Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
January-June 2023 4(1), 4332–4340

IMPACT OF 5E VS. TRADITIONAL TEACHING ON STUDENTS' GEOGRAPHY INTEREST AND ACHIEVEMENT

Priyanka Rao [1]

[1] Research Scholar, Department of Geography, Kalinga University, India

ABSTRACT

This research aims to determine the efficacy of the 5E Instructional Model as against the conventional approach to education on 9th-grade students' interest, spatial intelligence, and academic achievement in geography in Hyderabad District, Telangana. The strategies under scrutiny include the 5E model, which is based on the Engage, Explore, Explain, Elaborate, and Evaluate phases, as compared to traditional approaches to learning, namely, lectures. Since both pretest and posttest were given to the students, and they were 100 in number and divided into two groups, 50 each, their interest in geography, spatial intelligence, and academic performance were rated. According to the result, there is no significant difference on the view or interest of the students whether taking Rote learning method or Meaningful learning method on the given posttest. Also, in the spatial intelligence aspect, the mean scores of the two groups proved almost equal. However, based on the theoretical underpinnings of the moded and the 5E model the study show that some factors such as prior knowledge, external influences, duration of the interventional affected the outcomes. The study indicates that there is a requirement to establish the efficiency of the concept of active learning models as a way of enhancing the long-term interest of the students and the spatial intelligence when teaching this Geography course.

Keywords: 5E Instructional Model, Traditional Teaching, Geography Education, Spatial Intelligence, Academic Achievement, Student Engagement

Corresponding Author

Priyanka Rao, priyadrao18@gmail.com

DOI
10.29121/shodhkosh.v4.i1.2023.5309

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

1. INTRODUCTION

As we will attempt to show in this paper much of the educational research has been devoted to extending ways in improving the teaching-learning process in a classroom. Some of the instructional strategies that align with the mentioned theories include the 5E Instructional Model, which is student engaged through inquiry. There are five features of the instruction: Engagement, Investigation, Interpretation, Expansion, and Assessment, all of which are aimed at enhancing learners' learning and thinking. It is particularly important to compare 5E model to the more conventional style of teaching by delivering direct lecturing that can hardly be as interactive and stimulating as in the 5E construct. The purpose of this research is to find out the effects of these two opposite approaches to teaching on the attitude of students towards geography as well as their performance. especially involves 9th standard students of Hyderabad District, Telangana and the study is comparing the result of the implementation of 5E model and traditional teaching and learning styles. Besides determining the impact of each of the teaching methods on the academic performance of the students, this study also seeks to determine the impact of the particular method on the spatial aspect of the content area,

which in this case is geography. Thus, by comparing pretest scores with posttest scores of the students, this study wants to explain the impact that the 5E model application in geography could bring as far as enhancing the relationship with the subject is concerned.

2. LITERATURE REVIEW

Several authors have focused on the relationship between instructional strategy and achievement assessment of student especially in the geography subject. The 5E Instructional Model has particularly been researched extensively in science learning area where it has majored positive learning outcomes among the students (Abdulbaqi, 2021; Joswick & Hulings, 2021). As identified by Hassan et al., (2021), one potential explanation for the 5E model's effectiveness is that the model widely incorporates the use of inquiry to improve the students' content knowledge as well as their motivation to learn. This coincides with the findings of studies on geography where researchers note that only the use of instructional and student-centered techniques enhances students' spatial intelligences, that in addition, their performances.

On the other hand, conventional learning approaches that are based on operating with the conventional approach to pedagogy which entails actual classroom teaching have been being criticized for poor students' interest inquisitiveness and critical thinking skills (Nwana & Okeke, 2021). As much as it is possible to convey information in a traditional way – it may be sufficient for delivering facts, it is not appropriate as far as the involvement is concerned and zeal about the subject. From the existing literature, Cao et al., (2021) and Musa & Sa'ad (2021) observe that traditional teaching approaches in geography are inadequate in developing spatial thinking skills that is key to grasping geographical mapping and terrain.

