# Learning Impact Using SETS Approach On Motivation And Its Effect On Student's Cognitive Score

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**Abstract.** The aims of this study were: (1) to examine the effect of learning using SETS approach on motivation, (2) to test the effect of SETS approach on the cognitive score of students, and (3) to examine the effect of motivation on students' cognitive scores. This study used the method of Quasi-experimental with a non-equivalent Control Group Design. SETS learning approach invites students to always relate to the four elements of SETS (Science, Environment, Technology, and Society) in an interrelated and connected manner. The element of science (carbohydrate material) is the basis of the theory that absolutely must be understood by students, mapping the conditions of the weaknesses and strengths related to environmental conditions as well as linking and connecting them with existing conditions in society, and also mapping out what technologies can be used to overcome problems and to improve environmental and community conditions. The results of the implementation of SETS and non-SETS learning using quasi-experimental methods generated the data that: (1) there is an effect of SETS learning on students' cognitive values; (2) there is no effect of SETS learning on student's motivation; (3) there is an effect of motivation on students' cognitive values. Through SETS learning, it educates students to think, design, apply the four SETS elements simultaneously and interrelated, and think comprehensively and continuously, which will impact increasing knowledge and skills. Besides, the students are motivated to learn so that their cognitive abilities increase.

Keywords: Cognition score, Motivation, Learning, SETS.

## 1. Introduction

The quality of graduates really depends on how learning is implemented. Learning is a complex mental phenomenon in which motivation is a very important variable[1]. Learning is motivation that gives students a sense of meaning and satisfaction[2]. The motivation for academic achievement has an impact on academic activities, which encourages individual desire to achieve academic goals. This encourages the achievement of goals, attitudes, and


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individual achievement approaches and efforts as an effort to succeed in performance and enjoyment that provides success in performance[3].

Academic motivation encourages students to learn more effectively. This means that there is a significant relationship between student motivation with academic performance[1]. Academic achievement motivation is an internal force that directs learners to a comprehensive assessment of their performance towards highest standards[3]. Motivation is the key to successful academic performance because there is a strong correlation between motivation as an important catalyst for learning success and academic achievement[4]. This indicates that learning motivation will encourage better academic achievement for students.

Individual participation in learning process is conditioned by the interaction of motivational and cognitive elements. The elements of motivation include: learning self-concept, control, learning objectives, interest in learning, and the importance of understanding knowledge[5]. The two types of elements are influenced by the nature of the learning tasks (content, procedures, and resources) and teaching (methods, teacher behavior, assessment systems)[4].

## 2. Methods

### 2.1 Literatur Review

Bandura has identified several factors, including psychological, social, and cultural having a significant effect on student motivation, individual beliefs and information processing style, which will also affect student learning outcomes[6]. Zeynali, Pishghadam, & Hosseini state that motivational strategies as classroom interventions have led to increased student achievement in language education[7]. This suggests the use of various learning models used by teachers. Choosing a learning strategy may generate intrinsic motivation and a sense of responsibility, and they perceive learning as an opportunity to achieve personal success and growth[8]. The motivation variable has an impact on learning process and outcomes, including being influenced by the learning activity strategy implemented[1].

The social and cultural environment may serve as a tool for teachers to support learning strategies[9]. Bringing students closer to their environment is important to be accommodated. Learning strategies are considered an important determinant of learning outcomes because they will apply teacher as a potential mediator and motivational effect on learning outcomes[1]. Teachers need to create various environmental potentials and student needs in an interesting and meaningful learning. There are many learning strategies that can be applied, but the research that applies a learning strategy using the SETS approach and vision related to motivation and cognitive values still has some gaps to be investigated.

