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# Performance, Conceptual Understanding, and Self-Efficacy of Students via Contextualized Self-learning Modules in Junior High School

Chazzel Feel C. Salvane [a] *, Maris Jade Q. Orongan[b]

[a] *Cambangon Integrated School, Sitio Cambangon, Lilingayon, Valencia City, 8709, Bukidnon, Philippines*

[b] *College of Education, Central Mindanao University, University Town, Musuan, Maramag, 8714, Bukidnon, Philippines*

**Abstract**

This study examined the performance, conceptual understanding, and self-efficacy of students via contextualized self-learning modules in Junior High School of Cambangon Integrated School, Lilingayon, Valencia City. Specifically, it aimed to: 1) assess the level of student's performance via contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM), 2) identify the level of students' conceptual understanding in science via CSLM and non-CSLM in the pre-test and post-test, 3) determine the level of students' self-efficacy via CSLM and non-CSLM in terms of: a) conceptual understanding, b) higher-order thinking skill, c) practical work, d) everyday application, and e) science communication, 4) compare if there is a significant difference in students' performance via CSLM and to non-CSLM, 5) ascertain if there is a significant difference in the students' conceptual understanding in science via CSLM and to non-CSLM in the pre-test and post-test, and 6) find out if there is a significant difference in the students' self-efficacy via CSLM and to non-CSLM in terms of: a) conceptual understanding, b) higher-order thinking skill, c) practical work, d) everyday application, and e) science communication. The study used a quasi-experimental research design utilizing two (2) intact sections of Grade-9 students. The results of the study revealed that the level of students' performance, conceptual understanding, and self-efficacy under CSLM had a higher increase in mean scores compared to the mean scores of students under non-CSLM. Furthermore, the study also found out that there is a significant difference in student's performance, conceptual understanding, and self-efficacy of students who utilized CSLM and students who utilized non-CSLM. This study suggests to consider contextualizing and localizing self-learning modules since these respond effectively to learners' changing needs and conditions in this new normal, which can further contribute to their holistic development.

***Keywords:*** contextualized self-learning module; students' performance; self-efficacy; conceptual understanding



* Corresponding author name: Chazzel Feel Salvane ORCID ID.: https://orcid.org/0000-0002-1618-8648
*E-mail address*: chazzelfeelsme@gmail.com

## 1. Introduction

Science as a core subject is perceived to be of great importance because of the need to achieve a degree of scientific literacy which enables the students to participate effectively as citizens in modern societies (Walag, 2019). However, with the recent result of the Programme for International Student Assessment (PISA) 2018, it showed that the Philippines scored second-lowest in math and science, where the Philippines, in scientific literacy, attained an average score of 357 points, placing the country at Proficiency level 1a, categorized as low performers (PISA 2018 National Report of the Philippines, 2019).

Dangle and Sumaoang (2020) highlighted the main challenges in this new normal: lack of school funding in the production and delivery of modules, students struggle with self-studying, and parents' lack of knowledge to academically guide their child/children. In a different study, students encounter problems in learning science in terms of motivation, cognitive ability, teacher characteristics, subject matter content, medium of instruction, learning environment, instructional resources, curriculum, and parental support (Sadera et al., 2020). Moreover, Walag (2019) also stresses that positive self-efficacy towards science can affect and is highly influential to students' academic performance.

In the Division of Valencia City, Cambangon Integrated School located in Lilingayon, Valencia, Bukidnon, is considered as the lowest-performing Integrated School in science subject under district eight which is reflected on the science over-all school's Mean Percentage Score (MPS) of 65.04 in the last school year 2019-2020.

Moreover, the challenge brought by COVID-19 introduces different learning delivery modalities nationwide. With that, DepEd Order No. 012, s.2020 emphasizes considering distance learning or self-learning modules for alternative delivery modalities in low-risk areas, including localities in far-flung areas.

In relation, Cambangon Integrated School is situated in a remote area where most of the Junior High School learners belong to less-fortunate families who were apparently at great disadvantage in terms of internet connection, and not capable of providing the necessary tools and equipment like computer, smartphones, television, etc. in order to participate in an Online Learning. Modular Distance Learning as the learning modality of the school year poses challenges not just among the teachers but also the learners. In previous quarters, parents admit that the learners were struggling with self-studying due to low self-efficacy and learners' unfamiliarity with some examples, pictures and concepts presented in the modules.

To address such educational concerns, contextualized self-learning modules as an intervention in these trying times aimed to enhance student's performance, conceptual understanding, and self-efficacy of Grade-9 students through the developed self-learning modules with contextualized contents presented in different stages–Activity, Discussion, Input, Deepen, Application and Synthesis or known as ADIDAS approach. Thus, this study

investigated students' performance, conceptual understanding, and self-efficacy via contextualized self-learning modules in Junior High School in Cambangon Integrated School, Lilingayon, Valencia City.

## 2. Method

This study was conducted in Cambangon Integrated School with a School ID No. 501121 and is located at Sitio Cambangon, Lilingayon, Valencia City, Province of Bukidnon, Region 10. Currently, there are seventeen (17) teachers and three hundred and thirty-seven (337) pupils/students of Cambangon Elementary school, Its satellite school-Makailaw Elementary School, Grade 7, 8, and 9 students.

The study utilized a quasi-experimental research design to determine the student performance, conceptual understanding and self-efficacy in science. The respondents of the study were the two (2) heterogeneous sections of Grade-9 whose students were officially enrolled during the school year 2020-2021 in Cambangon Integrated School, Sitio Cambangon, Lilingayon, Valencia City, Bukidnon. One section utilized the contextualized self-learning modules (experimental group) while the other section utilized the non-contextualized self-learning modules (control group). Furthermore, this study used two (2) intact classes– thirty-two (32) participants in the experimental group and only twenty-nine (29) participants in the control group. Furthermore, this study utilized four (4) instruments in collecting the data: the contextualized self-learning modules which were subjected for content validity; student performance via portfolio assessment; the standardized test on conceptual understanding in science from DepEd; and the survey questionnaire adapted from student science learning self-efficacy (SLSE) of Lin and Tsai (2012).

Prior to the conduct of the study, the researcher sent a request through a letter addressed to the Schools Division Superintendent (SDS) of Valencia City and School Head of Cambangon Integrated School, Lilingayon, Valencia City. Once the permission was granted, the researcher then conducted an orientation to both control and experimental groups with the help of parents as the channel in informing the learners on the use of contextualized self-learning modules and non-contextualized self-learning modules. The parents' orientation was divided into two groups– orientation for the parents under experimental group was done in the morning, while orientation for the parents under the control group was in the afternoon. During the orientation, the researcher explained why the study was conducted and a consent letter was then provided– asking permission to let their child be one of the study participants. The schedules in taking pre-test and the distribution and retrieval of the module were also mentioned and discussed.

In examining the student conceptual understanding of science using the CSLM and non- CSLM, a standardized test about third-quarter Grade-9 science lessons were administered– pre-test and post-test to experimental and control groups. A pre-test was administered first before exposure to the approaches to determine the student prior

knowledge about the topics to be learned. After that, the researcher then let the experimental group used the CSLM while the control group utilized the non-CSLM. At the end of the quarter, a post-test was administered to both groups to determine their understanding of the science concept. Furthermore, the survey questionnaire about student self-efficacy was administered after implementing CSLM and non-CSLM. Moreover, after the post-test was conducted in both groups, the student portfolios were then collected and evaluated using the portfolio grading rubric.

In this study, the researcher utilized a descriptive statistic such as the means, frequency values, percentages, and standard deviation which were used to describe the student self-efficacy in science. Analysis of Covariance (ANCOVA) was used to determine any significant relationship between student performance, conceptual understanding, and self-efficacy of junior high school students. In addition, the researcher also utilized a t-test for paired samples in analyzing the data gathered from the results of pre-test and post-test of students. Furthermore, a one-sample t-test was also used to determine the learners' outcome with their scores in the portfolio and self-efficacy in both groups.

