

Original Article

Effectiveness of ICT-Based Program in Enhancing Self-Efficacy and Employability Skills of Undergraduate Students in Higher Education

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Abstract - This study investigates how well an ICT-based educational program improves undergraduate students' self-efficacy and employability abilities. Using a sample of forty students, a one-group pre-test and post-test quasi-experimental approach was used. Over the course of a semester, the intervention was delivered through digital assignments, interactive learning activities, and multimedia technologies. Data were collected using standardized self-efficacy and employability questionnaires, t-tests and effect size assessments were utilized to assess the results. The findings showed that ICT-based intervention had a substantial influence on both self-efficacy and employability abilities, with large effect sizes ($d > 1.7$), and statistically significant gains ($p < 0.05$). The results imply that student's self-efficacy and employability skills are improved by ICT-supported learning.

Keywords - ICT, Self-Efficacy, Employability Skills, Higher Education, Quasi-Experimental Design.

1. Introduction

In the twenty-first century, a revolutionary time in the evolution of education, Information & Communication Technology (ICT) has emerged as a crucial element of teaching, learning, research & innovation. The integration of technology breakthroughs with educational practices has radically changed the processes of knowledge generation, diffusion, acquisition. Because of this, traditional classroom environments have progressively evolved into digitally enhanced learning environments that promote flexibility, accessibility, & participation. ICT is now crucial to higher education for both the effective delivery of instruction and the thorough development of students' academic and professional skills.

ICT is now crucial to higher education for both the effective delivery of instruction & the thorough development of students' academic & professional skills. ICT encompasses a broad variety of systems and technologies that enhance administrative & instructional efficacy. These include both simple physical components like scanners, printers, cameras, & projectors as well as complex digital systems that support virtual collaboration, e-learning, & content management. By enabling dynamic interaction between teachers & students with educational materials,

these technologies enhance the overall quality of the teaching-learning process.

One of the most significant developments in education made possible by ICT is the creation of Project Based Learning, known as (PBL). This learner-centered approach emphasizes applying theoretical knowledge to real-world problems through active engagement, teamwork, & reflective inquiry. The integration of ICT technology, into PBL frameworks significantly boosts its effectiveness by fostering critical thinking, creativity, & problem solving abilities. Interactive digital platforms, online collaboration tools, and virtual simulation environments further facilitate experiential learning by allowing students to co create knowledge & share their discoveries through multimedia presentations.

Another crucial component of higher education is the potential of ICT to advance digital literacy & enhance employability skills. In an increasingly technologically advanced & competitive global context, graduates must demonstrate not just subject-specific knowledge but also technological competence & adaptability. ICT-based instructional modules assist students improve their feeling of self-efficacy by increasing their confidence in utilizing digital tools for communication, analysis, & creativity.



Exposure to technology-mediated learning environments can help students acquire vital skills, including data management, virtual collaboration, & online communication. These skills are necessary to meet the demands of contemporary businesses. Thus, ICT is essential for bridging the gap between academic learning & professional preparedness.

2. Review of Related Literature

The Integration of Information & Communication technology, known as (ICT), in higher education has garnered significant attention due to its potential to enhance student's self-efficacy & employability. International organizations such as UNESCO have emphasized that ICT plays a major role to improving educational standards by facilitating information access & creating productive learning environments. Similarly, more thorough policy frameworks highlight the importance of digital learning in preparing students for modern academic & professional challenges. Numerous studies have shown a substantial correlation between student's self-efficacy & ICT use. The basic framework for understanding how people develop self-assurance through technology engagement & mastery experiences is provided by Bandura's theory of self-efficacy. Empirical research indicates that ICT-based learning environments significantly boost student's self confidence in their academic aptitude. According to Tella, Yukselturk, & Bulut, for instance, student's confidence in doing academic work is increased when they actively use digital tools. Furthermore, it has been shown that incorporating mobile & technology supported learning environments positively affects self-efficacy & motivation. These findings suggest that the increasing student's self-efficacy requires the use of ICT-based teaching techniques.

Along with self-efficacy, employability skills have emerged as a critical outcome of higher education in the digital era. Employability abilities that are essential for success in contemporary organizations include digital literacy, problem-solving, teamwork, & communication. ICT integration significantly aids in the development of these skills, as several studies have demonstrated. According to Abbas & Tahir, ICT-based learning environments improve academic performance & employability skills. Similarly, Aithal & Aithal highlighted how the digital revolution in higher education enhances students' readiness for work environments.

Research conducted in the Indian context likewise supports the positive benefits of ICT on employability skills. According to research by Dwivedi & Sharma, Gupta & Tiwari, and Singh & Kaur, ICT-enabled learning fosters critical thinking, teamwork, digital proficiency in undergraduate students. Additionally, it has been found that ICT-based teaching strategies, such technology-supported classroom activities & blended learning, significantly enhance students' professional & practical abilities. ICT

integration in instructional strategies also aids in bridging the knowledge gap between academic learning and business demands. According to Patil, Dey, & Reddy, ICT-enabled skill development programs increase students' employability by giving them relevant professional & technology skills. By being exposed to digital platforms & collaborative technology, students may develop skills that align with the demands of the labor market.

