STUDENTS' ACADEMIC SELF-CONCEPT IN EARTH SCIENCE THROUGH ONLINE PROCESS ORIENTED GUIDED INQUIRY LEARNING APPROACH

Ricardo F. Uy Jr.and Andrea G. Azuelo, PhD

Science Education Department, Central Mindanao University
University Town, Musuan, Bukidnon, 8710 Philippines

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Abstract: This study investigated the effects of online Process Oriented Guided Inquiry Learning approach on students' academic self-concept among Junior High School in Earth Science. Specifically, it aimed to assess the student's academic self-concept as exposed to an online process-oriented guided inquiry learning approach in relation to academic confidence and academic effort. A one-shot pretest-posttest pre-experimental design was employed in the study. An adapted academic self-concept survey questionnaire was used with a reliable Chronbach's alpha of 0.89. Quantitative data from the questionnaire were analyzed using descriptive statistics. The findings of the study revealed that students exhibited positive academic self-concept after exposure to the online process-oriented guided inquiry learning approach. Further results show a moderately positive result in relation to academic confidence and positive academic effort. A quantitative analysis indicated that students positively perceived themselves as learners in Earth Science.

Keywords: academic confidence, academic effort, academic self-concept, online process oriented guided inquiry learningapproach

1. INTRODUCTION

The Philippine education department aims to equip students with the necessary knowledge and skills to think critically and solve complex problems. Students are taught to work collaboratively and use higher-ordert hinking skills. Decision-making, method icalreasoning, information analysis, and evenconveying ideas wereen hanced through active engagement in class. These became feasible through a student-centered approach that promotes cognition and improves students' perception of science. Moreover, the assessment of learning outcomes depends on students' development and the effectiveness of educational approaches.

Self-concept refers to the knowledge and perception about one selfformed through meaning full experience, interactions withpeers, and attributions of ownbehavior. Academic self-concept is one aspect of self-concept that relates to how well students perform in school or how wells tudents learn (Ajmal & Rafique, 2018). It includes self-assessment that influences senstudents' cognitive functioning and isposited as variable that facilitates the achievement of other desire doutcomes (De Melo & Amantes, 2021).

Students' science self-concept is a vital determinant for better outcomes in science classes (Uçar&Sungur, 2017). Due to the unprecedented situation caused by the COVID-19 pandemic, Filipino students have limited real-time interaction with their peers and teachers. It challenged collaboration, critical thinking, and demonstration of understanding. The aforementioned affects their commitment to performing school tasks and how they view themselves as learners (Villegas et al., 2013). Further more, the state of Filipino students' low performance in science isevident in the national and international achievement tests. It isnoteworthy to mention that academic self-concept and student achievement have a strong correlation (Ghazvini, 2011).

Process Oriented Guided Inquiry Learning (POGIL) is an integration of cooperative learning and inquiry-based learning (Sen & Yilmaz, 2015). It isgrounded on a social constructivist theory in which students work on activities designed to help them grasp key concepts and practice crucial abilities (Kussmaul & Pirmann, 2021). The activities

included enable learners to respond to inquiries by prioritizing evidence, formulating explanation sbased on the evidence, connecting those explanations to scientific knowledge, and then applying those explanations. Teachers become facilitators who model the learning process and support students in processing information (Zgraggen, 2018).

The Philippine Department of Education (DepEd) and Commission on Higher Education (CHED) emphasized to strengthen the online learning platforms such as Google Classroom, Edmodo and Zoom (Tria, 2020). More so, students become more dynamic if they can use the online world as an avenue for learning (Aderibigbe, 2020). It paved the way forscience education researchers to consider integrating online teaching approach that enhances students' perception to themselves as learners. Thus, this study aims to investigate the effects of online POGIL approach on students' academic self-concept in Earth Science.