## 3. Results

The presentations, analysis, and interpretation of the data were gathered from the Grade-9 students under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). Table 1 presents the level of student's performance via portfolio under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). The level of student's performance via portfolio was assessed individually guided with rubrics through the best output presented by the students in their respective portfolios. As shown in table 1, students who utilized CSLM had the following performance: four (4) or 12.5% of the students had a fairly satisfactory performance, seven (7) or 21.9% got satisfactory, six (6) or 18.8% of the students had a very satisfactory performance and fifteen (15) or 46.8% of them had reached an outstanding performance. While the students under the non-CSLM group had the following performances: eleven (11) or 37.7% of the students did not meet the expectations; four (4) or 13.8% had a fairly satisfactory performance, three (3) or 10.3% had a satisfactory performance, six (6) or 20.7% had a very satisfactory performance and only five (5) or 17.2% had an outstanding performance. The result implies that most of the students under CSLM

Table 1. Students Performance under CSLM and non-CSLM via Portfolio

| Range | GROUP | | | | Qualitative Interpretation |
|---|---|---|---|---|---|
| | CSLM n=32 | | non-CSLM n=29 | | |
| | f | % | F | % | |
| 90% and above | 15 | 46.8% | 5 | 17.2% | Outstanding (O) |
| 85%- 89% | 6 | 18.8% | 6 | 20.7% | Very Satisfactory (VS) |
| 80%- 84% | 7 | 21.9% | 3 | 10.3% | Satisfactory (S) |
| 75%- 79% | 4 | 12.5% | 4 | 13.8% | Fairly Satisfactory (FS) |
| 74% and below | 0 | 0% | 11 | 37.7% | Did Not Meet Expectations (DNME) |
| WEIGHTED MEAN | 87.66 (very satisfactory) | | 75.69 (fairly satisfactory) | | |

Legend:

| Grade Scale | Percentage score | Interpretation |
|---|---|---|
| 90-100 | 90% and above | Outstanding (O) |
| 85-89 | 85%- 89% | Very Satisfactory (VS) |
| 80-84 | 80%- 84% | Satisfactory (S) |
| 75-79 | 75%- 79% | Fairly Satisfactory (FS) |
| 0-74 | 74% and below | Did Not Meet Expectations (DNME) |

were able to showcase their creativity, sense of responsibility, and able to demonstrate their understanding of the lessons.

The data further reveals that 37.7% of the students under non-CSLM did not meet the standard set by the Department of Education because some of the learners under non-CSLM failed to demonstrate the conditions or criteria required in assessing their portfolio based on content, following of directions, design and organization, creativity, effort, reflection, and punctuality. This result shows that students under non-CSLM developed less engagement and interest in learning and understanding science concepts. Based on the observation, this was because the contents under the non-contextualized self-learning modules were unfamiliar to them. Given the fact that some of the students reside in a remote area where some of the houses have no electricity, gadgets such as smartphones and tv. Also, the reception of internet connection is poor–these conditions mentioned had become a disadvantage to the learners.

In addition, the students who utilized CSLM obtained a mean score of 87.66, indicating a very satisfactory result. In contrast, the students who utilized non-CSLM had a mean score of 75.69, indicating fairly satisfactory result. The results show that CSLM users obtained a higher mean score in academic performance via portfolio assessment than the non-CSLM users. It implies further that the learners under CSLM exerted more effort, demonstrated understanding of scientific knowledge, fulfilled the required conditions and successfully presented their best outputs, as reflected in the data shown in table 1.

Table 2 depicts the level of students conceptual understanding in pretest and post-test indicating frequency, qualitative interpretation, and percentage scores of the students under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). The level of conceptual understanding was measured through the scores as results of the standardized Grade-9 science test adopted from the DepEd K-12 curriculum. As shown in the table above, 32 or 100% of the students under CSLM and 29 or 100% of the students under non-CSLM obtained a very low rating in conceptual understanding. At this level, students struggled with their understanding, prerequisite and fundamental knowledge. The skills had not been acquired or developed adequately to aid understanding Moreover, the group of students under CSLM had an overall pretest mean score of 17.47 while students under the non-CSLM had an overall pretest mean score of 19.24. Both groups were in fairly satisfactory result inferring that learners still need enhancement. On the other hand, the overall pretest mean score of students under CSLM was 17.47, with an MPS value of 36.39%, revealed

Table 2. Students Level of Conceptual Understanding

| Range | CSLM n=32 | | | | Non-CSLM n=29 | | | | Qualitative Interpretation |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-test | | Post-test | | Pre-test | | Post-test | | |
| | f | % | f | % | F | % | f | % | |
| 90% and above | 0 | 0 | 1 | 3.1 | 0 | 0 | 0 | 0 | Outstanding (O) |
| 85%- 89% | 0 | 0 | 1 | 3.1 | 0 | 0 | 0 | 0 | Very Satisfactory (VS) |
| 80 %- 84% | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3.4 | Satisfactory (S) |
| 75%- 79% | 0 | 0 | 1 | 3.1 | 0 | 0 | 1 | 3.4 | Fairly Satisfactory (FS) |
| 74% and below | 32 | 100% | 29 | 90.7% | 29 | 100% | 27 | 92.6 % | Did Not Meet Expectations (DNME) |
| OVER-ALL MEAN | 17.47 (fairly satisfactory) | | 30.28 (very satisfactory) | | 19.24 (fairly satisfactory) | | 27.66 (satisfactory) | | |
| MPS | 36.39 (average mastery learning) | | 63.09 (average mastery learning) | | 40.09 (average mastery learning) | | 57.61 (average mastery learning) | | |

Legend:

| Grade Scale | Percentage score | Interpretation |
|---|---|---|
| 39-48 | 90% and above | Outstanding (O) |
| 30-38 | 85%- 89% | Very Satisfactory (VS) |
| 21-29 | 80%- 84% | Satisfactory (S) |
| 12-20 | 75%- 79% | Fairly Satisfactory (FS) |
| 0-11 | 74% and below | Did Not Meet Expectations (DNME) |

descriptive equivalent of average mastery learning. On the other hand, the overall posttest mean score of students under non-CSLM was 19.24, with an MPS value of 40.09%, which also explained to have a descriptive equivalent of average mastery learning. The Mean Percentage Score (MPS) interpretation was based on the DepEd standard in categorizing performing schools as cited in DepEd Memorandum, No. 160, s. 2012 (see appendix, N). The MPS result of the pretest was lower than the last school year's MPS result, which was 65.04. The findings of the study are parallel to the low National Achievement Test (NAT) and PISA result in 2018. The pretest result implies that both groups had a weak background on some scientific concepts about Earth Science. These findings are supported by the study of Al Mutawah et al. (2019) which confirms that students conceptual understanding level was high mostly for students with solid background in mathematics and science. In addition, the result of the study is similar with the previous results of the local studies on the level of student in pretest exam in a contextualized learning environment (Baiño, 2016; Cainoy, 2020; and Ederango, 2019)

## Students Self-Efficacy towards Science Learning

### Conceptual Understanding

Table 3 presents the level of student's self-efficacy towards learning science in terms of conceptual understanding under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). As shown in the table above show that among of the four statements, "I can choose an appropriate formula to solve a science problem" (4.06) was the highest while "I can link the contents among different science subjects, and establish the relationships between them" (3.75) was the lowest in the group of students who utilized CSLM. The study suggests that by incorporating localized resources and contextualizing module content, it could positively increase students' self-efficacy in choosing an appropriate formula or method in solving a science problem. However, the difficulty in linking and correlating the contents among the different areas of science was determined.

