



Exploring the Efficacy of Conventional vs. ICT-based Approaches in Teaching Life Science at the Secondary Level: A Comparative Study

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Abstract:

The present study aimed to compare the effects of information and communication technology (ICT)-based and conventional methods of instruction on secondary students' in teaching life science. The study was experimental design where pretest and posttest was applied. The results indicated that the posttest result of IICT was much higher than conventional method in the academic achievement test. Thus the study indicated students and teachers to explore and access up-to-date and diverse information beyond the limitations of traditional textbooks. It offers various tools and technologies that can enhance teaching and learning experiences. Multimedia presentations, interactive whiteboards, and educational software make lessons more engaging and interactive. Virtual simulations and educational games can help students grasp complex concepts and improve their understanding through hands-on experiences.

Keywords: ICT, Traditional Method, Secondary students, Life Science.

1. Introduction

Education is critical to every country's progress. The Kothari Commission claims that the classroom is "where India's destiny is being shaped." Education standards are also a major defines how much advancement a country is willing to pursue. All of our approaches to education— whether they be pedagogical, technological, or otherwise—need to be fluid and adaptable. Educators should be flexible and open to new methods of doing things in the classroom. The National Policy on Education (NPE) of 2019 reorganized the educational system in a way that places more emphasis on the use of technology in the classroom. A number of large computer manufacturers at the time began working with educational institutions to provide what would later be known as computer-assisted instructions for independent study. To a large extent, CAI relied on the tenets of Programmed Learning. These days, almost every elementary school student has at least a rudimentary understanding of how a computer works. He has extensive experience with the web and learns independently via it. Therefore, thanks to the proliferation of online lectures and self-learning resources, educational quality has risen dramatically. As a result, the kid is learning to rely less on the educator and more on the gadgets. As its acronym, ICT (Information and Communication Technology), suggests, this is a tool for imparting knowledge in any format desired by the student. The learning process is facilitated by the integration of text, images, music, animation, and video.

1.1. Need and Significance of The Study

In the traditional method, the teacher is considered the central authority in the classroom. They possess the knowledge and expertise, and their role is to transmit information to the students. Students play a relatively passive role in the traditional method of teaching. They are expected to listen, take notes, and absorb the information provided by the teacher. The emphasis is often on rote memorization and the acquisition of factual knowledge. Now with the advent of modern technology ICT provides interactive and multimedia elements that capture students' attention and foster their engagement. The use of videos, simulations, games, and interactive presentations can make learning more exciting and enjoyable, motivating students to actively participate in the learning process. It gives students access to a vast array of information and educational resources beyond the limitations of textbooks. The internet and online databases provide up-to-date and diverse content, facilitating research, exploration, and deeper understanding of topics. This access to a wealth of information promotes independent and self-directed learning.

1.2. Statement of The Problem

The study entitled as "Exploring the Efficacy of Conventional vs. ICT-based Approaches in Teaching Life Science at the Secondary Level: A Comparative Study."

1.3. Objectives of the Study

1. To study the effect of ICT on the Achievement of the students in the subject of mathematics.
2. To study the effect of Instructions given with the help of Traditional method on the Achievement of the students in the subject of mathematics.
3. To compare the effectiveness of ICT and Traditional method on the Achievement of the students in the subject of mathematics.

1.4. Hypotheses

The following hypotheses are determined to find out the achievements

Ho1: There is no significant difference in the pre and post test results of academic achievement of life science secondary students who were taught through conventional teaching methods.

Ho2: There is no significant difference in the pre and post test results of academic achievement of life science secondary students who were taught through ICT teaching methods.

Ho3: There is no significant difference in the post test results of academic achievement of life science secondary students who were taught through conventional and ICT teaching methods.

1.5. Delimitation

The research was delimited with respect to method, tools and sample, 200 students were selected as sample to study the problem. The study was confined to the achievement of students by using Traditional and ICT based methods.

