Assessing Digital Literacy and Entrepreneurial Skills among Prospective Teachers

P Geetha Bhaskaran[1], Dr. Minikumari D[2]
[1]*Research Scholar, NSS Training College, Ottapalam, Research Centre in Education, University of Calicut*
[2]*Associate Professor, NSS Training College, Ottapalam, Research Centre in Education, University of Calicut*

***Abstract*—This study aims to assess the levels of Digital Literacy and Entrepreneurial Skills among prospective teachers in the context of 21st-century teaching-learning environments. Sample consists of 150 prospective teachers from Thrissur and Palakkad districts. Simple Random Sampling Method is used to select the sample. Tests to measure Digital Literacy and Entrepreneurial Skills were developed by the investigators for data collection. Preliminary findings indicate above average skills in both Digital Literacy and Entrepreneurial Skills among prospective teachers. Findings indicate that there is no significant difference in Digital Literacy and Entrepreneurial Skills based on the stream of study among prospective teachers and also suggest that teacher education institutions should integrate comprehensive training modules that strengthen both digital and entrepreneurial capacities to create dynamic, technology-rich, and innovation-driven learning environments to nurture future teachers.**

***Index Terms*—Digital Literacy, Entrepreneurial Skills, Prospective Teachers, Teacher Education.**

I. INTRODUCTION

The educational landscape in the twenty-first century is undergoing rapid transformation due to the accelerated integration of digital technologies, artificial intelligence and innovative pedagogical practices. Traditional teacher-centered models are increasingly being replaced by interactive, technology-supported and learner-centered approaches that demand new competencies from teachers. As classrooms become more digitally mediated and schools adopt blended and online learning environments, it becomes imperative for future teachers to demonstrate strong Digital Literacy skills. Digital Literacy is no longer a supplementary or optional skill; it has emerged as a core requirement for effective teaching, curriculum delivery, assessment, and professional communication in modern educational settings.

Teacher education institutions are entrusted with the responsibility of preparing prospective teachers who can navigate digital platforms confidently, create pedagogical resources, manage virtual classrooms and engage learners through multimodal instructional strategies. Digital Literacy extends beyond basic computer knowledge to include the ability to access, evaluate, manage, and create digital content in ethical and responsible ways. Prospective teachers who lack these competencies may struggle to integrate technology meaningfully, thus affecting the quality of teaching and student engagement. Therefore, assessing their Digital Literacy becomes crucial to understanding their preparedness for contemporary classrooms and ensuring alignment with national standards such as the National Education Policy (NEP 2020), which emphasizes digital empowerment and ICT integration.

In addition to digital competence, teachers in modern educational environments are expected to possess Entrepreneurial Skills that foster creativity, innovation, adaptability, and problem-solving. Entrepreneurial Skills in education refer not to business ventures but to an innovative mindset that enables teachers to identify opportunities, experiment with new strategies, design projects, and take calculated risks to improve teaching-learning processes. Teachers with entrepreneurial traits are more likely to adopt innovative pedagogies, develop student-centered activities, and contribute to

institutional development. Thus, assessing Entrepreneurial Skills among prospective teachers is essential for understanding their potential to function as change-makers in the education system.

Digital Literacy and Entrepreneurial Skills are interconnected competencies that mutually reinforce each other. Teachers who are digitally skilled are better positioned to implement innovative ideas, design creative digital learning materials, analyze data and communicate effectively with learners and stakeholders. Entrepreneurial behavior supports teachers in using technology in novel ways, building digital learning environments and responding dynamically to challenges in the teaching profession.

II. DEFINING THE KEY TERMS

Digital Literacy

Digital literacies are those capabilities which fit an individual for living, learning and working in a digital society. (Jisc 2014) In 2014, Jisc developed the Seven Elements Model of Digital Literacy in which Digital Literacy encompasses a range of capabilities essential for living, learning and working successfully in a rapidly changing digital society. This model comprises media literacy, communications and collaboration, career and identity management, ICT literacy, learning skills, digital scholarship, and information literacy as the elements of Digital Literacy.