Table 3. Students Self-Efficacy Towards Learning Science in Terms of Conceptual Understanding.

| Conceptual Understanding | GROUP | | | |
|---|---|---|---|---|
| | CSLM n=32 | | Non-CSLM n=29 | |
| Indicators | Mean | QI | Mean | QI |
| 1. I can choose an appropriate formula to solve a science problem. | 4.06 | High | 3.21 | Moderate |
| 2. I can explain scientific laws and theories to others. | 3.88 | High | 3.07 | Moderate |
| 3. know the definitions of basic scientific concepts (for example, gravity, photosynthesis, etc.) very well. | 3.81 | High | 3.10 | Moderate |
| 4. I can link the contents among different science subjects (for example biology, chemistry and physics) and establish the relationships between them. | 3.75 | High | 2.79 | Moderate |
| WEIGHTED MEAN | 3.87 | High | 3.04 | Moderate |

Legend:

| Scale | Qualitative Interpretation |
|---|---|
| 4.51-5.0 | Very High |
| 3.51-4.50 | High |
| 2.51-3.50 | Moderate |
| 1.51-2.50 | Low |
| 1.0-1.50 | Very Low |

On the other hand, students under the non-CSLM group showed that among the four statements, "I can choose an appropriate formula to solve a science problem" (3.21) was the highest and "I can link the contents among different science subjects and establish

the relationships between them" (2.79) came the lowest. Moreover, students who utilized the CSLM had an overall mean score of 3.87, indicating a high self-efficacy result. In contrast, the students who utilized non-CSLM had an overall mean score of 3.04, indicating a moderate self-efficacy.

## Higher-Order Thinking Skill

Table 4 presents the result of student's science learning self-efficacy towards higher-order thinking skill under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). The data shows that students who utilized CSLM had the highest mean in the statement, "when I come across a science problem, I will actively think over it first and devise a strategy to solve it" (4.41) and lowest in "when I am exploring a scientific phenomenon, I am able to observe its changing process and think of possible reasons behind" (3.69). On the other hand, students who utilized the non-CSLM showed that among the six (6) statements, "When I come across a science problem, I will actively think it over first and devise a strategy to solve it" (3.45) was the highest indicating high self-efficacy, and "I am able to design scientific experiments to verify my hypotheses" (3.03) was the lowest indicating moderate self-efficacy. Moreover, the data also illustrates that student under CSLM had an overall mean score of 4.05, indicating a high self-efficacy result. In contrast, the students who utilized non-CSLM had an overall mean score of 3.29, indicating a moderate self-efficacy.

Table 4. Students Self-Efficacy Towards Learning Science in Terms of Higher-Order Thinking Skill

| Higher-Order Thinking Skill | GROUP | | | |
|---|---|---|---|---|
| | CSLM n=32 | | Non-CSLM n=29 | |
| Indicators | Mean | QI | Mean | QI |
| 1. When I come across a science problem, I will actively think over it first and devise a strategy to solve it. | 4.41 | High | 3.45 | Moderate |
| 2. I am able to propose many viable solutions to solve a science problem. | 4.25 | High | 3.52 | High |
| 3. I am able to make systematic observations and inquiries based on a specific science concept or scientific phenomenon. | 4.00 | High | 3.31 | Moderate |
| 4. I am able to critically evaluate the solutions of scientific problems. | 4.00 | High | 3.14 | Moderate |
| 5. I am able to design scientific experiments to verify my hypotheses. | 3.97 | High | 3.03 | Moderate |
| 6. When I am exploring a scientific phenomenon, I am able to observe its changing process and think of possible reasons behind it. | 3.69 | High | 3.31 | Moderate |
| WEIGHTED MEAN | 4.05 | High | 3.29 | Moderate |

Legend:

| Scale | Qualitative Interpretation |
|---|---|
| 4.51-5.0 | Very High |
| 3.51-4.50 | High |
| 2.51-3.50 | Moderate |
| 1.51-2.50 | Low |
| 1.0-1.50 | Very Low |

## Practical Work

Table 5 presents the results of student's science learning self-efficacy towards practical work under the contextualized s elf-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). The data showed that students who utilized CSLM had the highest mean in the statement, " I know how to carry out experimental procedures" had the highest mean (4.44), while "I know how to use equipment in the science laboratory" had the lowest (4.12). On the other hand, students who utilized the non-CSLM showed that among of the four (4) statements, the statement "I know how to set up equipment for laboratory experiments" (3.07) had the highest, and "I know how to carry out experimental procedures in the science laboratory" (2.66) had the lowest mean. On the other hand, students under CSLM had an overall mean score of 4.28 indicating a high self-efficacy result, while the students under non-CSLM had an overall mean score of 2.87, indicating a moderate self-efficacy result. Similarly, mean scores of students under non-CSLM imply that they knew how to set up equipments, although they lacked self-efficacy in conducting experiments that might be caused by their uncertainty.

Table 5. Students Self-Efficacy Towards Learning Science in Terms of Practical Work

| Practical Work Indicators | GROUP CSLM n=32 Mean | CSLM n=32 QI | Non-CSLM n=29 Mean | Non-CSLM n=29 QI |
|---|---|---|---|---|
| 1. I know how to carry out experimental procedures in the science laboratory. | 4.44 | High | 2.66 | High |
| 2. I know how to collect data during the science laboratory. | 4.22 | High | 2.86 | High |
| 3. I know how to set up equipment for laboratory experiments. | 4.38 | High | 3.07 | High |
| 4. I know how to use equipment (for example measuring cylinders, measuring scales, etc.) in the science laboratory. | 4.12 | High | 2.90 | High |
| WEIGHTED MEAN | 4.28 | High | 2.87 | Moderate |

Legend:

| Scale | Qualitative Interpretation |
|---|---|
| 4.51-5.0 | Very High |
| 3.51-4.50 | High |
| 2.51-3.50 | Moderate |
| 1.51-2.50 | Low |

## Everyday Application

Table 6 illustrates the result of science learning self-efficacy in terms of everyday application under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). The data showed that among eight (8) statements, the students who utilized the CSLM had the highest mean rating for the statement "I am able to apply what I have learned in school science to daily life" (4.41) and lowest for "I am able to explain everyday life using scientific theories" (3.87). On the other hand, for students who utilized the non-CSLM, the statement, "I can understand the news/documentaries I watch on

Table 6. Students Self-Efficacy Towards Learning Science in Terms of Everyday Application

| Everyday Application Indicators | GROUP CSLM n=32 Mean | CSLM n=32 QI | Non-CSLM n=29 Mean | Non-CSLM n=29 QI |
|---|---|---|---|---|
| 1. I am able to apply what I have learned in school science to daily life | 4.41 | High | 3.38 | Moderate |
| 2. I am able to propose solutions to everyday problems using science. | 4.34 | High | 3.41 | Moderate |
| 3. I am able to use scientific methods to solve problems in everyday life. | 4.09 | High | 3.14 | Moderate |
| 4. I am aware that a variety of phenomena in daily life involve science-related concepts | 4.09 | High | 3.52 | High |
| 5. I can understand the news/documentaries I watch on television related to science. | 4.03 | High | 3.66 | High |
| 6. I can recognize the careers related to science | 3.91 | High | 3.48 | Moderate |
| 7. I can understand and interpret social issues related to science (for example nuclear power usage and genetically modified foods) in a scientific manner. | 3.91 | High | 3.31 | Moderate |
| 8. I am able to explain everyday life using scientific theories. | 3.87 | High | 3.59 | High |
| WEIGHTED MEAN | 4.08 | High | 3.43 | Moderate |

television related to science" (3.66) had the highest mean scores indicating high self-efficacy while "I am able to use scientific methods to solve problems in everyday life" (3.14) had the lowest indicating moderate self-efficacy. Moreover, the students under CSLM had an overall mean score of 4.08 indicating a high self-efficacy result, while the students who utilized non-CSLM had an overall mean score of 3.43, indicating a moderate self-efficacy. The overall mean score of both groups implies that the students under CSLM developed higher self-efficacy in applying science concepts and related skills to daily life events than the non-CSLM group.