2. MATERIALS AND METHODS

The participants of this study were one homogenous intact Grade 9 class of Central Mindanao University Laboratory High School for the school year 2021-2022. There were 51 students in the class exposed to online process oriented guided inquiry learning approach during instruction. One-shot pretest-posttestpre-experimental research design was employed to ascertain the academic self-concept of students in Earth Science through online process oriented guided inquiry learning approach.

Academic self-concept questionnaire consists of twenty (20) items was administered to all participants of the study. The items were adapted from Liu and Wang (2005) with a Cronbach's alpha of 0.89. Using the Pearson Reliability Test, it was calculated that the consistency of the scores is 0.752, which means that the questionnaire is reliable. It has a five (5) point Likert scale that was utilized in the analysis of students' academic self-concept in Earth Science which includes the academic confidence and academic effort. The following was utilized in the scale during the interpretation of data:

Scale	Limits	Descriptive Rating	Qualitative Interpretation
5	4.51 - 5.00	Strongly Agree	Highly Positive
4	3.51 - 4.50	Agree	Positive
3	2.51 - 3.50	Undecided	Moderately Positive
2	1.51 - 2.50	Disagree	Negative
1	1.00 - 1.50	Strongly Disagree	Highly Negative

Quantitative data from the questionnaire was analyzed using descriptive statistics such as frequency values and means of the administered test to find out the the level of students' academic self-conceptas exposed to online process oriented guided inquiry learning approach in teaching Earth Science.

3. RESULTS AND DISCUSSION

3.1 Students' Academic Self-Concept in Learning Earth Science Concepts

Table 1 shows the students' academic confidence as exposed to an online process-oriented guided inquiry learning approach. As shown in the data table, the overall mean score of students was 3.47 which indicates "Moderately Positive" after the implementation of the online POGIL approach.

Based on the findings, students, as exposed to online POGIL, were positive on the following indicators: "Following the lessons easily." (4.06); "Able to help my classmates with their schoolwork." (3.88); "Good in most of my schoolwork." (3.65); "*Frightened when asked a question." (3.63); and "*Do poorly in tests." (3.53). Similarly, students found the integration of the approach favorable and were moderately positive on the following: "Work hard to pursue college or university." (3.39); "*Poor in my work." (3.25); "Do better than my friends." (3.20); "*My classmates are smarter than me." (3.09); and "*Forget what I have learned." (3.00).

Results indicate that students exposed to the online POGIL approach were positive concerning their ability to follow lessons, give assistance to classmates, and do better performance in schoolwork. At times, disagreed with the

feeling of fear when asked by teachers as well as having poor test performance. More so, students were moderately positive about working hard to get into college or university and doing better when compared to friends. However, there was a disagreement with work performance, feeling inferior to classmates, and being forgetful about the concepts learned in Earth Science. These findings can be directly associated with exposure to the online POGIL approach of which students build their academic confidence through active interaction with peers and the opportunity provided to solve real-world problems.

Table 1. Students' Academic Self-Concept in relation to Academic Confidence

Indicators	Mean	Qualitative Interpretation
I can follow the lessons in Earth Science easily.	4.06	Positive
I am able to help my classmates with their schoolwork in Earth Science if permitted.	3.88	Positive
I am good in most of my schoolwork in Earth Science.	3.65	Positive
*I get frightened when I am asked a question by the teachers about Earth Science.	3.63	Positive
*I always do poorly in Earth Science tests.	3.53	Positive
If I work hard, I think I can go to the college or university.	3.39	Moderately Positive
*I feel that I am poor in my work in Earth Science.	3.25	Moderately Positive
I am able to do better than my friends in Earth Science Subject.	3.20	Moderately Positive
*Most of my classmates are smarter than I am.	3.09	Moderately Positive
*I often forget what I have learnt in Earth Science.	3.00	Moderately Positive
Overall Mean	3.47	Moderately Positive

