

ICT Integration and English Learning Outcomes: A Study of Secondary Schools in Tamil Nadu

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Abstract

Information and Communication Technology (ICT) has become an emerging way of influencing the teaching and learning process of language in the Indian secondary schools. The empirical data concerning its effects on the learning outcomes in English in rural and semi-urban settings, however, is scarce. This paper has explored the connection between ICT integration and the learning outcomes of English among secondary school students in Tamil Nadu. The chosen research design was a quantitative descriptive one, which included a sample of students of secondary level in government schools. The data gathering was performed by using structured measurement and questionnaires that evaluated the students in terms of interest, language mastery, and their exposure to ICT-based instruction processes. The results showed that there was a positive correlation between structured ICT integration and enhancement of the English learning outcomes of students, especially the language confidence, grammatical accuracy and classroom participation. In spite of such gains, infrastructural bottlenecks and teacher training were known to be major challenges which influenced permanent implementation. The research emphasizes the significance of ICT use which is guided by pedagogies as opposed to technological accessibility. The results add to the expanding literature on digital pedagogy in local learning institutions and provide feasible advice to policy makers, instructors and curriculum developers aiming at promoting the learning of the English language using technology-mediated instruction.

Keywords: *ICT integration; English language learning; secondary education; digital pedagogy; rural education; learning outcomes; Tamil Nadu.*

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1.Introduction

The high rate of growth of Information and Communication Technology (ICT) has radically changed the way education should be conducted in the world. At the secondary school level, there has been an increasing impact of digital initiatives in the classroom teaching in India and Tamil Nadu in particular. ICT implementation in English language teaching provides chances of interactive learning as well as access to multimedia means and increased student engagement. The developments are particularly significant in situations where the common teaching approaches might deprive the communicative language of practice.

ICT-based learning allows students to have a wide range of learning resources, engage in cooperative learning, and get instant feedback, thus, creating active learning processes. ICT in education,

as it is defined by S. Ammanni and U. Aparanjani (2016), is the use of digital tools and communication technologies in teaching, learning, and administrative processes. Such tools can be used to achieve better academic results and language competence when they are pedagogically organized. Studies indicate that effective means of integrating technology not only entails access to digital devices but it also involves suitable teaching methods and readiness of teachers (Mishra and Koehler, 2006). In secondary education, and particularly among the students between the ages of 13-15 years, instructional practices based on ICT when structured can have an impact on motivation, participation, and language outcomes. Nevertheless, systematic empirical research on the influence of ICT integration on the English learning achievement in governmental and aided secondary schools in Tamil Nadu is necessary.

This report hence explored the connection that exists between ICT-aided teaching and learning activities and student performance regarding English language learning among Grade IX and X students in sampled schools in Tamil Nadu. The study investigated trends of ICT use, student activity and performance results in comparative study of traditional teaching and learning environment which involves the application of technology. The study attempted to give the pedagogical implications of ICT integration in English language teaching in the regional education setting by examining the performance indicators and responses of students.

2.Literature Review

Application of Information and Communication Technology (ICT) in education has become a world-renowned revolution in the field of teaching and learning. When it comes to English language education, ICT is useful in making multimedia materials, interactive platforms, and learning collaborations available to both the learners and therefore increase the engagement of the learners. Digital technologies facilitate active learning, personalized teaching and communicative significance when organized in a pedagogical way. According to Joke Voogt and Ronald Knezek (2018), the integration of technology in learning contributes to the acquisition of skills in the twenty-first century and enhances student engagement on the condition of adherence to the learning goals.

In addition to the formal learning in the classroom, digital technologies play a role in informal and self-directed language learning. Ruth Trinder (2017) investigated how informal and deliberate learning is done by learners through the help of emerging technologies when not in an institutional environment. In her findings, she found the second and the third, which are online resources and mobile applications to be highly influential to motivate learners, their autonomy, and language growth. These observations show how ICT is playing an increasingly important role in the development of modern language learning activities.

Empirical research has also shown that ICT-mediated teaching promotes different aspects of English language competence such as vocabulary, acquisition and pronunciation of English language and communicative competence. Educational platforms based on digital languages that provide a structured curriculum, quizzes, and multimedia data have demonstrated quantifiable positive effects on student engagement and performance in regional learning institutions (Gupta and Singh, 2021). The availability

of mobile learning applications, smart phones and tablets has increased chances of constant language practice outside of the classroom.

