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## A Study Experimenting with Project-Based Teaching Methodology in a Business Planning Course

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**Abstract:** This study revisits a classroom intervention that applied project-based teaching in a semester-long Business Planning course and evaluates the approach through rubric-based teamwork assessment, archived course documents, student satisfaction data, and teacher observation. The course was organized over 16 weeks and implemented through three self-selected teams working on authentic business-planning problems. The study is presented as a practice-based mixed-method classroom inquiry rather than a controlled experiment. The revised analysis draws on expert-reviewed rubric materials, pilot revision records, peer- and teacher-assessment procedures, archived satisfaction results, and a preserved score plot linking progress evaluation with examination performance. Quantitatively, 95% of respondents reported satisfaction with rubric-based assessment, 5% were moderately satisfied, and none reported dissatisfaction. The archived score plot also indicates a strong positive association between progress evaluation and examination performance ( $R^2 = 0.7443$ ). Qualitatively, classroom observation suggests that peer evaluation became more candid after mid-semester and that teamwork, responsibility, and task coordination improved by the end of the course. The findings suggest that project-based teaching can support practical business-planning skills and collaborative learning when combined with transparent rubrics and repeated feedback. At the same time, the study is limited by missing student-level demographic data, the absence of a control group, and incomplete archival statistics.

**Keywords:** project-based learning, business planning, rubric assessment, teamwork, classroom intervention, higher education

### 1. Introduction

Project-based learning (PBL) has been widely discussed as an approach that helps students connect conceptual knowledge with authentic problem solving, collaboration, and communication. In business education, PBL is particularly relevant because students must learn not only analytical tools but also how to generate ideas, work in teams, and translate plans into feasible action. The original manuscript reports the use of a project-based approach in a Business Planning course, but the presentation needed sharper research questions, clearer methodological boundaries, and more cautious interpretation of the evidence.

This revised manuscript therefore reorganizes the study as a practice-based classroom inquiry. Rather than claiming strong causal effects, it examines what can be supported by the preserved course records: how the project-based course was implemented, what forms of assessment were used, and what descriptive and correlational evidence is available regarding teamwork and learning outcomes. The purpose is to provide a clearer and more academically defensible account of the intervention in a higher-education context that remains underrepresented in the PBL literature.

### 2. Focused Literature Review

PBL is commonly defined as a teaching approach in which learners investigate complex questions or problems and produce meaningful outputs over an extended period of time. Prior research suggests that PBL can strengthen student engagement, knowledge integration, and authentic application of learning, especially when the tasks mirror real-life problems and require sustained collaboration <sup>[1]–[3]</sup>. In business and professional education, PBL is often valued because it gives students repeated opportunities to practice planning, communication, negotiation, and decision making under conditions of uncertainty.

Assessment is central to PBL because students are expected to demonstrate both process and product. Rubrics are frequently used for this purpose because they clarify expectations, make criteria transparent, and support both formative and summative evaluation <sup>[4], [5]</sup>. Rubrics can also be useful for peer assessment of teamwork, since they provide shared language for judging contribution, communication, responsibility, and quality of collaboration. However, rubric-based

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evaluation is only convincing when the assessment criteria are clear and when claims about improvement are supported by interpretable evidence.

The present study sits at the intersection of these two strands of research: project-based teaching and rubric-based assessment. Its contribution is modest but practically relevant. It documents a classroom implementation in which students completed team-based business-planning projects over one semester and were assessed through structured criteria, peer feedback, and teacher observation. The revised paper keeps the literature review focused on this linkage rather than on broad definitions of education in general.

### **3. Research Questions**

The study addresses the following questions:

RQ1. How was project-based teaching implemented in the Business Planning course over the 16-week semester?

RQ2. How was rubric-based assessment used to evaluate teamwork and project performance?

RQ3. What descriptive, correlational, and observational evidence indicates the strengths and limits of the project-based approach in this course?

### **4. Methodology**

#### **4.1 Research Design**

The revised paper treats the intervention as a mixed-method classroom study grounded in one semester of course implementation. The design combined quantitative descriptive evidence (rubric scores, satisfaction percentages, and an archived score relationship plot) with qualitative evidence (teacher observation, group interaction during project work, and feedback collected during pilot testing). Because the preserved archive does not include a control group, random assignment, or a full student-level data file, the study should not be interpreted as a full quasi-experiment.