Entrepreneurial Skills

Entrepreneurship is the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting reward (Hisrich, Peters, & Shepherd, 2005, p. 8). Entrepreneurial Skills consists of Technical Skills (Monitoring of environment, taking advantage of technology, Ability to organize, Management style), Business Management Skills (Problem solving, Decision making, Planning and strategizing, Human Relations, Business planning, managing finance, marketing, accounting) and Personal Skills (Creative thinking, Inner control, Risk propensity, Innovativeness, Opportunity identification, Visionary leadership, Change orientation, Persistence).

III. NEED AND SIGNIFICANCE OF THE STUDY

The rapid digital transformation in education, marked by the integration of ICT tools, online platforms, virtual classrooms and AI-based learning systems has made digital competency indispensable for modern teachers. The growing demand for innovative pedagogies has highlighted the importance of Entrepreneurial Skills that foster creativity, critical thinking, experimentation and adaptability which are essential for enhancing student engagement and learning outcomes. The National Education Policy (NEP 2020) further reinforces this need by emphasizing teacher digital empowerment, innovation, problem-solving and the development of future entrepreneurs with digital skills. Assessing the Digital Literacy and Entrepreneurial Skills of prospective teachers becomes vital for ensuring their professional readiness to effectively engage in diverse and technology-rich educational environments.

Studies related to Digital Literacy

Sholikhah, O. H., Purwanto, Hadi, S., & Muksar, M. (2025) contributed a novel conceptual model extending Mezirow's Transformative Learning Theory and the TPACK framework, emphasizing the synergistic development of cognitive, social, and digital skills to foster professional reflection in teacher candidates. Fazal, N., Aslam, M., & Azam, N. (2024) found that significant differences amid public and private institutions in technological knowledge, usage and awareness recommends enhancing technological training in the teacher preparation programs and stress for professional growth in educational technology. Shamsher, S., & Iqbal, K. (2024) revealed a statistically significant positive association between future teachers' self-engagement and their digital literacy skills, attitude towards teaching, and academic motivation. Asad, M. M., Gul, J., & Lashari, M. A. (2020) enhanced the knowledge and technological skills of prospective teachers through ICT integration and increased the interest of prospective teachers in digital literacy through ICT based training.

Studies related Entrepreneurial Skills

Latip, A., Rahmaniar, A., Zanah, F., & Puspita, D. (2025) findings suggest that the integration of ET into science education holds significant potential in shaping innovative and solution-oriented mindsets

among pre-service science teachers. Iyamuremye, A., Musengimana, J., Nsabayezu, E., Rugabirwa, B., Kayirangwa, V., & Niyonzima, F.N. (2025) findings suggest that experience and gender-related factors influence how chemistry teachers develop and apply entrepreneurial knowledge in educational settings. Supriatno, B., Kusumawaty, D., Tallei, T. E., Emran, T. B., & Suwandi, T. (2023) reveals that results of the logical validation of the hypothetical model of CAPAB(L)E bioentrepreneurship learning model is valid and can be implemented, with a score of 81,25%. The students' perceptions are generally positive on the structure and content of the material. Jamil, S. B., & Iqbal, Z. (2020) reveal that the level of entrepreneurial skills among women was very low, majority of the women did not attempt the assessment test related to technical skills and some women got a minimum score in business plan template and situational judgment.

Objectives

- To assess the level of Digital Literacy among Prospective Teachers
- To assess the level of Entrepreneurial Skills among Prospective Teachers
- To check whether there exist significant differences in Digital Literacy based on Stream of Study
- To check whether there exist significant differences in Entrepreneurial Skills based on Stream of Study

Hypotheses

- There is no significant difference in Digital Literacy among Prospective Teachers
- There is no significant difference in Entrepreneurial Skills among Prospective Teachers
- There does not exist significant differences in Digital Literacy based on Stream of Study
- There does not exist significant differences in Entrepreneurial Skills based on Stream of Study

III. METHODOLOGY

Research Design

In the present study, a descriptive method is used. Descriptive studies help to identify the demographic characteristics of the population.

Population and Sample

The population of the study is prospective teachers from Thrissur and Palakkad districts. The sample consists of 150 students studying in various B.Ed. colleges. Simple random sampling technique is used.

