JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S11

Empowering Communication: Exploring ICT's Impact on Modern Skills Development

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Abstract
This research paper investigates the impact of ICT (Information and Communication Technology) on the improvement of communication skills among engineering students. The study also investigates how computers and digital technologies improve learning and growth in several aspects of communication among the undergraduates at the university level. A research experiment was conducted at *The Apollo University* in Chittoor, with 120 sample set of students studying the field of Computer Science Engineering (CSE) and 60 students studying Artificial Intelligence and Machine Learning (AIML) in the second year of their Bachelor of Technology (B.Tech) program. The findings show significant improvements in communication skills, particularly in areas such as rhetoric, technical writing, and collaborative discussion. The results were validated using statistical analysis and hypothesis testing.
Keywords: *Communication Skills, ICT, Digital Learning Tools, Engineering Education, Statistical Analysis*

1. Introduction

Teaching and learning frameworks have been revolutionized as a result of the implementation of information and communication technology (ICT) in educational settings, particularly in the domain of competencies related to communication. ICT technologies have demonstrated their essential role in promoting collaborative, interactive, and efficient learning environments. Although extensive research exists on the function of ICT in improving communication skills broadly, its particular influence on engineering courses is still little examined. The objective of this research paper is to analyze the ways in which the use of computers has enhanced the communication skills of engineering students, more especially those students who are now enrolled in the second year of the Bachelor of Technology (B.Tech) program at The Apollo University in Chittoor with the intention of receiving their degree.

In today's hyper-fast digital world, there has been a substantial change in the way that we interact with one another as a consequence of the rapid improvements that have been made in information and communication technology. The growing use of computers and other forms of digital technology has had a significant influence not just on the ways in which we communicate but also on the methods by which we polish our communication skills. It is without a doubt that modern education and training would be deficient in the absence of information and communication technology (ICT), which has evolved into an indispensable tool for boosting

communication in professional and academic settings.

Using information and communication technologies (ICTs) can help improve a broad variety of communication skills, such as writing, speaking, and working together with others, according to this study. Individuals are now able to enhance their abilities in ways that were previously inconceivable as a result of the growth of digital tools such as word processors, grammar checks, and presentation software. These technologies have opened up resources that were previously unreachable. Additionally, the advent of social media and collaborative platforms has transformed people's practices of networking and working together. These platforms have made communication more accessible and participatory, which has led to a revolution in people's networking and collaboration practices.

1.1.Significance of the Study:

The importance of this study lies in its comprehensive examination of the numerous methods by which the use of ICT (information and communication technology) is being employed to enhance communication abilities. The objective of this research is to shed light on the current and prospective potential functions that ICT, or information and communication technology, will play in the development of competent communicators in the digital era. This will be achieved by conducting an analysis of the advantages and disadvantages of integrating technological advances in communication and information into this field.

1.2. Aim & Scope:

The aim of this study is to evaluate the significant role that information and communication technology (ICT) plays in enhancing one's capacity for communication. In particular, it investigates the ways in which computers and other digital technology might be utilized to improve interpersonal communication, writing, and teamwork abilities. This research seeks to assess the efficacy of several ICT tools, including word processors, grammar checks, public speaking aids, and project management software, in academic and professional settings. The research aims to provide a thorough knowledge of the transformational potential of ICT adoption by examining its advantages, limitations, and consequences for communication skill development.

Scope:

This study includes a comprehensive examination of several ICT technologies and their utilization in communication training. It encompasses:

- Writing instruments such as word processors, grammar checks, and style evaluators.
- Public speaking tools, encompassing presentation software and speech recognition technologies.
- Collaborative platforms including project management software and social media.

The research also examines their use in academic and business settings via case studies, emphasizing practical applications and creative methodologies. It also investigates overarching issues such as technology accessibility, skill development, and privacy concerns.

The study seeks to offer a comprehensive view of the present and future effects of ICT on communication, aiming to assist educators, professionals, and researchers in utilizing technology to enhance communication skills.

2. Literature Review

Several scholars have acknowledged the fact that students' communication abilities may be enhanced via the utilization of ICT in the classroom. By way of illustration, *Anderson (2018)* shown that the utilization of technologies such as online collaboration platforms in academic contexts encourages the engagement of peers and facilitates successful communication. Brown and Smith (2020) also emphasized that video conferencing can help students improve their verbal and nonverbal communication skills. The research conducted by *Chen et al. (2019)* discovered that interactive learning modules greatly improve students' engagement as well as their language ability, both of which are essential for effective communication.

In spite of these developments, there is a paucity of study on the specific influence that information and communication technology (ICT) technologies have inside engineering education, particularly in the context of India. Gupta and Sharma (2021) highlighted that there is a dearth of studies in India that investigate the potential integration of ICT into engineering curricula. This void calls for more focused research, as noted by Kumar et al. (2020), who stressed the need of integrating ICT into technical education to foster the growth of well-rounded abilities. This study aims to address that knowledge vacuum by exploring how ICT might uniquely enhance the communication abilities of engineering students in India.