## Science Communication

Table 7 presents the result of science learning self-efficacy in terms of science communication under the contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). As shown in the table, students who utilized the CSLM showed high self-efficacy in six (6) statements in which among the statements, "I am able to comment on presentations made by my classmates in science class" (4.31), and In science class, I can clearly express my own opinions" (4.13) had the highest mean scores while the statement "I am able to use what I have learned in science classes to discuss with others" (3.91) had the lowest mean. On the other hand, students under non-CSLM showed that among the six (6) statements, the statements "I am able to comment on presentations made by my classmates in science class" (3.69), "I am able to use what I have learned in science classes to discuss with others" (3.55), and "In science classes, I can express my own ideas properly" (3.45) had the highest mean scores indicating high self-efficacy while the statement "I feel comfortable discussing science content with my classmates" (3.45), "In science classes, I can express my ideas properly" (3.45) and "I am able to clearly explain what I have learned to others" (3.28) had the lowest indicating moderate self-efficacy. The data also illustrated that the students who utilized CSLM had an overall mean score of 4.03 indicating a high self-efficacy, while the students who utilized non-CSLM had an overall mean score of 3.27 indicating a moderate self-efficacy. The overall mean score of students revealed that students under CSLM developed a higher level of self-efficacy towards science communication compared to the control group.

Table 7. Students Self-Efficacy Towards Learning Science in Terms of Science Communication

| Science Communication | GROUP | | | |
|---|---|---|---|---|
| | CSLM n=32 | | Non-CSLM n=29 | |
| Indicators | Mean | QI | Mean | QI |
| 1. I am able to comment on presentations made by my classmates in science class. | 4.31 | High | 3.69 | High |
| 2. In science classes, I can clearly express my own opinions. | 4.13 | High | 3.52 | High |
| 3. I am able to clearly explain what I have learned to others. | 3.97 | High | 3.28 | Moderate |
| 4. I feel comfortable discussing science content with my classmates. | 3.94 | High | 3.45 | Moderate |
| 5. In science classes, I can express my ideas properly | 3.94 | High | 3.45 | Moderate |
| 6. I am able to use what I have learned in science classes to discuss with others. | 3.91 | High | 3.55 | High |
| WEIGHTED MEAN | 4.03 | High | 3.27 | Moderate |

Legend:

| Scale | Qualitative Interpretation |
|---|---|
| 4.51-5.0 | Very High |
| 3.51-4.50 | High |
| 2.51-3.50 | Moderate |
| 1.51-2.50 | Low |
| 1.0-1.50 | Very Low |

Table 8 presents summary or the overall level of self-efficacy dimensions towards learning science between students who utilized contextualized self-learning module (CSLM) and non-contextualized self-learning module (non-CSLM). Result of the study reveals that for science learning students under CSLM had an overall mean score of 4.06 indicating high self-efficacy while students under the non-CSLM had an overall mean score of 3.27 indicating moderate self-efficacy. The result of the over-all mean score indicates that the student's self-efficacy under the contextualized learning has positively increased. This means that with series of localized and contextualized activities offered by the self-learning modules, the learners under CSLM developed confidence in expressing the following: a) understanding the cognitive skills including concepts and theories; b) advanced cognitive skills such as problem solving, critical thinking, or scientific inquiry; c) capability of performing science experiments in laboratory activities; d) ability to apply science concepts and related skills to daily life events, and; e) scientifically communicating or discussing with others.

Table 8. Overall Level of Students Self-Efficacy Towards Learning Science

| Self-efficacy Dimensions | GROUP | | | |
|---|---|---|---|---|
| | CSLM n=32 | | Non-CSLM n=29 | |
| | Mean | QI | Mean | QI |
| Practical Work | 4.29 | High | 2.87 | Moderate |
| Everyday Application | 4.08 | High | 3.46 | Moderate |
| Higher-Order Thinking Skill | 4.05 | High | 3.29 | Moderate |
| Science Communication | 4.03 | High | 3.48 | Moderate |
| Conceptual Understanding | 3.87 | High | 3.04 | Moderate |
| OVERALL MEAN | 4.06 | High | 3.27 | Moderate |

Legend:

| Scale | Qualitative Interpretation |
|---|---|
| 4.51-5.0 | Very High |
| 3.51-4.50 | High |
| 2.51-3.50 | Moderate |
| 1.51-2.50 | Low |
| 1.0-1.50 | Very Low |

## Comparison of Students Performance via CSLM and the Non-CSLM using Portfolio Assessment

Table 9 shows the difference in students' performance via portfolio in science learning under CSLM and non-CSLM. Students under the CSLM obtained a mean score of 87.66 higher than the mean score of students under the non-CSLM which was 75.69. Upon comparison, the t-value obtained was 4.504 with a probability value of 0.000 indicating significance at the 0.05 level. These results conclude that the study rejects the null hypothesis that "there is no significant difference in the student's portfolio in science via contextualized self-learning module and non-contextualized self-learning module"

Table 9. Difference in students performance via CSLM and Non-CSLM

| Group | N | Mean | SD | t | Sig |
|---|---|---|---|---|---|
| CSLM | 32 | 87.66 | 8.612 | | |
| non-CSLM | 29 | 75.69 | 12.006 | 4.504 | 0.0( |
| TOTAL | 61 | | | | |

*p<0.05 ns= not significant

The result of the study shows that a contextualized module enhances and improves students learning output or performance. Moreover, with a contextualized content of a

module, the learners were able to perform confidently in their science experiments and activities thus, they improved their learning output. Furthermore, the study's findings revealed that student's performance in science was enhanced along with the learners' self-efficacy and conceptual understanding using a contextualized module. Thus, it proves that despite the pandemic, quality learning is still possible and attainable

## Analysis of Covariance (ANCOVA) on Student's Conceptual Understanding

Table 10 presents the analysis of covariance on students conceptual understanding under CSLM and non-CSLM. The pretest was used as a covariate to statistically equate dissimilar prognostic variables which may affect the analysis. Students under CSLM obtained a mean score of 63.09 while the students under non-CSLM obtained a mean score of 57.61. The computed F-value between groups was 33.131 at p-value of 0.000 indicating highly significant difference.

Table 10. Analysis of covariance (ANCOVA) on students conceptual understanding exposed to CSLM and Non-CSLM

| GROUP | N | MEAN | SD |
|---|---|---|---|
| CSLM | 32 | 63.09 | 9.7 |
| Non-CSLM | 29 | 57.61 | 11.56 |
| Total | 61 | 60.49 | 10.91 |

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Group | 6344.925 | 2 | 3172.462 | 33.131 | 0.000* |
| Pre-test | 1134.587 | 1 | 1134.587 | 11.849 | 0.001* |
| Error | 5553.869 | 58 | 95.756 | | |
| Total | 230308.160 | 61 | | | |

* p<0.05 ns= not significant

This implies that the students under CSLM obtained higher conceptual understanding than those students under non-CSLM. Thus, the null hypothesis that there is no significant difference on the students conceptual understanding in science via contextualized self-learning module and non-contextualized self-learning module is rejected.

**Difference in Students Self-Efficacy in Science Learning**

Table 11 illustrates the difference in student's self-efficacy in science learning under CSLM and non-CSLM. Students under CSLM obtained an overall mean score of 4.06 higher than the mean score of students under non-CSLM which was 3.27. Upon comparison, the t-value obtained was 10.266 with a probability value of 0.000 indicating significance at the 0.05 level. Thus, the null hypothesis that there is no significant difference in the level of students self-efficacy via contextualized self-learning module and non-contextualized self-learning module is rejected. Based on the results, all the self-efficacy dimensions, namely: conceptual understanding; higher-order thinking skill; practical work; everyday application and science communication were significant within the 95% confidence interval. Certainly, students under CSLM have higher self-efficacy than those students under non-CSLM.

