

Teachers' Use Of Higher-Order Cognitive Skills, Instructional Skills in Online Science Teaching and Students' Achievement in Elementary Science



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ABSTRACT: This descriptive-correlational study investigated the relationship between the teachers' use of higher-order cognitive skills, instructional skills in online science teaching and academic achievement of students in elementary science. The respondents of the study were 91 elementary science teachers who were randomly sampled from the 117 Grade 3-6 elementary science teachers of DepEd Division of the City of Sta. Rosa. The research instrument was validated by experts in the field and its internal consistency reliability was ascertained using Cronbach Alpha.

The findings revealed that the teachers always used higher order cognitive skills in online science teaching (WM=3.28). They had very high level of instructional skills in online science teaching (WM=3.42.). Sixty-five (65) or 71.43 percent of the elementary science teachers reported an aggregated GPA of 85 to 89 for their classes; 18 or 19.78 percent had 80 to 84; and 8 or 8.79 percent got 90 to 94. There were no significant relationships between the respondents' frequency of use of higher-order cognitive skills in online science teaching and the students' academic achievement in elementary science ($p>0.05$); and between the respondents' level of instructional skills in online science teaching and the students' academic achievement in elementary science ($p>0.05$). It was concluded in the study that the teachers' use of higher order teaching skills in online science teaching and their instructional skills have no bearing on the academic achievement of the students. A study on the correlation between higher-order skills of students and their academic achievement in elementary science may be conducted to verify this study's findings and confirm the other studies' findings.

KEYWORDS: Higher-Order Cognitive Skills, Instructional Skill, Online, Science Teaching, Students achievement

INTRODUCTION

The Science Framework for Philippine Basic Education (2011) emphasizes the importance of science as a link between technology and industry which are areas of high priority for national development. Science enables one to view the world systematically. It can develop students' scientific inquiry skills, values and attitudes which are essential for his own personal and professional development, and life in general. Thus, science education is important in all schools.

Research have shown the interrelationship of the use of higher order thinking skills, and instructional skills and their impact on the academic achievement of students in science. For instance, Astutik et al. (2018) found out that students who struggle in analyzing, solving, and writing investigative reports have low academic performance and needs to be exposed to higher order thinking skills. Afifah and Retnawati (2019) proved that even educators struggle in teaching higher order cognitive processes due to lack of knowledge in constructing higher order thinking skills (HOTS) problems and lack of experience in utilizing suitable learning media.

While several studies provided a room for science teachers to enhance their quality of learning and nurturing higher order thinking skills to students, little research has been done to thoroughly determine ways in improving it. In particular, in the DepEd City Division of Sta. Rosa no study has been conducted evaluating the use of higher-order cognitive skills or higher-order thinking skills (HOTS) in science teaching, instructional skills and academic achievement in science of elementary students.

Thus, this study attempted to investigate the teachers' use of higher-order cognitive skills or the HOTS, instructional skills in online science teaching and academic achievement of students in elementary science. It probed relationship between the teachers' frequency of use of higher-order cognitive skills in online science teaching and students' academic achievement in elementary

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science; and between teachers' instructional skills in online science teaching and students' academic achievement in elementary science.

METHODOLOGY

This study on teachers' frequency of use of higher-order cognitive skills, instructional skills in online elementary science teaching and academic achievement of students in elementary science employed the descriptive-correlational research design

Correlational research design measures a relationship between two variables without the researcher controlling either of them. The study engaged the participation of the elementary science teachers of DepEd Division of the City of Sta. Rosa, who comprised the sample respondents in this study, as the primary sources of data. Secondary sources of data for the GPA were the teachers' electronic class records.

The population of this study consisted of 117 elementary science teachers who taught online during this pandemic in seventeen (17) elementary schools in the DepEd Division of the City of Sta. Rosa. Using the Slovin's formula, a sample size of 91 was considered in this study. Actual selection of the respondents was done using stratified random sampling. This descriptive-correlational study had 88 respondents who were randomly sampled from the Grade 3-6 elementary science teachers of DepEd Division of the City of Sta. Rosa.

A researcher-made questionnaire was constructed for the purpose of generating the needed primary data. Part I covered the frequency of use of higher-order cognitive skills in online science teaching; Part II dealt on the teachers' instructional skills in online science teaching; and Part III focused on the students' academic achievement in elementary science.

RESULTS AND DISCUSSIONS

Based on the data gathered, analyzed and interpreted, the salient findings of the study are the following:

1. The respondents 'always' used higher order cognitive skills in online science teaching with an overall weighted mean of 3.31 along analyzing, evaluating and creating. They 'always' asked their students to do the process of *evaluating* with an average weighted mean of 3.40 (Rank 1); to do the method of *analyzing* with an average weighted mean of 3.36 (Rank 2); and to do the task of *creating* with an average weighted mean of 3.16 (Rank 3).
2. The teacher-respondents' level of instructional skills in online science teaching was 'very high' with an average weighted mean of 3.42.
3. Sixty-five (65) or 71.43 percent of the elementary science teachers reported an aggregated GPA of 85 to 89 for their classes; 18 or 19.78 percent had 80 to 84; and 8 or 8.79 percent got 90 to 94.
4. There was no significant relationship between the respondents' frequency of use of higher-order cognitive skills in online science teaching and the students' academic achievement in elementary science as shown by the Pearson r values of -0.066, -0.060 and 0.119 for analyzing, evaluating and creating, respectively and the computed p -values which were higher than 0.05 level of significance for analyzing ($p=0.531 > 0.05$), evaluating ($p=0.574 > 0.05$) and creating ($p=0.260 > 0.05$).
5. No significant relationship was noted between the respondents' level of instructional skills in online science teaching and the students' academic achievement in elementary science as shown by the Pearson r value of 0.014 (negligible correlation) and the computed p -value of 0.894 which was higher than 0.05 level of significance.

The conclusions drawn from the findings of the study:

1. The teacher-respondents continually promote to the students the use higher order cognitive skills in science learning to help them solve problems efficiently by anticipating connections between different ideas. They recognize the fact that for high-ability students, there is always more to learn.
2. The elementary science teachers are highly proficient and technically adept in techno-pedagogy, which consists of content, pedagogy and technology within the context of online teaching amid the pandemic.
3. The academic achievement of the students in elementary science is above-average.
4. The academic performance of the students in elementary science is not directly dependent on the teachers' frequency of use of higher-order cognitive skills in online science teaching. The teachers' use of higher-order cognitive skills in science teaching could lead to the development of the higher-order thinking skills of the students, which in turn, can influence student academic performance.
5. The students' academic achievement is not dependent on the very high level of instructional skills of the teachers in online science teaching.

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6. An action plan is deemed important to address the issues and concerns regarding the use of HOTS in teaching science and the development of HOTS in students.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are hereby made:

1. The teachers may determine whether the use of higher-order thinking skills in teaching elementary science is effective in developing higher-order thinking skills among the students by empirically ascertaining the students' level of higher order thinking skills.
2. A study on the lower thinking skills may be conducted to determine the status and growth of the cognitive skills of the students before promoting higher level of thinking skills.
3. The techno-pedagogical skills of the elementary science teachers, post-pandemic, may be revisited and re-calibrated through an in-service training in preparation for the new normal.
4. A study on the correlation between higher-order skills of students this time and their academic achievement in elementary science may be conducted to verify this study's findings and confirm the other studies' findings.
5. The proposed action plan be submitted for review and subsequent implementation when deemed feasible.
6. A comparative study be conducted on limited face to face and online teaching-learning modalities is suggested.

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