## 2.2 Research Questions and Objectives

SETS is a way of learning in which the process and concepts learned are always seen in the context of the relationship between the elements of Science, Environment, Technology, and Society. The idea of SETS education was introduced by Binadja at RECSAM (Regional Center for Education in Science and Mathematics) starting in 1996[10]. Learning using SETS vision and approach demands the availability of learning documents, such as curriculum models and accompanying documents (syllabus, semester lesson plans (RPS), teaching materials, and assessment instruments. SETS implementation in learning encourages a broader understanding of learning topics, encourages students looking for a variety of information to find the technology used, the availability of environmental resources needed, and its impact on society broadly[11].

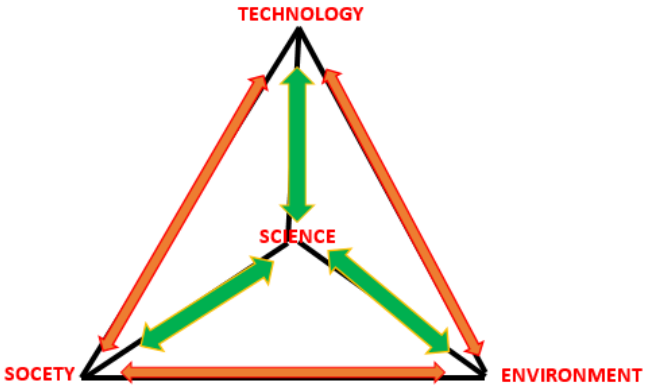


**Fig 1**. Interrelationship in SETS

The indicators of suitability and adequacy of learning materials using the SETS approach and vision are: (1) in line with the lesson plan; (2) providing the opportunity for the appearance of the SETS vision marked by the appearance of the SETS Vision with the presence of four SETS elements interrelated in learning process; (3) allowing the appearance of the SETS approach features: according to the topics discussed, the form of technology linked to the benefit of society, and considering its consequences and benefits [11].

This research was conducted in the D3 Nutrition Study Program. The D3 Nutrition curriculum is designed to be able to encourage the formation of hard skills, personality, and behaviour (soft skills) that can be applied in a variety of situations and conditions. The D3 Nutrition graduates are required to have the skills to be ready to work in the field. This

becomes a necessity so that the learning can encourage and initiatively have readiness to take responsive activity steps based on their environmental resources.

It is expected that through SETS-based learning, students are encouraged to work more skillfully. The most important issue is: Can SETS-approached learning increase students 'motivation, and students' academic scores? and is there the effect of motivation on learning outcomes? Therefore, it is necessary to test the effectiveness of SETS-based learning. The objectives of this study were: (1) to examine the effect of SETS approach to motivation. (2) to test the effect of SETS approach to learning outcomes; (3) to examine the effect of motivation on student learning outcomes.

This study used the method of Quasi-Experimental with a non-equivalent Control Group Design. In this research design, it was not chosen randomly either in the experimental group or control group.

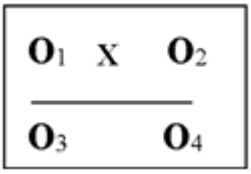


**Fig 2**. Method Of Quasi-Experimental With A Non-Equivalent Control Group Design

Description:

1. O1 and O3 is the pre-test.
2. O2 and O4 is post-test
3. X is treatment (learning treatment with SETS approach)

**Research Subject**

The subjects of this study were all students of the D. 3 Nutrition of UNIMUS, both the control class and experimental class. NON-SETS-approached learning was carried out in the control class, and SETS-approached learning was carried out in the experimental class. The variables used were: (1) The learning approach methods (SETS and NON SETS) as the Independent Variables, (2) cognitive score, and motivation as the Dependent Variables. The study was conducted for four weeks.

