Perceptions of Resubmission Policies Among Upper-Level Engineering Students

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Abstract

This paper examines students' perceptions of a structured assignment resubmission policy implemented in an upper-level mechanical engineering vibrations course at a private, high-research-activity institution in the southern United States. The study extends prior work that investigated a similar resubmission policy in an introductory engineering course at the same institution. Using a pre-experimental research design with a post-course survey, we explored how resubmission opportunities influenced students' experiences in the course. We further examined differences in perceptions between students encountering resubmission for the first time and those with prior experience under this practice. To provide broader context, findings from the upper-level course were compared with results from the earlier first-year course to examine how the perceived effects of resubmission practices evolve across academic levels within the same institutional context. The results contribute empirical insight into how resubmission practices are perceived by upper-level engineering students and highlight how prior exposure and academic standing shape students' experiences with iterative assessment.

Introduction

Upper-level engineering courses play a critical role in preparing students to apply foundational knowledge to complex, real-world problems. At this stage of the curriculum, students are expected to demonstrate analytical reasoning, conceptual understanding, and the ability to translate physical systems into mathematical models. These skills are developed most strongly in core analytical courses that emphasize modeling, abstraction, and multi-step problem solving.

Mechanical vibrations is a required upper-level course in mechanical engineering that bridges foundational mechanics with application-driven design. Its concepts are directly applied in senior design projects such as robotics, vehicle systems like EcoCar, and multidisciplinary capstones. As students frequently encounter challenges in system dynamics, structural response, and dynamic modeling, proficiency in vibrations is essential for effective design and analysis.

Learning in vibrations is *inherently iterative*. Students must construct appropriate free-body diagrams, formulate equations of motion, and refine modeling assumptions before meaningful analysis can occur. Errors in early steps often propagate through an entire solution, requiring students to revisit their reasoning and correct misunderstandings. As a result, *learning in this*

course depends not only on producing correct final answers, but on engaging with feedback and revising analytical reasoning.

Despite this iterative learning process, assessment practices in many upper-division engineering courses continue to rely on single-attempt submissions[1]. Such approaches emphasize performance on a first attempt and offer limited opportunity for students to learn from mistakes. This can be particularly limiting in analytically intensive courses, where a single modeling error can obscure whether students understand the underlying concepts or simply made an early mistake.

Resubmission policies have been proposed as a means to better align assessment with student-centered instructional goals [2, 3]. Prior research in engineering and computing education suggests that opportunities to revise and resubmit work can encourage engagement with feedback, reduce stress, and promote mastery-oriented learning [4]. However, most existing studies focus on introductory courses or programming-based assignments, where feedback and revision differ substantially from those in advanced analytical engineering courses [5].

There remains a limited understanding of how resubmission policies are perceived by students in upper-level engineering courses, such as in vibrations. In these settings, assessments demand both conceptual modeling and formal analytical execution, and feedback often targets reasoning rather than syntax or procedural errors. Examining resubmission practices in this context is therefore important for understanding whether and how such policies support learning in courses that directly prepare students for senior design.

This paper examines students' perceptions of a structured resubmission policy implemented in an upper-level mechanical engineering vibrations course at a private, high-research-activity institution in the southern United States. The study extends our prior work, which investigated a similar resubmission policy in an introductory engineering course at the same institution [6]. Using a pre-experimental research design with a post-course survey, we explored how resubmission opportunities influenced students' experiences in the course. In addition, we examined differences in perceptions between students encountering resubmission for the first time and those with prior experience under this policy. Finally, we compared the findings from this upper-level course with results from the earlier first-year course to examine how the perceived effects of resubmission practices evolve across academic levels within the same institutional context.

The contributions of this study include the following:

- empirical evidence of how upper-level mechanical engineering students perceive the impact of resubmission practices on their course experience;
- an examination of differences in student perceptions between those experiencing resubmission for the first time and those with prior exposure to the practice; and
- a comparison of resubmission experiences between upper-level and introductory-level engineering students.

Literature Review

Literature on resubmission practice

Resubmission policies have been adopted across a wide range of college level courses, including both lower and upper level computer science (CS) courses.

Prior work has largely focused on students' perceptions of these policies and their impact on learning experiences. For example, one study implementing resubmission policies in two large introductory CS courses found that students frequently used resubmission to improve their grades while reporting reduced stress associated with achieving a perfect solution on the first attempt [7]. Similarly, another study in two introductory CS courses reported increased student engagement, satisfaction, and focus on learning, with evidence that resubmission opportunities helped mitigate differences associated with students' prior backgrounds [8]. In an upper-level CS elective course, students describe resubmission practices as supporting intrinsic motivation, self-efficacy, and a greater sense of control over their own learning, while also reducing overall course anxiety [9]. Collectively, these studies suggest that resubmission policies can promote mastery-oriented learning and more positive outcomes [10].