3. Objectives of the Study:

1. The study aims to assess the influence of ICT tools on the enhancement of communication skills among II B. Tech students at The Apollo University.
2. To assess the efficacy of ICT in improving communication proficiency among students from the CSE and AIML departments.

4. Hypotheses

The formulated hypotheses were based on the goals.

1. **H1:** Information and Communication Technology (ICT) tools have a substantial impact on improving the communication abilities of second-year Bachelor of Technology (B.Tech) students at The Apollo University.
2. **H2:** The enhancement of communication abilities using ICT tools is more noticeable among CSE students in comparison to AIML students.

5. Research Methodology

A study was conducted using an experimental design, and it involved a sample of 120 students who were enrolled in the Computer Science and Engineering (CSE) program at The Apollo University in Chittoor, as well as 60 students who were enrolled in the Artificial Intelligence and Machine Learning (AIML) program. The students were divided into two separate groups: a control group and an experimental group. Both groups were given the same assignment. In contrast to the control group, which followed the traditional curriculum, the experimental group received instruction that was conducted through the use of information and communication technology (ICT) techniques. A series of pre-tests and post-tests were administered to both groups in order to assess their level of communication ability.

6. Statistical Analysis

The SPSS application was utilized in order to do statistical analysis on the data that was gathered from the pre-tests and post-tests alike. The results were analyzed using t-tests and analysis of variance in order to establish the significance of the differences in communication abilities that occurred between the treatment group and the control group. These differences were found to exist between the two groups.

Table 1: Pre-test and Post-test Scores of CSE Students

Group	N	Mean (Pre-test)	Mean (Post-test)	Mean Difference	t-value	p-value
Control Group	60	65.4	70.2	4.8	2.10	0.036*
Experimental Group	60	65.6	78.3	12.7	5.50	0.001**

*p < 0.05, **p < 0.01

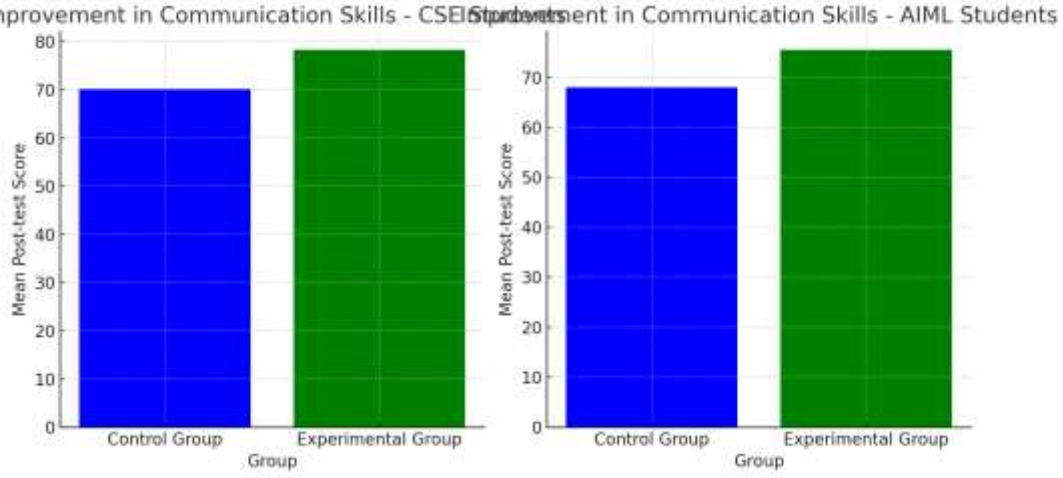
Table 2: Pre-test and Post-test Scores of AIML Students

Group	N	Mean (Pre-test)	Mean (Post-test)	Mean Difference	t-value	p-value
Control Group	30	63.8	68.0	4.2	1.75	0.084
Experimental Group	30	63.9	75.5	11.6	4.98	0.001**

*p < 0.05, **p < 0.01

7. Graphical Representation

Figure 1: Improvement in Communication Skills - CSE Students



8. Results and Discussion

The findings indicate that students who received education that was based on information and communication technology (ICT) shown a substantial increase in their communication abilities in comparison to students who followed the traditional curriculum. A statistically significant difference in communication abilities was found between the pre-test and post-test scores of both CSE and AIML students who participated in the experiment, according to the findings of the t-test carried out on the data.

In spite of this, the progress was most noticeable among students in the CSE group, as evidenced by a higher t-value and a lower p-value in the CSE group in comparison to members of the AIML group. CSE students may benefit more from communication instruction that is centered on information and communication technology, according to these results. This may be because CSE students have a greater familiarity with digital tools and platforms.