Geographical and institutional barriers have also been minimized in the virtual classrooms and online learning environments. These tools allow real-time and offline learning, which enables students to collaborate and interact with the teacher. According to Kristina Mullamaa (2010), e-learning environments increase flexibility and take care of the learner needs in the classroom setting. Nevertheless, integration of ICT requires effective teacher readiness, availability of infrastructures and long-term institutional support. Although digital tools provide us with an opportunity to enhance English language education in schools in Tamil Nadu, the successful implementation of the methods must include the system of pedagogical planning and professional development. Thus, further empirical studies are still required to test the long-term effectiveness of ICT integration on language competence and determine the context-dependent best practices in secondary school.

3.Research Questions

The research questions used to guide the study were as follows:

RQ1:

What is the impact of the use of ICT based modes of instruction (web-based learning platforms, video-based resources, and mobile learning applications) on learning outcomes of English among secondary school learners within Tamil Nadu?

RQ2:

How do students, parents and teachers perceive and experience the application of ICT-based instructions practices in learning English language in Tamil Nadu secondary schools?

To answer RQ1, quantitative data were gathered through the online questionnaire tool and structured digital learning platform which was implemented on the secondary school students. More than 800 students in different districts in Tamil Nadu were surveyed and their responses were analyzed to identify the trends in the use of ICT and the results of learning. To answer RQ2, data were collected using qualitative and survey-based method to study participant views on the effectiveness, accessibility and challenges related to ICT-supported English instruction involving students, parents and teachers.

4.Context of the Study

4.1 Tamil Nadu School Teaching and Evaluation Practices Traditionally.

Secondary schools in Tamil Nadu have long been using traditional instructional and assessment practices. These strategies have provided adequate coverage of the syllabus and readiness to examination but in most cases, these are teacher-centered methods

of instruction and possibility of knowledge without active learning and critical thinking.

4.2 Lecture-Based Instruction

In most of the classrooms, lecture-based teaching is still a prevalent method of instruction. Under this approach, instructors present the material orally, describe the textbooks and scribble important points on the board as the learners play a very passive role. Even though lectures can be used to transmit information in an effective way, they might restrict student activity and critical thinking. It has been discovered that lectured based classrooms tend to decrease participation and they do not accommodate varied learning styles (Bligh, 2000).

4.3 Textbook-Centric Learning

Most of the Tamil Nadu schools use textbooks as the main source of instruction. Although the instruction based on the textbooks provides the systematic coverage of the syllabus, the overdependence on memorizing causes the limited possibilities of analytical thinking and application to the contexts. The research has shown that strict textbook use may decrease the autonomy of students and their independent research (Wang and Liu, 2020).

4.4 Rote Memorization

Students are often subjected to rote learning as a way of training them to do exams. In spite of the fact that memorization can help in the short-term academic achievement, it does not always lead to the conceptual knowledge or communicative fluency, especially in the language learning processes.

4.5 Conventional methods of assessment.

Evaluation in schools in Tamil Nadu is normally done through written assignments, oral examination, periodic written examination, term examination and board examination by Tamil Nadu State Board of School Examination. These tests mainly teach the retention of knowledge and exam results. New reforms have brought about the Continuous and Comprehensive Evaluation (CCE) that focuses on formative assessment, skill and continuous feedback. The studies suggest that the formative assessment methods may increase the student interest and their overall academic progress (Singh and Sharma, 2018). Nonetheless, there is variation in the implementation in institutions. Even though traditional approaches have a long history of influencing the achievement of educational attainments, they have to be augmented with learner centered and technology-based pedagogies to address the current educational needs.

5. ICT Strategies to Bridging the Gap between English and Learning.

ICT integration to improve the learning outcomes of English necessitates a structured planning, infrastructure and the mental readiness of the teachers. It is recommended to use the following strategies:

5.1 Curriculum Design and ICT Integration.

ICT-based activities in language learning should be included in the curriculum frameworks. Integration can be pedagogically constructed to allow a better understanding, involvement, and the ability to think critically. Studies have revealed that the proper integration of ICT enhances academic achievements and interactive learning processes (Chen and Wang, 2019).

5.2 Access to Digital Resources

Digital libraries, multimedia materials, language learning software and educational platforms provide the opportunity to learn in a flexible and individual way. It has been indicated that the motivation to use digital materials and the level of language acquisition improves as a result of access to online resources (Li and Zhang, 2020).