In addition to student perceptions, several studies have investigated how submission policies influence student behavior and performance. In one CS1 course, students were allowed to resubmit assignments up to 14 days after the original deadline, analysis of submission patterns revealed that most students resubmitted shortly after the initial submission rather than delaying until the end of the allowed window. The authors concluded that the policy did not promote procrastination and was associated with a reduction in late-submission requests[11]. In another introductory CS course, researchers found that all students utilized the resubmission policy at least once and that overall grades increased as a result[12]. Further evidence suggests that resubmission opportunities not only improve grades but also encourage students to prioritize learning for mastery rather than solely focusing on performance outcomes [13].

A few studies have looked into the effects of limited resubmission policies. In one study conducted in an introductory non-CS course, students were permitted up to five resubmission attempts per assignment; results indicated that all students resubmitted at least one assignment and that subsequent submissions reflected a more substantive revisions [14]. Similarly, a study in a CS course, researchers examining the relationship between the number of resubmissions attempts and the student's grade found that limited resubmission attempts encouraged students to produce more deliberate, efficient and meaningful attempts [15].

Resubmission Practice in Mechanical Engineering

Prior work in mechanical engineering has demonstrated the learning benefits of resubmission primarily through structured, feedback-oriented homework practices, though such approaches remain relatively uncommon in core analytical courses. Moore and Ranalli, for example, implemented mastery grading in sophomore-level mechanical engineering courses, where homework and all resubmissions were fully hand-graded and accompanied by written instructor feedback [4]. Their work established the formative value of resubmission while also noting the significant grading effort required. Related efforts by Wood et al. introduced a dual-submission

homework policy in mechanics courses, in which students submitted an initial attempt followed by a self-assessed revision based on instructor-provided solutions [1]. This approach emphasized student responsibility and reflection while reducing grading burden, but relied primarily on student self-evaluation rather than instructor or grader reassessment of revised analytical work. More recently, Linford et al. examined a self-evaluation and revision method in upper-level mechanical engineering courses, including vibrations and dynamics, highlighting gains in student metacognition through structured revision and instructor verification [5]. Together, these studies illustrate that while revision and resubmission have been explored in mechanical engineering, they are typically embedded within mastery or self-assessment frameworks and remain relatively rare as routine, structured components of assessment in analytically intensive upper-level courses. Notably, when multiple opportunities for demonstrating mastery are implemented, they are most commonly observed in foundational engineering courses such as statics [16, 17], dynamics [18], and related core courses including strength of materials and embedded systems [19]. This gap motivates examining resubmission practices that balance formative feedback, grading feasibility, and alignment with problem complexity in courses such as mechanical vibrations.

Our previous studies on resubmission practice

In our prior work [6, 20], we examined the implementation and impact of an assignment resubmission policy in an introductory programming course for engineers at the same institution where the present study was conducted. The resubmission policy was applied to homework assignments and allowed students a single opportunity to revise and resubmit their work within one week of receiving feedback. Using a similar pre-experimental research design, the study investigated students' perceptions of how resubmission influenced their performance, confidence, sense of belonging, and overall course experience. Results indicated consistently high and positive student perceptions, with students who utilized the resubmission opportunity reporting significantly higher perceived benefits across all three measured constructs. Qualitative analysis further revealed improvements in both students' *individualized and learning experiences*. Specifically, learning related experiences reflected *improved learning and recall* as well as *growth through mistakes and feedback*, while individualized experiences highlighted enhancements in *emotional well-being* and contributions to *academic success*. These key categories emerging from the qualitative analysis informed the development of closed-ended survey items in the current study, enabling direct comparison of student perceptions between introductory- and upper-level engineering courses.

Analysis of resubmission usage and performance outcomes showed that approximately 65% of responding students engaged with the resubmission opportunity at least once. For these students, the average initial submission grade across homework assignments was 83.64%, which increased to 89.59% following resubmission. Students typically resubmitted between one and three assignments, with an average of 1.5 resubmissions per student.