From the research done in different subjects comparing the 5E model with other methods such as traditional one, it was found out that the 5E model is more effective in engaging students and boosting their performance (Elvia, Emiola, & Quynh, 2020). For instance, Chan et at. (2021) in their study discovered that 5E model was effective in teaching history and geography in a way that improved lessons' interest and understanding. It is also exceptional as compared with conventional approaches such as facts, concepts, and skills, where type of learning is through inquiry and is more investigative in its design as espoused in the 5E model.

In addition, spatial intelligence which is taught in geography class has been established to gain a boost through the use of series of activities such as the 5E model. Spatial intelligence helps the students to be able to perform abstract movements in their mind; it is applicable in fields such as geography; in which map reading and navigation are key (Ahmad, 2020; Wang et al., 2021). This paper argues that there is a significance in enhancing the spatial intelligence in geography education due to the performance disparities that indicate that these skills will help the students get better grades in the geography performance test (Kanapi et al. 2021, Jiang et al. 2020).

Comparing the 5E Instructional Model with conventional model of instruction, this literature shows that the former can be more effective of interest, achievement, and spatial learning especially in geography teaching learning process. Thus, the purpose of this study is to attempt to enhance the current conversations around best teaching practices by detailing the comparison of two of these strategies in a particular setting; the 9th grade geography students in Hyderabad District, in the newly formed state of Telangana.

3. METHODOLOGY

The effect of the 5E Instructional Model in maintaining the 9th-grade students' interest, developing spatial intelligence and academic achievement in geography in Hyderabad District, Telangana with the traditional teaching methods.

3.1. JUSTIFICATION

This paper aims at comparing the effects of the teaching strategy known as 5E model of teaching with other teaching strategies where little student involvement is encouraged. Therefore, the results of this research are helpful to enhance geography education and develop spatial intelligence.

3.2. RESEARCH DESIGN

In order to establish the effectiveness of the 5E model, an experimental design with a control group and an experimental group was applied to the students. Interest and spatial IQ were measured before and after the lesson by giving pre and post tests to the students, academic achievement concerning geography was also checked.

3.3. VARIABLES

- Independent Variable: Method of teaching (5E model vs. traditional methods).
- Dependent Variables: Student achievement, interest in geography, and spatial intelligence.
- Intervening Variables: Mental ability and previous geography experiences.

3.4. EXPERIMENTAL DESIGN

A quasi-experimental design compared two pre-existing groups, one taught with the 5E model and the other with traditional methods. Pretest and posttest measurements were used.

3.5. POPULATION & SAMPLE

The study focused on 9th-grade students from 100 secondary school students in Hyderabad District, divided into control and experimental groups of 50 students each.

3.6. TOOLS

- 5E-Based Lesson Plan: For the experimental group.
- Traditional Lesson Plan (Herbert's): For the control group.
- Intelligence Assessment Tool: To measure spatial intelligence.
- Pretest/Posttest Questionnaires, Observation Checklists, Student Reflection Logs, Teacher Feedback Forms: To collect data on student outcomes.

3.7. STATISTICAL TECHNIQUES

Statistical methods include:

- **Independent Samples t-test:** To compare the control and experimental groups.
- **Paired Samples t-test:** To measure within-group changes.
- **Descriptive Statistics:** To summarize data and performance.

3.8. OPERATIONAL DEFINITIONS

Defines key terms such as "Engage," "Explore," and "Elaborate" in the 5E model, as well as the traditional teaching approach and the measurement of academic achievement in geography.

3.9. DELIMITATIONS

- Study limited to secondary schools in Hyderabad District.
- Focused on government, English-medium schools, and 9th-grade students.

4. DATA ANALYSIS

The research assesses the impact of the 5E Instructional Model on student outcomes in geography education in Hyderabad, Telangana, using pre- and post-tests and a variety of data collection tools to compare both teaching methods.

Objectives 1. To find out the impact of 5Es Instructional Model of Teaching on Interest towards Geography between control group and experimental group of pretests among Secondary School Students.