Table 11. Difference in students self-efficacy in science learning via CLSM and non-CSLM

| Self-efficacy Dimensions | Mean | | SD | | t | Sig. |
|---|---|---|---|---|---|---|
| | CSLM | non-CSLM | CSLM | non-CSLM | | |
| A. Practical Work | 4.29 | 2.87 | 0.50843 | 0.49830 | 10.984 | 0.000* |
| B. Everyday Application | 4.08 | 3.44 | 0.36285 | 0.35137 | 7.056 | 0.000* |
| C. Higher-Order Thinking Skill | 4.05 | 3.29 | 0.45680 | 0.41941 | 6.736 | 0.000* |
| D. Science Communication | 4.03 | 3.49 | 0.36524 | 0.47753 | 5.013 | 0.000* |
| E. Conceptual Understanding | 3.86 | 3.04 | 0.54625 | 0.59787 | 5.679 | 0.000* |
| OVERALL SELF-EFFICACY MEAN | 4.06 | 3.27 | 0.32098 | 0.27822 | 10.266 | 0.000* |

* p<0.05 ns= not significant

## 4. Discussion

Results revealed that, in the CSLM group, four (4) of the students had a fairly satisfactory performance, seven (7) of the students had satisfactory performance, six (6) of the students had very satisfactory performance and fifteen (15) of the students had reached an outstanding performance. While students under the non-CSLM group had the following performance: eleven (11) of the students did not meet expectations, four (4) had fairly satisfactory performance, three (3) had satisfactory performance, six (6) had a very satisfactory performance, and only five (5) had an outstanding performance.

The pretest-posttest mean percentage score obtained by students under CSLM were 36.39% (average mastery learning), and 63.09% (average mastery learning), respectively. On the other hand, the pretest-posttest mean percentage score obtained by students under SLM were 40.09% (average mastery learning), and 57.61% (average mastery learning), respectively. The result showed that there was an increase in students' MPS for both groups. However, students' MPS under CSLM was higher compared to the other group.

The self-efficacy of students under CSLM and non-CSLM in terms of "conceptual understanding" were (3.87) and (3.04), "higher-order thinking skill" were (4.05) and (3.29), "practical Work" were (4.29) and (2.87), "everyday application" was (4.08) and (3.46), and "science communication" were (4.03) and (3.48), respectively. Students under CSLM had

an overall mean score of 4.06 indicating high self-efficacy while students under the non-CSLM had an overall mean score of 3.27 indicating moderate self-efficacy. The result of the study indicated that students under CSLM developed higher level of self-efficacy compared to non-CSLM group.

Student's academic performance via portfolio assessment under CSLM obtained a mean score of 87.66 higher than the mean score of students under non-CSLM which was 75.69. Upon comparison, the t-value obtained is 4.504 with a probability value of 0.000 indicating significance at the 0.05 level. The result of the study showed that a contextualized module enhanced and improved students' learning output or performance.

Analysis of Covariance on student's conceptual understanding between groups indicated a highly significant difference with a computed F-value of 33.131 at p-value of 0.000.

Student's self-efficacy under CSLM obtained an overall mean score of 4.06 higher than the mean score of students under non-CSLM which was 3.27. Upon comparison, the t-value obtained was 10.266 with a probability value of 0.000 indicating significance at the 0.05 level. Self-efficacy dimensions, namely; conceptual understanding, higher-order thinking skill, practical work, everyday application and science communication were significantly different between groups

## 5. Conclusions

The findings of the study revealed that the students in portfolio assessment under contextualized self-learning modules (CSLM) accomplish and perform better in portfolio assessment than the other group of students. This study infers that in learning, when activities, pictures, and materials used in science lessons and experiments are localized and contextualized, it promotes better performance and output from the learners. Furthermore, the results of the study indicated that through contextualized self-learning modules, students apply their knowledge and skills as they interpret and solve problems in real life situations and scenarios, thus, they can develop greater understanding of the context and nature of science.

Students under CSLM developed their high-level self-efficacy in science than those students under non-CSLM. With series of localized and contextualized activities offered by the self-learning module, the learners under CSLM are able to develop high self-efficacy. Also, there is a significant difference in students' performance via CSLM and non-CSLM. This study infers that a contextualized module can enhance and improve students output or performance.

Students' conceptual understanding shows a high significant difference after the respective groups utilized their modules. The study attests that with a series of a contextualized and localized content in activities, pictures, and materials, the students can attain a deeper understanding on science concepts. Finally, the students' self-efficacy showed a significant difference after utilizing CSLM and non-CSLM. This concludes that

there is a significant difference in students conceptual understanding, higher-order thinking skill, practical work, everyday application, and science communication.

## References

Abaidoo, A. (2018). Factors contributing to academic performance of students in a Junior High School. School System, Educational and School Politics. https://www.grin.com/en/catalog/subject/32/

Adonis, A. (2020). Contextualized Strategic Intervention Materials In Grade 9 Mathematics. People: International Journal of Social Sciences, 5(3), 850–868. https://doi.org/10.20319/pijss.2020.53.850868

Al-Mutawah, M., Thomas, R., Eid, A., Mahmoud, E. Y., & Fateel, M. J. (2019). Conceptual Understanding, Procedural Knowledge and Problem-Solving Skills in Mathematics: High School Graduates Work Analysis and Standpoints. International Journal of Education and Practice, 7(3), 258–273. https://doi.org/10.18488/journal.61.2019.73.258.273

Aliberas, J., Gutiérrez, R., & Izquierdo, M. (2019). Identifying Changes in a Student's Mental Models and Stimulating Intrinsic Motivation for Learning During a Dialogue Regulated by the Teachback Technique: a Case Study. Research in Science Education, 51(3), 617–645. https://doi.org/10.1007/s11165-018-9810-z

Alyami, M., Melyani, Z., Johani, A. A., Ullah, E., Alyami, H., Sundram, F., Hill, A., & Henning, M. (2017). The Impact of Self-Esteem, Academic Self-Efficacy and Perceived Stress on Academic Performance: A Cross-Sectional Study of Saudi Psychology Students. The European Journal of Educational Sciences, 04(04). https://doi.org/10.19044/ejes.v4no3a5

Amani, F., & Salehi, H. (2017). Impacts Of Portfolio Assessment On Iranian Efl Students' Reading Comprehension Ability Based On Junior High School English Textbook (Prospect 2). Veda's Journal of English Language and Literature-JOELL, 4(4), 69–84. http://joell.in/wp-content/uploads/2017/09/Impacts-of-Portfolio-Assessment.pdf

Avargil, S. (2019). Learning Chemistry: Self-Efficacy, Chemical Understanding, and Graphing Skills. Journal of Science Education and Technology, 28(4), 285–298. https://doi.org/10.1007/s10956-018-9765-x

Aurah, C. (2017). Investigating the Relationship between Science Self-efficacy Beliefs, Gender, and Academic Achievement, among High School Students in Kenya. Journal of Education and Practice, 8(8), 146–153. https://files.eric.ed.gov/fulltext/EJ1139069.pdf

Baiño, M. (2016, March). Context-based approach on students' learning outcomes and attitude in Grade-9 Science (Thesis). College of Education Library, Central Mindanao University, Musuan, Maramag, Bukidnon.