#### **4.2 Course Setting and Participants**

The intervention was implemented in a Business Planning course conducted over 16 weeks. Students were organized into three self-selected teams and completed projects based on real organizational or start-up problems. The archived manuscript confirms the team structure and semester length, but it does not preserve a complete participant roster, demographic breakdown, or a reliable student-level sample count. For that reason, the present revision reports the study transparently at the course-cohort and team level rather than fabricating unavailable participant details. This limitation is carried into the discussion and conclusion.

#### **4.3 Study Procedure**

The course followed five broad stages: rubric drafting, expert review, pilot revision, semester-long project implementation, and assessment/reflection. At the start of the study, a five-level rubric was developed and reviewed by two professors and instructional-development experts. A pilot exercise was then conducted with one pilot team, after which the rubric language and criteria were refined. During the course itself, teams identified project ideas, defined problems, collected and analyzed business information, prepared business plans, and presented revised outputs to organizational stakeholders. Peer evaluation and teacher assessment were used throughout the process.

#### **4.4 Instruments and Evidence Sources**

The primary assessment tool was a five-level rubric used to evaluate teamwork-related performance. Based on the archived teaching materials, the rubric emphasized observable dimensions such as participation in team tasks, collaboration, communication, responsibility, and task completion. Additional evidence came from student satisfaction responses about rubric-based assessment, teacher observation of team processes, and a preserved score plot showing the relationship between progress evaluation and examination performance.

Content validity was addressed through expert review and pilot revision. The original manuscript also stated that Cronbach's alpha and intraclass correlation coefficient (ICC) were planned for reliability analysis, but the underlying coefficients were not retained in the surviving document set. In this revised manuscript, those procedures are reported as part of the intended analytical design, while the absence of retrievable coefficients is acknowledged as a limitation.

#### **4.5 Data Analysis**

The revised analysis focuses on evidence that can be reported responsibly from the preserved record. These include: (1) descriptive evidence on student satisfaction with rubric assessment; (2) the archived relationship between progress evaluation and examination performance shown in the original score plot; and (3) qualitative interpretation of classroom observations recorded in the manuscript. Statistical claims are therefore limited to the reported percentages and the displayed coefficient of determination ( $R^2 = 0.7443$ ). No p-value or effect-size claim is added beyond what can be supported by the archived material.

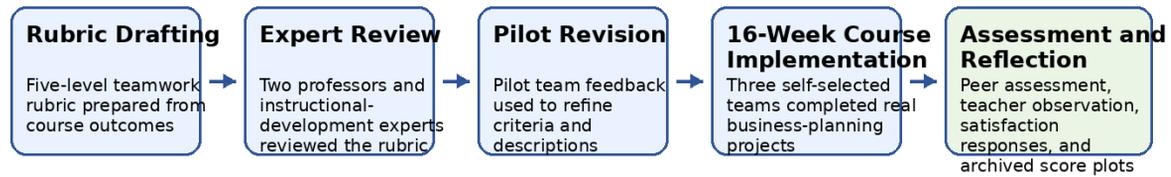
**Figure 1. Study procedure used in the revised report**

Figure 1. Summary of the revised study procedure.

#### 4.6 Course Activities

Table 1 summarizes the main stages of the semester-long project work and the corresponding student learning activities.

Stage	Key teaching and learning activities	Expected learning focus
Idea generation	Students reviewed organizations they had encountered during practice, proposed project ideas, and discussed possible start-up directions.	Problem identification, opportunity recognition, and initial teamwork formation
Problem analysis	Teams studied the selected organization, consulted experts, prepared a work plan, and used a problem-tree approach to clarify the core issue.	Analytical thinking, evidence gathering, and shared task planning
Data collection and planning	Teams collected market and organizational data, analyzed internal and external environments, conducted SWOT/TOWS analysis, and drafted marketing, sales, financial, investment, and risk plans.	Application of business-planning tools to authentic situations
Presentation and improvement	Teams presented business plans to stakeholders, received feedback, and revised outputs.	Communication, reflection, and iterative improvement
Peer assessment and reflection	Students and teacher used the rubric to evaluate teamwork and discuss strengths and weaknesses across the semester.	Self-regulation, accountability, and collaborative learning

#### 5. Results

The revised results section distinguishes clearly between reported findings and interpretation. Because the archived manuscript did not retain a complete raw dataset, only the preserved descriptive and graphical evidence is reported as quantitative evidence. Qualitative interpretation is then added separately.