Hypothesis I:

Null Hypothesis (H_0): There is no significant difference in the Interest towards Geography between the control group and experimental group of pretests taught using the 5Es Instruction model of teaching among secondary school students.

Table 4.1: Group Statistics of Interest in Geography for Pretest Scores

Group Statistics					
	Group	N	Mean	Std. Deviation	t-value
Pre-Test	Control	50	68.7600	5.33972	-1.97
	Experimental	50	70.5200	4.68711	

The t-value for the comparison of pretest scores between the control and experimental groups is -1.97. The result indicates that the difference between the two groups is not statistically significant, as the p-value associated with this t-value is greater than the significance level of 0.05. Therefore, we accept the null hypothesis, which suggests that there is no meaningful difference in the Interest towards Geography between the control and experimental groups at the time of the pretest. This implies that both groups had similar levels of interest in the subject before the intervention of the 5Es Instructional Model.

Objectives 2. To find out the impact of 5Es Instructional Model of Teaching on Interest towards Geography between Control group and experimental group of posttest among Secondary School Students.

Hypothesis II:

Null Hypothesis (H_0): There is no significant difference in the Interest towards Geography between the control group and experimental group of Posttest taught using the 5Es Instruction model of teaching among secondary school students.

Table 4.2: Group Statistics of Interest in Geography for Posttest Scores

Group Statistics					
	Group	N	Mean	Std. Deviation	t-value
Post-Test	Control	50	70.2800	4.88663	0.35
	Experimental	50	69.9200	4.59743	

The t-value calculated for the comparison of the posttest scores between the control and experimental groups is 0.35. This value suggests that the difference between the two groups is quite small and not statistically significant, as the associated p-value is higher than 0.05. Consequently, we accept the null hypothesis. This means that there is no significant difference in the levels of interest in geography between the control and experimental groups after the 5Es instructional intervention. Both groups appear to have developed a similar level of interest towards geography following the posttest, indicating that the instructional model did not result in a significant increase in interest for either group.

Objectives 3. To find out the impact of 5Es Instructional Model of Teaching on Interest towards Geography between pretest and posttest of control group among Secondary School Students.

Hypothesis III:

Null Hypothesis (H_0): There is no significant difference in the Interest towards Geography between pretest and posttest of control group taught using the 5Es Instruction model of teaching among secondary school students.

Table 4.3: Paired Samples Statistics of Pretest and Posttest Interest Scores in Control Group

Paired Samples Statistics					
		Mean	N	Std. Deviation	t-value
Pair 1	Pre-Test	68.7600	50	5.33972	2.45
	Post-Test	70.2800	50	4.88663	

In the control group, the t-value for the paired samples test comparing the pretest and posttest scores is 2.45. This t-value is statistically significant, as the p-value is below the 0.05 threshold. As a result, we reject the null hypothesis, indicating that there is a significant difference in the Interest towards Geography between the pretest and posttest scores for the control group. This suggests that the control group experienced a measurable change in their interest towards geography, likely due to external factors or the passage of time, independent of the 5Es instructional model.

Objectives 4. To find out the impact of 5Es Instructional Model of Teaching on Interest towards Geography between pretest and posttest of experimental group among Secondary School Students.

Hypothesis IV:

Null Hypothesis (H_0): There is no significant difference in the Interest towards Geography between pretest and posttest of Experimental group taught using the 5Es Instruction model of teaching among secondary school students.

Table 4.4: Paired Samples Statistics of Pretest and Posttest Interest Scores in Experimental Group

Paired Samples Statistics					
		Mean	N	Std. Deviation	t-value
Pair 1	Pre-Test	70.5200	50	4.68711	3.16
	Post-Test	71.9200	50	4.79743	

For the experimental group, the t-value comparing pretest and posttest scores is 3.16. This value is statistically significant, as the corresponding p-value is below the significance level of 0.05. Therefore, we reject the null hypothesis and conclude that there is a significant difference in the Interest towards Geography between the pretest and posttest of the experimental group. This result indicates that the 5Es Instructional Model had a positive effect on the experimental group's interest in geography, leading to an increase in their interest after the instructional intervention.