Course Setting

The resubmission policy examined in this study was implemented in two sections of a vibration course in a Mechanical Engineering department. Both sections were taught by the same instructor

using identical instructional practices. Therefore, participants were not differentiated by section in the analysis. The course is typically taken by junior- and senior-level students and serves as a core requirement within the curriculum. The course focuses on the modeling and analysis of vibratory mechanical systems, with emphasis on translating physical systems into mathematical representations and interpreting system behavior from governing equations. Core topics include free and forced vibration of single-degree-of-freedom and multiple-degree-of-freedom systems, formulation of equations of motion, damping models, natural frequencies, resonance, and steady-state and transient response. Students are expected to integrate concepts from dynamics, differential equations, and linear system theory, and to demonstrate proficiency in multi-step analytical problem solving.

Assessment Structure

The course employed frequent, low-stakes assessments in the form of daily quizzes aligned with individual lecture topics. Each quiz was designed to reinforce recently introduced concepts and provide timely feedback on student understanding. Quizzes were administered consistently throughout the semester and collectively contributed to the course grade.

To account for differences in cognitive demand across topics, quizzes were intentionally designed using two grading modalities:

- **Auto-graded quizzes** focused on problems where solution strategies were relatively direct once the appropriate governing equation or formula was identified. These questions primarily assessed conceptual understanding related to selecting the correct physical model or mathematical relationship, followed by straightforward implementation.
- **Manually graded quizzes** targeted problems requiring multi-step analytical reasoning, such as constructing free-body diagrams, formulating equations of motion using appropriate mechanics principles, and clearly articulating modeling assumptions. These problems emphasized process, structure, and reasoning rather than final numerical answers alone.

Resubmission Policy

All quizzes, regardless of grading modality, allowed students a total of two submission attempts. For auto-graded quizzes, both attempts were built into the online assessment system, with immediate feedback provided after each submission. For manually graded quizzes, students submitted an initial attempt that was reviewed by a course grader, who provided written qualitative feedback. Students were then permitted one resubmission after receiving this feedback. This design choice was intended to balance opportunities for revision with instructional feasibility, while encouraging students to engage meaningfully with feedback rather than relying on repeated trial-and-error submissions.

To help students stay aware of the process, the resubmission policy was introduced during the syllabus review and reinforced throughout the semester as well. Each time a resubmission quiz was opened, a Canvas announcement was posted, as well as a brief reminder given in class.

Instructional Intent

The resubmission policy was introduced to support iterative learning in a rigorous upper-level engineering course, helping students address gaps in conceptual modeling and analysis. It was framed from the start as a tool for reflection and improvement through feedback, rather than for late submission or point recovery, positioning it as a core part of the learning process.

Method

The goal of this study is to *examine the impact of a structured resubmission practice on students' course experiences, as reflected through their perceptions*. We employed an IRB-approved pre-experimental research design with a post-course survey in an upper-level mechanical engineering vibrations course (Section : Course Setting) to address the following research questions:

- **RQ1:** How do students perceive the impact of the resubmission practice on their course experience?
- **RQ2:** How do student perceptions of the resubmission practice differ between those experiencing it for the first time and those with prior exposure to the practice?
- **RQ3:** How do students' perceptions of resubmission practices differ between upper-level and introductory-level engineering courses within the same institution?

In this section, we describe the process of data collection, and data analysis.

Data Collection

We administered a Qualtrics survey during the final week of the course to collect student responses. The survey included the following items relevant to the present study. First, a closed-ended question asked whether students had previously experienced a similar resubmission policy in any of their other courses. The survey then included nine Likert-scale items designed to capture students' perceptions of the impact of the resubmission practice. These items measured constructs adapted from our prior study, performance, confidence, and sense of belonging (SoB), as well as four additional factors identified through qualitative analysis of the previous implementation [6]. All perception items were measured using a 5-point Agree/Disagree Likert scale (listed below and identified as either adapted or newly introduced). Finally, the survey included open-ended questions, including: (1) "Are there any other ways, outside of those above, that you think this practice impacted your experience in the course? If so, please explain."

- Helps me improve my performance in the course (adapted)
- Contributes to my learning in the course (new)
- Helps me gain confidence in my ability to succeed in this course (adapted)
- Contributes to my feeling of being accepted in the course (adapted)
- Contributes to my feeling of being supported in the course (adapted)

- Contributes to my feeling of belonging to in the course (adapted)
- Reduces my anxiety about the course (new)
- Helps me grow from feedback (new)
- Helps me grow from my mistakes (new)

Data Analysis

To examine the impact of the resubmission practice on students' course experiences (RQ1–RQ3), we analyzed quantitative survey responses using frequency distributions and descriptive statistics. Differences in perceived impact between first-time and previously exposed students (RQ2), as well as between lower- and upper-level courses (RQ3), were assessed using the Mann–Whitney U test, a non-parametric alternative to the independent samples t-test, appropriate for ordinal Likert-scale data.