5.3 Language Laboratories that are Technology Enabled.

An audio-visual equipment of language laboratories with interactive software can be used to promote organized practice of listening, speaking, reading, and writing skills. Empirical evidence shows that language labs that work with technologies enhance communicative competence and the engagement of learners (Lee and Kim, 2018). Mobile-Assisted Language Learning (MALL) describes a study approach that involves instructing and learning through the use of mobile devices.

Mobile learning programs enable students to have access to language material even outside the classroom. Mobile-assisted language learning has been linked to high learner autonomy, motivation, and performance (Garcia and Martinez, 2021).

5.5 Online Tutoring and virtual Classrooms.

Online learning opportunities have been created with virtual classes and online tutoring where geographical barriers are minimized due to asynchronous and synchronous learning opportunities. These systems encourage teamwork and individual care, which leads to better performance (Jones, 2020).

5.6 Professional Development of teachers.

Teacher competence and confidence is a requirement that helps in the effective integration of ICT. Digital literacy and pedagogical adaptation are improved with the help of continuous professional development programs. Research indicates that teacher training has a positive effect on student learning and the quality of instructions (Smith, 2019).

5.7 ICT Based assessment and Feedback.

Online tests, such as quizzes and list, give instant feedback and quantitative information on student achievement. Feedback is delivered in time, which improves the learning process and academic development.

5.8 Development of infrastructure.

Sustainable ICT integration requires reliable internet connectivity, working hardware and multimedia facilities. The infrastructure development facilitates fair accessibility and enhances instructional services (Sarwar and Soomro, 2019).

The 5.9 Community Engagement and Partnerships highlight the need to engage the community, particularly through its participation in social-related matters within the organization like policing, legislation, and so on. Partnership with parents, local agencies, and institutions will increase institutional support and availability of resources. The connection between community engagement and enhanced student performance and institutional performance has been observed (O'Meara and Jaeger, 2019).

5.10 Monitoring and Evaluation

Data analytics, surveys, and performance indicators facilitate the systematic monitoring of the ICT-based programs and contribute to the continuous improvement. There are indications that the implementation of data-driven decision-making helps to improve the quality of education and the sustainability of the programs (Zhang and Wang, 2020).

6.1 Research Design

The study adopted a **quantitative descriptive research design** to examine the effectiveness of ICT-based instructional modes in enhancing English

language learning outcomes among school students in Tamil Nadu.

6.2 Data Sources for RQ1

To address Research Question 1, data were collected from two ICT-based learning platforms:

1. A structured English instructional video platform hosted on YouTube, designed to support public examination preparation.
2. A mobile-based online assessment application used to administer objective-type quizzes aligned with prescribed English learning outcomes.

The video-based instructional content focused on grammar, vocabulary, comprehension, and communicative skills relevant to secondary-level public examinations. The accompanying mobile assessment tool contained structured objective-type questions designed according to syllabus-based learning outcomes. As of January 2023, a total of **1,468 learners** had participated in the online assessment activities. Platform analytics, participation records, and quiz performance data were used to examine engagement levels and learning outcomes.

6.3 Data Collection for RQ2

To address Research Question 2, a structured questionnaire was administered through an online survey platform. The respondents included students, parents, and teachers from various districts of Tamil Nadu. The age range of participants was between 13 and 54 years.

- Perceptions of ICT-based English instruction
- Accessibility and usability of digital platforms
- Perceived learning benefits
- Challenges associated with ICT integration

6.4 Data Analysis

The collected data were analyzed using descriptive statistical techniques, including frequency distribution, percentage analysis, mean scores, and standard deviation. The findings were used to identify trends in ICT usage, learner engagement, performance outcomes, and stakeholder perceptions regarding ICT-supported English instruction. Participation was voluntary, and responses were anonymized to ensure confidentiality.

Participants and Survey Details

Table 1

S.No	Frequency	Students	Teachers	Parents	Total
1	YouTube Coaching Video views	1113 (38.28%)	1439 (49.50)	355 (12.22)	2907 (100%)
2	Survey Heart Quiz responses	1400 (95.36%)	60 (04.08%)	8 (00.56%)	1468 (100%)
3	Google Forms responses	25 (12.50%)	159 (79.50%)	16 (08.00%)	200 (100%)

The information captured in Table 1 was obtained among participants in state of Tamil Nadu, India. The data collection was done using three ICT based instruments depending on the two research questions. There were two ICT tools used in RQ1:

- (1) a YouTube based educational channel offering English coaching education, and
- (2) SurveyHeart mobile application to administer structured, objective-type, quizzes with accordance of public examination learning outcomes.