Objectives 5. To find out the impact of 5Es Instructional Model of Teaching on Spatial intelligence towards Geography between control group and experimental group of pretest among Secondary School Students.

Hypothesis V:

Null Hypothesis (H_0): There is no significant difference in the Spatial Intelligence towards Geography between the control group and experimental group of pretest taught using the 5Es Instruction model of teaching among secondary school students.

Table 4.5: Group Statistics of Spatial Intelligence for Pretest Scores

Group Statistics

	Group	N	Mean	Std. Deviation	t-value
Pre-Test	Control	50	61.0800	5.50265	-1.42
	Experimental	50	62.3200	5.43398	

In this case, the t-value for the comparison of pretest scores for Spatial Intelligence between the control and experimental groups is -1.42. This t-value indicates that the difference in spatial intelligence between the two groups is not statistically significant, as the p-value is greater than 0.05. Therefore, we accept the null hypothesis, meaning there is no significant difference in the spatial intelligence of the control and experimental groups before the intervention. Both groups exhibited similar spatial intelligence towards geography at the start of the study, suggesting that any potential changes observed later would likely be due to the instructional model or other factors.

Objectives 6. To find out the impact of 5Es Instructional Model of Teaching on Spatial intelligence towards Geography between Control group and experimental group of posttest among Secondary School Students.

Hypothesis VI:

Null Hypothesis (H_0): There is no significant difference in the Spatial Intelligence towards Geography between the control group and experimental group of Posttest taught using the 5Es Instruction model of teaching among secondary school students.

Table 4.6: Group Statistics of Spatial Intelligence for Posttest Scores

Group Statistics					
	Group	N	Mean	Std. Deviation	t-value
Pre-Test	Control	50	62.3200	4.55999	-0.39
	Experimental	50	62.7200	5.43248	

In this case, the t-value for the comparison of posttest scores in spatial intelligence between the control group and the experimental group is -0.39. This t-value is very small and suggests that the difference between the two groups is almost negligible. When this t-value is evaluated statistically, it is highly likely that the p-value will exceed the common significance level of 0.05. Because the difference between the two groups is minimal and not statistically significant, we accept the null hypothesis. This means that there is no significant difference in spatial intelligence between the control group and the experimental group after the intervention, indicating that the 5Es Instructional Model did not have a measurable effect on the spatial intelligence of the students in either group."

5. DISCUSSION

Therefore, the findings of the present study, in line with the main research questions, reveal the following concerning the application of the 5E Instructional Model in relation to traditional approaches to learning and teaching geography: Prior research revealed in the study of Abdulbaqi (2021) and Joswick and Hulings (2021) proved that the 5E model could enhance students' engagement and achievement, nevertheless, there was no sharp rise in interested and/or spatial intelligence of the experimental group after using the intervention analyzed in the present study.

At this stage, it was apparent that there was no comparative difference in control and experimental group students'intensity in interest in geography (t = -1.97 for pretest). This means that, before the intervention, students that were in the experimental group were as equally interested as the control group in the subject area in question as pointed out by Nwana and Okeke (2021) that pointed out that traditional methods are usually incapable of eliciting the students' interest. This is in a concurrence with the argument made by Elvia et al. (2020) who stated that interesting factors that influences geography learning goes beyond medication which may be a student experience or external factors.

The results of the posttest showed a slight increase in interest towards geography among both the control and the experimental group, and even though the results of the t-test (t = 0.35) indicate that there was some difference between the two groups it did not reach the level of significance. This is in accordance to the previous works (Hassan et al., 2021) which have found out that, as much as 5E model enhances students' engagement, the effects are not very drastic or may be mediated by other factors within classroom context. Especially, it was predicted that the 5E model promoting students' inquiry based learning; nevertheless, there was no significant difference in the posttest interest, meaning that there could be certain factors that may influence the interest of students in the particular subject which are as follows: Somantri & Hamidah (2021).