Responses to the open-ended question were analyzed to inform all three research questions. We employed thematic analysis [21], following procedures established in our prior work across this and other institutions [6]. Text-level codes were first generated inductively by the authors and subsequently synthesized into higher-level categories and themes. Unlike our earlier study, which relied exclusively on inductive thematic analysis, the present study adopted both inductive and then deductive approach. Text-level codes were still established inductively; however, during the synthesis stage, these codes were organized using the same categories and themes identified in our prior work.

Results and Discussion

In this section, we present the results and discuss them in the context of the research questions. Out of the 66 students enrolled in the course, 53 responded to the survey, of whom 49 provided consent for their responses to be included in the analysis.

Student perceptions on the impact of the resubmission practice (RQ1)

Figure 1 presents student perceptions of the resubmission practice across multiple factors of course experience, addressing RQ1. Overall, the results indicate a strongly positive perceived impact of the practice, with the majority of students selecting Strongly Agree or Agree (at least 34 out 49 participants) across nearly all items. The highest levels of strong agreement were observed for items related to *growth from mistakes* and *growth from feedback*, suggesting that students primarily experienced resubmission as supporting iterative learning and reflection. Similarly, most students reported that the practice helped *improve performance, contribute to learning, increase confidence, and reduce anxiety*, highlighting both academic and affective benefits. Perceptions related to *feeling supported and feeling accepted* were also predominantly positive, though these items exhibited a slightly wider distribution of responses, with a greater proportion of neutral selections. The item related to *sense of belonging* showed the greatest variability, with fewer students selecting Strongly Agree compared to other constructs, indicating that while resubmission positively influenced learning-focused experiences (improved performance,

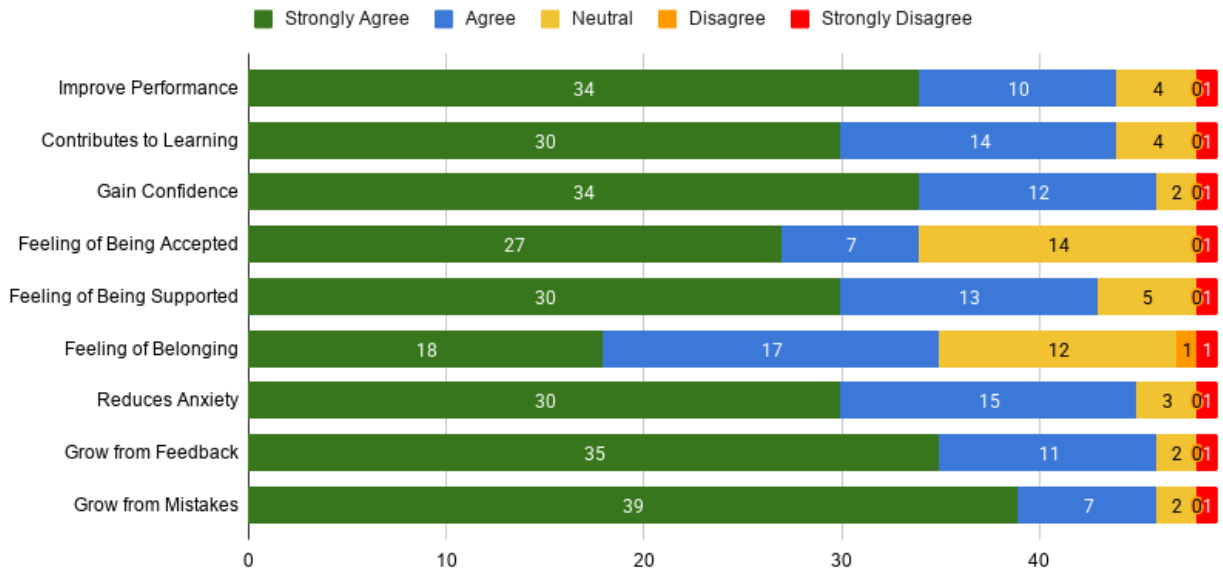

Figure 1: Distribution of student perceptions on the impact of the resubmission policy

contributes to learning, grow from feedback, grow from mistakes), its impact on sense-of-belonging outcomes (confidence, feeling of being accepted, feeling of being supported, feeling of belonging) was less uniform. Taken together, these findings suggest that, in response to RQ1, students perceived the resubmission practice as having a positive impact on their overall course experience, particularly in supporting learning, confidence, and growth through mistakes and feedback.

