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Eduscrum and Student Autonomy in Algerian Higher Education: A Mixed-Methods Investigation of an Agile Pedagogical Framework

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Abstract

This study investigated whether the Eduscrum framework , an agile, sprint-based adaptation of Scrum principles , can enhance autonomous learning among second-year master students of English at Mohamed Lamine Debaghine Sétif 2 University, Algeria. Grounded in learner autonomy theory and agile learning principles, the study also examined students' perceptions of the intervention. Using a two-group, pre-post-test mixed-method design across a sample of 78 students (39 experimental, 39 control), the research collected data through classroom observations, diagnostic instruments, attitudinal scales, and pre/post-tests analyzed with SPSS. Results demonstrated significantly stronger autonomous learning gains in the experimental group following the Eduscrum intervention, while the control group showed no comparable improvement. A post-experimental satisfaction scale revealed overwhelmingly positive perceptions, with students reporting that the framework improved their task organization, self-evaluation, and sense of learning responsibility. These findings position Eduscrum as a viable, evidence-based pedagogical framework for fostering learner autonomy in higher-education language contexts.

Keywords: Eduscrum · learner autonomy · mixed methods · agile learning · higher education · Algeria

1. Introduction

The landscape of higher education is undergoing a profound pedagogical shift , one that demands not only the transmission of subject-matter knowledge but also the deliberate cultivation of student agency, self-direction, and metacognitive responsibility. In the domain of English as a Foreign Language (EFL) instruction, this shift manifests most pressingly as the problem of learner autonomy: the capacity to plan, monitor, and evaluate one's own learning without perpetual dependence on teacher mediation. For second-yearmaster students engaged in academically demanding work , particularly the writing of research proposals , autonomous learning is not a pedagogical nicety but a disciplinary necessity.

Yet the empirical reality in many Algerian higher-education contexts tells a different story. Classroom observations and diagnostic data from the present study's exploratory phase revealed students who remained oriented entirely toward the teacher, rarely initiated learning activity, and struggled to articulate the purpose or direction of their own work. This picture is consistent with

broader patterns in the literature, where learner autonomy is frequently identified as underdeveloped in contexts characterized by teacher-fronted, content-transmission models of instruction (Kumaravadivelu, 2003; Little, 1998).

This study proposes Eduscrum as a structural remedy. Derived from the Scrum framework used in agile software development, Eduscrum translates sprint-based project management into a pedagogical model in which students work in teams, organize tasks through visible boards, and engage in regular review and retrospective cycles (Delhij & Wijnands, 2015). Its central pedagogical value lies in redistributing responsibility: rather than receiving instruction, students plan, coordinate, and evaluate , behaviors that are constitutive of autonomous learning as theorized by Little (1991, 1998) and elaborated by Tassinari (2012).

The study pursued two interconnected questions: first, whether Eduscrum could produce measurable gains in autonomous learning among second-year master students of English at Sétif 2 University; and second, whether students would perceive the framework as supportive of their independence and learning effectiveness. A two-group, pre-post-test mixed-method design was employed to address both questions with the rigor appropriate to a quasi-experimental educational investigation.

2. Literature Review

2.1 Learner Autonomy: Definitions and Dimensions

Learner autonomy occupies a central place in contemporary language education research, though its definitions have evolved considerably since Holec's (1981) foundational characterization of the autonomous learner as one who takes charge of their own learning. Little's influential account refines this formulation by linking autonomy to reflective self-management: the autonomous learner not only works independently but understands the purpose of their learning, contributes to goal-setting, and evaluates the effectiveness of their efforts (Little, 1998). This distinction , between mere independence and reflective, responsible engagement , is crucial for higher education, where students must increasingly manage complex academic tasks with decreasing teacher scaffolding (Yoshimoto et al., 2007).

Autonomy is best understood not as a fixed personality trait but as a developmental capacity that can be cultivated through appropriate instructional conditions (Umeda, 2000; Kumaravadivelu, 2003). This developmental view has important pedagogical implications: if autonomy is learnable, then instructional design becomes a critical lever for its promotion. A growing body of research supports interventions that make responsibility explicit and manageable , including tutoring programmes, computer-assisted language learning (CALL) environments, smartphone-mediated strategy use, and digital storytelling , as effective contexts for autonomy development (Senouci, 2019; Farivar & Rahimi, 2015; Alzubi & Singh, 2017; Kim, 2014).