Research Procedure

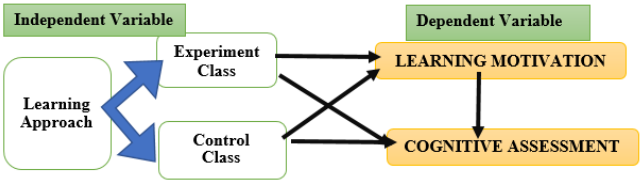


**Fig 2**. Research Procedure

Figure 2. Research Procedure

Hypothesis:

There are three research hypotheses, i.e.:

1. Differences in learning between the SETS and NON SETS approaches to the cognitive score of students. (a) Ho = There is no difference in student motivation, between the learning using SETS and NON SETS approaches. (b) Ha = There is a difference in student motivation between the learning using SETS, and NON SETS approaches.
2. 2.Learning differences between the SETS and NON SETS approach to motivation. (a) Ho = There is no difference in student motivation between the learning using SETS and NON SETS approaches (b) Ha = There is a difference in student motivation, between the learning, using SETS and NON SETS approaches.
3. 3.Effect of student learning motivation on the cognitive score of students. (a) Ho = There is no significant effect of learning motivation on the cognitive score of students. (b) Ha = There is a significant effect of learning motivation on the cognitive score of students:

## 2.3 Research instruments

The research instruments consisted of (1) Motivational instruments, (2) Cognitive assessment instruments to measure students' cognitive scores. The motivation instrument was through questionnaires, and the cognitive instrument included the Carbohydrate theory test in the form of the multiple-choice of 40 items and experiments.

### Motivation Instrument

The Motivation Instruments had four dimensions, i.e.: (1) Responsibility: joy and enthusiasm for food chemistry lessons; carrying out tasks with clear targets; having the responsibility for what has been done; studying seriously and sincerely; having a clear

program of what will be done. (2) Achievement: prioritizing achievement in learning; having a desire to succeed with good results and providing benefits; having an atmosphere of strong and healthy competition; learning with the expectation of solving the problems occurred; learning various other supporting information, the expectation to get good grades. (3) Self-development: showing interest in various food chemistry problems; the need for learning; the expectation and ideals of the future; having the desire to learn other supporting knowledge; having high morale towards various existing present problems. (4) Independence: always doing the task independently and not depending on others; always trying to make ends meet; loving a challenge; strength training; doing work diligently [12][3][8][13][14]. This study's motivation instrument was 40 items, using a Likert scale, with 20 positive statements and 20 negative statements. The data were obtained from pre-test and post-test.

**Cognitive Instruments**

The cognitive assessment with the discussion topic of carbohydrate material using multiple choices used the total questions of 40 items. The 6-level cognitive measurement referred to Bloom's taxonomy (Bloom, 1956): C1 (Remember, 30%), C2 (Understand, 30%), C3 (Apply, 13%), C4 (Analyze, 12%), C5 (Evaluate, 10%), and C6 (Create, 5%). The cognitive assessment included theory and practice. The pre and post practical tests were carried out twice, including the qualitative and quantitative tests of carbohydrates. The practicum hours were executed in 4 hours (4 x 60 minutes)..

## 3. Results and Discussions

### 3.1 Data Analysis

The instruments, before its use, were tested first to obtain data reliability and validity. The data collected from the instrument test results are as follows:

| No | Variable | Invalid Problem Items | Reliability. Cronbach alpha valu e> 0.325 |
|---|---|---|---|
| 1 | Motivation | 3,8,9,19,26, 28. After the testing, the discarded instruments were three items. | Cronbach alpha value = 0.919 The Instrument is Reliable. |
| 2 | Cognitive Carbohydrates | 15, 21, 31. three BS were discarded. | Cronbach alpha value = 0.907 The Instrument is Reliable |

Based on the results of the analysis of the instruments' reliability, it was found that both motivation and cognitive instruments were all reliable. In the validity of the items, it was concluded that there were three items in both the motivation and cognitive instruments that were not used. The number of the instruments compiled both cognitive and motivation was 50 items, and the number of instruments used each was 40 items.

