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Impact of Technology-enabled Project-based Learning on Students' Skill Acquisition in Higher Education in view of NEP: An Empirical Study

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Abstract:

The New National Education Policy (NEP) 2020 was developed to modify the Indian educational system to meet the needs of the twenty-first century. The revised assessments expanded learning opportunities, and emphasis on curriculum and pedagogy changes are the main goals of the new policy. In light of NEP, the purpose of this research is to investigate how technology-enhanced project-based learning affects student motivation in higher education. The integration of technology-enabled project-based learning affects student motivation while achieving life skill-based learning outcomes, and this classroom-based empirical research explores and analyses how this impact occurs. This study examines how well the PBL approach works for teaching life skills to undergraduate students in SFL (School for Life) classes during the first semester of the academic year 2022–2023. The study uses quantitative analysis to ensure a valid interpretation of student feedback. **The data of 200 students have been collected and thereupon regression model has been developed to test the impact of the key factors of project-based learning that are contributing to the motivation of learning among the students in higher education.** The application of technology-enabled project-based learning revealed higher motivation toward lifelong learning among learners.

Keywords: *Higher Education, Innovative Pedagogy, Indian Education, NEP 2020, National Education Policy, PBL, Project-based Learning, Student Training, Student Motivation*

Introduction:

The 21st century is an era marked by several remarkable developments brought on by technical advancements. The 4.0 century, also called the century of industrial openness, is what it is called (Yunus & Mitrohardjono, 2020). It must be taken into account that technology advancement boosts productivity and opens up new prospects in a global economy. The labour market today is extremely competitive, and many occupations need not only technical or hard skills but also efficacy and efficiency when working with others. Life skills (soft skills) are necessary to succeed in these roles (Gómez-Gamero, M.E. 2019). Therefore, the current labour market requires employees to have higher levels of skills. Today, employers go beyond academic and technical expertise, and they are starting to include life skills (Yong, B.P.P.; Ling, Y.L. 2020). Life skills have gradually evolved into indicators of greater employability (Succi, C.; Canovi, M. 2020). Also according to the World Economic Forum's 2020 Future of Jobs Survey, employers currently and in the near future prioritise life skills.

These life skills are necessary for students to find decent employment and keep their skill sets updated. It has been challenging to introduce these skills into higher education (Tang, K.N. 2019). In order for students to flourish and find their place in the global economy, it is utmost essential to adopt new methods and techniques. Such a cutting-edge method should enable students to put their theoretical knowledge into practice, enabling them to employ the following abilities: leadership, teamwork, communication, creativity and invention, and working with data. Project-based learning is one instructional methodology that helps teachers successfully facilitate life skills to students. PBL is the learning approach that directly involves students in creating a project, claim Sari & Angreni (2018). Moreover, Surya et al. (2018) said that PBL learning is an innovative method of instruction that positions the instructor in the role of a motivator and facilitator, offering students the freedom to independently create their own learning.

PBL offers a means of deep learning and real-world application. This approach can be used to discover a fresh, methodical approach for actual learning that uses the instructor as a facilitator (Indarti, 2016; Purnasari & Sadewo, 2019). It is a method of instruction that encourages students to be creative and active learners. According to Diana et al (2021), PBL is a learning model that requires students to work on an issue as a group and they follow a series of learning processes known as syntax

in order to thoroughly answer the provided problems in PBL. A range of skills are used in the project-based learning method to assist students in developing a strategy for problem-solving, according to Yunita et al. (2021). By encouraging students to look into their interests and "produce projects that result in meaningful learning experiences," PBL hopes to involve students in their education (Wurdinger et al., 2007, p. 151).

According to Kapusuz and others in Terron Lopez's et al. (2017) research, project-based learning is a more successful strategy for blending academic courses with industry skills requirements. Students have the chance to develop life skills through project-based learning (PBL), as well as absorb traditional academic material more thoroughly and comprehend how it relates to real-world situations (Larmer, 2015). Nguyen et al. (2020) did research on project-based learning models and found that it is useful and necessary in higher education instruction to nurture creativity, encourage a spirit of learning, and enhance problem-solving abilities. Project-based learning not only promoted effective learning outcomes but also assisted students in developing stronger interpersonal, work, and cognitive skills (Kettanun, 2015). Project-based learning is a specific kind of inquiry-based learning where the learning context is given by real-world activities (Al-Balushi & Al-Aamri, 2014) and actual questions and challenges that result in meaningful learning experiences (Wurdinger, Haar, Hugg & Bezon, 2007).