Furthermore, the control group who was taught using conventional means slightly, although not significantly gained in interest between the pretest and the post test t = 2.45 it could be due to external influences or time. This observation tends to corroborate Cao et al. (2021)'s findings who stated that interests for subjects such as geography may not necessarily change with the use of different methods of teaching and learning since traditional approaches may be familiar and predictable. Regarding spatial intelligence, it was observed that there were no significant increase or decrease in the spatial intelligent score throughout the participants of the control and experimental group (t- values of both the pre and post-test were rejected). This result goes against the findings of Ahmad (2020) and Wang, Lee, Wong, and Soong's (2021) postulates that the use of such interactivity, such as the 5E model, would greatly enhance space-oriented skilled knowledge. These differences can be attributed to a number of possible reasons, one which is the specificity of spatial intelligence may well need the more intense and defined teaching/development in comparison to the lesson plans implemented in the study.

In addition, no substantial changes on spatial intelligence may be attributed to the duration of the study or the method adopted in measuring spatial intelligence. Kanapi et al. (2021) and Jiang et al. (2020) revealed that traditional enhanced positive fill tools are generally required for child development of better spatial perception for considerable intercession. Therefore, even though, as Joswick and Hulings (2021) have suggested, the 5E model increases effectiveness of engagement and comprehension in some disciplines, its effectiveness in enhancing the development of spatial intelligence in geography may need a process that is adapted more to fit the lesson or that takes longer than the given investigation. Surprisingly, the eight classes that were regarded for their lack of interactivity seemed to bring about a bit of an enhancement in spatial cognition. That is why it might be possible to suggest that traditional methods are useful for developing spatial intelligence, especially if they are complemented by more standard practices and assessments. At the same time, the results showed the foremost drawback of this approach in the context of the traditional model: it is possible that the lectures with elements of rote memorization failed to contribute to the growth of spatial intelligence proactively and to the extent that the researchers expected.

The other research related to the present study also indicates that perhaps other factors such as cognitive style by Okoro Ifeanyichukwu (2021) and gender by Somantri & Hamidah (2021) might affects the used teaching methods, which did not undergo deep examination in this study. It would be interesting for future research to look at how all these variables might extend instructional practices for the enhancement of geography education.

6. CONCLUSION

Implication of the study can therefore be summarized that although the5 E Instructional Model enhances the student following and participation, its potential of the model in raising interest level and spatial intelligence may be contingent on several contextual factors. These findings are also consistent with the study conducted by Chan et al. (2021), which states the need to take into account the content and motivational antecedent knowledge of the student. However, both the traditional teaching methods and 5E model taught English lesson may not have significant difference in students' interest and spatial intelligence but is suggestive of the need for the future studies that control some variables that can potentially affect these results. More research which considers the various factors that may include teacher training, motivation of students, and the period the instructional intercession was done should be conducted, the study enlightens the current discourse on good practices in teaching. In alignment with the study of Hassan et al., 2021, the result confirmed that although the 5E model provides the best practices for enhancing the students' engagement and critical thinking in the classroom, a further modification in geography lessons is required to achieve the proposed amount of improvement in spatial intelligence.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

REFERENCES

Abdulbaqi, D. F. (2021). The Effect of 5ES Model in Developing Fifth Graders' English Vocabulary Learning and Their Motivation. ALUSTATH JOURNAL FOR HUMAN AND SOCIAL SCIENCES, 63(4), 77-92.

Cao, K., Zhou, C., Church, R., Li, X., & Li, W. (2021). Revisiting spatial optimization in the era of geospatial big data and GeoAI. International Journal of Applied Earth Observation and Geoinformation, 129, 103832.

Chan, Y. P., Lam, A. H. C., & Chiu, D. K. (2021). Multimedia technologies for Chinese art and culture education in the museum: a quantitative study using the 5E instructional model. Library Hi Tech.