Prior to qualitative analysis, results deemed to be non-answers, such as ”N/A,” ”no,” or similar answers were flagged with a code ”Non-Answer.” 27 of the 49 responses were classed as ”Non-Answer,” leaving 22 responses to be analyzed through thematic analysis. 16 unique text-level codes were found, which are not presented in this paper. These 16 codes were synthesized into 7 categories, which were inductively determined based on our prior work.We found that the responses from the students aligned with the existing categories from our prior work, and did not require new categories to be made to synthesize them. These 7 categories were then combined into two themes, which were again inductively determined from our prior work. Despite the question phrasing for different impacts from the Likert style questions, and the inclusion of prior categories as Likert style questions, there was no comments given that did not fit into the existing categories and themes. The count and frequency among analyzed (not a non-answer) responses is shown in Table 1.

Learning Experience, which accounted for 41% of the analyzed responses, represents the ability for the resubmission practice to facilitate some form of learning for students in the class. Under this theme, there are three categories which were referenced by students: *Improved Learning and Recall*, *Growth Through Mistakes and Feedback*, and *Expand Skillset Beyond Core Content*. *Improved Learning and Recall* represents the ability of the practice to enhance students learning, either through reinforcing content, or simply promoting a second look at their submissions. *Growth Through Mistakes and Feedback* was demonstrated when students explicitly outlined that

Table 1: Frequency of Themes and Categories

Themes	Categories	Count	Frequency (%)
Learning Experience		9	41%
	Improved Learning and Recall	8	36%
	Growth through mistakes and feedback	3	14%
	Expand Skillset Beyond Core Content	1	5%
Individualized Experience		15	68%
	Emotional Well-being	8	36%
	Self-regulation and productivity	5	23%
	Academic Success	3	14%
	Account for life	1	5%
Total		22	

their ability to grow from mistakes was enhanced, or even entirely facilitated by, the resubmission practice. Finally, *Expand Skillset Beyond Core Content* represents the ability of the resubmission practice to promote students in thinking about problems in different ways, or seeking out new skills to solve their problems, which helps them be more versatile engineers. We believe the following quote most accurately conveys the learning benefits of resubmission, particularly related to expanding a student's skill set:

> *"I think that additionally, it expands your understanding of the concept because it may require you to complete the assignment in more than one way. This is important because engineering problems in industry are not necessarily cookie-cutter and may require engineers to get creative."* -Student 40

Individualized Experience, which accounted for a larger 68% of analyzed responses, demonstrates the ability to impact students as individuals, in ways that aren't necessarily centered around their learning. This theme includes categories of *Emotional Well-Being*, *Self-regulation and Productivity*, *Academic Success*, and *Account for Life*. *Emotional Well-Being* emphasizes the ability of the resubmission practice to foster better emotional health through our students, be that through reduced stress or anxiety related to the course and their performance, or through increasing their confidence and sense of belonging in the course. *Self-regulation and Productivity* relates to the promotion of positive habits, which mostly related to actively engaging with feedback to resubmit a truly better product. *Academic success* directly represents this practice's ability to increase student grades, through allowing students to create superior products. Lastly, *Account for Life* spoke to one students' experience that the practice gives them breathing room, especially with other demanding courses that may be taking. The following student quote conveys these feelings of comfort, as well as the ability to interact critically with feedback given:

> *"The opportunity to resubmit allowed me to feel comfortable in making mistakes the first time around. It then allowed me to critically think of why I got an answer wrong before resubmitting. Additionally, [the learning management system] can be particular about the way some answers are uploaded for auto graded assignments. The option to resubmit made me feel comfortable that if I added an incorrect sign or rounded incorrectly that I would have the opportunity to correct myself."* -Student 44