2.2 Psychological Mediators of Autonomous Learning

The literature consistently identifies a cluster of psychological and cognitive variables that shape how readily students develop autonomous learning behaviors. Motivation functions as a primary mediator: learners are more likely to assume responsibility when they perceive value in their tasks

and agency in their decisions (Little, 1998). Anxiety, particularly foreign language classroom anxiety (FLCA), can inhibit the risk-taking that autonomous participation requires (Checa et al., 2015). Locus of control , the degree to which learners attribute outcomes to their own effort rather than external forces , is closely associated with self-directed action, with internal orientations generally supporting greater autonomy (Rotter, 1966; Daum & Wiebe, 2003).

Self-efficacy, understood as one's confidence in completing specific academic tasks, shapes persistence, planning, and willingness to engage with challenge (Heslin & Klehe, 1979). Learning style preferences , particularly visual, auditory, and kinesthetic orientations , have also been linked to differences in autonomous learning behavior (Foroutan et al., 2013). The present study treated all five of these variables as pre-experimental covariates, documenting the learner profile before the intervention to support more nuanced interpretation of outcomes.

2.3 Eduscrum as an Agile Pedagogical Framework

Eduscrum adapts the Scrum framework , developed for agile software development , to educational settings. In the Eduscrum model, learning is organized into structured sprints: finite work cycles in which student teams pursue defined learning goals, make progress visible through a shared board (the Flap), and engage in regular review and retrospective ceremonies (Delhij & Wijnands, 2015; Sutherland et al., 2011). The teacher adopts a facilitative role, functioning simultaneously as product owner (who establishes learning goals) and Eduscrum master (who supports the team's process without directing its content decisions).

This design is theoretically aligned with autonomy development for at least three reasons. First, it makes responsibility structural rather than optional: students must plan, distribute tasks, and track progress as a condition of the framework's operation. Second, it renders learning goals and progress visible, reducing the uncertainty that often inhibits self-direction. Third, its iterative review cycles , analogous to what Tassinari (2012) calls dynamic self-assessment , provide regular occasions for reflection on learning effectiveness.

Existing empirical work on Eduscrum, while limited, offers preliminary support for these claims. In secondary computer science education, Eduscrum has been associated with improved task coordination and deadline management (Jager & W, 2015). In higher education, students working on real-world projects have valued the framework's support for collaboration and task organization (Neumann & Baumann, 2021). Studies have also reported motivational benefits among younger learners (Semenovskikh & Volkodav, 2021). However, direct evidence of Eduscrum's capacity to foster autonomous learning in higher-education language classrooms , particularly in research-intensive academic writing contexts , remains limited, constituting the primary gap this study addresses.

3. Method

3.1 Design and Setting

The study employed a two-group, pre-post-test mixed-method design (Creswell & Creswell, 2018; Teddlie & Tashakkori, 2009), combining quantitative measurement of autonomous learning with qualitative exploration of student perceptions. Because participants could not be randomly

assigned, the study was implemented as a single-site quasi-experiment with triangulated data sources (Shadish et al., 2002; Denzin, 1978). The research was conducted during the academic year 2025–2026 in the Department of English Language and Literature at Mohamed Lamine Debaghine Sétif 2 University, Algeria.

3.2 Participants

The study population comprised 362 second-year master students of English. A required sample of 196 was calculated; in practice, 78 students agreed to participate and were divided into two groups of 39. The experimental group was recruited through snowball sampling; the control group was selected through convenience sampling (Leavy, 2017; Babbie, 2016). Both groups were enrolled in the same academic programme, supporting contextual comparability. Participants who missed the pre-test, post-test, or any treatment sessions were excluded from the final analysis.

3.3 Procedure: Four Research Phases

The study unfolded across four sequential phases, each with a distinct data-collection purpose.

Exploration Phase

Six classroom observations were conducted across three second-year master groups during RESEARCH METHODOLOGYsessions, supplemented by an informal discussion with five students, a focus group discussion with seven students and their teacher, a diagnostic autonomy test administered to 31 students, and a questionnaire distributed to four RESEARCH METHODOLOGYteachers. This phase served to verify the existence and extent of the autonomy deficit before designing the intervention.