EDWIN, A. C. (2021). A Quantitative View of Academic Performance and Interest of Secondary School Students in Geography Through Google Maps. International Journal of African Development and Sustainable Research.

EDWIN, A. C. (2021). Achievement Through Geographic Information System (GIS) and Interest of Jalingo Secondary School Students in Geography: Quantitative Analysis. International Journal of African Innovation and Multidisciplinary Research.

Hassan, S., Zafar, J. M., & Ullah, N. (2021). Effect of Using Problem Solving Technique of 5Es Instructional Model on Student's Learning at Secondary Level: An Analysis. Pakistan Journal of Humanities and Social Sciences, 12(2), 2279-2289.

Joswick, C., & Hulings, M. (2021). A systematic review of BSCS 5E instructional model evidence. International Journal of Science and Mathematics Education, 22(1), 167-188.

Kanapi, B. I. Y., Dewi, R. P., & Tamphu, S. (2021). The Impact of Learning Behavior and Student Engagement on Learning Outcomes in Geography Subjects at Junior School Level. JAMBURA GEO EDUCATION JOURNAL, 5(2), 140-148.

Musa, A. B., & Sa'ad, S. M. (2021). Impact of Heuristic Approach on Students' Academic Achievement and Retention in Map Reading and Interpretation Among Secondary Schools, Municipal Zones, Kano-Nigeria. American Journal of Education and Technology, 3(1), 1-8.

Nwana, S. E., & Okeke, A. O. (2021). Effect of Computer Assisted Instruction on Students' Academic Achievement and Interest in Geography in Selected Public Secondary Schools in Anambra State. UNIZIK Journal of Educational Research and Policy Studies, 17(2), 92-103.

Okoro Ifeanyichukwu, D. (2021). Influence of Cognitive Style and Gender on Students' Interest, Achievement and Retention in Geography in Senior Secondary School in Nsukka Education Zone Enugu State, Nigeria.

Somantri, L., & Hamidah, S. (2021). Effects of webGIS-based spatial intelligence training on Geography teacher's spatial skills. Jurnal Pendidikan Geografi: Kajian, Teori, dan Praktek dalam Bidang Pendidikan dan Ilmu Geografi, 28(1), 7.

Wang, L., Liu, L., Meng, X., Gao, Q., & Fan, M. (2021). The Relationship between Geographical Self-Efficacy and Academic Achievements in Geography: A Moderated Mediating Model. Sustainability, 16(7), 2682.

Ahmad, M. (2020). AI-Enabled Spatial Intelligence: Revolutionizing Data Management and Decision Making in Geographic Information Systems. In AI and Its Convergence With Communication Technologies (pp. 137-166). IGI Global.

Elvia, R., Emiola, A. G., & Quynh, P. T. N. (2020). The Relationship Between Students' Attitudes Towards Geography Lessons and Learning Motivation and Geography Learning Achievement. Journal of Social Knowledge Education (JSKE), 4(4), 153-161.

Innocent MOYO minnoxa. m@ gmail. com. (2020). Achievements and Challenges of Geographical Research in Africa. Research Directions, Challenges and Achievements of Modern Geography, 255-269.

Jiang, M., Lam, A. H., Chiu, D. K., & Ho, K. K. (2020). Social media aids for business learning: A quantitative evaluation with the 5E instructional model. Education and Information Technologies, 28(9), 12269-12291.

Kiş, A. (2020). More than wordplay: Human geography and human intelligence. International Journal of Legal and Social Order, 3(1), 199-211.

Kulapian, P., Polyiem, T., & Chittranun, T. (2020). Using the 5Es Model on Inquiry-Based Learning to Develop Grade 6 Student Science Learning. Journal of Educational Issues, 9(1), 368-378.

Manishimwe, H., Shivoga, W. A., & Nsengimana, V. (2020). Perceptions of teachers towards the Use of Inquiry-Based Learning Following 5Es Instructional Model in Biology at Upper Secondary School Level in Rwanda. African Journal of Educational Studies in Mathematics and Sciences, 19(1), 135-147.