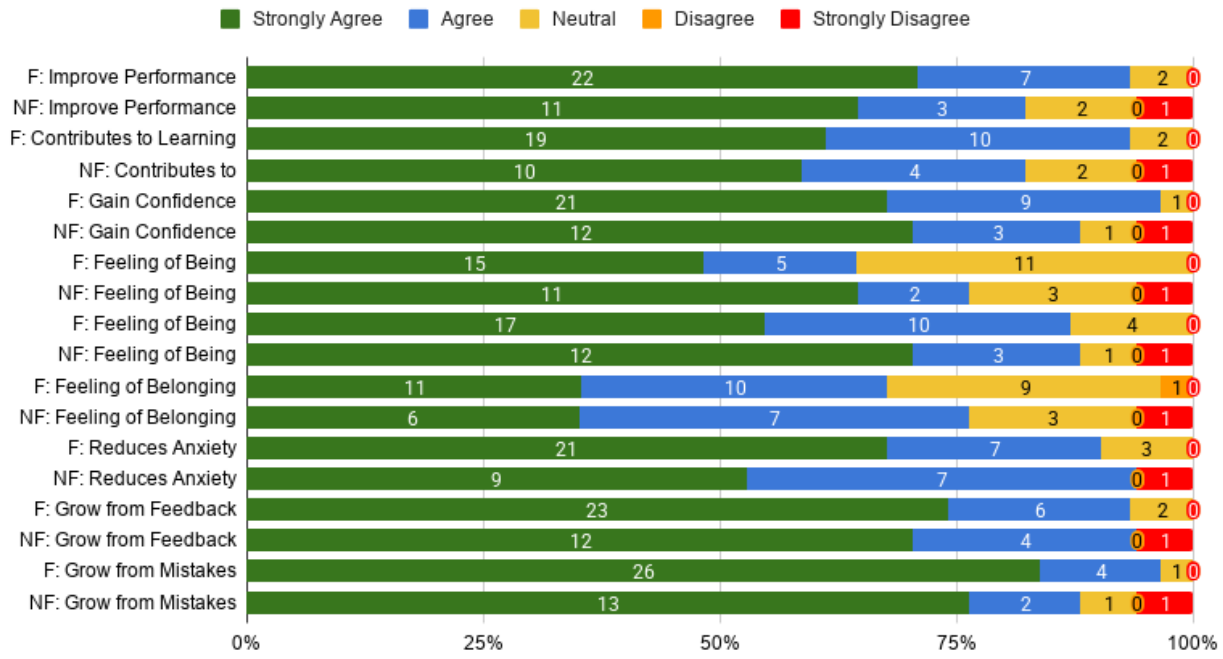

Figure 2: Distribution of Likert-scale responses for students experiencing the policy for the first time (F) and students with prior exposure (NF) across all survey measures.

Difference in perception between first and non-first timers (RQ2)

To better understand how prior exposure to the policy shapes student perceptions, we examined differences between students experiencing the policy for the first time and those encountering it in a previous course. We first present quantitative survey results to characterize differences in how the two groups rated the policy across learning, affective and belonging-related measures. We then draw on qualitative responses to provide additional contents and help explain observed patterns, particularly where differences in strength of endorsement or neutrality emerged between groups.

Examining the responses based on whether students were experiencing the policy for the first (F) or had encountered it in a prior course (NF), we observe that both groups reported largely positive perceptions across all measures. Figure 2 represents a stacked bar chart comparing the distribution of Likert responses for F and NF students across all measures. Students in their first exposure tended to select *Strongly Agree* more frequently, particularly on items related to performance, learning, confidence and learning from mistakes, suggesting a strong initial impact on how students interpret and use feedback. Students with prior exposure continued to report high levels of agreement, indicating that the policy is always beneficial.

We also observe differences across affective measures. First-time students reported stronger benefits related to confidence and anxiety reduction, consistent with the policy providing early reassurance and structure during early encounters with course expectations. Items related to acceptance and belonging showed a higher proportion of neutral responses, particularly among first-time students, which likely reflects the fact that these constructs are shaped by broader course

Table 2: Frequency of Themes and Categories Among First Time Exposures

Themes	Categories	Count	Frequency (%)
Learning Experience		3	38%
	Improved Learning and Recall	2	25%
	Growth through mistakes and feedback	0	0%
	Expand Skillset Beyond Core Content	1	13%
Individualized Experience		6	75%
	Emotional Well-being	3	38%
	Self-regulation and productivity	1	13%
	Academic Success	1	13%
	Account for life	1	13%
Total		8	

Table 3: Frequency of Themes and Categories Among Non-First Time Exposures

Themes	Categories	Count	Frequency (%)
Learning Experience		6	46%
	Improved Learning and Recall	6	46%
	Growth through mistakes and feedback	3	23%
	Expand Skillset Beyond Core Content	0	0%
Individualized Experience		9	69%
	Emotional Well-being	5	38%
	Self-regulation and productivity	4	31%
	Academic Success	2	15%
	Account for life	0	0%
Total		13	

and institutional contexts rather than a single instructional practice. Taken together, these findings suggest that the policy offers meaningful support while continuing to function as a stable and valued component of the learning environment for students who encounter it across multiple courses.