Pre-Experimental Phase

Six instruments were administered to characterize the participant sample before the intervention: the Foreign Language Classroom Anxiety Scale (FLCAS), a learning styles inventory, a locus of control scale, the Educational Language Learning Motivation Scale (ELLMS), a placement test, and an educational self-efficacy scale. These data served as interpretive context for the experimental outcomes rather than as independent variables in the statistical analysis.

Experimental Phase

Both groups completed a pre-test before the treatment began. The experimental group then received eight instructional sessions , six in the classroom and two delivered via Zoom during the winter recess, each lasting 90 minutes , on writing a research proposal through the Eduscrum framework. The control group continued with standard RESEARCH METHODOLOGYinstruction.

Before the intervention commenced, the researcher completed 16 hours of Eduscrum training (four hours per week) to ensure implementation fidelity. Students in the experimental group received an orientation to Eduscrum's roles, ceremonies, and visual board before the first sprint began. The research proposal assignment was structured as a single sprint divided into five story-based tasks, with a team captain in each group and the teacher serving in a dual product-owner/Eduscrum-master role. Sprint reviews occurred in sessions three and six; a retrospective was held at the conclusion of the sprint.

Post-Experimental Phase

A six-item satisfaction scale was administered online via Google Forms to the experimental group immediately following the intervention. This instrument captured students' overall perceptions of Eduscrum as a learning framework and their sense of its impact on autonomy, organization, and self-evaluation.

3.4 Instruments and Measurement Quality

The pre-test and post-test were adapted from an established autonomous learning checklist, organized around three dimensions: planning, task completion, and self-evaluation of learning. The experimental-phase students' questionnaire comprised 22 items. The satisfaction scale contained six items. Internal validity and reliability checks are summarized in Table 1.

Exploration teacher questionnaire	0.751 ($p < .05$)	24	0.922
Pre-test / Post-test instrument	0.771 ($p < .05$)	103	0.700
Satisfaction scale	0.804 ($p < .01$)	6	0.909

Table 1. Measurement Quality Indicators for Key Instruments

3.5 Data Analysis

Quantitative data were analyzed using SPSS and Microsoft Excel 2019. Normality was assessed with the Kolmogorov-Smirnov test; homogeneity of variance was evaluated with Levene's test. Between-group comparisons used independent-samples t-tests; within-group change was assessed with paired-samples t-tests. Effect size was calculated using eta squared (η^2). Qualitative data from the exploratory phase and progress test were transcribed, coded, and interpreted thematically. Ethical approval was secured from the department administration, and participants provided informed consent prior to any data collection.

4. Results

4.1 Exploration Phase: Documenting the Autonomy Deficit

Across all exploratory sources, a consistent pattern emerged: students displayed marked dependence on teacher direction and demonstrated limited capacity for self-initiated learning. Classroom observations showed students rarely asking questions, not responding readily to open prompts, and treating the teacher as their sole information source. The informal discussion and focus group discussion corroborated these observations; students acknowledged that they could not clearly articulate the purpose of their learning and described themselves as passive in their approach to academic tasks.

Quantitative exploration reinforced this picture. The diagnostic autonomy test administered to 31 students produced a total mean score of 2.15, placing the group in the Rarely range on the response scale. No individual item exceeded 2.56 (Occasionally). The teacher questionnaire (total mean =

2.39, corresponding to Disagree) similarly indicated that instructors did not perceive their students as demonstrating autonomous learning behaviors. These convergent findings confirmed the need for an intervention and provided the justification for proceeding to the experimental phase.

4.2 Pre-Experimental Phase: Learner Profile

The pre-experimental battery produced a nuanced portrait of the study population. All 100 students assessed for anxiety fell into the Medium anxiety range (FLCAS), with no students classified as Low or High. The learning styles inventory showed the largest proportions preferring Visual (n = 40) and Kinesthetic (n = 33) modalities. The locus of control scale revealed a slight majority with External orientation (n = 58) compared to Internal (n = 42) , a finding with implications for autonomy development, as internal control beliefs are generally associated with greater self-directed behavior.

