristal Secondary school, Dili. The data analysis technique used in this study is a descriptive analysis technique by calculating the average score, proportion, and percentage of the aspects measured. The following description of the results of research and data analysis, which applies the Demonstration method:

Teacher's Ability in Managing Learning

The results of observations on learning management when learning activities use RP 1 and RP 2. Two people were observed, in short the assessment of learning management is presented in the following table:

Table 2 Learning Management Assessment

No	Observed aspects	RP		Average skors	Category
		01	02		
1.	Introduction	3,75	3,68	3,72	Good
2.	Main activities	3,50	3,73	3,62	Good
3.	Conclusion	3,75	3,50	3,62	Good
4.	Organizing time	3,50	3,50	3,50	Good
5.	Cleass environment	3,50	4.00	3,75	Good
Total					

Based on the table above, it shows the average score for each aspect observed, i.e. the observations show that in general the ability to manage teacher learning is good. The teacher in operating the learning device with the appropriate allocation of time makes students enthusiastic and interested in participating in learning. The observations used to calculate the reliability of the learning management instrument applied appeared in the following table:

Table 3 Learning Management Instrument Reliability

Observed on	Reliabilitas each person	
	RP 01	RP 02
teachers	97,44	97,44

Table 3 showed that the reliability of the teacher learning management instrument that applies the demonstration method for RP 1 and RP 2. So, it can be stated that classroom management by the teacher of each observer exceeds 75%, so that the instrument is included in the category of good instruments . The results of observations of the implementation of the Learning Plan by the teacher during class activities are generally good. The teacher carries out all the planned steps.

Student Learning Outcomes Test

Instrument Learning Outcomes Test 2 in appendix 2 is used to determine student learning outcomes measured by completeness of 4 TPK. Based on what has been adapted so far, a TPK is said to be complete if the proportion of correct answers of students P 0.65 and completeness of TPK is said to be complete if the proportion of correct answers of students P 0.65. Meanwhile, Sensitivity and THB analysis can be seen in the following table:

Table 4 TPK Completeness and THB Sensitivity

No TPK	Items	P Butir soal		Sensitivity	P TPK	Category
		U1	U2			
A	B	C	D	E	F	G
1	1	0.38	0.93	0.55	0.85	Complete
	2	0.22	0.78	0.55		
2	3	0.43	0.93	0.50	0.84	Complete
	4	0.33	0.79	0.47		
	5	0.24	0.81	0.57		
3	6	0.26	0.86	0.60	0.88	Complete
	7	0.22	0.91	0.69		
	8	0.22	0.88	0.66		
	9	0.22	0.84	0.62		
4	10	0.29	0.81	0.52	0.73	Complete
	11	0.36	0.66	0.29		
Total		0.29	0.84			Complete

Table 4 showed that the Learning Outcomes Test given from all TPK is complete. Because of the 4 TPK used in this study obtained P 0.65. Based on the sensitivity of the items, each item can be said to be sensitive to measure the effects of learning because there is no sensitivity of items that are negative (under P <0.65). The table above shows that the learning tool by applying the demonstration method can increase the proportion of student answers from 0.29 to 0.84. THB students' completeness can be seen in the following table:

Tabel 5 Completeness **Test Student Learning Outcome**

No	Student Number	Proporsi	Completeness P 0,65	No	Student Number	Proporsi	Completeness P 0,65
1	A1	0.73	Completeness	30	A30	0.82	Completeness
2	A2	0.82	Completeness	31	A31	0.73	Completeness
3	A3	0.82	Completeness	32	A32	0.82	Completeness
4	A4	0.91	Completeness	33	A33	0.82	Completeness
5	A5	1.00	Completeness	34	A34	0.91	Completeness
6	A6	0.73	Completeness	35	A35	1.00	Completeness
7	A7	0.82	Completeness	36	A36	0.82	Completeness
8	A8	0.82	Completeness	37	A37	0.73	Completeness
9	A9	0.73	Completeness	38	A38	0.91	Completeness
10	A10	0.73	Completeness	39	A39	0.82	Completeness
11	A11	0.91	Completeness	40	A40	1.00	Completeness
12	A12	0.91	Completeness	41	A41	0.82	Completeness
13	A13	0.73	Completeness	42	A42	0.91	Completeness
14	A14	0.73	Completeness	43	A43	0.73	Completeness
15	A15	0.82	Completeness	44	A44	0.91	Completeness

16	A16	0.82	Completeness	45	A45	0.91	Completeness
17	A17	0.73	Completeness	46	A46	1.00	Completeness
18	A18	0.82	Completeness	47	A47	0.91	Completeness
19	A19	0.73	Completeness	58	A48	0.91	Completeness
20	A20	0.82	Completeness	49	A49	0.91	Completeness
21	A21	0.73	Completeness	50	A50	0.91	Completeness
22	A22	0.91	Completeness	51	A51	0.82	Completeness
23	A23	0.91	Completeness	52	A52	0.73	Completeness
24	A24	0.73	Completeness	53	A53	1.00	Completeness
25	A25	0.91	Completeness	54	A54	0.82	Completeness
26	A26	0.91	Completeness	55	A55	0.91	Completeness
27	A27	0.73	Completeness	56	A56	0.82	Completeness
28	A28	0.82	Completeness	57	A57	0.91	Completeness
29	A29	0.82	Completeness	58	A58	0.73	Completeness

Table 5 showed that there are no students included in the incomplete category according to completeness P < 0.65 where all of the students who took the test were all complete.