Although first-time students more frequently selected Strongly Agree across several measures, independent-samples t-tests revealed no statistically significant differences between first-time and non-first-time students. As such, the quantitative findings are interpreted descriptively, with attention to patterns of endorsement rather than group-level differences.

For the qualitative analysis, we analyzed the same categories and themes as they were distributed among students encountering the resubmission for the first time (first time exposures) and those who have encountered the practice in other courses before (non-first time exposures). Among students who encountered this practice for the first time in this course, 9 responses were deemed as non-answers, leaving 8 responses to be analyzed, as shown in Table 2. Among students who encountered the practice before, 18 responses were determined to be non-answers, leaving 13 responses to be analyzed, shown in Table 3.

It is immediately apparent that the frequency of both themes, Learning Experience and Individualized Experience, are similar across the two groups. This aligns with the quantitative

results showing consistently high agreement across learning- and support-related survey items for both populations.The most apparent and substantial difference between the two groups appears in the categories of Improved Learning and Recall, Growth Through Mistakes and Feedback, and Self-Regulation and Productivity, while we see surprisingly similar rates for Emotional Well-being and Academic Success mirroring the quantitative findings that both groups reported similar perceptions of reduced anxiety and improved performance. While these results aren't substantiated through any rigorous analysis, we theorize that these results may be due to the amount of exposure and familiarity students have with the policies. The reduced stress and increased grades resubmission can yield students are immediately apparent, and are equally mentioned by both parties, while the ability to increase learning, effectively grow from the feedback, and critically understand that feedback, seem to be more common reflections among students who have encountered the practice before. This would suggest that students who have encountered these policies before may get more out of using them, especially as it relates to learning, understanding and utilizing feedback.

Taken together, the quantitative and qualitative findings provide a complementary view of how students experience the policy across repeated exposure. While the quantitative results highlight consistently positive perceptions and differences in strength of endorsement between first-time and non-first-time students, the qualitative findings offer insight into how these differences manifest in practice. In particular, the qualitative themes suggest that some benefits, such as reduced stress and perceived academic support, are immediately apparent, whereas deeper learning-related outcomes, including growth from feedback, reflection on mistakes and self-regulation, may develop with continued exposure. Viewed together, these results suggest that the policy supports students both in early stages by providing structure and reassurance and over time by enabling more intentional and effective use of feedback, reinforcing its role as a sustainable and supportive instructional practice.

Comparison of perceptions with our previous study results (RQ3)

The quantitative comparison between the upper-level (ME 400) and lower-level (EGR 115) courses (Figure 3) shows consistently high mean ratings (above 4 out of 5) across all measured items, indicating positive perceptions of the resubmission practice at both levels. The lower-level course exhibited slightly higher mean values across all constructs; however, these differences were not statistically significant based on Mann–Whitney U tests. The largest observed difference occurred for sense of belonging, which approached but did not reach statistical significance ($p = 0.073$). This trend suggests that while the resubmission practice is similarly valued across course levels, it may have a relatively stronger influence on fostering a sense of belonging among lower-level students compared to upper-level students.

Compared to our prior work [6], we see that there is a much higher prevalence of *Individual Experience* categories appearing in the reflections, which was not the case for the prior study, where the prevalence of *Learning Experiences* was far higher. This may be attributed to the fact that, due to the higher prevalence in the prior experiment, those Learning Experience related categories were adapted into Likert style questions, with fewer categories related to Individual Experience themes were adopted. However, the most prevalent categories across all reflections, *Improved Learning and Recall* and *Emotional Well-being*, were accounted for in the Likert style