2. Review of Related Literature

Tularam, G. A. (2018). Traditional vs Non-traditional Teaching and Learning Strategies-the case of E-learning! *International Journal for mathematics teaching and learning*, 19(1), 129-158. The computer based teaching technology (e-learning) is now constantly used in mathematics and engineering courses. The e-

learning methodology is considered to be in line with the non-traditional approaches than the traditional teaching approaches; and this paper critically reviews the literature on mathematics and engineering that have made comparisons of the approaches outlined. The paper will specifically examine the advantages/ disadvantages of the approaches as well the manner in which they influence performance of students in mathematics and engineering courses.

Lessani, A., Yunus, A., & Bakar, K. (2017). Comparison of new mathematics teaching methods with traditional method. *People: International Journal of Social Sciences*, 3(2), 1285-1297. The aim of this paper is to compare the mathematics teaching methods, and study their consequences on mathematics learning. Numerous studies have shown that students experience mathematics anxiety which is a feeling of tension and fear that interfere with math learning. The qualitative case study method was considered more feasible and appropriate to meet the aim of this study. Data were collected using observation and semi-structured interviews with teachers in the secondary schools in Malaysia. It was observed that traditional, problem solving and discovery learning methods were practiced by the teachers. The findings reveal that students are more successful when systematic problem solving method based on Polya's.

Mbodila, M., & Muhandji, K. (2012, July). The use of ICT in Education: a comparison of traditional pedagogy and emerging pedagogy enabled by ICTs. In *Proceedings of the 11th International Conference on Frontier in Education*. Improving excellence in education is a critical issue; mainly at this time of everything is becoming globalized. This method is characteristically based on pre-packaged learning materials, fixed deadlines, assessment tasks and criteria are defined by teachers. But research has shown that the appropriate use of ICTs can catalyze the paradigmatic shift in both content and pedagogy that is the heart of education reform in the 21st century and promote problem based learning. This paper gives an overview of the traditional ways of teaching and some of its limitations; also discussed the emerging ways of teaching enabled by the use of Information Communication Technology (ICTs), furthermore organizes a variety of approaches found in ICTs uses in Education.

Safdar, A., Yousuf, M. I., Parveen, Q., & Behlol, M. G. (2011). Effectiveness of information and communication technology (ICT) in teaching mathematics at secondary level. *International Journal of Academic Research*, 3(5). The purpose of this study was to determine the effectiveness of Information and Communication Technology (ICT) as compared to the traditional method of teaching in the subject of mathematics at secondary level in Pakistan. Both the groups were equated on the basis of their scores by pair random sampling from the previous examination of class VIII in the subject of mathematics. The students of experimental group were exposed to the teaching through ICT, whereas the students of control groups were taught through traditional method of teaching in the subject of mathematics.

2.1. Research Gap

None of the above studies have conducted research on exploring the Efficacy of Conventional vs. ICT-based Approaches in Teaching Life Science at the Secondary Level: A Comparative Study, therefore this is the gap of the present study.

3. Methodology of Study

Investigator used experimental method to find the Academic Achievement of the students, he used pre-test as well as posttest to compare the results and find out which method is better or effective.

3.1. Tools

Investigator used experimental method to find the Academic Achievement of the students, she used pre-test as well as posttest to compare the results and find out which method is better or effective related to topics of Reproductive system, Fertilization and Embryonic Development, Menstrual Cycle and Hormonal Control and Pregnancy and Placenta.

4. Analysis and Interpretation of Data

Ho1: There is no significant difference in the pre and posttests results of academic achievement of life science secondary students who were taught through conventional teaching methods.

To verify the hypothesis, descriptive statistics and independent t test were performed to verify the hypothesis which is shown in the following tables.