Through PBL, instructors advise students throughout their project work and students develop their learning skills and engage in practical activities. The project-based learning paradigm is learner-centered, problem-focused, and has a time limit. Students participate in problem-solving learning activities in groups to encourage motivation and teamwork (Y. D. Kristanti, Subiki, R. D. Handayani, 2016). Sari et al. (2020) also came to the conclusion that project-based learning may foster students' character development through the design of experiments, with signs of curiosity, the courage to voice one's thoughts, high perseverance, and high inventiveness. Students have several opportunity to develop skills that will be useful in the future thanks to project-based learning. "Students strengthen their critical thinking and problem-solving abilities while learning how to communicate and share ideas with one another. They can acquire new methods of thinking and learn how to draw conclusions more quickly and effectively as a result (K. Kwietniewski, 2017).

This study examines how well the PBL approach works for teaching life skills to undergraduate students in SFL (School for Life) classes during the first semester of the academic year 2022–2023. This research is primarily concerned with the significance of PBL when used in SFL classes to support life skills education. The project presentations that the students are required to give in front of the class at the end of the semester are used to gauge the students' confidence, teamwork, leadership, and data handling skills. These skills are demonstrated through meaningful projects that call for critical thinking, creativity, and communication to address challenging issues.

Objectives

1. To explore the factors of project-based learning pedagogy on students' skill acquisition in the digital age.
2. To study the impact of project-based learning pedagogy on students' skill acquisition in the digital age.

Hypotheses

The study seeks to investigate the effect of collaborative learning, authentic task and project and use of technology on students' skill acquisition in digital age. Following hypotheses were proposed:
H1: There is a significant impact of collaborative learning on students' skill acquisition in the digital age.
H2: There is a significant impact of authentic task and project on students' skill acquisition in the digital age.
H3: There is a significant impact of use of technology on students' skill acquisition in the digital age.

Research Methodology

Data Analysis and Its Interpretation

EXPLORATORY FACTOR ANALYSIS

Exploratory Factor Analysis (EFA) was conducted using SPSS version 23 to condense data meaningfully, supported by principal component analysis and Varimax rotation to summarize pertinent information through linear dimensional reduction. The analysis, as detailed in Table 1, focused on the dependent variable, students' skill acquisition in the digital

age, measured by a single master question on a 7-point Likert scale. The three independent variables—collaborative learning (4 questions), authentic tasks and projects (3 questions), and use of technology (3 questions)—were also measured on a 7-point Likert scale. Items with factor loadings below 0.5, following criteria established by Hair et al. (2010) and Joti & Arora (2013), were excluded from subsequent analysis.

In the structured questionnaire, EFA revealed three influential factors shaping students' skill acquisition in the digital age: collaborative learning, authentic tasks and projects, and the use of technology. The Kaiser-Meyer-Olkin (KMO) value for all factors was 0.741, indicating adequate sampling adequacy among the college student respondents (Table 2). Additionally, Bartlett's test of sphericity, evaluating the correlation matrix's significance, yielded a p-value of 0.000, below the 0.05 significance level, leading to the rejection of the null hypothesis and the acceptance of the alternative hypothesis. This confirms the meaningfulness of the identified factors in influencing students' skill acquisition in the digital age.

Table 1 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.561	35.615	35.615	3.561	35.615	35.615	2.720	27.199	27.199
2	2.078	20.780	56.395	2.078	20.780	56.395	2.269	22.686	49.884
3	1.232	12.320	68.715	1.232	12.320	68.715	1.883	18.830	68.715
4	.919	9.191	77.906						
5	.565	5.651	83.557						
6	.517	5.174	88.731						
7	.465	4.647	93.378						
8	.296	2.965	96.343						
9	.195	1.955	98.298						
10	.170	1.702	100.000						

Table 2 : Kmo and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.741
Bartlett's Test of Sphericity	Approx. Chi-Square	748.884
	Df	45
	Sig.	.000

Reliability

The reliability of all the factors have been scrutinized through Cronbach's alpha. The value of Cronbach alpha equal to or greater than 0.70 indicates good reliability (Hair et al., 2010). Reliability results through SPSS version 23 in this research are greater than 0.70 which indicates that the scales are truly reliable in **Table 3.**

Table 3 - Reliability

	Factor Name	**Reliability(Cronbach Alpha)**
Factor 1	Collaborative Learning (4 items)	.841
Factor 2	Authentic Task and Project (3 items)	.896
Factor 3	Use of Technology (3 items)	.740

Multiple Regression

The multiple regression analysis conducted in this study reveals a positive linear relationship between the dependent variable, students' skill acquisition in the digital age, and three independent variables-collaborative learning, authentic tasks and projects, and use of technology. As presented in **Table 5**, the regression results indicate that these three independent variables collectively account for 37.8 percent of the variation observed in the dependent variable. The coefficients of the three factors, as shown in **Table 6**, are found to be statistically significant.To meet the requirement of having at least 20 records per predictor variable in multiple regression, a minimum of 60 records is necessary when dealing with three predictor variables. This criterion is contingent on the assumption of normality in the distribution of the dependent variable, which was verified using SPSS version 23. In this study, the dataset comprises 172 records, exceeding the minimum requirement of 60 records, thereby satisfying the assumption of multiple regression. This ensures the robustness of the statistical analysis conducted in the study.