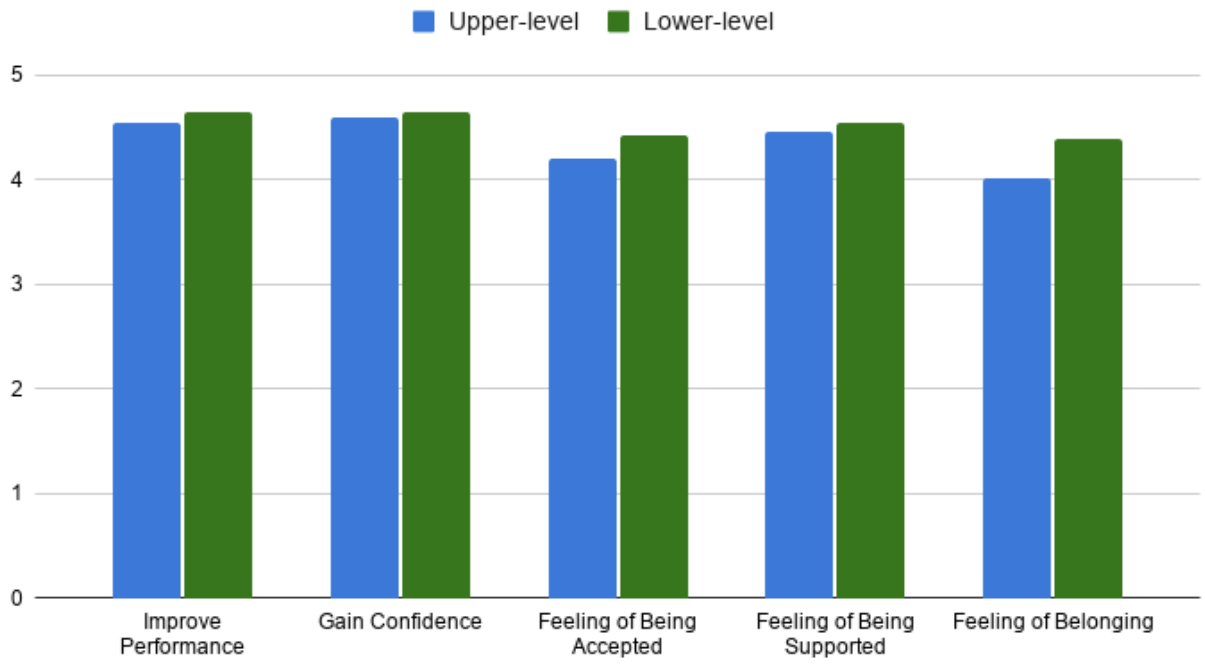

Figure 3: Mean student perceptions for the upper-level and lower-level courses.

questions, and were still the popular categories under their respective themes.

Accounting for that, the increase in Individualized Experiences compared to our prior experiment may also be rooted in the difference in course level and audience; the prior experiments focused on introductory computing courses, which may have lower (or be perceived to have lower) stakes than the course focused on in this work, which is an upper-level course. The increased prevalence of individualized experiences may reflect this, as upper-level students often have increased pressure exerted by more difficult classes and extensive projects, as well as more foundational understanding upon which to build. We believe the increased presence of Emotional Well-being as a theme in student reflections is a product of the higher expectations in these upper-level courses, and how the resubmission practice can help lower the pressure on these students. The increased presence of self-regulation and productivity we believe also relates to the course context, where upper-level students are more positioned and able to make use of rich feedback, especially as it relates to these complex topics.

Conclusion

This study examined students' perceptions of a structured resubmission policy implemented in an upper-level mechanical engineering vibrations course, extending prior work conducted in an introductory engineering context at the same institution. Across all three research questions, the findings indicate that resubmission practices are perceived positively by upper-level students and meaningfully support their course experience. In response to RQ1, both quantitative and qualitative results demonstrate that students viewed resubmission as particularly beneficial for

learning-focused outcomes, including growth from mistakes, engagement with feedback, improved confidence, reduced anxiety, and enhanced understanding of course material. Qualitative findings further revealed that students experienced resubmission not only as a learning mechanism but also as an individualized support structure that promoted emotional well-being, self-regulation, and academic success.

Addressing RQ2, results suggest that students encountering the policy for the first time and those with prior exposure both reported strong positive perceptions, with no statistically significant differences between groups. However, results indicate that while affective benefits such as reduced stress and academic success are immediately apparent, deeper learning-related outcomes, such as reflective use of feedback, and self-regulation, may become more pronounced with continued exposure to resubmission practices. Finally, in response to RQ3, both upper and lower-level students reported consistently positive perceptions of the resubmission practice, with no statistically significant differences between the groups. While lower-level students showed slightly higher ratings, particularly in sense of belonging, suggesting a stronger affective impact early on. Qualitative comparison with prior findings highlights a greater prominence of individualized experiences in the upper-level context. These results indicate that resubmission practices support both affective and learning needs across levels, fostering belonging in lower-level courses and supporting students through the increased cognitive demands of upper-level coursework.

Taken together, these findings suggest that structured resubmission policies can function as a sustainable and supportive instructional practice in analytically intensive upper-level engineering courses. By aligning assessment with the inherently iterative nature of engineering problem solving, resubmission practices help normalize mistakes as part of learning, encourage meaningful engagement with feedback, and support both academic and affective dimensions of student experience.

For future work, we will examine factors influencing students' use of resubmission and explore faculty perspectives on its adoption, including benefits and barriers. We will also identify institutional supports needed, such as grading resources, infrastructure, and technology, to enable sustainable and scalable implementation.

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