Motivation scores were comparatively strong: the ELLMS total mean was 42.74, corresponding to High motivation. The placement test placed 74 students at Upper-Intermediate level, 19 at Advanced, and 7 at Intermediate, suggesting a group with sufficient linguistic resources to engage meaningfully with academic writing tasks. Educational self-efficacy produced a total mean of 3.26 (Somewhat confident). Taken together, this profile describes a group that entered the study with moderate-to-strong motivation and adequate language level, but with notable tendencies toward anxiety, external control beliefs, and limited confidence in academic self-efficacy , conditions that informed the interpretation of intervention outcomes.

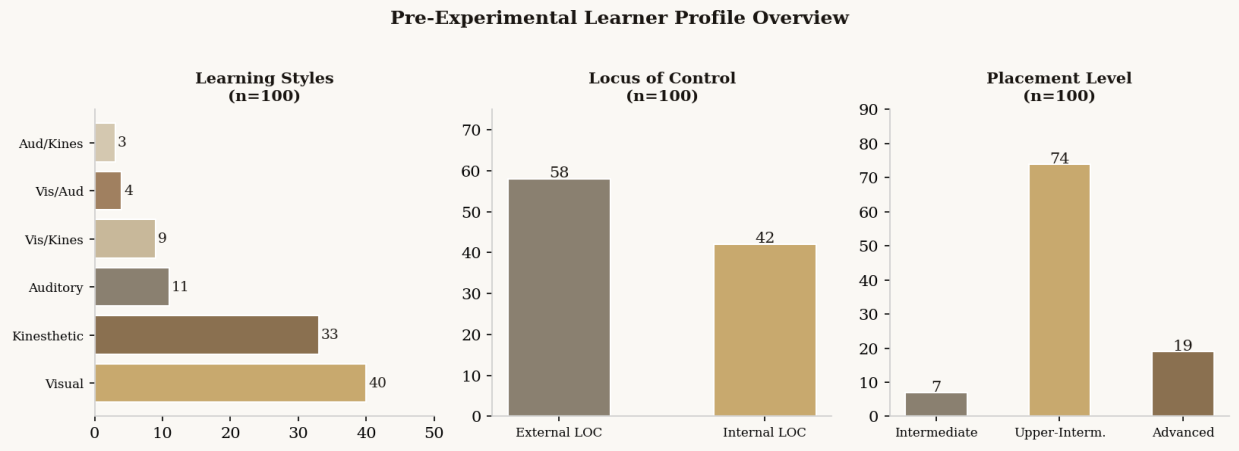

Figure 1. Pre-Experimental Learner Profile: Learning Styles, Locus of Control, and Placement Level Distributions (n = 100)

4.3 Experimental Phase: Group Equivalence and Between-Group Outcomes

Before examining intervention effects, statistical checks confirmed that the two groups were sufficiently similar at baseline. Levene's test for homogeneity produced $F(1, 60) = 0.464$, $p = .499$, indicating equal variances. Kolmogorov-Smirnov normality tests supported parametric analysis: for the control group pre-test, $D(31) = 0.106$, $p = .200$; for the experimental group pre-test, $D(31) = 0.149$, $p = .077$. The pre-test means confirmed equivalence: the control group recorded M =

394.22 (SD = 36.54) and the experimental group M = 385.90 (SD = 46.38), with no statistically significant difference between groups (t(60) = 0.785, p = .436).

Following the intervention, the post-test pattern changed markedly. The control group obtained M = 386.93 (SD = 38.45), while the experimental group reached M = 426.03 (SD = 38.78). This between-group difference was statistically significant and favored the Eduscrum-trained students, indicating that the intervention produced a measurable advantage in autonomous learning outcomes that was not attributable to pre-existing group differences.