Stream of study	N
Language	30
English	30
Mathematics	30
Physical Science	30
Social Science	30

IV. DATA COLLECTION TOOLS

1) Personal Data Sheet: The Personal Data Sheet prepared by the researchers consists of details such as the Name of the prospective teacher, Gender, Name of the college, Type of Management, Stream of study and Academic Year.

2) Digital Literacy Test: The tool is prepared by the researcher with the help of the Research Supervisor, used to collect the data from prospective teachers online. The test consists of 25 items based on Digital Literacy of JISC (2014) classification.

3) Entrepreneurial Skills Test: The tool is prepared by the researcher with the help of the Research Supervisor, used to collect the data from prospective teachers online. The test consists of 25 items based on Entrepreneurial Skills of (Hisrich, Peters, & Shepherd, 2005) classification.

Statistical Techniques

- Mean and Standard Deviation
- One-Way ANOVA

Application and Data Collection

The investigators collected data from prospective teachers from Thrissur and Palakkad districts online. After collecting the data, tabulation of the information according to the objectives and subsequent evaluation of the data was done.

V. DATA ANALYSIS

In this study, mean, standard deviation and independent sample t-test is used to assess Digital Literacy and Entrepreneurial Skills of prospective teachers.

Table-1 Frequency and Percentage of Digital Literacy among prospective teachers

Level of Digital Literacy	Frequency	Percentage
Below average	21	14%
Average	29	19.33%
Above Average	100	66.66%

Table 1 reveals that 14% of prospective teachers have below average level of Digital Literacy, 19.33% have average level of Digital Literacy and 66.66% have above average level of Digital Literacy.

Table-2 Frequency and Percentage of Entrepreneurial Skills among prospective teachers

Level of Entrepreneurial Skills	Frequency	Percentage
Below average	29	19.33%
Average	32	21.33%
Above Average	89	59.33%

Table 2 reveals that 19.33% of prospective teachers have below average level of Entrepreneurial Skills, 21.33% have average level of Entrepreneurial Skills and 59.33% have above average level of Entrepreneurial Skills.

Table 3 Mean Score, SD of Digital Literacy among prospective teachers based on Stream of study

Stream of Study	N	Mean	Standard Deviation
Language	30	18.80	5.804
English	30	19.27	4.927
Mathematics	30	18.37	5.136
Physical Science	30	17.67	6.002
Social Science	30	18.93	5.232
Total	150	18.61	5.391

Table 3 reveals the mean scores for Digital Literacy of prospective teachers based on Stream of Study for Language 18.30, English 19.27, Mathematics 18.37, Physical Science 17.67 and Social Science 18.93. The mean value(s) for Digital Literacy of prospective teachers based on Language, English, Mathematics, Physical Science and Social Science was found much closer.

The standard deviation values indicate how much the scores vary within each Stream of Study. The Physical Science group shows the highest standard deviation of 6.002, suggesting the greatest variability and less consistency in students' scores. The Language and Mathematics streams have standard deviations of 5.804 and 5.136 respectively, indicating moderate variability in performance. The Social Science stream has a slightly lower standard deviation of 5.232, showing somewhat more consistent scores compared to language and physical science. The English stream displays the lowest standard deviation of 4.927, indicating that students' scores in this group are the most consistent and least spread out. The variation across streams is moderate, with Physical Science showing the widest spread of scores and English showing the most stable performance.

Table 4 One-Way ANOVA Showing Differences in Digital Literacy among Prospective Teachers Based on Stream of Study

	Sum of squares	df	Mean Square	F	Sig.
Between Groups	45.627	4	11.407	.386	.818
Within Groups	4284.167	145	29.546		
Total	4329.793	149			

Table 4 the F-value is 0.386. This value compares the variation between the groups with the variation within the groups. F-value less than 1 indicates that the group means are very similar. This suggests that there is very little difference across the groups.The significance value (p-value) is 818. This value is much greater than the standard significance level of 0.05. This means that there is no statistically significant difference among the group means. Any differences observed are likely due to random variation rather than a true effect.

The one-way ANOVA result shows that the differences between the group means are not statistically significant, with F (4, 145) = 0.386 and p = 0.818. This indicates that the groups did not differ significantly on the measured variable. The sum of squares between groups is 45.627, which indicates small variation between the groups. The degrees of freedom between groups are 4, representing the number of groups minus one.The mean square between groups is 11.407.