The aggregate number of views using the YouTube system was 2,907, which was shared among the students, teachers, and parents. The Survey Heart quiz service received 1,468 responses where most of the participants were students (95.36%). In the case of RQ2, a structured questionnaire that is perception based was created and administered using Google forms. Two hundred responses were obtained among the students, teachers, and parents in various districts of Tamil Nadu.

These data collection methods, which were ICT-enabled, also allowed participation of large scale and real-time aggregation of the data. Digital platforms are more accessible, more efficient, and more scalable than those of traditional paper-based surveys, as well as more accurate in data. Online surveying enables the researcher to access geographically far-between respondents and ease in data management procedures. Research shows that survey techniques using ICT help to manage the responses better than administrative errors, and overall data quality is better than when using traditional methods (Dillman, Smyth, and Christian, 2014; Evans and Mathur, 2018; Wright, 2005).

7.Results

The results of the study are presented in relation to the two research questions formulated for this investigation.

7.1 Results for Research Question 1

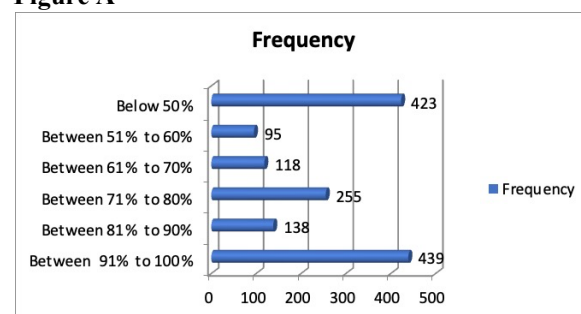
RQ1:

What is the impact of instructional modes that are based on ICT (like web-based learning platforms, YouTube-based instruction, mobile applications) on the learning outcomes of English language in students in Tamil Nadu schools?

The initial research question focused on the effects of ICT based instructional mode on the English language learning among the secondary school students in Tamil Nadu.

The data analysis based on platform participation and quiz performance records showed the high level of participation by learners of various age groups and gender. The results indicate that ICT based instruction delivery led to enhanced engagement and quantifiable learning performance in English language elements in grammar, vocabulary, comprehension and examination-based skills.

Figure A



Gender-wise Distribution of Participants Engaged in ICT-Based English Learning

Figure A shows the gender division of the respondents that used the ICT-based English instructional platforms. There were 2,907 responses that were made. Of these, 1,808 (62.19) of them were men, and 1,099 (37.81) of them were women. The results show that there was a greater involvement of male respondents than those of female respondents. Nonetheless, large presence of female learners indicates wide accessibility and tolerance of ICT-mediated instruction in English learning between sexes.

Its comparatively equal distribution indicates that online sources offered inclusive education and supported large numbers of learners in Tamil Nadu secondary schools to participate.

Table 2 Participants details according to age group.

S.No	YouTube Viewer Age Group	Frequency	Percentage
1	13 Years to 17 Years	587	20.20%
2	18 Years to 24 Years	450	15.50%
3	25 Years to 34 Years	381	13.10%
4	35 Years to 44 Years	1134	39.00%
5	45 Years to 54 Years	355	12.20%
Total		2907	100.00%

Interpretation of Table 2

The age-based break down of the respondents who viewed the YouTube based instructional videos in English is shown in Table 2. There were 2,907 participants in total that were recorded. The age group of 1317 (20.20%), was mostly the students of secondary school and the age group of 1824 (15.50%), consisted of the students of secondary school and higher secondary school and undergraduate. Teachers were a large portion of the participants, 25-34 (13.10) and 35-44 (39.00) most commonly participated in the study, with the age group of 35-44 having highest number of participants. The 45-54 age bracket (12.20) was mostly made up of parents, with the less significant percentage of the experienced teachers.

The results have shown that 13-17 years school students and teachers (especially 35-44 years) constituted about 59.20 percent of the overall participants. This implies that there is a high level of interaction between learners and educators with English learning materials that are based on ICT. The increased involvement of teachers (39%) demonstrates that digital resources are not only utilized by students but are also utilized by teachers as support in teaching and being used as a professional source and as a way of preparing to exams.