Overall, it is clear from the reviewed studies that ICT-based teaching methods greatly increase students' self-efficacy and employability. These findings provide a strong theoretical and empirical foundation for the current study, which attempts to examine the effectiveness of ICT-based interventions in enhancing these two critical competencies among undergraduate students.

3. Objectives of the Study

The goal of the current study is to find out how ICT-based interventions affect the skills of undergraduate students. The study specifically seeks to accomplish the following goals:

1. To evaluate undergraduate students' employability and capabilities.
2. To investigate how ICT-based programs affect undergraduate student's employability and skills.
3. To assess undergraduate students degree of self-efficacy.
4. To examine how ICT-based programs affect undergraduate students self-efficacy.

4. Methodology

4.1. Research Design

This study used a one group pre-test & post-test quasi-experimental research design to examine the effects of an ICT-based instructional program on undergraduate students self-efficacy & employability skills. This design was accepted because it enables the assessment of changes within the same group of participants across time following exposure to a structured intervention.

Institutional constraints prevented the inclusion of a control group & random assignment. Consequently, the study employed a within-group comparison approach using pre-test & post-test measurements.

The design of the study can be represented as:

$$O_1 \rightarrow X \rightarrow O_2$$

where:

O_1 = Pre-test measurement

X = ICT-based instructional intervention

O_2 = Post-test measurement

4.2. Population and Sampling

Undergraduate students participating in arts programs at a degree institution connected to C.C.S. University, Meerut,

made up the study's population. The complete class method was used to choose a sample of forty undergraduate students. The experimental intervention was implemented more smoothly & with less disturbance to the usual teaching-learning process, thanks to the employment of an unbroken class. Furthermore, variability resulting from variations in individual factors like aptitude, background, & prior knowledge was reduced since the same set of students was evaluated at both the pre-test & post-test phases.

4.3. Variables of the Study

4.3.1. Independent Variable

- ICT-based instructional intervention (University-prescribed ICT Certificate Course)

4.3.2. Dependent Variables

- Self-efficacy
- Employability skills

Controlled Variables

The following factors were closely monitored while the ICT-based instructional intervention was being implemented in order to guarantee the study's internal validity:

- Academic Discipline: Every participant was chosen from the same college's Arts stream. This prevented variance resulting from disparities in topic specialization & guaranteed that students had similar academic backgrounds.
- Semester Duration: The intervention lasted a set 16 weeks & was administered to all participants throughout the same academic semester. As a result, the ICT-based program was equally accessible to all pupils.
- Curriculum Content: Every participant adhered to the university's unified ICT curriculum. All pupils were taught the same subjects since there could be no content variance.
- Instructor: Throughout the intervention period, every student received ICT-based education from the same teacher. This managed variations in engagement, explanation, & teaching methodology.
- Learning Environment: Every session was held in the same classroom with comparable ICT resources, including PCs & digital tools. All participants were guaranteed equal learning circumstances as a result.

By keeping these variables under control, study made sure that the ICT-based instructional intervention was the main cause of the observed improvements in employability skills & self-efficacy rather than outside influences. By lowering the impact of unrelated factors, control over these variables improved the study's internal validity.

4.4. Description of the ICT-Based Instructional Intervention

The ICT-based instructional intervention was carried out over the course of one academic semester (16 weeks) using a

university-mandated ICT curriculum that was modified from C. C. S. University, Meerut.

Smart classroom instruction, multimedia presentations, Learning Management Systems known as (LMS), digital assignments & presentations, online collaborative activities, exposure to digital research repositories like Shodhganga & Shodhgangotri were just a few of the technology-enabled teaching learning techniques used in the intervention.

Key units, including Introduction to Computers, Digital Presentation Preparation, & Basic Cyber Laws & Cyber Security Awareness, were all addressed in the course material. Through practical exercises that were in line with the course of objectives, experiential learning was emphasized.

Thirty hours of practical training, & fifteen hours of theoretical education made up the 45 instructional hours allotted.

4.5. Tools for Data Collection

Two standardized instruments were employed for data collection:

1. Dhar & Dhar (2019) created the Self-Efficacy Scale, which has 35 items with a five-point Likert scale. According to reports, the scale's reliability coefficient (Cronbach's α) is 0.88.
2. The 39-item Employability Skills Inventory was modified from Naachimuthu (2019). With a Cronbach's α rating of 0.82, the instrument shows respectable dependability.

4.6. Procedure of the Study

The research was carried out in four consecutive stages:

Phase I: Pre-Test: To determine baseline levels of self-efficacy & employability abilities, participants were given both instruments.

Phase II: ICT-Based education: For one academic semester, students received organized ICT-based education.

Phase III: Post-Test: To evaluate changes in the dependent variables, the same instruments were given again after the intervention was finished.

Phase IV: Data Compilation: The gathered information was methodically tallied, graded, & ready for statistical examination.