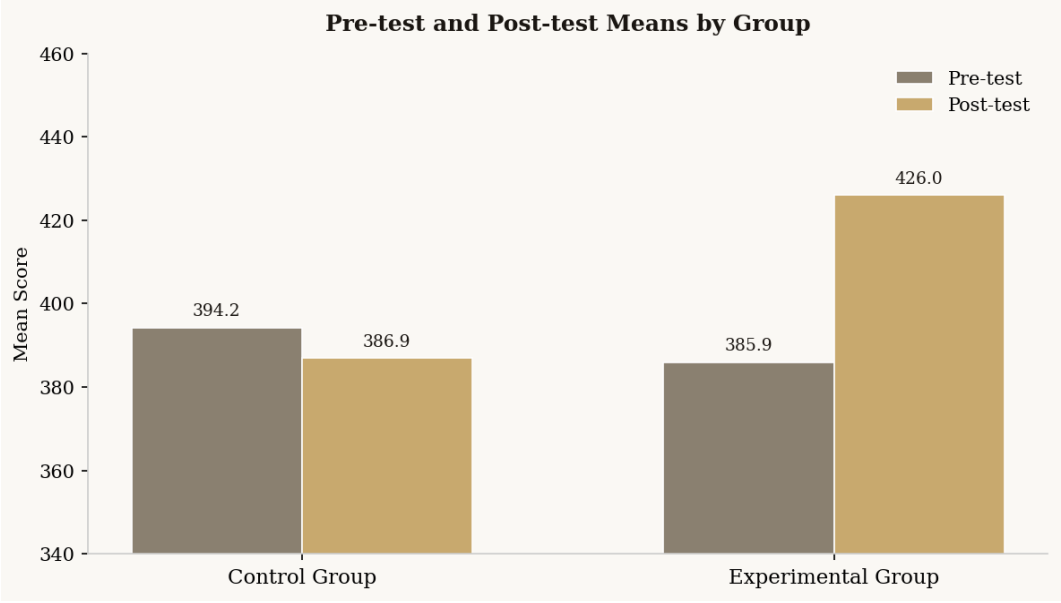

Figure 2. Pre-test and Post-test Mean Scores by Group. The experimental group's post-test mean (426.03) substantially exceeds that of the control group (386.93), while pre-test means were statistically equivalent.

4.4 Experimental Phase: Within-Group Change

Paired-samples t-tests examined change within each group from pre-test to post-test. For the experimental group, scores rose from M = 385.90 to M = 426.03, a mean gain of 40.13 points (SD = 40.70), t(30) = 5.49, p < .001. Effect-size analysis produced $\eta^2 = 0.458$, representing a large effect by conventional benchmarks. In contrast, the control group showed a negligible and statistically non-significant change: from M = 394.22 to M = 386.94, mean difference = −7.29 (SD = 30.61), t(30) = 1.32, p = .195.

The divergence between these within-group trajectories , significant improvement in the experimental group, absence of change in the control group , provides strong evidence that the observed gains were attributable to the Eduscrum intervention rather than to maturation, testing effects, or other extraneous influences.

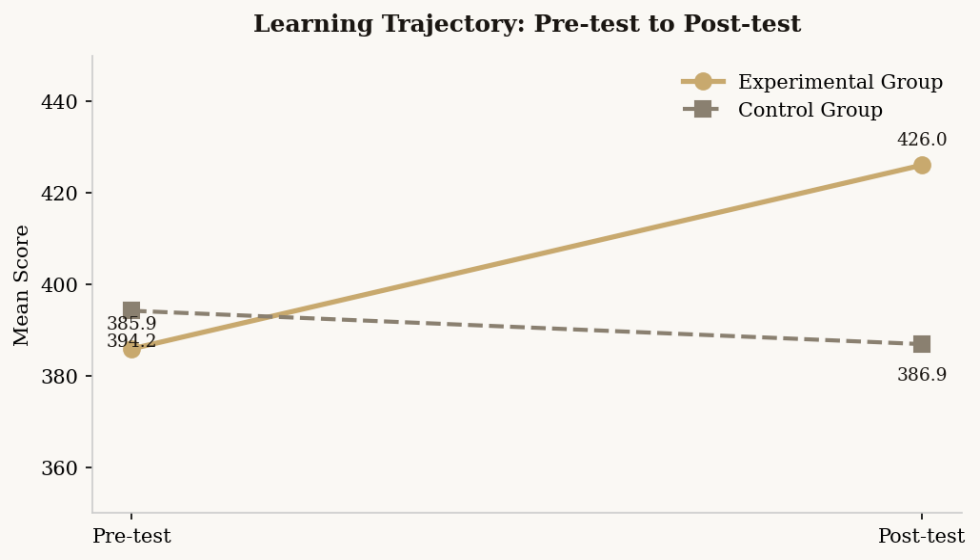

Figure 3. Learning Trajectory from Pre-test to Post-test for Both Groups. The experimental group shows a pronounced upward trajectory, while the control group scores remained essentially flat.