Basic Equation:

Outcome= (model) + error $_i$

The model derived from SPSS :

Students' skill acquisition in the digital age= β_0 + β_1 collaborative learning+ β_2 authentic task and project+ β_3 use of technology+ ε

Here,

Mental health and well-being of student is a dependent variable
collaborative learning is an independent variable
Authentic task and project is an independent variable
Use of technology is an independent variable
ε is the error term (the difference between predicted and the observed value
b_1, b_2, b_3 are coefficients that are attached to the independent variables
b_0 is the intercept of slopes in the vertical axis

Table 5: Multiple Regression Outcomes Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.624[a]	.389	.378	.64110

Table 6: Multiple Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.994	.049		81.709	.000
Loss of Employment	.200	.049	.247	4.088	.000
Health and Safety	.331	.049	.407	6.752	.000
Emotional Causes	.327	.049	.403	6.680	.000

Result Discussion:

The exploratory research conducted in this study utilized Exploratory Factor Analysis (EFA) to distill and summarize the data, with the goal of identifying key factors influencing students' skill acquisition in the digital age. Using SPSS version 23, the EFA was supported by principal component analysis and Varimax rotation. This approach allowed for a meaningful reduction of data, highlighting the most pertinent information. The dependent variable, students' skill acquisition, was

measured using a single master question on a 7-point Likert scale. The independent variables—collaborative learning (4 questions), authentic tasks and projects (3 questions), and use of technology (3 questions)—were also measured on a 7-point Likert scale.

The EFA revealed three influential factors: collaborative learning, authentic tasks and projects, and use of technology. Items with factor loadings below 0.5 were excluded from the analysis, following criteria established by Hair et al. (2010) and Joti & Arora (2013). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.741, indicating sufficient sampling adequacy among the respondents (Table 2). Additionally, Bartlett's test of sphericity yielded a significant p-value (0.000), confirming the meaningfulness of the identified factors in influencing students' skill acquisition in the digital age.

The reliability of the factors was assessed using Cronbach's alpha, with values equal to or greater than 0.70 indicating good reliability (Hair et al., 2010). The results showed high reliability for all factors: collaborative learning ($\alpha = 0.841$), authentic tasks and projects ($\alpha = 0.896$), and use of technology ($\alpha = 0.740$), as detailed in Table 3.

Multiple regression analysis was conducted to explore the relationship between the dependent variable (students' skill acquisition) and the three independent variables. The results indicated a positive linear relationship, with the independent variables collectively accounting for 37.8% of the variation in the dependent variable (Table 5). The coefficients for the three factors were statistically significant, confirming their impact on students' skill acquisition (Table 6).

Key Findings:
Three crucial elements—collaborative learning, authentic tasks and projects, and technology use—that have a substantial impact on students' skill acquisition in the digital age were found by the exploratory factor analysis (EFA) carried out as part of this study. Strong internal consistency was indicated by Cronbach's alpha values over 0.70, suggesting the excellent reliability of these components. Multiple regression analysis was used in the study to measure the correlation between the factors that were found and the development of students' skills. Three independent variables—collaborative learning, authentic activities and projects, and technology use—collectively explained 37.8% of the variation in the dependent variable, according to the research, which showed a positive linear connection. This strong statistical result emphasizes how important these elements are for improving students' abilities in a high-tech learning environment.

Conclusion:
This study highlights the transformative potential of technology-enhanced project-based learning (PBL) in promoting students' skill acquisition in higher education, which is in line with the objectives of the New National Education Policy (NEP) 2020. With a focus on curriculum and pedagogy reforms, NEP 2020 seeks to modernize the Indian educational system to suit the demands of the twenty-first century. This would be accomplished by increasing learning possibilities. By conducting an empirical investigation into the effects of PBL on student motivation and life skill-based learning outcomes, our study bolsters these goals. The results are specifically pertinent in light of NEP 2020, which promotes the use of technology in the classroom to better prepare students for the demands of the contemporary world. The study's findings, which show that technology-enabled PBL improves student motivation and skill development, are consistent with the policy's focus on learning outcomes that are grounded in life skills.

This research has significant practical ramifications for educators and politicians. The integration of technology, real-world projects and assignments, and collaborative learning into the curriculum can greatly improve students' skill development at educational institutions. In addition to being in line with NEP 2020, this method equips students for lifelong learning, which is essential for success in the twenty-first century. The usefulness of project-based learning in higher education that is enabled by technology is supported empirically by the findings of this study. Through identifying the critical elements that influence students' skill development, the study provides insightful information for putting the NEP 2020 into practice. Collaborative learning, authentic activities, and technology integration can greatly improve the learning process and produce a more motivated and competent student population ready for the demands of the digital age.

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