Although the perceived improvement in learning outcomes in the view of the viewers was indicated through the qualitative feedback, the current analysis relies on the participation patterns and the engagement measurement instead of anecdotal feedback.

Figure B

Distribution of Student Performance Levels in ICT-Based Quiz Assessment

Figure B shows the performance level of the students given the responses in the Survey Heart quiz platform. One thousand four hundred and six hundred students were the participants of the assessment conducted after a year of ICT-based instruction in English.

The findings reveal that there is the following distribution:

- 423 students (28.81%) scored below 50%.
- 95 students (6.47%) scored between 51% and 60%.
- 118 students (8.04%) scored between 61% and 70%.
- 255 students (17.37%) scored between 71% and 80%.
- 138 students (9.40%) scored between 81% and 90%.
- 439 students (29.90%) scored between 91% and 100%.

It is important to note that the percent of students who scored above 70 (56.67) was also 832 students, which means that students accomplished satisfactory to high results in the ICT-based test. The distribution of performance implies that a significant percentage of the learners had a high level of achievement after being exposed to ICT instructional strategies. Although a lower percentage (28.81) of the participants had a score less than 50, the total distribution of the learners indicated that the learners were generally distributed in the higher performance groups (71% and above). This suggests that there is a positive correlation between ICT-mediated instructing activity and enhanced performance in English language of the involved students. Nonetheless, additional inferential statistics would have to be performed to gain causal associations.

Table 3

Stakeholder Feedback on ICT Mode of Education

S.No	Frequency	Students	Teachers	Parents
1	Have you heard about ICT mode of Education ?	17 (68.0%)	154 (96.90%)	13 (81.3%)
2	ICT - is need of the hour.	24 (96.0%)	156 (98.10%)	16 (100.0%)
3	Do you really like ICT mode of teaching and learning?	22 (88.0%)	149 (93.70%)	13 (81.3%)
4	Do you think the ICT mode of Education improve the learning outcomes of students?	22 (88.0%)	139 (87.40%)	12 (75.0%)

Table 3 reflects the perceptions of the stakeholders towards ICT based education. The results show that there are a high awareness and acceptance of the same among all the respondents' groups. The level of awareness about ICT-based education among teachers (96.90%), as well as parents (81.3%), and also was found to be 68.0% among the students.

A massive majority of all respondents were of the view that ICT is the need of the hour with 98.10% of teachers and 100 percent of parents agreeing with the same. What is more, 88.0 percent of students, 93.70 percent of teachers, and 81.3 percent of parents expressed positive attitudes toward the ICT-based teaching and learning. About perceived influence on learning outcomes, 88.0 percent of students, 87.40 percent of teachers, and 75.0 percent of parents thought that learning performance of students can be enhanced by integrating ICT.

In general, the findings indicate a high stakeholder support of the ICT integration in education.

Table 4

S.No	Frequency	ICT mode of Education	Traditional mode of Education	I don't know	Total
1	Student	17 (68.0%)	4 (16.0%)	4 (16.0%)	25 (100%)
2	Teacher	126 (79.20%)	28 (17.60%)	5 (3.10%)	159 (100%)
3	Parent	11 (68.80%)	0 (0.0%)	5 (31.30%)	16 (100%)
Total		154 (77.0%)	32 (16.00%)	14 (7.0%)	200 (100%)

Participants' Preference for ICT vs Traditional Mode of Education

Table 4 shows the preference of the stakeholders between ICT based and traditional modes of education.

Most of the respondents (77.0%) indicated their preference towards ICT-based education as opposed to 16.0% who indicated their preference towards traditional classroom education. Only 7.0% remained uncertain. The most supported teachers were 79.20% who preferred ICT integration, and it showed that they were very professional in endorsing digital instructional strategies. On the same note, 68 percent of students and 68.80 percent of parental choices leaned towards an ICT-based learning environment.

Such findings indicate that there is a positive institutional and community orientation towards technology-enhanced education in the Tamil Nadu schools.