4.7. Data Analysis and Interpretation

Table 1. Pre-Test and Post-Test Mean Scores of Self-Efficacy (N = 40)

Test	Mean	SD
Pre-Test	62.45	6.21
Post-Test	81.32	5.74

The above table indicates increase in the mean score of self-efficacy from pre-test (M = 62.45, SD = 6.21) to post-test (M = 81.32, SD = 5.74). This significant improvement

implies that the student's confidence in their capacity to do academic activities was significantly impacted by ICT-based educational intervention. Additionally, decrease in standard deviation shows that individual's progress has been comparatively steady.

Table 2. Pre-Test and Post-Test Mean Scores of Employability (N = 40)

Test	Mean	SD
Pre-Test	64.12	5.32
Post-Test	83.25	4.98

The data presented in the table reveal a notable enhancement in employability skills, with the mean score increasing from 64.12 (SD = 5.32) in the pre-test to 83.25 (SD = 4.98) in the post-test. This suggests that the ICT-based curriculum made a substantial contribution to the development of critical employability qualities, including problem solving, teamwork, & communication. The slight decrease in standard deviation reflects a more uniform development of these skills across the group.

4.7.1. Hypothesis 1

H₀₁: There is no significant difference between the pre-test & post-test mean scores of self-efficacy among undergraduate students exposed to the ICT-based instructional program.

Table 3. Paired Sample t-Test Results for Pre-Test and Post-Test Self-Efficacy

Variable	Mean Difference	t-value	p-value
Self-Efficacy	18.87	12.64	<0.001*

The paired sample t-test result indicates that $t(39) = 18.87$, $p < 0.05$. Since the obtained p-value is less than the level of significance ($\alpha = 0.05$), the null hypothesis is rejected. This finding demonstrates that there is a statistically significant improvement in students' self-efficacy following the ICT-based instructional intervention.

4.7.2. Hypothesis 2

H₀₂: There is no significant difference between the pre-test & post-test mean scores of employability skills among undergraduate students exposed to the ICT-based instructional program.

Table 4. Paired Sample t-Test Results for Pre-Test and Post-Test Employability Skills

Variable	Mean Difference	t-value	p-value
Employability Skill	19.13	14.21	<0.001*

The results of the paired sample t-test for employability skills reveal that the calculated value of $t(39) = 19.13$ with a

p-value of 0.001 is statistically significant at the 0.05 level. Since the p-value is less than the prescribed level of significance, the null hypothesis is rejected.

This indicates that there is a statistically significant difference between the pre-test & post-test mean scores of employability skills. Therefore, it can be concluded that the ICT-based instructional intervention had a significant positive impact on enhancing employability skills among undergraduate students.

4.7.3. Effect Size Estimation

Effect size was computed to determine the magnitude of the impact of the ICT-based instructional intervention. Cohen's *d* was used as a standardized measure of effect size.

Table 5. Effect Size (Cohen's d) on Self-Efficacy and Employability Skill of Undergraduate Students

Variable	Cohen's d	Magnitude
Self-Efficacy	1.72	Large
Employability Skills	1.83	Large

The computed effect sizes for both self-efficacy & employability skills are substantially higher than the conventional benchmark of 0.80, as suggested by Cohen. This indicates that the ICT-based instructional intervention had a strong & practically significant impact on students learning outcomes. The large magnitude of effect size suggests that the observed improvements are not only statistically significant but also educationally meaningful, highlighting the effectiveness of ICT integration in enhancing both psychological (self-efficacy) and professional (employability skills) competencies among undergraduate students.

4.8. Ethical Considerations

Strict adherence to ethical standards was maintained throughout the study. Prior to beginning the work, approval to conduct the research was obtained from the appropriate authorities. The participants were informed of the purpose of the study & the conditions for their involvement. Prior to data collection, each subject provided their consent, & participation was completely optional. They were assured that the information they provided would only be used for academic purposes. The participant's privacy was safeguarded at all levels. No personal information was collected, & the responses were kept confidential. Participants may also leave the study at any time without suffering any consequences. There was no pain or harm to the participants as a result of the ICT-based activities. The study was carried out in an ethical and responsible manner.

5. Findings and Conclusion

The results of this study offer solid empirical support for the idea that ICT-based instructional interventions might

improve undergraduate students' self-efficacy & employability abilities. These two factors were positively & significantly impacted by exposure to ICT-based instructional modules, as seen by the statistically significant variations between pre-test & post-test scores.

The notable increase in self-efficacy suggests that ICT-based teaching strategies boosted students' self-assurance in their capacity to complete academic assignments successfully. Students were able to participate more actively in the learning process & strengthen their confidence in their academic ability via the use of digital tools, interactive learning environments, and technology supported activities. The impact of the ICT-based educational intervention is both statistically significant and practically useful, as further shown by the substantial effect sizes found in this study ($d > 1.7$).

Overall, the study finds that ICT-integrated teaching strategies greatly improve student's employability & self-efficacy. For undergraduate students to develop both academic confidence & employability preparedness, ICT integration in higher education should be seen as crucial.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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