Student Response

The students' response data used to the learning devices that applies. The demonstration method implemented a student response questionnaire. Detailed student responses are in the following table:

Table 6 Student Response

No	Items responses of each student happy / unhappy on KBM	Response	Percentage
I	What is your opinion about 1. Learning Subject 2. Learning Subject that teacher provided 3.Learning subject for student 4.Learning activities in the classroom learning in the classroom 5.Way teacher teach	 Happy satisfaction Happy satisfaction unhappy Happy Happy Happy satisfaction	 70 30 35 40 25 100 100 78 22
II	Do you interest to participate the learning activities?	Yes	100
III	What is your idea about: 1. Readable 2. Clearness o writing	 Easier to understand Easier to understand Clear enough clear	 28 72 48 52

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Table 6 showed that the students' response to the teaching and learning process that implements the demonstration method expresses happy. They are happy towards the 5 components (subject matter, worksheets provided, student searching materials, classroom learning activities and teaching the teacher). The 70% students are happy and 30% satisfaction with the subject matter. Furthermore,

students stated that 35% were satisfaction 40% were quite happy and happy and 25% were not happy with the worksheet given, the 100% student said they were happy with teaching materials and activities in the class and 78% were happy and 22% were satisfaction with the way teachers taught. In addition, 100% expressed satisfaction with the activities carried out. On the other hand, 43 students stated that the readability of the teacher's writing was easy to understand. The 28% and 72% students stated quite understood. About the clarity of writing 49% stated quite clearly and 52% stated clear.

DISCUSSION

Based on the implementation of the learning tools, the research results discussed as follows:

1. From the results of the analysis of the feasibility of learning the demonstration method in teaching and learning activities implemented accordance to the planned stages or phases. This accomplishment realized because of the availability of learning tools. The material taught is generally prepared neatly and planned. Thus, it helps teachers and students in learning activities. Another supporting factor is the availability of Student Worksheets that enable students to be active in teaching and learning activities. Thus, the implementation of each Learning Plan in Teaching and Learning Activities was also determined by the availability of learning tools.
2. From the results of this study, stated that the instruments developed in this study are good instruments. Learning management instruments developed in the application of demonstration methods have a reliability of more than 65%. Borich (1994) included in the category of good instruments. Learning Outcomes Test Instrument developed has a positive sensitivity so that it can measure the effects of learning.
3. Based on the results of descriptive analysis on the initial and final tests, there is an increase in the proportion of students' correct answers to the test learning result. Initial test the proportion of students 'correct answers was 0.29 and at the final test, the proportion of students' correct answers became 0.84. This shows that after students take part in learning activities that use the demonstration method an increase in the proportion of correct answers is as large as 0.55 or 55% on learning outcomes so that the class completed if the demonstration method is to present the subject matter. Thus, the teaching and learning process that applied in the demonstration method are successfully in optimizing student's learning outcomes. The increasing the learning outcomes proved that during the teaching and learning process the demonstration methods help the teacher. It facilitates teachers to teach effective to teach high-level thinking processes, such as the steps of activities in Learning Plan 01 and Learning Plan 02. These helped students process the information they have acquired and possess, and with the guidance of the teacher during the demonstration has helped students gain their own knowledge about the world of natural sciences around them. This proves that although this demonstration method is based on the use of tools and the ability to use tools that are in accordance with the topic demonstrated, it is suitable to be

developed, studied and carried out by exacta subject teachers in this case chemistry through adequate teaching and training.

4. From observations on the management of learning that applies the demonstration method when the teaching and learning process takes place, in general the ability of teachers who apply the demonstration method is good. The teacher operates the device with an appropriate allocation of time and makes students enthusiastic in participating in learning. This proven through the average score obtained for each category of observation of learning activities. In accordance with the quantitative measures of assessment, such as the ability of teachers to manage learning activities that apply the demonstration method is good if the scores obtained are 3 to 4.00 for all aspects observed.
5. The analysis of the Learning Outcomes Test, the Specific Learning Objectives used in the Learning Outcomes Test was complete. This is evidenced in student learning outcomes that show an increase in the average proportion of the Learning Outcomes Test 0.29 in the initial test and 0.84 so that in accordance with the completeness reference that is a Specific Learning Objective is said to be complete if the proportion of students' correct answers P ≥ 0, 65
6. Student responses to learning that apply demonstration methods are generally good. This is in accordance with the opinion of Wariani (2002) that learning is effective if students are actively involved in the learning process.

CONCLUSION

Based on descriptive analysis of research data that it can be concluded that:

1. This research produced learning tools that use the demonstration method. The resulting learning tools proved to be effective.
2. Teachers managed teachning well and on time and all material prepared thoroughly, with a proportion of completeness of 0.84.
3. Students achieved mastery learning for test learning result increase to 0.55 or 55% with an increase in the proportion of students' correct answers from an average of 0.29 to 0.84.
4. Students responsed in the teaching and learning process that teaching materials on this subject are generally good, because 70% were happy and 30% quite happy. In addition, students stated that 35% were satisfaction, 40% were satisfaction and happy and 25% were not happy with the worksheet given; 100% said they were happy with teaching materials and activities in the class and 78% were happy and 22% were quite happy with the way teachers taught. In addition, 100% expressed satisfaction with the activities carried out. The readability of the teacher's writings is easy to understand and states that it is sufficiently understood 28% and 72%. About the clarity of writing 49% stated quite clearly and 52%. or state clearly.

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