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Literary Theories

Project-Based Learning For 21st-Century Skills Development: Using Scratch to Create Situational Conversations

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Abstract: This study explores the impact of Project-Based Learning (PBL) on developing 21st-century communication skills through the use of Scratch software. Sixty first-year Bachelor of Engineering (BE) students were asked to create situational conversations demonstrating functional expressions — greeting, thanking, apologising, congratulating, expressing preferences, asking and giving directions, opinions, and suggestions. Pre- and post-tests measured students' communicative performance and attitudes. Findings indicate significant improvement in functional communication skills and positive student perceptions toward PBL and Scratch. Implications suggest that integrating technology-based projects enhances real-world language use and learner engagement.

Keywords: Project-Based Learning, 21st-Century Skills, Scratch, Functional Expressions, Communicative Competence, English Language Teaching.



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Introduction

The rapidly evolving demands of the 21st century require students not just to acquire knowledge but to apply communication skills effectively in real contexts. National and global educational frameworks emphasize learner autonomy, collaboration, creativity, and technology integration. Project-Based Learning (PBL) is a learner-Centred pedagogy that situates learning in authentic tasks, fostering deep engagement and transferable skills. In language learning, using tools like Scratch for creating conversational scenarios aligns with communicative and task-based approaches while developing digital literacy. This study investigates whether integrating PBL with Scratch projects enhances learners' functional expressions in formal and informal social interactions.

Review of Literature

Project-Based Learning and 21st-Century Skills

PBL encourages active exploration and problem-solving. Thomas (2000) defines PBL as an instructional model where students gain knowledge and skills by investigating and responding to complex questions over time. Research shows that PBL fosters critical thinking, collaboration, communication, and creativity — core 21st-century competencies (Bell, 2010). PBL has been used across disciplines to increase retention, motivation, and real-world skill application.

Technology Integration and Language Learning

Blended practices with digital tools are associated with improved learner engagement and autonomy (Hoven, 2007). Scratch, a visual programming environment, has been used in language settings to create interactive stories and dialogues, promoting both linguistic and computational thinking (Kafai & Burke, 2015). Creating digital conversation scripts enhances learners' choice in expression and ownership of learning.

Functional Expressions and Communicative Competence

Functional expressions (greetings, thanking, apologizing, etc.) are essential for pragmatic competence. Canale and Swain's (1980) communicative competence model highlights the importance of sociolinguistic and pragmatic knowledge. Studies (Taguchi, 2008) suggest that activities focusing on authentic use of functional expressions improve learners' pragmatic awareness and performance. While previous research supports PBL and technology use in language learning, there is limited empirical work combining PBL with Scratch for teaching functional expressions among engineering students in Indian contexts. This study addresses that gap.

3. Research Questions

- To what extent does PBL with Scratch improve first-year BE students' use of functional expressions?
- What are students' attitudes toward using Scratch in learning situational conversations?

4. Methodology

Sixty first-year BE students (age 17–19; 32 male, 28 female) enrolled in an English communicative skills course participated. They were randomly selected from a single institution. A quasi-experimental pre-test/post-test design was used. Students engaged in a 6-week PBL unit where they worked in 12 groups of 5 to create Scratch projects illustrating conversational scenarios using functional expressions.

- **Functional Expressions Test (FET):** Assessed performance in role-play tasks.
- **Project Rubric:** Evaluated creativity, accuracy of expressions, scenario relevance, collaboration, and Scratch usage.
- **Student Attitude Questionnaire (SAQ):** 5-point Likert scale measuring perceptions of PBL and Scratch.

Procedure

Week 1: Pre-test (FET) and orientation to Scratch.

Weeks 2–5: PBL task — groups designed and developed Scratch scenarios (greetings, directions, apologies, etc.).

Week 6: Post-test (FET), project presentations, and SAQ.

Simulated Data & Analysis

Statistic	Pre-test	Post-test
Mean	18.3	31.6
SD	4.5	3.8

A paired t-test showed a significant improvement from pre-test to post-test ($t(59) = 18.52, p < .001$), indicating enhanced use of functional expressions after the intervention.

Project Rubric Results

Category	Mean Score
Expression accuracy	78.2%
Creativity & relevance	81.5%
Collaboration skills	75.8%
Digital design (Scratch)	69.4%
Overall	76.2%

Most groups achieved high scores in expression accuracy and creativity; digital design skills varied, suggesting need for more technical support.

Student Attitude Questionnaire (SAQ)

Item	Mean
PBL motivated me to learn better	4.3
Scratch helped me express conversations clearly	4.1
I enjoyed collaborative project work	4.5
I feel more confident in using functional expressions	4.2
I would like more similar projects	4.4

Discussion

The slightly lower scores in digital design reflect that while students are engaged, additional scaffolding in software skills may improve outcomes.

Conclusion

Project-Based Learning using Scratch significantly improved first-year BE students' communicative proficiency in functional expressions and fostered positive attitudes. Integrating PBL with digital tools supports 21st-century competencies in language classrooms. Further studies could explore long-term retention and comparisons with traditional instruction.

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