Review Article

Effects of 7E Learning Model on Science Learning in the Philippine Context: A Scoping Review

Danilo V. Rogayan Jr.*

College of Teacher Education, President Ramon Magsaysay State University, Philippines

*Corresponding author email: danrogayan@prmsu.edu.ph

Article Info

Received: 8 September 2022
Revise: 25 December 2022
Accepted: 28 December 2022

Publisher:
Universitas Mohammad Husni Thamrin, Pondok Gede Street No.23-25 East Jakarta 13550, Website: thamrin.ac.id

Abstract

The use of 7E instructional strategy in teaching science has been done by several teacher-practitioners globally. However, a review of the available literature on the effects of the learning model in learning science has not been fully explored specifically in the Philippines. This study utilized a scoping review to determine the effects of 7E learning model on science learning in the Philippine context. A total of 10 published articles that satisfied the inclusion and exclusion criteria were used in the analysis. To provide an overview of the findings, a qualitative summary of the results was created. Results revealed that the 7E learning model has positive effects on science learning. The 7E instructional strategy can enhance the students’ conceptual knowledge and understanding in science, develops their science process skills, sustains their high-order thinking skills, improves their performance and academic achievement, strengthens their self-efficacy, arouses their interest, and motivates them to engage in science lessons, advances environmental stewardship, reduces misconceptions, and can serve as an effective instructional model in virtual science learning. This paper offers several pedagogical implications discussed in the paper.

Keywords: 7E learning model, instructional strategy, Philippines

Copyright © 2022. Jurnal Inovasi Pendidikan MH Thamrin is licensed under a Creative Commons Attribution 4.0 International License.

How to cite:

INTRODUCTION

The 7E learning model is one of the many pedagogical strategies which has been found to be effective in teaching science. This model encompasses seven significant steps such as elicit, engage, explore, explain, elaborate, evaluate, and extend. These steps cultivate the scientific literacy of learners. Understanding the positive effects of the 7E learning model in science learning is indispensable so that science teachers will be able to design their lessons well. The need to synthesize the previous studies through scoping review may inform science educators of the different effects of the 7E learning strategy in science teaching and may further guide them in contextualizing, localizing and indigenizing the strategy to suit the context of the learners.

The 7E learning model's primary objective in scientific education is to emphasize the growing significance of stimulating prior understandings and transferring ideas to new situations (Balta & Sarac, 2016). This pedagogical model is a learner-centered approach consisting of stages of activities designed in such a manner that students may master the learning skills via active participation (Fatimah & Anggrisia, 2019). Furthermore, the 7E learning model enhances the critical thinking and creative thinking of students which are crucial in their understanding of the nature of science.

Globally, many studies have been done to explore the effects of 7E instructional strategy on science learning. Its effects on science learning are reported in several scholarly literatures. Based on the literature survey, the 7E instructional strategy can positively influence the students’ retention ability (Abdullahi et al., 2021; Adam et al., 2022; Sarac & Tarhan, 2017), increases academic achievement (Cherono et al., 2021; Gyampon et al., 2020 Sarac & Tarhan, 2017), promotes conceptual understanding in science (Ibrahim et al, 2022; Wodaj & Belay, 2021), and develops science process skills (Hartini et al., 2020), increases students’ knowledge and skills (Suardana et al., 2018), enhance students’ curiosity and critical thinking skills (Abdullahi et al., 2021; Suardana et al., 2018), and positively influence students to actively participate in learning activities and in the formulation of research and investigatory projects (Suardana et al., 2018).

In the Philippines, the use of 7E in teaching science has been explored by many Filipino researchers and teacher-practitioners (Abas et al., 2019; Briones & Errabo, 2021; Cajayon & Benavides, 2022). Such studies employed action research and descriptive research designs. However, there is a dearth of studies that utilizes a scoping review methodology in exploring the effects of the strategy in the local setting.

The use of the scoping review is significant to map out the existing studies conducted as regards the 7E learning model. This will give a better picture of the effectiveness of the learning model in science learning in the Philippine setting. Moreover, the scoping review can serve as an important baseline in setting a research agenda regarding the use of the 7E learning model in science instruction.

Hence, this scoping review aimed to determine the effects of the 7E learning model on science learning in the Philippine context. This will further give adequate information in localizing the strategy to further enhance the scientific literacy of Filipino learners.
METHOD
This study utilized a scoping review methodology in analyzing scholarly literature that reported the effects of 7E instructional model in science learning in the Philippine context. Arksey and O'Malley (2005) defined scoping review as a technique for identifying literature to produce comprehensive results, with the obligation to identify all relevant material regardless of design. Researchers engage in reflexivity across phases of its iterative and non-linear procedure. Arksey et al. (2005) detailed the stages of scoping review, which include identifying research questions, locating relevant studies, selecting studies, charting data, and compiling, summarizing, and reporting results.