Figure C

Stakeholder Perceptions on the Impact of ICT Mode of Education on Learning Outcomes

Figure C shows the responses obtained of 200 questions given to the participants in Tamil Nadu in a structured online questionnaire. There were students, teachers, and parents as respondents. The question addressed was:

The results reveal that a significant percentage (86.5) of the participants consider the ICT-based education as an aspect that has a positive influence on student learning outcomes. A smaller rate (12) said they were not sure whereas only 1.5% said they disagreed with the statement. The satisfaction between stakeholders is high, which implies that ICT-supported instructional practices are very acceptable in Tamil Nadu schools. The findings of these perceptions, added to the results of the performance provided earlier, suggest a positive angle towards technology-enhanced English learning.

Nevertheless, the results may not be viewed as a measure of causal influence but only reflect the perceptions of the stakeholders as reported by them.

Discussion

The current research investigated the effects of ICT based pedagogic forms on the English language learning performance in the Tamil Nadu schools. The results show that learner engagement is rather high among all ages, performance level in ICT-based tests is better, and all stakeholders support the use of technology in education.

The result distribution of the performance showed that the number of students who scored above 70 percent in the ICT based tests was more than half of the students who took part (56.67 percent). Moreover, 86.5 percent of the stakeholders were of the view that ICT integration would help enhance learning outcomes. These results are consistent with the prior literature that may indicate that technology-based learning can increase student learning intensity, access, and engagement (Dillman et al., 2014; Evans and Mathur, 2018).

8.1 ICT-Enabled Learning Environments.

The findings show that instructional platforms supported by ICT could be used to provide greater involvement of students and teachers. The fact that the rate of involvement of teachers is high (39% in the 3544-age group) indicates that teachers are using digital tools not only to support student learning but also to support the instruction process. This corroborates the argument that the ICT integration facilitates group work and interactive learning classrooms and thus improves delivery of instructions.

8.2 Multimedia and Interaction Content.

The research results indicate that the use of video based training and mobile based tests helped to enhance the involvement of learners. The audiovisual explanation, structured quizzes, and interactive forms of multimedia could have served various types of learning and enhanced understanding. These results support earlier research that stated that multimedia-based learning environments can increase retention and motivation among language learners.

8.3 Web-based Services and Portable Learning.

Online tools allowed the learners to study training material outside the classroom room. These high rates of participation signify that online learning systems are flexible and accessible enough, especially where there are geographical distances. These platforms enable students to learn languages at their own level and they may end up performing better in academics.

8.4 Preparedness and Professional Development of Teachers.

The attitude of teachers towards ICT integration is positive, which speaks about the professional

preparedness. The proper use of ICT in the teaching of language is based on the capability of teachers to build interactive lessons, using digital tools efficiently, and modifying the instructional methods to the requirements of students. The ongoing professional growth is also an important factor in the maintenance of technology-enhanced education.

8.5 Community Engagement and Supporting Infrastructure.

The results also show that parents have positive feelings about ICT-based education. The idea of stakeholder acceptance implies that the wider societal involvement can provide effective implementation of ICT. Nonetheless, the proper integration needs proper infrastructure, internet connectivity, and digital literacy to make sure everyone who learns has equal access.

Limitations of the Study

Despite the fact that the research showed promising positive trends in the ICT-supported learning outcomes, there were certain limitations that must be mentioned. The results are formulated on platform analytics, as well as self-reported survey statistics. Lack of controlled experimental comparison eliminates the capability of making causal relations. Experimental, as well as quasi-experimental designs, can be used in future research to provide additional confirmation of the effect of the ICT-based instructions on the English language proficiency.

Conclusion

The current research paper has discussed the suitability of using ICT based modes of instruction to improve the performance of students in the English language in schools within Tamil Nadu. The results showed that the degree of learner engagement through the digital platforms was significant, their performance level through ICT-related testing was high, and the stakeholders showed great support to the technology-based integrated learning. Over fifty percent of the students involved recorded a level of more than 70 percent in ICT based tests and a majority of the stakeholders viewed ICT integration as a way of enhancing learning outcomes. These results indicate that structured online learning, multimedia tools, and mobile learning tests can help to positively influence the acquisition of English language.

Nevertheless, effective adoption of ICT in learning institutions takes proper infrastructure, a good internet connection, and the training of teachers. Online disparity is also a factor of concern especially to the learners who have low economic backgrounds. Thus, planning at the institutional level and policy-level intervention are required in order to provide equal

access to technology-enhanced learning. Generally, the research points to the possibilities of ICT-based instructional strategies in order to reinforce English language education in Tamil Nadu schools. The integration of technology with systematic implementation and the constant professional development can bring better grades and provide more opportunities to learn.

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