The sum of squares within groups is 4284.167, which shows large variation within the groups. The degrees of freedom within groups are 145, representing total participants minus the number of groups. The mean square within groups is 29.546. Since the variation within the groups is much larger than the variation between the groups, the groups overlap considerably. This means there is no meaningful difference among the groups.

There is no significant difference among the groups, meaning group membership does not influence the variable being studied, so null hypothesis is accepted.

Table 5 Mean Score, SD of Entrepreneurial Skills among prospective teachers based on Stream of study

Stream of Study	N	Mean	Standard Deviation
Language	30	17.87	6.404
English	30	17.57	7.528
Mathematics	30	15.77	6.224
Physical Science	30	17.57	6.372
Social Science	30	19.50	4.769
Total	150	17.65	6.348

Table 5 reveals the mean scores for Entrepreneurial Skills of prospective teachers based on Stream of Study for Language 18.30, English 19.27, Mathematics 18.37, Physical Science 17.67 and Social Science 18.93. The mean value(s) for Entrepreneurial Skills of prospective teachers based on Language, English, Mathematics, Physical Science and Social Science was found much closer.

The standard deviation values show how widely the scores vary within each Stream of Study. The English group has the highest standard deviation of 7.528, indicating that students' scores in this stream are the most spread out and less consistent. The Language, Mathematics, and Physical Science streams have similar standard deviations of 6.404, 6.224, and 6.372 respectively, which suggests moderate variability in performance within these groups. In contrast, the Social Science stream has the lowest standard deviation of 4.769, showing that students' scores in this group are more closely clustered around the mean and therefore more consistent compared to the other streams. The variation in scores differs across subjects, with English showing the greatest score dispersion and social science showing the least.

Table 6 One-Way ANOVA Showing Differences in Entrepreneurial Skills among Prospective Teachers Based on Stream of Study

	Sum of squares	df	Mean Square	F	Sig.
Between Groups	210.907	4	52.727	1.320	.265
Within Groups	5793.067	145	39.952		
Total	6003.973	149			

Table 6 the sum of squares between groups is 210.907. This value represents the amount of variation explained by the differences between the groups. A larger between-group sum of squares would indicate more variation caused by group differences, but in this case the value is relatively small. This suggests that the groups do not differ greatly from one another.

Degrees of freedom between groups is 4. The mean square between groups is 52.727. This value is obtained by dividing the between-group sum of squares by its degrees of freedom. It shows the average variation between the groups.

The F-value is 1.320. F-value compares the variation between groups to the variation within groups. An F-value close to 1 suggests that the variation between the groups is similar to the variation within the groups. This indicates that the group means are not very different.

The significance value (p-value) is 0.265 which is greater than the commonly used threshold of 0.05.the differences between group means are not statistically significant. This indicates that any difference observed among the groups is likely due to chance rather than a real effect. The sum of squares within groups is 5793.067. This represents the amount of variation that occurs within the individual groups. This value is much larger than the between-group sum of squares, showing that most of the variability comes from differences within groups, not between them.

The degrees of freedom within groups are 145. This represents the total number of participants minus the number of groups. The mean square within groups is 39.952. This is the average variation within the groups. Since the within-group variation is much larger than the between-group variation, the groups overlap considerably means that the group membership does not have a meaningful effect on the variable being studied. The results indicate that there is no significant difference among the groups, so null hypothesis is accepted.

VI. EDUCATIONAL IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

Educational Implications

- The finding that most prospective teachers possess above-average Digital Literacy and

Entrepreneurial Skills indicates that teacher education programmes are moving in a positive direction, so structured institutional support for developing Digital Literacy and Entrepreneurial Skills is still required to ensure uniform competency development among all trainees.

- The presence of prospective teachers with average and below-average skill levels highlights the need for systematic interventions within teacher education institutions to bridge competency gaps and promote inclusive professional readiness.
- The absence of significant differences based on stream of study suggests that Digital Literacy and Entrepreneurial Skills are universal teaching competencies and should be integrated as core components across all subject disciplines.
- The study reinforces the alignment of Digital Literacy and Entrepreneurial Skills with the objectives of the National Education Policy (NEP 2020), emphasizing teacher digital empowerment, innovation, and professional autonomy.