In accordance with recommendations for scoping studies and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocols (Moher et al, 2009), the researcher devised a search strategy to identify articles pertaining to the 7E learning model (Figure 1).

**Figure 1. PRISMA Flow chart.**
For the selection of articles, the following inclusion criteria were used: (a) utilized 7E learning model in science discipline; (b) conducted in the Philippine setting; (c) published in a journal or conference proceeding from 2018 to 2022; and (d) authored by Filipino scholars. The researcher entered the following search parameters in the Google Scholar database:

Address=“7E” AND “science” AND Philippines
Timespan=2018-2022

The initial search of the Google Scholar database yielded a total of 25 articles. After removing duplicates, only 18 papers remained; these were screened based on their titles and abstracts. The articles were evaluated for eligibility and included in the preliminary evaluation. This scoping review included a total of 10 articles that met the search parameters and were included in the results.

Ten sampled articles were used by the researcher in the scoping review. Two of which were published in 2019, one in 2020, six in 2021, and 1 in 2022.

RESULTS AND DISCUSSION

Study Characteristics

As shown in Table 1, four articles were conducted in Luzon, Philippines; four in Mindanao; and two in the National Capital Region (NCR). The studies employed either one or two research designs. There were eight action researches, three instructional development designs, and one descriptive research. Two of the action researches utilized the Plan-Do-Check-Act (PDCA) cycle.

Table 1. Summary of the Sampled Studies

<table>
<thead>
<tr>
<th>Author(s) &amp; Year</th>
<th>Research Design</th>
<th>Sample Characteristics</th>
<th>Locale of Study</th>
<th>Discipline</th>
<th>Education Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abas et al. (2019)</td>
<td>Instructional development study; pre-posttest quasi-experimental research</td>
<td>Grade 11 STEM students</td>
<td>Iligan City, PH</td>
<td>Earth Science</td>
<td>Senior High School</td>
</tr>
<tr>
<td>Briones and Errabo (2021)</td>
<td>PDCA action research</td>
<td>Teacher education students (who have already taken Genetics and Biochemistry courses)</td>
<td>Manila, PH</td>
<td>Cell and Molecular Biology</td>
<td>College</td>
</tr>
<tr>
<td>Cajayon and Benavides (2022)</td>
<td>Instructional development study; one-group experimental research</td>
<td>25 Grade 11 HUMMS students; 5 science teaching experts</td>
<td>Sorsogon, PH</td>
<td>Life Science</td>
<td>Senior High School</td>
</tr>
</tbody>
</table>
In terms of the experimental designs, three studies employed two-group experimental design, two studies used one-shot design, and one study employed four-group design. The participants of the sampled studies were mostly senior high school students taking up STEM academic strand (4 studies), TVL (1), and HUMSS (1). Two studies utilized preservice science teachers as participants, while one study used Grade 5 elementary pupils, and another study used Grade 8 students. All of the studies focused on science disciplines such as earth and life science (4 studies), general chemistry (2), environmental science (1), disaster readiness and risk reduction (1), elementary science (1), and secondary science (1). These areas are selected based on the selection criteria that sampled articles must be in science education. Six studies were conducted in senior high school, two studies in college, one study in junior high school, and one study in elementary.

**Effects of 7E Learning Model on Science Learning**

Table 2 presents the summary of sampled articles accentuating the effects of 7E instructional strategy on science learning. The scoping review evidently shows the effectiveness of the 7E instructional strategy in science education.

The qualitative matrix revealed that the 7E instructional strategy enhances the students’ conceptual understanding (Abas et al., 2019; Vallespin, 2021) and enhances students’ knowledge and understanding of the select topics and basic concepts in science (Cajayon &...
Benavides, 2022). This implies that 7E is effective in students’ conceptual retention and mastery of scientific ideas and principles. The use of 7E reinforces the students’ skills in remembering and understanding scientific concepts and principles. Rogayan et al. (2021) reaffirmed that it is essential for STEM educators to craft instructional activities that include performance tasks that boost students’ conceptual comprehension and appreciation of science. The 7E instructional strategy is critical in improving students’ learning as it expands students’ understanding of the nature of science and understanding of the world. It facilitates the cultivation of their scientific literacy and scientific understanding.