Cognitive assessment needs to be measured in terms of the difficulty level of items and the different power. The difficulty level is the testability to capture the number of test subjects who can do it correctly. When viewed in terms of difficulties, good questions are the questions that are not too easy and not too tricky. The difficulty level data is as follows:

**Table 2.** Percentage of Instrument Difficulty Level of Carbohydrate Test

| Criteria | | Total | Percentage |
|---|---|---|---|
| IK = 0.00 Too difficult Questions | | | |
| 0.00 <IK ≤ 0.30 | Hard Questions | 8 Items | 20% |
| 0.30 <IK ≤ 0.70 | Medium Questions | 31 Items | 78% |
| 0.70 <IK <1.00 | Easy Questions | 1 Item | 2% |
| IK = 1.00 Too Easy Questions | | 40 Items | 100% |

Based on the data above, there are eight difficult items (20%), 31 medium question items (78%), and one easy question item (3%). It indicates that the instrument items are mostly in the medium category.

Distinguishing power is the ability of questions to differentiate between high-ability and less-capable students. The higher the value of an item's distinguishing power, the more able the question is to distinguish smart children from less intelligent children. In this study, the data identifying potential on carbohydrate instruments is in the category of very good with ten items, good with 19 items, enough with 11 items. The following is the consistency of the respondents in answering the items.

**Table 2**. Percentage of Instrument Difficulty Level of Carbohydrate Test

| No | Percentage | Information | Amount | Percentage |
|---|---|---|---|---|
| 1 | 0.40 – up | Very good items | Ten items | 25% |
| 2 | 0.3 - 0.39 | Reasonable good | 19 items | 47.5% |
| 3 | 0.20 - 0.29 | Marginal items | 11 items | 27.5% |
| 4 | Below 0, 19 | Poor items | 40 items | 100% |

### 3.2 Learning Activities Using SETS Vision and Approach on Carbohydrate Materials

The learning activities were carried out based on SETS (Science, Environment, Technology, and Society). The indicators of learning material suitability and adequacy using SETS vision and approach were: Preparation, planning, learning, and assessment. All of them provide opportunities for the SETS vision to appear. The appearance of SETS Vision was marked by at least the presence of the four SETS elements interrelated in the learning process and displayed the characteristics of the SETS approach.

The learners understood the usefulness of scientific concepts related to Carbohydrate material. The concept of Carbohydrate was directed to the form of technology for the benefit of society. The students were able to understand the various possible consequences that occurred in the process of transferring science to this form of technology. They were able to explain the relationship between the concept of carbohydrates and the other elements in the SETS that affected the various relationships in these elements, considering the benefits or disadvantages of using the concept of science when changed in the form of technology. It provides the students with an opportunity to talk about SETS from various directions and starting points depending on their basic knowledge[10]. The mechanism is as follows:

1. Science (Composition, function, the effects of deficiencies, and how to manage them, qualities, structure, classifications, and analytical methods).

   Society (hunger, society issues, health cases in Indonesia, empowerment of society with a life skill, an economy that increases, healthy societies).

2. Environment (application of yard, sewage, availability of natural materials, use of carbohydrates: banana plant, sweet potato).

3. Technology (socialization and training, new treatment technologies, creativity and innovation, variations in food processing, searching information, equipment, baseal-processing technologies based on hydrolysate).

The following is the linkage flow of the SETS elements in Carbohydrate material.