4.5 Process Evidence: Progress Test and Mid-Intervention Questionnaire

A progress test conducted as a structured discussion during the third treatment session offered qualitative evidence of developing autonomy within the experimental group. Students reported that the Eduscrum Flap had made their tasks more manageable, that they had begun taking initiative in planning their proposal work, and that the framework had clarified the purpose of what they were doing. However, they also acknowledged that full independence had not yet been achieved: several participants described themselves as still becoming autonomous rather than fully self-directed, suggesting that eight sessions represented an intermediate developmental stage rather than a completed transformation.

The mid-intervention students' questionnaire (22 items) produced a total mean of 4.06, within the Agree range. All but two items produced means above 4.00; the highest was Item 10 (M = 4.55) and the lowest was Item 22 (M = 3.35). The distribution of responses demonstrated consistent agreement that Eduscrum was supporting autonomous learning behaviors.

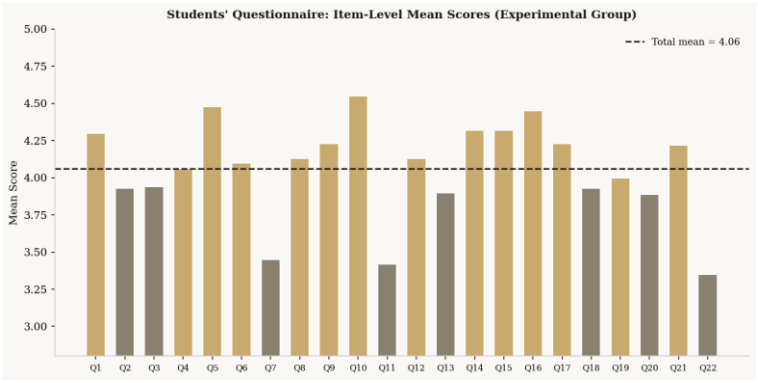

Figure 4. Students' Questionnaire: Item-Level Mean Scores (Experimental Group, n = 39). Gold bars indicate items at or above the total mean of 4.06.

4.6 Post-Experimental Phase: Student Perceptions

The satisfaction scale administered to the experimental group after the intervention yielded uniformly positive responses, with a total mean of 4.45 (Strongly Agree). Individual item means ranged from 4.11 to 4.61. Students expressed particularly strong agreement that Eduscrum helped them learn autonomously (M = 4.61) and that overall satisfaction with the framework was high (M = 4.61). Items related to task organization (M = 4.50) and self-evaluation of learning (M = 4.50) also scored highly. The item reflecting perceived ease of learning through Eduscrum received the lowest rating (M = 4.11), suggesting that students recognized the framework as demanding even while evaluating it favorably.