Three teams completed the semester-long project cycle. The projects required students to identify a feasible business idea, analyze a target organization or market opportunity, prepare a business plan, and revise the final product based on stakeholder feedback. One documented example in the original manuscript was a coffee-shop business-planning project, indicating that students worked with real rather than purely hypothetical problems.

##### 5.1 Student Satisfaction with Rubric-Based Assessment

The archived course summary reported that 95% of students were satisfied with rubric-based assessment, 5% were moderately satisfied, and none reported dissatisfaction. This result suggests a high level of acceptance of transparent assessment criteria and peer-evaluation procedures in the course.

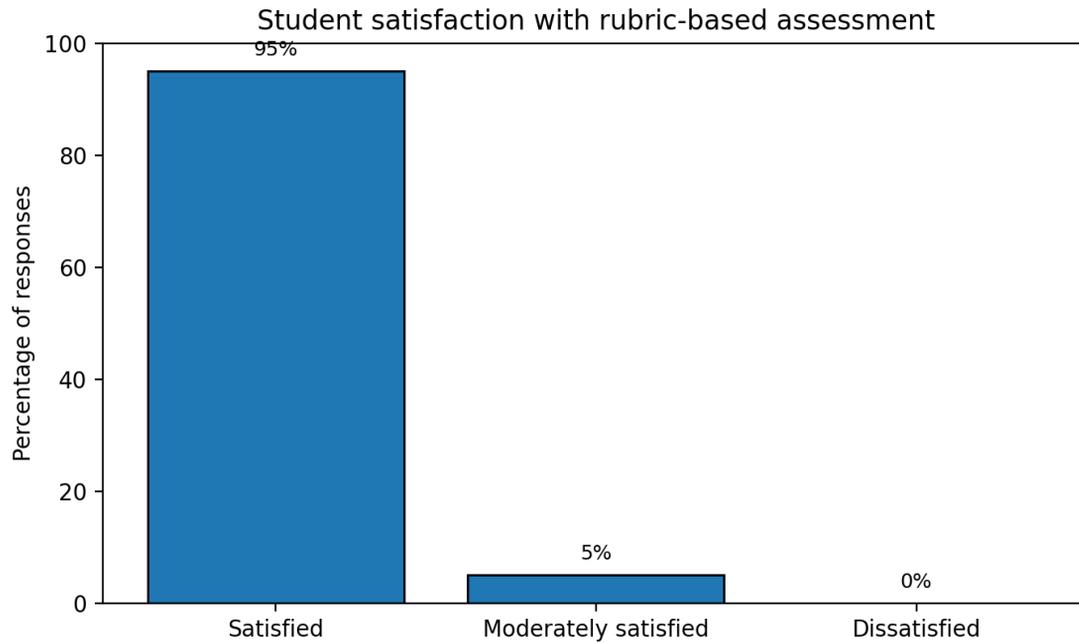


Figure 2. Reported student satisfaction with rubric-based assessment.

### 5.2 Relationship Between Progress Evaluation and Examination Performance

The original manuscript stated that course progress evaluation and examination scores were strongly positively related. The preserved score plot shows an  $R^2$  value of 0.7443, indicating that roughly three quarters of the variation in the plotted examination outcome was associated with the plotted progress-evaluation score. The plot should be interpreted cautiously because the raw observations, exact sample size, and significance test were not preserved; however, the available evidence is consistent with a strong positive association rather than with no relationship.

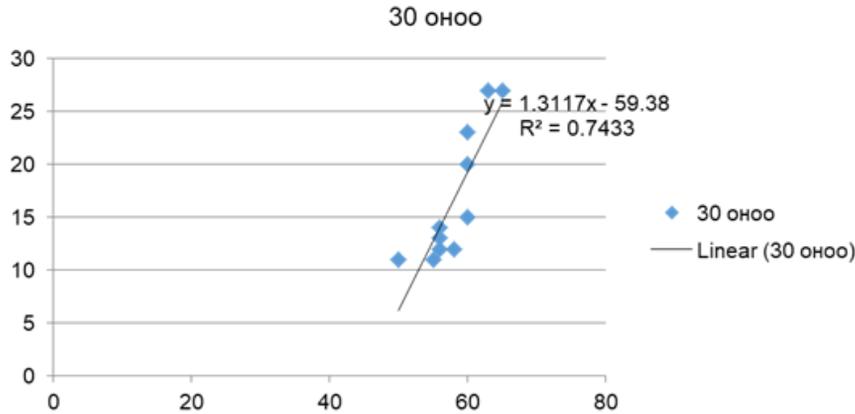


Figure 3. Archived scatter plot showing the association between progress evaluation and examination performance ( $R^2 = 0.7443$ ).