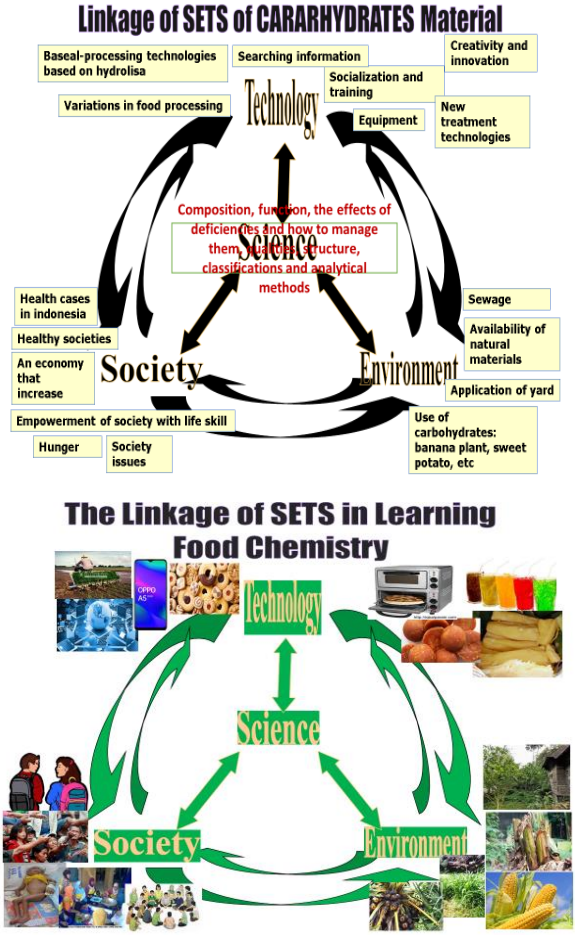


**Fig 4.** The Linkage of SETS in Learning in Food Chemistry

**Table 4.** Learning Activities

| Preliminary | Main Activities | Closing |
|---|---|---|
| The lecturer explained that the learning of carbohydrate material in Food is directed to how a Nutritionist can be called and touched by the problems that exist and occur in society, faced by the nation and state. And how a | Provide an introduction and explain the carbohydrate material<br>Divide students into groups of three students, give assignments to discuss and make products and practicum. | Directing and opening students' mindset of thinking and developing ideas regarding the expected result and motivating students to make products that can be made to make the title of Scientific Papers, |

| | | |
|---|---|---|
| Nutritionist plays a role in solving these problems following their abilities such as capabilities related to Food Processing Technology | Conveying information and analyzing the nation's and society's problems: poverty and its effects, malnutrition, waste, sugar import cases, etc.<br>Discuss, effect, and analyze possible products, with cheap and nutritious ingredients, waste utilization, business opportunities, the role of a Nutritionist.<br>Download information on food processing techniques that are high in carbohydrates, using natural/existing waste<br>Discuss, create workflows, present and make food products<br>Analyze carbohydrate levels of products made by students and discuss them in groups. | entrepreneurship, and skills in the field of food processing. |

### 3.3 Statistical calculation results

**Statistical Results of Sets and Non-Sets Method on Cognitive Value**

**Table 5.** Statistical Results of the SETS and Non SETS Methods on Cognitive Value

| Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Control | 30 | 5.000 | 3.61999 | 0.660 |
| Experiment | 30 | 11.900 | 5.0402 | 0.9202 |

From Table 5, the data shows that the number of observations of each subject is 30. The mean value of the control class is 5,000, with a standard deviation of 3,6199, while the mean value of the experimental class is 11,900, with a standard deviation of 5.0402.

**Table 6**. Different Test Results for SETS and NON SETS Methods on Cognitive Value

| | Levene's Test | | t-test for Equality of Means | | | |
|---|---|---|---|---|---|---|
| | F | Sig. | T | Sig.2-tailed | 95% Confidence Interval of the Difference | |
| | | | | | Lower | Upper |
| Equal variances assumed | 2,797 | 0,10 | -6,09 | 0,0 | -9,1678 | -4,6322 |

| | | | | |
|---|---|---|---|---|
| Equal variances not assumed | -6,09 | 0,0 | -9,1728 | -4,6272 |

In Table 6, there are two rows (cells). The first cell assumes that the two groups' variances are the same, while in the second cell, it assumes that the group variances are not the same. To choose which cell we will use as a test, we referred to the column F. When the significance is (p-value) > α (0.05), the assumption of variance is the same. Conversely, when the value is sig <α (0.05), the variance is not the same. The F test shows that the variance of the two groups is the same because the p-value (0.100)> α (0.05) so that the cell that read was the first cell. The t-test column shows that the calculated t value is -6.090, and the Sig value (p-value) is 0.000. Because p-value is < α (0:05), H0 is rejected. Then, there are differences in cognitive values between the classes that used the Sets method and the classes that used the non-Sets method.