The learning model also enriches the students’ science inquiry skills (Lubiano & Magpantay, 2021), develops critical and analytical thinking skills (Masalunga, 2019), and increases students’ cognitive learning (Migalang & Azuelo, 2020). Several studies have found that inquiry-based methods improve science education (Abaniel, 2021). Inquiry skills are quintessential skills that 21st-century learners must possess to survive and thrive in this knowledge-based society. The 7E model enables the learners to develop their high-order thinking skills which are essential future job skills. Likewise, the cultivation of the scientific literacy skills will equip the learners in the challenges of the fourth industrial revolution (FIRE). In the context of the FIRE, enhancing learners’ 21st-century abilities will greatly assist them in becoming future-ready and internationally competent workforce members in the global economy (Rogayan, Gallardo, Lacaste, and Roque, 2021).

The 7E pedagogical strategy in science also improves students’ performance (Cajayon & Benavides, 2022; Errabo et al., 2021; Tecson et al., 2021), boosts their efficacy (Errabo et al., 2021), and enhances learners’ academic achievement (San Miguel, 2021). This suggests that the strategy can be used to further augment the performance of students in science classes, and also improves their academic standing. Utilizing engaging and interesting pedagogical approaches such as the 7E model in teaching Gen Z learners could increase the students’ motivation and academic achievement (Rogayan, Padrique, & Costales, 2021). The use of 7E model can likewise improve teachers’ critical and creative thinking skills as they are immersed in the development of the different learning tasks including the type of assessment strategies and the learning approaches embedded in the seven stages of the learning model.

**Table 2.** Effects of 7E on Science Learning in the Philippine Context

<table>
<thead>
<tr>
<th>Author(s) &amp; Year</th>
<th>Effects of 7E on Science Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abas et al. (2019)</td>
<td>• Improves students’ conceptual understanding of Earth Systems.</td>
</tr>
<tr>
<td></td>
<td>• Improves students’ behavioral responses towards the lesson</td>
</tr>
<tr>
<td>Briones and Errabo</td>
<td>• Is an effective model of instruction in e-learning in science.</td>
</tr>
<tr>
<td>(2021)</td>
<td></td>
</tr>
<tr>
<td>Cajayon and Benavides</td>
<td>• Is successful in teaching basic science concepts</td>
</tr>
<tr>
<td>(2022)</td>
<td>• Increases students’ performance</td>
</tr>
<tr>
<td></td>
<td>• Enhances students’ knowledge and understanding of the select topics</td>
</tr>
<tr>
<td>Errabo et al. (2021)</td>
<td>• Augments students’ performance</td>
</tr>
<tr>
<td></td>
<td>• Enhances students’ efficacy</td>
</tr>
<tr>
<td></td>
<td>• Imposes a positive attitude among students</td>
</tr>
<tr>
<td></td>
<td>• Advances environmental empathy across ecological conditions to drive a holistic attitude and responsible citizenship.</td>
</tr>
</tbody>
</table>
Furthermore, the strategy also has positive effects on the attitude of the students. The strategy enhances students’ attitudes (Errabo et al., 2021), improves students’ behavioral responses towards the lesson (Abas et al., 2019), arouses their interest in science lessons (Migalang & Azuelo, 2020), and advances environmental empathy across ecological conditions to drive a holistic attitude and responsible citizenship (Errabo et al., 2021). This connotes that the 7E strategy does not only improve students’ academic achievement but also their motivation and interest in science. It is crucial for science teachers to also augment students’ engagement, interest, and motivation in learning the subject so that students can further see its relevance and meaning for them.

The 7E has also been found to be an effective model of instruction in e-learning in science (Briones & Errabo, 2021). This implies that 7E learning model can be integrated into designing online lessons in science, especially in this digital era. Lastly, 7E is an effective tool in reducing the occurrence of alternative conceptions among learners (Vallespin, 2021). The misconceptions of the students can be further corrected through the use of the 7E instructional model.

CONCLUSION

This scoping review reveals that the 7E learning model has positive effects on science learning in the Philippine context. The 7E instructional strategy can enhance the students’ conceptual knowledge and understanding in science, develops their science process skills, sustains their high-order thinking skills, improves their performance and academic achievement, strengthens their self-efficacy, arouses their interest, and motivates them to engage in science lessons, advances environmental stewardship, reduces misconceptions, and can serve as an effective instructional model in virtual science learning. The 7E learning model is an effective pedagogical strategy for developing scientifically-literate, future-ready and future-proof learners in this knowledge-based era.

This scoping review offers the following pedagogical implications. First, science teachers from elementary to tertiary levels, may use the strategy in improving the science achievement of the learners. Second, modifications may be done by the teachers to suit the 7E implementation in different contexts and disciplines of science. And lastly, school administrators could send their faculty for re-tooling and upskilling programs on the basic rudiments of the 7E learning model in teaching science.

This scoping review only focused on the 7E learning model as applied in science instruction in the Philippine context. Future scoping review may focus on the effectiveness of
the learning model in other disciplines such as Mathematics, and English. Likewise, further exploration may also be done in other learning models in science such as the 5E learning model.

REFERENCES