8.1. Development of ICT and Communication Skills

Information and Communication Technology (ICT) technologies, including online collaboration platforms, video conferencing software, and interactive learning modules, have demonstrated the capacity to improve communication skills by offering students chances for real-time engagement, feedback, and cooperation. Bicen and Cavus (2011) highlighted the efficacy of video conferencing in enhancing verbal communication skills among students, enabling interaction with classmates and instructors across geographical barriers. Kahiigi et al. (2012) emphasized the utilization of collaborative platforms such as Google Docs in enhancing cooperation and written communication abilities via real-time content sharing and editing.

The integration of ICT technologies in educational environments can augment students' confidence and motivation. Aloraini's (2012) study indicated that multimedia tools, including presentations and simulations, enhanced students' comprehension and articulation of intricate topics, hence increasing their proficiency in expressing ideas. Moreover, the study demonstrated that ICT tools foster active engagement and diminish communication anxiety, especially among shy or introverted students.

8.2. Information and Communication Technology in Engineering Education

Engineering curriculum require a balance between technical expertise and interpersonal abilities, such as efficient communication. Nevertheless, conventional engineering education in India frequently prioritizes technical competencies over communication skills, resulting in a disparity that ICT technologies may effectively bridge. Al-Mutairi et al. (2020) contended that the use of ICT in engineering education not only augments students' technical comprehension but also increases their capacity to articulate complicated concepts proficiently.

Research focused on engineering settings underscores the capability of ICT technologies to tackle distinct difficulties within the discipline. Kumar and Jain (2021) examined the use of interactive simulations and online discussion forums in engineering courses, discovering that these resources markedly enhanced students' proficiency in articulating technical concepts. The research indicated that students utilizing these technologies exhibited enhanced collaboration and collaborative abilities, crucial for interdisciplinary engineering endeavors.

8.3. Technology for Information and Communication in India

The use of ICT in education in India has been inconsistent, with considerable inequalities between urban and rural institutions. The Digital India project, introduced by the Government of India, seeks to address this disparity by advancing ICT infrastructure and digital literacy (Ministry of Electronics and Information Technology, 2015). Notwithstanding these initiatives, engineering education in India frequently falls short in utilizing ICT technologies for the enhancement of communication skills.

Rajesh and Ramesh (2019) conducted a study on the utilization of ICT tools in Indian engineering colleges, identifying several obstacles such as insufficient infrastructure, untrained teachers, and opposition to change. Nevertheless, the report also emphasized successful implementations, like the utilization of virtual laboratories and online project management tools, which have enhanced students' communication and collaboration skills. These findings highlight the potential of ICT in improving communication skills provided problems are effectively addressed.

8.4. Challenges and Limitations:

Although ICT has several advantages, its integration into engineering education presents some problems. A significant concern is the digital gap, which restricts access to ICT resources for kids from economically disadvantaged households. Kaur and Singh (2020) noted that inadequate internet access and gadgets in rural regions impede the efficacy of ICT-based treatments.

Teachers also face the problem of insufficient information and communication technology training. In their framework for Technological Pedagogical Content Knowledge (TPACK), Mishra and Koehler (2006) emphasized that many teachers lack the competence and self-assurance to effectively integrate ICT into their teaching methods. In order to improve students' communication skills, the framework stresses the need of professional development programs that teach teachers how to make the most of information and communication technology.

Concerns regarding privacy and security provide considerable obstacles. Video conferencing and collaboration platforms sometimes necessitate the sharing of personal information by students, which raises issues regarding data privacy and potential misuse. Drossel et al. (2017) found that students voiced concerns regarding privacy when utilizing ICT tools, potentially impeding their readiness to participate fully with these technologies.

8.5. Scope for Further Research:

Notwithstanding the limitations, the capacity of ICT to revolutionize engineering education, especially in India, offers several avenues for future research. Initially, longitudinal studies are essential to evaluate the enduring effects of ICT tools on the development of communication skills. Such studies may yield significant information into the durability and scalability of ICT initiatives.

Secondly, research must concentrate on creating context-specific ICT tools designed to meet the requirements of Indian engineering students. Language learning applications aimed at enhancing technical vocabulary in English might mitigate linguistic obstacles encountered by numerous pupils. Furthermore, research investigating the use of future technologies like artificial intelligence and virtual reality in communication training may provide novel opportunities for innovation.

Third, there is a necessity for policy-focused research to tackle structural obstacles to ICT adoption in Indian engineering education. Research assessing the efficacy of governmental

programs such as the National Education Policy (2020) in facilitating ICT integration may guide approaches to mitigate the digital divide.

9. Conclusion

This paper shows how ICT technologies help engineering students to increase their communication competency. Particularly among students studying computer science and engineering (CSE), the findings corroborate the idea that instruments related to information and communication technology (ICT) have a somewhat beneficial influence on communication abilities. The results show that including ICT into the engineering curriculum can be a successful strategy to improve communication abilities, which are essential for success in both academic and professional environment.

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