LEGEND: (*) means scoring was reversed

Scale	Limits	Descriptive Rating	Qualitative Interpretation
5	4.51 - 5.00	Strongly Agree	Highly Positive
4	3.51 - 4.50	Agree	Positive
3	2.51 - 3.50	Undecided	Moderately Positive
2	1.51 - 2.50	Disagree	Negative
1	1.00 - 1.50	Strongly Disagree	Highly Negative

The current findings were found consistent with De Gale and Boisselle (2015) that students had positive academic confidence after the implementation of POGIL. Similarly, Marianty et al. (2021) revealed that students in the public health department had a highly positive academic confidence. Sander and De la Fuente (2020) indicated that there was a positive correlation between positive academic confidence and positive academic emotions. According to Kirikkanat and Soyer (2018), positive academic confidence manifested by students has a pivotal direct effect on academic achievement. However, the current study contradicts Shatila (2007) that students have no improvement in their academic confidence as exposed to POGIL.

According to Shaukat and Bashir (2016), positive academic confidence can be developed from the mastery of skills, meaningful experiences, and social and emotional support. It was noted in the study of Telbis et al. (2016) that students who have positive academic confidence are more likely to complete their course program. With this regard, online POGIL promotes social interaction among students to work collaboratively on the designed activities for mastery of subject matter and the development of skills in the process of thinking and problem-solving. These are essential for students to develop their academic confidence and skills needed to be successful in class.

Table 2 shows the academic effort of students exposed to an online process-oriented guided inquiry learning approach. As shown, the overall mean score of students was 4.00 which indicate "Positive" after the implementation of the online POGIL approach.

As can be gleaned, students showed highly positive in "Willing to do my best to pass." (4.69); and "*Daydreaming in Earth Science class." (4.61). Students were positive the following indicators: "Pay attention during lessons."

(4.31); "Study hard for my tests." (4.06); "Never give up when faced with a difficult question." (4.04); "*Unwilling to put more effort in schoolwork." (3.98) "Usually interested in my schoolwork." (3.92); and "*Doing homework without thinking." (3.86). Moreover, students were moderately positive on the following indicators: "*Often feel like quitting school." (3.37); and "* Always waiting for the lessons to end." (3.18).

Table 2. Students' Academic Self-Concept in relation to Academic Effort

Indicators	Mean	Qualitative Interpretation
I am willing to do my best to pass the Earth Science subject.	4.69	Highly Positive
* I daydream a lot in Earth Science class.	4.61	Highly Positive
I pay attention to the teachers during Earth Science lessons.	4.31	Positive
I study hard for my tests in Earth Science.	4.06	Positive
I do not give up easily when I am faced with difficult question in Earth Science.	4.04	Positive
* I am not willing to put more effort in in my schoolwork in Earth Science.	3.98	Positive
I am usually interested in my Earth Science schoolwork.	3.92	Positive
*I often do my homework in Earth Science without thinking.	3.86	Positive
*I often feel like quitting school.	3.37	Moderately Positive
*I am always waiting for the Earth Science lessons to end.	3.18	Moderately Positive
Overall Mean	4.00	Positive

LEGEND: (*****) means scoring was reversed

Scale	Limits	Descriptive Rating	Qualitative Interpretation
5	4.51 - 5.00	Strongly Agree	Highly Positive
4	3.51 - 4.50	Agree	Positive
3	2.51 - 3.50	Undecided	Moderately Positive
2	1.51 - 2.50	Disagree	Negative
1	1.00 - 1.50	Strongly Disagree	Highly Negative

Research findings indicate that students after exposure to the online POGIL approach were highly positive about their willingness to do their best and showed disagreement on daydreaming in class. Also, students fostered positive views about paying attention during the discussion, studying hard for the test to get good scores, interest in schoolwork and not giving up on difficult questions. Meanwhile, students disagreed with the unwillingness to put effort and doing homework without thinking. Moreover, there was a disagreement about quitting school and waiting for lessons to end. The academic effort was greatly affected by the exposure to the online POGIL approach as it promotes students' commitment, interest, and enthusiasm, especially when working actively with a group guided by a teacher as a facilitator.