Table 4.2.1: Showing The Pre and Posttests Results of Academic Achievement of Life Science Secondary Students Through Conventional Teaching Methods

Academic Achievement of Life Science Secondary Students	Test	Mean	S.D	T value	Result
	Pretest	25.9	5.1	-2.881	.891 NS
	Posttest	26.1	7.1		

Source: Field Survey 2022-2023

To test the hypothesis 1, researcher represented the Descriptive Statistics of academic Achievement of Life Science Secondary Students Through Conventional Teaching Methods and the result was displayed in the table no. 4.2.1, which depicted that the average and S.D. scores of the pretest scores of academic achievement of life science were 25.9 ± 5.1 and posttest score were 26.1 ± 7.1 where calculated' was -2.881 with $p = .891$ ($p > .05$). Hence, "t" was not significant at .05 and at .01 levels. There were no significant difference in the pretest and posttests results of academic achievement of life science secondary students who were taught through conventional teaching methods.

Ho2: There is no significant difference in the pre and post test results of academic achievement of life science secondary students who were taught through ICT teaching methods.

To verify the hypothesis, descriptive statistics and independent t test were performed to verify the hypothesis which is shown in the following tables.

Table 4.2.2: Showing The Pre and Posttests Results of Academic Achievement of Life Science Secondary Students Through ICT Teaching Methods

Academic Achievement of Life Science Secondary Students	Test	Mean	S.D	T value	Result
	Pretest	35.2	7.01	-5.993	.932 NS
	Posttest	36.01	6.23		

To test the hypothesis 2, researcher represented the Descriptive Statistics of academic Achievement of Life Science Secondary Students Through ICT Teaching Methods and the result was displayed in the table no.

4.2.2, which depicted that the average and S.D. scores of the posttest scores of academic achievement of life science were 35.2 ± 7.01 and posttest score were 36.01 ± 6.23 where calculated' was -5.993 with $p = .932$ ($p > .05$). Hence, "t" was not significant at .05 and at .01 levels. There were no significant difference in the pretest and posttests results of academic achievement of life science secondary students who were taught through ICT teaching methods.

Ho3: There is no significant difference in the post test results of academic achievement of life science secondary students who were taught through conventional and ICT teaching methods.

To verify the hypothesis, descriptive statistics and independent t test were performed to verify the hypothesis which is shown in the following tables.

Table 4.2.3: Showing The Posttests Results of Academic Achievement of Life Science Secondary Students Through Conventional And ICT Teaching Methods

Academic Achievement of Life Science Secondary Students	Test	Mean	S.D	T value	Result
	Posttest	26.01	7.9	7.234	.000
	Posttest	36.01	6.23		

To test the hypothesis 3, researcher represented the Descriptive Statistics of academic Achievement of Life Science Secondary Students Through ICT Teaching Methods and the result was displayed in the table no. 4.2.3, which depicted that the average and S.D. scores of the posttest scores of academic achievement of life science through Conventional methods were 26.01 ± 7.9 and for ICT method posttest score were 36.01 ± 6.23 where calculated' was 7.234 with $p = .000$ ($p < .05$). Hence, "t" was significant at .05 and at .01 levels. There were significant difference between the posttests results of academic achievement of life science secondary students through conventional and ICT Teaching methods.

5. Conclusion

ICT provides access to a vast amount of information and resources. The internet, digital libraries, and online databases offer a wide range of educational materials, including e-books, research articles, videos, and interactive multimedia content. This enables students and teachers to explore and access up-to-date and diverse information beyond the limitations of traditional textbooks. It offers various tools and technologies that can enhance teaching and learning experiences. Multimedia presentations, interactive whiteboards, and educational software make lessons more engaging and interactive. Virtual simulations and educational games can help students grasp complex concepts and improve their understanding through hands-on experiences. Online collaboration tools facilitate communication and group work, enabling students to collaborate with peers and experts from different locations. It enables personalized and adaptive learning approaches. Online platforms and learning management systems allow teachers to create customized learning pathways and provide individualized instruction based on students' unique needs, learning styles, and progress. Adaptive learning software can dynamically adjust the learning content and pace to match the abilities of individual students, providing targeted support and challenges as required.

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