Ballen, C. J., Wieman, C., Salehi, S., Searle, J. B., & Zamudio, K. R. (2017). Enhancing Diversity in Undergraduate Science: Self-Efficacy Drives Performance Gains with Active Learning. CBE—Life Sciences Education, 16(4), ar56. https://doi.org/10.1187/cbe.16-12-0344

Bansal, S., & Bansal, A. (2015). Cooperative Learning: A Boon to Higher Education. Journal of Education, 4(2), 90-95. http://bmcesnp.in/iqac/aje/ANWESHAN_Vol-3_De 2015__1_.pdf#page=98

Botelho, W. T., Marietto, M. D. G. B., Ferreira, J. C. D. M., & Pimentel, E. P. (2015). Kolb's experiential learning theory and Belhot's learning cycle guiding the use of computer simulation in engineering education: A pedagogical proposal to shift toward an experiential pedagogy. Computer Applications in Engineering Education, 24(1), 79–88. https://doi.org/10.1002/cae.21674

Buan, A. T., Ali, A. Z. M., & Gomez, R. (2021). Development and validation of contextualized lesson in mathematics. Journal of Physics: Conference Series, 1835(1), 012100. https://doi.org/10.1088/1742-6596/1835/1/012100

Cainoy, J. (2020, June). Students' academic performance and self-efficacy beliefs in a contextualized instruction (Thesis). College of Education Library, Central Mindanao University, Musuan, Maramag, Bukidnon.

Castino, J. (2019, December). Think-pair-share method on students' academic performance and self-efficacy in science learning (Thesis). College of Education Library, Central Mindanao University, Musuan, Maramag, Bukidnon.

Chang, C. C., Liang, C., Chou, P. N., & Liao, Y. M. (2018). Using e-portfolio for learning goal setting to facilitate self-regulated learning of high school students. Behaviour & Information Technology, 37(12), 1237–1251. https://doi.org/10.1080/0144929x.2018.1496275

CORD (1999). Teaching mathematics contextually: The cornerstone of tech prep. Waco, TX: CORD Communications.

Cubillas, T. E. (2020). Contextualized Learning Material (CLM) in Developing Conceptual Understanding of Grade 7 Mathematics. International Journal of Scientific and Research Publications (IJSRP), 10(3), p9967. https://doi.org/10.29322/ijsrp.10.03.2020.p9967

D'Mello, L., Monteiro, M., & Pinto, N. (2018). A Study on the Self Esteem and Academic Performance among the Students. International Journal of Health Sciences and Pharmacy, 1–7. https://doi.org/10.47992/ijhsp.2581.6411.0021

Dangle, Y. R., & Sumaoang, J. D. (2020). The Implementation of Modular Distance Learning in the Philippine Secondary Public Schools. 3rd International Conference on Advanced Research in Teaching and Education, 100–108. https://www.dpublication.com/wp-content/uploads/2020/11/27-427.pdf

Daya, R. (2010). Experiences of facilitators in using ADIDS as a participatory approach in a training class: an exploratory study. University of Southern Mindanao Research and Development. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.996.7026&rep=rep1&type=pdf

Del Mundo, A. (2018). Contextualized Module in Statistics: Effects on Grade 10 Students' Performance At San Jose Community High School, School Year 2017 – 2018 (Thesis). College of Science and Computer Studies Graduate Studies. De La Salle University-Dasmariñas. City of Dasmariñas, Cavite

Dewi, P. Y. A., & Primayana, K. H. (2019). Effect of Learning Module with Setting Contextual Teaching and Learning to Increase the Understanding of Concepts. International Journal of Education and Learning, 1(1), 19–26. https://doi.org/10.31763/ijele.v1i1.26

DO 012, s. 2020– Adoption of the Basic Education Learning Continuity Plan for School Year 2020-2021 in Light of the COVID-19 Public Health Emergency. (2020, June 19, 2020). https://www.deped.gov.ph/wp-content/uploads/2020/06/DO_s2020_012.pdf

DO 35, s. 2016 – The Learning Action Cell as a K to 12 Basic Education Program School-Based Continuing Professional Development Strategy for the Improvement of Teaching and Learning | Department of Education. (2016, June 7). Department of Education. https://www.deped.gov.ph/2016/06/07/do-35-s-2016-the-learning-action-cell-as-a-k-to-12-basic-education-program-school-based-continuing-professional-development-strategy-for-the-improvement-of-teaching-and-learning/

Digal, N. B., & Walag, A. M. (2019). Self-effcacy, Study Habits and Teaching Strategies and Its Influence on Student Science Performance: A Cross-Sectional Study. Asia Pacific Journal of Social and Behavioral Sciences, 51–76. https://www.researchgate.net/publication/338230278_Self-efficacy_Study_Habits_and_Teaching_Strategies_and_Its_Influence_on_Student_Science_Performance_A_Cross-Sectional_Study

Dullas, A. R. (2018). The Development of Academic Self-Efficacy Scale for Filipino Junior High School Students. Frontiers in Education, 3. https://doi.org/10.3389/feduc.2018.00019

Ederango, J., (2019, December). Enhancing students' academic achievement and scientific skills in chemistry through context-based approach (Thesis). College of Education Library, Central Mindanao University, Musuan, Maramag, Bukidnon

Effendi, Z., Usman, B., & Muslem, A. (2017). Implementation of portfolio assessment in teaching english writing. English Education Journal, 8(1), 187–198. http://jurnal.unsyiah.ac.id/EEJ/article/view/7227/5939

Fakhriyah, F., Masfuah, S., Roysa, M., Rusilowati, A., & Rahayu, E. S. (2017). Student's Science Literacy in the Aspect of Content Science? Jurnal Pendidikan IPA Indonesia, 6(1). https://doi.org/10.15294/jpii.v6i1.7245

Faour, M. A., & Ayoubi, Z. (2018). The effect of using virtual laboratory on grade 10 students' conceptual understanding and their attitudes towards physics. Journal of Education in Science, Environment and Health (JESEH), 4(1), 54-68. DOI:10.21891/jeseh.387482

Fox, J. (2016). Using Portfolios for Assessment/Alternative Assessment. Language Testing and Assessment, 1–13. https://doi.org/10.1007/978-3-319-02326-7_9-1

Garin, R., Reyes, R., Domantay, G., & Rosals, J. (2017). Contextualized and Localized Teaching as a Technique in Teaching Basic Statistics. Asia Pacific Journal of Education, Arts and Sciences. 4(1) 62-67 ISSN 2362-8022. http://apjeas.apjmr.com/wp-content/uploads/2017/05/APJEAS-2017.4.1.2.08.pdf

Glaze, A. (2018). Teaching and Learning Science in the 21st Century: Challenging Critical Assumptions in Post-Secondary Science. Education Sciences, 8(1), 12. https://doi.org/10.3390/educsci8010012

Hambre, V. D. (2019). Development of Teacher-Designed Self-Learning Kit in Geometry for Subanens, Maranaos and Visayans . International Journal of Humanities and Social Sciences, 1-14. https://ijhss.net/index.php/ijhss/article/view/45/16

Hanifa, R. (2017). Teachers' View on the Use of Portfolio Assessment in Secondary Schools in Indonesia. The Asian Conference on Language Learning 2017. https://www.researchgate.net/publication/324111607_Teachers%27_View_on_The_Use_of_Portfolio_Assessment_in_Secondary_Schools_in_Indonesia

Haryanto, P. C., & Arty, I. S. (2019). The Application of Contextual Teaching and Learning in Natural Science to Improve Student's HOTS and Self-efficacy. Journal of Physics: Conference Series, 1233, 012106. https://doi.org/10.1088/1742-6596/1233/1/012106

Hayat, A. A., Shateri, K., Amini, M., & Shokrpour, N. (2020). Relationships Between Academic Self-Efficacy, Learning-Related Emotions, And Metacognitive Learning Strategies With Academic Performance In Medical Students: A Structural Equation Model. BMC Medical Education. doi:https://doi.org/10.1186/s12909-020-01995-9

Healey, M., & Jenkins, A. (2000a). Kolb's Experiential Learning Theory and Its Application in Geography in Higher Education. Journal of Geography, 99(5), 185–195. https://doi.org/10.1080/00221340008978967