**Statistical Calculation Results for Sets and Non-Sets Methods on Motivation**

**Table 7.** Statistical Calculation Results for Sets and Non-Sets Methods on Motivation

| Group | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Control | 30 | 3.733 | 9.8329 | 1.7952 |
| Experiment | 30 | 5.333 | 7.3688 | 1.3453 |

Based on Table 7 shows that the number of observations of each subject is 30. The mean value of the control class is 3.733, with a standard deviation of 9.8329, while the mean value of the experimental class is 5.333, with a standard deviation of 7.3688.

**Table 8.** Different Test Results for SETS and NON SETS Methods on Motivation

| | Levene's Test | | t-test for Equality of Means | | | |
|---|---|---|---|---|---|---|
| | F | Sig. | t | Sig. 2-tailed | 95% Confidence Interval of the Difference | |
| | | | | | Lower | Upper |
| Equal variances assumed | 0,795 | 0,376 | -0,713 | 0,479 | -6,091 | 2,890 |
| Equal variances not assumed | | | -0,713 | 0,479 | -6,098 | 2,898 |

In Table 8, there are two rows (cells). The first cell assumes that the two groups' variances are the same, while in the second cell, it assumes that the group variances are not the same. To choose which cell we will use as a test, we referred to the column F. When the significance is (p-value) > α (0.05), the assumption of variance is the same. Conversely,

when the value is sig <α (0.05), the variance is not the same. The F test shows that the variance of the two groups is the same because the p-value (0.376)> α (0.05) so that the cell that read was the first cell.

The t-test column shows that the t count is -0,713, and the Sig value (p-value) is 0,479. Because p-value is > α (0:05), H0 is accepted. Then, there is no difference in cognitive values between the classes that used the Sets method and the classes that used the non-Sets method.

**Statistical Calculation Results of Motivation on the Cognitive Score of the Control Class**

**Table 9.** Motivation on the Cognitive Score of the Control Class

| | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Pre_test | 103,467 | 30 | 7,3190 | 1,3363 |
| Post_test | 107,200 | 30 | 7,4157 | 1,3539 |

From Table 9, the number of observations for each subject is 30. The mean value before motivation is 103.467, with a standard deviation of 7.3190, while the mean after given motivation is 107.200, with a standard deviation of 7.4157.

**Table 10**. Differences in the cognitive score before and after the motivation of the Control Class

| | Paired Differences | | | | T | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | 95% Confidence Interval of the Difference | | | |
| | | | Lower | Upper | | |
| Pre_test - Post_test | -3,73 | 9,833 | -7,41 | -,062 | -2,08 | 0,047 |

From the results above, the value of the t count is -2.080 with the value of sig ( p-value) of 0.047 <0.05 so that H0 is rejected. Therefore, there are differences in the cognitive scores before and after motivation is given.

3.4 Experiment Class

**Table 11.** Motivation on the Cognitive Score of the Experiment Class

| | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Pre_test | 103,900 | 30 | 4,5056 | 0,8226 |
| Post_test | 109,233 | 30 | 7,5507 | 1,3786 |

From Table 11, it is found that the number of observations of each subject is 30. The mean value before given motivation is 103.467, with a standard deviation of 7.3190, while the mean value after given motivation is 107.200, with a standard deviation of 7.4157.