Recommendations

- Teacher education institutions should introduce compulsory, credit-based courses focusing specifically on Digital Literacy and Entrepreneurial Skills within the B.Ed. curriculum.
- Regular training programmes, workshops, and seminars should be conducted to familiarize prospective teachers with emerging digital tools, artificial intelligence applications, online teaching platforms, and digital assessment techniques.
- Entrepreneurial Skills development should be promoted through activity-oriented strategies such as problem-based learning, innovation projects, collaborative teaching tasks, and design thinking activities.
- Continuous monitoring and evaluation of Digital Literacy and Entrepreneurial Skills should be incorporated into teacher education programmes to ensure sustained competency development.

Conclusion

The study concludes that the majority of prospective teachers demonstrate above-average levels of Digital Literacy and Entrepreneurial Skills, reflecting a positive readiness for contemporary teaching-learning environments. The absence of significant differences based on stream of study confirms that these competencies are essential for all prospective teachers, regardless of subject specialization. Digital Literacy and Entrepreneurial Skills are interrelated competencies that collectively enhance teaching effectiveness, innovation, and adaptability in the 21st-century classroom. Teacher education institutions play a crucial role in nurturing these competencies through curriculum design, pedagogical strategies, assessment practices, and institutional support systems. The findings of the study support the vision of NEP 2020 by emphasizing the need for digitally empowered and entrepreneurially oriented teachers.

Overall, the study underscores the necessity of a holistic and systematic approach in teacher education to prepare future teachers as competent professionals and transformative leaders in education.

REFERENCE

[1] Government of India, Ministry of Education, *National Education Policy 2020*. New Delhi, India, 2020. [Online]. Available: https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

[2] M. M. Asad, J. Gul, and M. A. Lashari, "Digital skills and literacy among prospective teachers of Sukkur Pakistan: A conceptual framework," *Proceeding on Teaching and Science Education (ICTASE)*, vol. 1, no. 1, pp. 27–36, 2020, doi: 10.31098/ictase. v1i1.18.

[3] N. Fazal, M. Aslam, and N. Azam, "Digital literacy among prospective teachers: The comparative analysis of public and private universities," *Journal of Social Sciences Development*, 2024, doi: 10.53664/JSSD/03-04-2024-02-11-20.

[4] Iyamuremye, J. Musengimana, E. Nsabayezu, B. Rugabirwa, V. Kayirangwa, and F. N. Niyonzima, "Assessing chemistry teachers' entrepreneurial competencies for developing small chemical-based businesses in Rwanda," *Discover Education*, vol. 4, 2025.

[5] S. B. Jamil and Z. Iqbal, "Evaluation of vocational training programs for developing entrepreneurial skills among women in the Punjab," *Bulletin of Education and Research*, vol. 42, no. 2, pp. 197–218, 2020.

[6] Latip, A. Rahmaniar, F. Zanah, and D. Puspita, "Mapping pre-service science teachers' understanding, attitudes, and skills in entrepreneurial thinking within science projects," *Indonesian Science Education Research (ISER)*, vol. 7, no. 1, 2025, doi: 10.24114/iser. v7i1.68248.

[7] S. Shamsher and K. Iqbal, "Relationship between digital literacy skills, attitude towards teaching profession and academic motivation among prospective teachers," *VFAST Transactions on Education and Social Sciences*, vol. 12, no. 1, 2024, doi: 10.21015/vtess. v12i1.1704.

[8] O. H. Sholikhah, Purwanto, S. Hadi, and M. Muksar, "The effect of numeracy on reflective thinking moderated by leadership and digital information literacy among prospective elementary school teachers," *Multidisciplinary Reviews*, 2025.

[9] B. Supriatno, D. Kusumawaty, T. E. Tallei, T. B. Emran, and T. Suwandi, "Introducing CAPAB(L)E: A learning model to promote prospective biology teacher's entrepreneurship skills," *Jurnal Pendidikan IPA Indonesia*, vol. 12, no. 2, 2023, doi: 10.15294/jpii. v12i2.40741.