Helal, S., Li, J., Liu, L., Ebrahimie, E., Dawson, S., & Murray, D. J. (2018). Identifying key factors of student academic performance by subgroup discovery. International Journal of Data Science and Analytics, 7(3), 227–245. https://doi.org/10.1007/s41060-018-0141-y

Höft, L., & Bernholt, S. (2019). Longitudinal couplings between interest and conceptual understanding in secondary school chemistry: an activity-based perspective. International Journal of Science Education, 41(5), 607–627. https://doi.org/10.1080/09500693.2019.1571650

lhan, N., Yildirim, A., & Yilmaz, S.S. (2016). The effect of context-based chemical equilibrium on grade 11 students' learning, motivation and constructivist learning environment. International Journal of Environmental & Science Education. 2016, vol. 11, no. 9, 3117-3137. https://doi.org/10.12973/ijese.2016.919a

Jeong, J. S., González-Gómez, D., Cañada-Cañada, F., Gallego-Picó, A., & Bravo, J. C. (2019). Effects of active learning methodologies on the students' emotions, self-efficacy beliefs and learning outcomes in a science distance learning course. Journal of Technology and Science Education, 9(2), 217. https://doi.org/10.3926/jotse.530

Juan, A., Hannan, S., & Namome, C. (2018). I believe I can do science: Self-efficacy and science achievement of Grade 9 students in South Africa. South African Journal of Science, 114(7/8). https://doi.org/10.17159/sajs.2018/20170269

Katz, S. (2015). Enhancing Self-efficacy of Elementary School Students to Learn Mathematics. Journal of Curriculum and Teaching, 4(1). https://doi.org/10.5430/jct.v4n1p42

Khairunnisa, T., Supramono, & Shulahuddin, A. (2019). The Use of Portfolio Instruments to Assess Science Process Skills Students in Junior High School. European Journal of Education Studies, Volume 5(Issue 9), 1- https://doi.org/10.5281/zenodo.2544577

Kloser, M., Borko, H., Martínez, J. F., Stecher, B., & Luskin, R. (2016). Evidence of Middle School Science Assessment Practice from Classroom-Based Portfolios. Science Education, 101(2), 209–231. https://doi.org/10.1002/sce.21256

Köseoğlu, Y. (2017). Self-Efficacy and Academic Achievement – A Case From Turkey. Journal of Education and Practice, 6(29), 131–141. https://files.eric.ed.gov/fulltext/EJ1081281.pdf

Kurniasari, H., Sukarmin, & Sarwanto. (2018). Development of contextual teaching and learning based science module for junior high school for increasing creativity of students. Journal of Physics: Conference Series, 983, 012035. https://doi.org/10.1088/1742-6596/983/1/012035

Kurniawati, A. F., & Paidi. (2018). The influences of peer tutoring method to improve conceptual understanding. Journal of Physics: Conference Series, 1097, 012044. https://doi.org/10.1088/1742-6596/1097/1/012044

Kwok, S. (2018). Science education in the 21st century. Nature Astronomy, 2(7), 530–533. https://doi.org/10.1038/s41550-018-0510-4

Lee, M. H., Liang, J. C., Wu, Y. T., Chiou, G. L., Hsu, C. Y., Wang, C. Y., Lin, J. W., & Tsai, C. C. (2019). High School Students' Conceptions of Science Laboratory Learning, Perceptions of the Science Laboratory Environment, and Academic Self-Efficacy in Science Learning. International Journal of Science and Mathematics Education, 18(1), 1–18. https://doi.org/10.1007/s10763-019-09951-w

Leonor, J. P. (2015). Exploration of Conceptual Understanding and Science Process Skills: A Basis for Differentiated Science Inquiry Curriculum Model. International Journal of Information and Education Technology, 5(4), 255–259. https://doi.org/10.7763/ijiet.2015.v5.512

Lestariani, I., Sujadi, I., & Pramudya, I. (2018). The implementation of portfolio assessment by the educators on the mathematics learning process in senior high school. Journal of Physics: Conference Series, 1022, 012011. https://doi.org/10.1088/1742-6596/1022/1/012011

Lin, T. J., & Tsai, C. C. (2013). A Multi-Dimensional Instrument For Evaluating Taiwanese High School Students' Science Learning Self-Efficacy In Relation To Their Approaches To Learning Science. International Journal of Science and Mathematics Education, 11(6), 1275–1301. https://doi.org/10.1007/s10763-012-9376-6

Lin, T. J., & Tsai, C. C. (2017). Differentiating the Sources of Taiwanese High School Students' Multidimensional Science Learning Self-Efficacy: An Examination of Gender Differences. Research in Science Education, 48(3), 575–596. https://doi.org/10.1007/s11165-016-9579-x

Linanti, A. T., Ridlo, S., & Bintari, S. H. (2021). The Implementation of Portfolio Assessment to Increase Critical Thinking Ability for High School Students on Human Coordination System Material. Journal of Innovative Science Education, 9(3), 130–136. https://doi.org/10.15294/jise.v9i3.41065

Liu, C. & Chen, I.J (2010). Evolution Of Constructivism. Contemporary Issues In Education Research. 3(4) https://files.eric.ed.gov/fulltext/EJ1072608.pdf

MacCannan, C., Brown, L., Bucich, M., Double, K., & Minbashian, A. (2019). Emotional Intelligence Predicts Academic Performance: A Meta-Analysis. American Psychological Association. 142(2)– , 150–186 http://dx.doi.org/10.1037/bul00002

Madrazo, A. L., & Dio, R. V. (2020). Contextualized Learning Modules In Bridging Students' Learning Gaps In Calculus With Analytic Geometry Through Independent Learning. Journal on Mathematics Education, 11(3), 457–476. https://doi.org/10.22342/jme.11.3.12456.457-476

Mainini, M., & Banes, L. (2017). Differentiating Instruction to Increase Conceptual Understanding and Engagement in Mathematics. Journal of Teacher Action Research 4(1) 2017.

Magulod, G. (2019). Learning styles, study habits and academic performance of Filipino University students in applied science courses: Implications for instruction. Journal of Technology and Science Education, 9(2), 184. https://doi.org/10.3926/jotse.504

Martiningsih, I., Lisdiana, Susilowati, S.M. (2019). Development of Module Based on Scientific Contextual Additives Material to Increase Learning Outcomes and Science Process Skills in Junior High School. Journal of Innovative Science Education. 8 (2) 2019 : 128 – 137 ISSN 2252-6412

Massam, W. (2019). Investigating Effects Of Contextualized Science Curricular Experiences on Students' Learning And Their Teachers' Teaching In Tanzania. UNIVERSITY OF BRITISH COLUMBIA.

Medrano, S.A. (2020). Portfolio-based assessment practices of selected high school english language teachers in metro manila. International Journal of Psychosocial Rehabilitation, 24(8), 2020. ISSN: 1475-7192

Monteagudo, N., & Chua, E. (2020). Self-paced module using summarized strategy in science 8 Earth and Space for Students at Risk of Dropping out (SARDO). IOER International Multidisciplinary Research Journal, 2. https://www.ioer-imrj.com/wp-content/uploads/2020/09/Self %E2%80%93-Paced-Module-using-Summarized-Strategy-in-Science-8-Earth-and-Space-for-Students-at-Risk-of-Dropping-Out-SARDO.pdf

Morsy, S. (2018, September). Understanding self-efficacy, science classroom teaching and learning experiences and high school science achievement in Egypt and United States (Dissertation). ProQuest LLC.https://www.proquest.com/openview/296ccab94820f61f37b28bc72627830b/1?pq-origsite=gscholar&cbl=18750

Murphy, P. K., Greene, J. A., Allen, E., Baszczewski, S., Swearingen, A., Wei, L., & Butler, A. M. (2018). Fostering high school students' conceptual understanding and argumentation performance in science through Quality Talk discussions. Science Education, 102(6), 1239–1264. https://doi.org/10.1002/sce.21471

Neftyan, C. C. A., Suyanto, E., & Suyatna, A. (2018). The Influence of Learning using Contextual Teaching and Learning Approach to Physics Learning outcomes of High School Students. International Journal of Advanced Engineering, Management and Science, 4(6), 446–450. https://doi.org/10.22161/ijaems.4.6.3

Ningtyas, D. A. & Tenzer, A. (2018). Pengaruh penerapan asesmen portofolio proses dalam model inkuiri terbimbing terhadap keterampilan berpikir kritis dan hasil belajar biologi peserta didik kelas x sma negeri 2 batu. Jurnal Pendidikan Biologi, 9(1): 1-9.