According to Tolentino et al. (2019), students put forth academic effort because they recognize and accept personal responsibility for their academic learning and development. POGIL promotes students' sense of responsibility through their assigned roles and task. Schmid and Bogner (2015) reported that Grade 9 students with high academic effort in a structured inquiry-based interdisciplinary Biology and Physics module achieved high knowledge scores. However, the study by Patron and Lopez (2016) mentioned that successful performance through online courses may not function as a measure of academic effort. The result of this study contradicts Kemp (2020) in which students reported investing more effort to face to face compare with online learning.

Based on the study of Hopland and Nyhus (2016) satisfaction with teacher guidance, well-designed learning materials, and social environment plays a crucial role in enhancing academic effort both in class and in homework. Thus, students' positive academic effort can be attributed to the POGIL as an instructional approach where the teacher facilitates students while working collaboratively with the designed activities.

Table 3 presents the summary of the academic self-concept of students exposed to an online process-oriented guided inquiry learning approach in relation to academic confidence and academic effort. As can be gleaned from the table, the academic effort had a mean score of 4.00 which indicates "Positive", and the academic confidence mean score was 3.47 which indicates "Moderately Positive". The overall mean score was 3.74 which indicate a positive academic self-concept.

Table 3. Summary of Students' Academic Self-Concept in Earth Science

	Mean	Descriptive Interpretation
Academic Effort	4.00	Positive
Academic Confidence	3.47	Moderately Positive
Overall Mean	3.74	Positive

LEGEND:

Scale	Limits	Descriptive Rating	Qualitative Interpretation
5	4.51 - 5.00	Strongly Agree	Highly Positive
4	3.51 - 4.50	Agree	Positive
3	2.51 - 3.50	Undecided	Moderately Positive
2	1.51 - 2.50	Disagree	Negative
1	1.00 - 1.50	Strongly Disagree	Highly Negative

The current study obtained a high academic effort mean score compared to academic confidence. Students' effort was evident in their cognitive learning outcome and a manifestation that through the online POGIL approach, they exhibited active learning, information processing, and rewarding learning experiences while working on a collaborative task in the class. However, the current research findings contradict Meerah and Mazlan (2017) that students' mean score for academic confidence was significantly higher than an academic effort.

As presented, students had a positive academic self-concept as exposed to the online POGIL approach. In the online POGIL Earth Science class, students were positive about their academic ability as shown by how they performed as a learning group which resulted in satisfactory learning outcomes. Research suggested that the achievement of a positive academic self-concept affects academic behaviors, academic choices, educational aspirations, and academic achievement (Marsh, 2014). In line with this, Ajmal and Rafique (2018) found strong relationships between academic self-concept and academic achievement of distance learners. Peer achievement in online POGIL classes influences academic self-concept. This was supported by Jansen et al. (2015) that average peer achievement is a better predictor of science self-concept.

As reported by Chen et al. (2013) students with positive academic self-concept are more motivated and more likely to achieve high-grade marks. Research findings indicate that students in STEM courses enrolled in online classes had a higher academic self-concept than those in traditional classes (Flowers et al., 2013). Oluwatosin and Bamidele (2014) stressed that having a good academic self-concept is a significant psychological factor that is relevant to achieving success in a science subject.

4. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were drawn from the research investigations:

Students' academic self-concept was found positive when exposed to an online process-oriented guided inquiry learning approach. Moreover, a moderately positive result in relation to academic confidence was noted and positive academic effort upon exposure to the online POGIL approach.

Educators and future researchers may consider investigating the relationship between academic self-concept and students' learning outcomes in science through technology-based instruction. The online process-oriented guided inquiry learning (POGIL) approach positively affects the academic self-concept of students. Further, one may be

able to determine the level of competence among students' potential for it creates inspiration for change in the learner's behavior.

For future educational research, several pedagogical approaches may be adopted to correlate with the POGIL approach affecting the teaching and learning process.

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