### 5.3 Observed Changes in Teamwork Processes

The observational record in the manuscript indicates that peer assessment changed over time. During the early weeks, students were described as lenient in rating one another; by around the eighth week, peer judgments became more candid and students began to set clearer expectations for one another. By the end of the sixteenth week, the manuscript reports better cooperation, more realistic peer accountability, and improved coordination in team work. Because these findings are qualitative, they should be understood as classroom observations rather than as statistically verified effects.

**5.4 Consolidated Result Summary**

Evidence source	Reported finding	Interpretation boundary
Student satisfaction summary	95% satisfied; 5% moderately satisfied; 0% dissatisfied	Supports strong acceptance of rubric-based assessment, but not causal proof of learning gains
Archived score plot	$R^2 = 0.7443$ for progress evaluation and exam performance	Supports a strong positive association, but raw data and significance test are unavailable
Teacher observation and peer-assessment narrative	Peer assessment became more candid after mid-semester; teamwork improved by week 16	Supports qualitative evidence of process improvement, not a controlled-effect estimate
Project outputs and stakeholder feedback	Teams completed authentic business-planning tasks and revised outputs after feedback	Supports practical relevance and real-world application of the course design

**6 Discussion**

The revised findings align with the objectives of the study more directly than the original draft. The first objective was to organize a Business Planning course through a project-based methodology. The course evidence confirms that this was accomplished through a coherent semester structure that moved from idea generation to problem analysis, planning, presentation, and revision. The second objective was to evaluate student performance using a rubric. The revised paper clarifies that rubric use was not peripheral; it was built into expert review, pilot refinement, peer assessment, and end-of-course reflection.

The quantitative evidence is limited but still meaningful. The satisfaction result suggests that students responded positively to rubric-based assessment, likely because the criteria made evaluation more transparent. The archived score plot also suggests that stronger ongoing engagement with course tasks was associated with better examination performance. This pattern is broadly consistent with prior studies arguing that PBL supports integration of knowledge and application when students are required to work with authentic problems over time <sup>[1]–[3]</sup>.

The qualitative evidence adds an important process dimension. The shift from lenient peer ratings early in the semester to more candid peer assessment later in the course suggests that students were gradually learning how to judge teamwork in a more accountable way. That observation fits research showing that rubrics can support self-assessment, shared standards, and collaborative learning when they are used repeatedly rather than only at the end of a course <sup>[4], [5]</sup>.

At the same time, the discussion must remain proportionate to the evidence. The present study does not prove that project-based teaching alone caused all reported improvements. The study was conducted in a single course, no comparison group was retained in the archived record, and several statistical details originally referenced in the manuscript cannot now be reproduced. The contribution of the paper is therefore practical and context-rich rather than experimentally definitive.

**7. Limitations**

Several limitations should be stated explicitly. First, the surviving document set does not preserve the full student roster, demographic breakdown, or raw individual-level score matrix. Second, the study is a single-course classroom inquiry rather than a controlled experimental design. Third, although the original manuscript mentioned reliability statistics such as Cronbach's alpha and ICC, the numerical coefficients were not retained in the available archive. Fourth, the preserved score plot supports an association between progress evaluation and examination performance, but the raw data needed for full inferential analysis are unavailable.

These limitations do not invalidate the classroom experience, but they do narrow the claims that can responsibly be made. Future studies should preserve anonymized participant profiles, item-level rubric data, inter-rater reliability estimates, and pre/post or comparison-group evidence so that stronger conclusions can be drawn.

**8. Conclusion**

This revised paper presents the intervention as a carefully bounded classroom study of project-based teaching in a Business Planning course. The available evidence indicates that the course design supported authentic problem solving, repeated team interaction, and transparent rubric-based assessment. Students reported high satisfaction with rubric use, and the archived score plot suggests that stronger progress evaluation was associated with better examination performance. Classroom observations also indicate that teamwork became more accountable and better coordinated over the semester.

The main value of the study lies in showing how project-based teaching can be implemented and assessed in a practical higher-education setting. Its contribution is strongest as a practice-based report from an underrepresented context. Future

work should build on this foundation with fuller participant reporting, stronger reliability documentation, and more rigorous comparative designs.

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