**Table 12.** Differences In The Cognitive Scores Before And After The Motivation Of The Experiment Class

| | Paired Differences | | | | t | | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | 95% Confidence Interval of the Difference | | | | |
| | | | Lower | Upper | | | |
| Pre_test - Post_test | -5,33 | 7,37 | -8,08 | -2,58 | -3,96 | 29 | 0,00 |

From the results above, the t count is -3.964 with sig (p-value) 0.000 <0.05, so that H0 was rejected. Therefore, there are differences in the cognitive scores before and after given motivation.

### 3.5 Discusion

**The Effect of the SETS and NONSETS Approaches on Cognitive Scores**

There is a difference between learning through the SETS (experimental class), and NONSETS approaches (control class) on cognitive measurements. It indicates that learning with SETS vision and approach affect the cognitive score of students. SETS-approached learning encourages active learning and places the teacher's role in learning as a facilitator.

Through the SETS approach, the learning process invited the students to always relate all interrelated SETS elements. The four elements of SETS are Science, Environment, Technology, and Society. The element of science was placed in the middle of the triangle with the hope that knowledge, understanding, and mastery of science are the theoretical basis that must be possessed by the students. The students could associate the elements of science with Environment, Technology, and Society well when basic knowledge was possessed properly.

The learners mapped out the conditions of weakness and excess related to environmental conditions related to carbohydrates. At the same time, the students also paid close attention, obtained the information related to the problems and strengths in relation with the conditions in society, and at the same time mapped out what technology could be used to overcome the problems and improved related to environmental and community conditions as well as what basic knowledge was needed. Thinking, designing, and applying the four SETS elements together and interrelated, it educated the students to think comprehensively.

The students always thought and worked continuously, which had an impact on their knowledge and curiosity skills. This trained students to always look for various information related to Science, Environment, Technology, and Society.

The research findings above are very relevant to some of the findings of previous studies. The students' critical thinking abilities who learn through the SETS learning model are better than the students who learn using conventional learning models[15]. The results of previous studies conducted show that learning with the Science-Technology-Society (STS) approach makes students encouraged to learn better when the students are encouraged to solve problems, to explore and consider possible solutions, and to make decisions[16].

**The Effect of SETS and NONSETS Approaches on Motivation**

Based on the research results above, there was no difference in the learning approaches using the SETS and NONSETS visions related to motivation. The student motivation was not influenced by the learning approach using the SETS and NONSETS approaches.

Based on the research results, the implementation of learning strategies encourages the formation of a student-centered learning environment and achievement motivation which leads to strengthening support for student competence[17]. Motivation is an inner drive and has the desire to make it happen. Motivation is a serious, deliberate, calm, work-oriented, and goal-directed thinking[18]. Motivation is more emphasized on willingness to implement, not on being able to implement[19]. One important key to helping students is that educators must understand the relationship between motivation and mental processes. Extraordinary mentality requires extraordinary motivation and commitment to achievement[18]. Motivation refers to the process by which the activities that lead to goals are driven, directed, and sustainable[20].

The vision and approach of SETS built were hoped to be able to encourage the students to be independent and connected to the surrounding environment so that they would motivate the students. However, in reality, the students were less motivated because: (1) the raw material for carbohydrates processed into food was from waste, so the students could not enjoy it; (2) the processing into food technology (such as: nuget, crackers, fermented cassava, brownish, cake, bread, etc.) was left entirely to the students so that there was less assistance; (3) the equipment used was still simple/ manual; (4) there was less public attractiveness because they think the products were made of waste; (5) the products created were less varied; (6) the raw materials of waste were small in quantity; (7) they did not know the correct method / process of waste treatment in order that the waste was suitable for consumption; (8) the marketing was less desirable; (9) the risk of failed processing (the nutritional content is not present or increases, but the nutritional value actually decreases). In addition, the demand for linking between the elements required that the students read a lot of information, discuss together in groups, and link between elements requiring good

precision, as well as the accuracy in mapping the appropriate elements. The urge to seek other information required time, thoroughness and high enthusiasm.