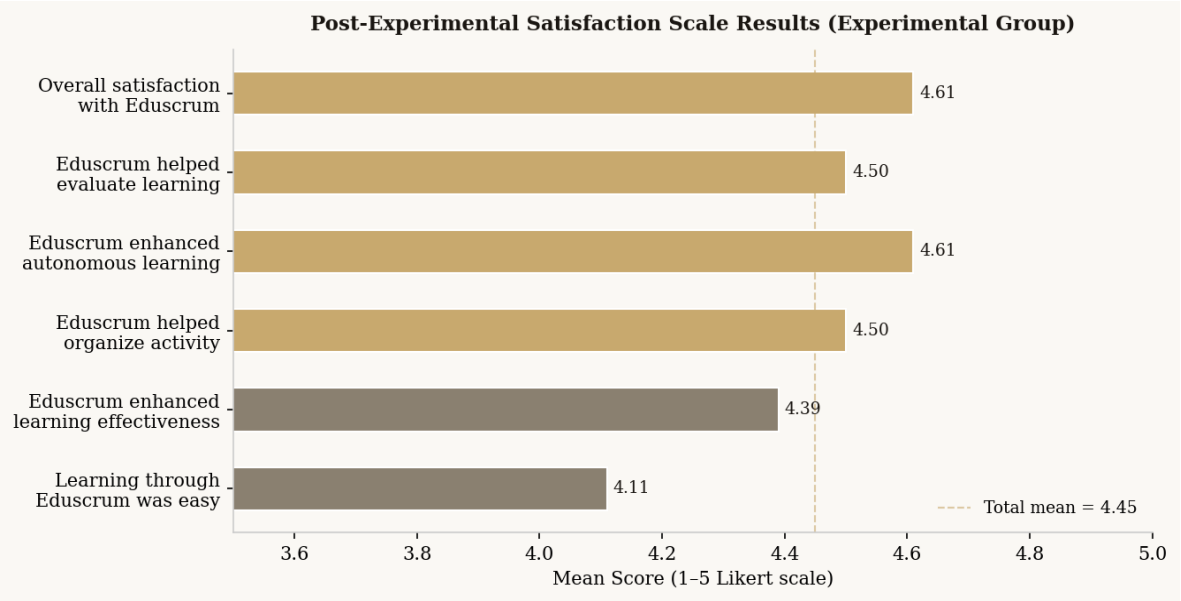

Figure 5. Post-Experimental Satisfaction Scale Results (Experimental Group, n = 39). The dashed line indicates the total scale mean of 4.45.

Pre-test Mean (SD)	394.22 (36.54)	385.90 (46.38)
Post-test Mean (SD)	386.93 (38.45)	426.03 (38.78)
Mean Difference (Pre→Post)	−7.29	+40.13
Paired t-test	t(30) = 1.32	t(30) = 5.49
Significance (p)	p = .195 (n.s.)	p < .001 ***
Effect Size (η^2)	,	0.458 (large)

Satisfaction Scale Mean	N/A	4.45 (Strongly Agree)

Table 2. Summary of Key Quantitative Outcomes by Group

5. Discussion

5.1 Eduscrum as a Structural Vehicle for Autonomous Learning

The most significant finding of this study is not simply that the experimental group outperformed the control group on the post-test , it is that Eduscrum appears to have worked because of how it restructured the distribution of responsibility within the classroom. In the conventional Research Methodology setting, responsibility for organizing and directing learning remained with the teacher. In the Eduscrum setting, that responsibility was transferred , progressively and with support , to the students themselves. They planned tasks, assigned roles, monitored progress through the Flap, reviewed outcomes in sprints, and reflected in retrospectives. Each of these acts is constitutive of autonomous learning as defined by Little (1998): understanding the purpose of learning, contributing to its direction, and evaluating its effectiveness.

This interpretation explains why the effect size was large ($\eta^2 = 0.458$) despite a relatively modest intervention of eight sessions. Eduscrum did not supplement autonomous learning; it made autonomous learning the operational condition of the classroom. Students were not asked to become autonomous in addition to completing the research proposal , they had to enact autonomy in order to complete it. That structural compulsion, supported by the visible accountability of the Flap and the social scaffolding of the team, appears to have produced genuine behavioral change rather than surface compliance.

5.2 The Motivational Dimension

Student perceptions, as captured by both the mid-intervention questionnaire and the satisfaction scale, reveal an important motivational dimension to the Eduscrum effect. The consistently high agreement scores , particularly on items related to task organization, learning purpose, and self-evaluation , suggest that the framework did not merely demand autonomous behavior but made it feel meaningful and achievable. This aligns with Little's (1998) observation that autonomy is closely intertwined with intrinsic motivation: students who understand why they are doing something and experience agency over how they do it are more likely to sustain the effort that self-directed learning requires.

The pre-experimental profile is instructive here. This was a group with high motivation but moderate self-efficacy and a tendency toward external locus of control , a combination that might initially seem unfavorable for autonomous learning. Yet Eduscrum appears to have been precisely the kind of compensatory framework this profile requires: structured enough to reduce anxiety and provide clear direction, yet demanding enough to require genuine self-organization. Prior research showing mixed results from technology-mediated autonomy interventions (Adara, 2020) suggests

that the mere presence of a tool is insufficient; what matters is whether the tool creates conditions in which students must exercise agency. Eduscrum's design appears to satisfy that criterion.

5.3 Eduscrum in the Context of Research Proposal Writing

An important contextual contribution of this study is its focus on research proposal writing as the vehicle for the Eduscrum intervention. This academic genre is particularly well suited to agile pedagogy because it requires precisely the skills that autonomous learning theory identifies as central: sequencing complex tasks, managing multiple interdependent components, and maintaining coherence over time. The five-story structure of the proposal sprint , covering topic selection, background and framing, methodology, ethical and organizational considerations, and final front matter , mapped naturally onto Eduscrum's sprint logic, making the framework's demands feel intellectually coherent rather than artificially imposed.