Nurhidayah., Yani, A., dan Nurlina., 2015. Penerapan model contextual teaching learning (ctl) terhadap hasil belajar fisika pada siswa kelas xi sma handayani sungguminasa kabupaten gowa. Jurnal Pendidikan Fisika (ISSN: 2302-8939 (P) | ISSN: 2527-4015 (O)), 4(2), 161-172.

Osman, K., & Suryawati, E. (2017). Contextual Learning: Innovative Approach towards the Development of Students' Scientific Attitude and Natural Science Performance. EURASIA Journal of Mathematics, Science and Technology Education, 14(1). https://doi.org/10.12973/ejmste/79329

Pate, P.E. (2003). Implementing Contextual Teaching and Learning: Case Study of Rhonda, a High School Mathematics Novice Teacher. (Thesis) University of Georgia: Research.

Pecson, R. (2020). Self-Learning Kit in Improving the Academic Performance of Senior High School Students. SSRN Electronic Journal. Published. https://doi.org/10.2139/ssrn.3572917

Quansah, F. (2018). Traditional or Performance Assessment: What is the Right Way in Assessing Leaners? Research on Humanities and Social Science. ISSN 2224-5766 (Paper) ISSN 2225-0484 (Online)

Ramnarain, U., & Ramaila, S. (2018). The relationship between chemistry self-efficacy of South African first year university students and their academic performance. Chemistry Education Research and Practice, 19(1), 60–67. https://doi.org/10.1039/c7rp00110j

Rufii, R. (2015). Developing Module on Constructivist Learning Strategies to Promote Students' Independence and Performance. International Journal of Education, 7(1), 18. https://doi.org/10.5296/ije.v7i1.6675

Sadera, J. R. N., Torres, R. Y. S., & Rogayan. Jr., D. V. (2020). Challenges Encountered by Junior High School Students in Learning Science: Basis for Action Plan. Universal Journal of Educational Research, 8(12A), 7405–7414. https://doi.org/10.13189/ujer.2020.082524

Saleh, S., Muhammad, A., & Syed Abdullah, S. M. (2020). Stem Project-Based Approach In Enhancing Conceptual Understanding And Inventive Thinking Skills Among Secondary School Students. Journal of Nusantara Studies (JONUS), 5(1), 234–254. https://doi.org/10.24200/jonus.vol5iss1pp234-254

Samo, D. D., Darhim, D., & Kartasasmita, B. (2017). Developing Contextual Mathematical Thinking Learning Model to Enhance Higher-Order Thinking Ability for Middle School Students. International Education Studies, 10(12), 17. https://doi.org/10.5539/ies.v10n12p17

Saricayir, H., Ay, S., Comek, A., Cansiz, G., & Uce, M. (2016). Determining Students' Conceptual Understanding Level of Thermodynamics. Journal of Education and Training Studies, 4(6). https://doi.org/10.11114/jets.v4i6.1421

Simpson, L., & Whitworth, B. (2021). Science Portfolios: Embedding the Nature of Science. The Science Teacher. https://www.researchgate.net/publication/351728622_Science_Portfolios_Embedding_the_Nature_of_Science

Soifah, U., & Pratolo, B. W. (2020). Teacher's belief, implementation, and challenges in portfolio assessment in writing. Journal of Critical Reviews, 7(9). doi:http://creativecommons.org/licenses/by/4.0/

Suastra, I.W, & Ristiati, N. P. (2019). Developing Critical Thinking, Scientific Attitude, and Self-efficacy in Students through Project Based Learning and Authentic Assessment in Science Teaching at Junior High School. Journal of Physics: Conference Series, 1233, 012087. https://doi.org/10.1088/1742-6596/1233/1/012087

Suhendi, A., & . P. (2018). Constructivist Learning Theory: The Contribution to Foreign Language Learning and Teaching. KnE Social Sciences, 3(4), 87. https://doi.org/10.18502/kss.v3i4.1921

Sukardiyono, S., Rosana, D., & Dwandaru, W. S. B. (2019). Measuring Junior High School Students Science Learning and Science Process Skills through an Integrated Science Instructional Assessment. Turkish Journal of Science Education, 16(4), 467–477. https://doi.org/10.36681/tused.2020.1

Sultiz, L. (2020, June). Students' Academic Achievement and Self-Efficacy In Science In Augmented Reality Environment Using Quick Response Code. College of Education Library, Central Mindanao University, Musuan, Maramag, Bukidnon.

Surdin (2018). The Effect of Contextual Teaching and Learning (CTL) Models on learning outcomes of Social Sciences of the material of forms the face of the earth on Class VII of Junior High School. International Journal of Education and Research. 6(3) ISSN: 2411-5681 https://www.ijern.com/journal/2018/March-2018/08.pdf

Talsma, K., Schüz, B., Schwarzer, R., & Norris, K. (2018). I believe, therefore I achieve (and vice versa): A meta-analytic cross-lagged panel analysis of self-efficacy and academic performance. Learning and Individual Differences, 61, 136–150. https://doi.org/10.1016/j.lindif.2017.11.015

Tan, A. L., Liang, J. C., & Tsai, C. C. (2020). Relationship among High School Students' Science Academic Hardiness, Conceptions of Learning Science and Science Learning Self-Efficacy in Singapore. International Journal of Science and Mathematics Education, 19(2), 313–332. https://doi.org/10.1007/s10763-019-10040-1

Traxler, J. (2018). Distance Learning—Predictions and Possibilities. Education Sciences, 8(1), 35. https://doi.org/10.3390/educsci8010035

Villafañe, S. M., Xu, X., & Raker, J. R. (2016). Self-efficacy and academic performance in first-semester organic chemistry: testing a model of reciprocal causation. Chemistry Education Research and Practice, 17(4), 973–984. https://doi.org/10.1039/c6rp00119j

Walag, A. M. P. (2019). Self-efficacy, Study Habits and Teaching Strategies and Its Influence on Student Science Performance: A Cross-Sectional Study. Asia Pacific Journal of Social and Behavioral Sciences. Retrieved from http://research.buksu.edu.ph/index.php?journal=APJSBS&page=article&op=view&path%5B%5D=162&path%5B%5D=65

Warren, L., Reilly, D., Herdan, A., & Lin, Y. (2020). Self-efficacy, performance and the role of blended learning. Journal of Applied Research in Higher Education, 13(1), 98–111. https://doi.org/10.1108/jarhe-08-2019-0210

Yazon, A. D. (2018). Self-Esteem, Self-Efficacy, And Academic Performance Of Student Teacher Education Students In One State University Of The Philippines. International Journal of Science and Research (IJSR), 7(11). https://doi.org/10.21275/ART20193188

Zheng, L., Dong, Y., Huang, R., Chang, C. Y., & Bhagat, K. K. (2017). Investigating the interrelationships among conceptions of, approaches to, and self-efficacy in learning science. International Journal of Science Education, 40(2), 139–158. https://doi.org/10.1080/09500693.2017.1402142

Zientek, L., Dorsey, J., Stano, N., & Lane, F. C. (2019). An investigation of self-efficacy of students enrolled in a mathematics pathway course. Journal of Applied Research in Higher Education, 11(3), 636–652. https://doi.org/10.1108/jarhe-10-2018-0207