**Effect of Motivation on Cognitive Scores**

Based on the data above, the conclusion is that motivation influences the cognitive value of students. SETS-approached learning affects the cognitive value of students as an impact of academic motivation. When the motivation of students is good, the cognitive value will be good. It is in line with the results of previous studies. Pintrich and Schrauben (1992) said that individual participation in the learning process conditioned by the interaction of motivational and cognitive.

elements. When the goals and interests of learning are high, knowledge will also increase. Academic motivation encourages students to learn more effectively because there is a significant relationship between student motivation and academic performance[2]. Motivation is a catalyst for learning success and academic achievement[4][21].

The findings above illustrate that SETS-approached learning substantially enables the growth of learning motivation so that students' academic value increases. Implementation of the SETS approach encourages students to understand the material more broadly. The mastery of carbohydrate material content was the basis of the students to link and connect other elements in the SETS. This skill encouraged the students to read a lot of additional information. Through SETS, it helped the students discover the existing environmental problems and opportunities and examine the problems and conditions of society and what technology can be developed and carried out.

SETS-based learning enables students to learn more effectively. Motivation can increase because it influenced by internal and external factors and students can consciously organize themselves to increase their capacity[18]. Students are motivated in learning because they know what will be learned and why it needs to be learned.

SETS approached learning is an intervention carried out to influence and encourage students so that their cognitive abilities increase. The application of a variety of interesting learning methods is very necessary, so students are motivated in learning[22]. Many factors motivate students to learn, including the presence of interesting learning[19]. Children will be motivated to learn to produce maximum value.

Unfortunately, many students whose talents are not fully visible because they do not know how to be motivated so their potential is maximized. Therefore, one important key to helping students is that educators must understand the relationship between motivation and mental processes. Extraordinary mentality requires motivation and commitment to extraordinary achievement[18]. Serious and enjoyable motivation will encourage creative mental mechanisms and independent intelligence.

Practical experience supports the application of knowledge, demands resolution skills in diverse situations, and perfects mastery of experience in the field. Students will be challenged by the complexity of the task or skill and improve student skills and student self-regulation, which ultimately increases students' self-efficacy, leading to mastery experiences[22]. Therefore, SETS learning provides the opportunity for an activity to accommodate the potential of the environment, the occurring problems, students' opportunity to advance, and mastering learning material. Educators are very meaningful; an educator not only encourages students in their intellectual development but also emphasizes that students as a rounded personal part can react positively or negatively to the stimuli they receive.

## 4. Conclusions

The SETS learning approach invites students to always link the four elements of SETS (Science, Environment, Technology, and Society) in interrelated and connected manner. The element of science (carbohydrate material) becomes the theoretical basis that absolutely must be understood by students, map the conditions of weaknesses and strengths related to environmental conditions, link and connect them with existing conditions in society, and map what technology can be used to solve problems and to improve environmental and community conditions.

The results of the implementation of SETS and non-SETS learning with quasi-experimental methods provide the data that: (1) there is an effect of SETS learning on students' cognitive values. (2) There is no effect of SETS learning on student motivation. (3) there is a motivational effect on students' cognitive values. Through SETS-based learning, it educates students to think, design, and apply the four SETS elements simultaneously and interrelated, and to think comprehensively and continuously which will have an impact on increasing knowledge and skills. In addition, students are motivated to learn so that their cognitive abilities increase.

The SETS approach did not affect motivation because: (1) the raw material for carbohydrates processed into food was from waste; (2) lack of assistance; (3) The equipment used was still simple / manual; (4) Less public attractiveness; (5) The products created were less varied; (6) Raw materials of waste were small in quantity; (7) they did not know the correct waste treatment method; (8) Marketing was less desirable; and (9) Risk of failed processing. In addition, the demand for linking between the elements required that the students read a lot of information, discuss together in groups, and link between elements requiring good precision, as well as the accuracy in mapping the appropriate elements. The urge to seek other information required time, thoroughness and high enthusiasm.

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