This context-specific finding extends the existing Eduscrum literature, which has largely focused on general motivation and project management in non-language settings (Jager & W, 2015; Neumann & Baumann, 2021), into the domain of academic writing in EFL higher education. It suggests that Eduscrum's value may be particularly pronounced in courses where students must produce extended, structured academic work , a common requirement in Englishprogrammes.

5.4 The Teacher's Role: From Authority to Architect

The findings also invite reflection on the changed role of the teacher in an Eduscrum-based classroom. The significant gains in the experimental group were not achieved by removing the teacher but by repositioning them. The instructor functioned simultaneously as product owner , establishing the learning goals and sprint criteria , and Eduscrum master , facilitating the team's process without arbitrating its decisions. This dual role required a reorientation from knowledge transmission to learning architecture: designing the conditions within which student agency could develop rather than supplying the content that students would passively receive.

This repositioning is consistent with what Kumaravadivelu (2003) describes as the shift from dependent to independent learning environments, and it aligns with Tassinari's (2012) model of dynamic autonomy, in which teacher and learner roles are understood as mutually constitutive rather than opposing. The practical implication is that Eduscrum cannot be implemented without teacher preparation: the 16 hours of framework training undertaken by the researcher before the intervention was not a bureaucratic formality but a substantive condition for effective facilitation.

6. Limitations

Several constraints qualify the generalizability of these findings. The study was conducted at a single university department with a specific student population, limiting transferability to other institutional contexts, disciplines, or learner profiles. The intervention was bounded to eight sessions centered on a single academic task (research proposal writing), so the observed autonomy gains should be understood as evidence tied to this particular format rather than as proof of a universal Eduscrum effect.

The quasi-experimental design, necessitated by the impossibility of random assignment, reduces the strength of causal claims that can be made in journal article terms (Shadish et al., 2002).

Attrition , 16 participants withdrew before the post-test , may have introduced selection bias in the final sample. Practical challenges associated with hybrid delivery, including variable internet access and device availability, may have affected implementation consistency. Finally, autonomous learning was operationalized through a specific instrument and definition; future studies employing alternative measures might produce partially different results.

7. Conclusion

This study set out to examine whether Eduscrum could serve as an effective pedagogical framework for fostering learner autonomy in a higher-education EFL context and whether students would perceive it as a supportive learning experience. Both questions received affirmative answers. The experimental group demonstrated statistically significant and practically large gains in autonomous learning following the Eduscrum intervention, while the control group showed no comparable change. Post-experimental satisfaction data revealed overwhelmingly positive student perceptions, particularly regarding task organization, self-evaluation, and the development of learning responsibility.

These findings position Eduscrum not merely as a classroom management tool or a novelty imported from the technology sector but as a pedagogically coherent framework for cultivating the kind of reflective, goal-oriented, self-managing learner that higher education demands. Its contribution lies in combining structure with agency: students receive clear goals, visible progress indicators, and collaborative routines, while still having to plan, negotiate, and evaluate their own work. For learners who need to develop academic independence , but who are not yet ready for fully unscaffolded self-direction , this combination may be more effective than either directive instruction or open-ended autonomy alone.

Educators considering Eduscrum are advised to begin with focused, well-defined academic tasks that map naturally onto sprint structures, to invest in framework training before implementation, and to adapt the ceremony sequence to local time constraints and institutional culture. Policy-makers seeking to modernize higher education pedagogy should recognize agile approaches as evidence-based options worthy of curricular attention.

Future research should extend this work to other university programmes and disciplines, to longer intervention periods, and to more diverse learner populations. Comparative designs that position Eduscrum alongside other autonomy-promoting frameworks would also advance understanding of the mechanisms through which agile pedagogy produces its effects. The present study offers a starting point , a single, context-specific, but methodologically rigorous account of what Eduscrum can achieve , and an invitation to the broader research community to test its boundaries.

"The goal is not to produce students who can learn without guidance, but students who know how to make use of guidance , and who can function without it when they must." , Adapted from Little (1998)

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