

WIP: Engineering students' views on assessments: A student survey on course assessment design choices

Thiha Myat Thu, Embry–Riddle Aeronautical University, Daytona Beach

Maya Al Shanti, Embry–Riddle Aeronautical University, Daytona Beach

Kai Jun Chew, Embry-Riddle Aeronautical University - Daytona Beach

Kai Jun "KJ" Chew is an assistant professor in the Engineering Fundamentals department at Embry-Riddle Aeronautical University. He is passionate about teaching and research, and he strives to produce knowledge that informs better teaching. His research intersects assessment and evaluation, motivation, and power dynamics. His research goal is to promote improvement in engineering classrooms through the intersections of the research.

Engineering students' views on assessments: A student survey on course assessment design choices

Introduction

Understanding the students' perception of class assessments is vital for enhancing student learning. Students' interpretations of assessments can influence how they engage with course content and reveal the effectiveness of instruction, making their perspectives an important yet understudied component of instructional improvement [1]. It is common for instructors to provide feedback to students to enhance their learning; however, while students are given the opportunity to provide feedback to instructors, this feedback tends to focus more on teaching methods. Minimal research has investigated the specific relationship between assessment effectiveness and student learning outcomes [2].

To address this gap, this study utilizes the *Perceptions of Assessment Tasks Inventory* (PATI) instrument designed by Dorman & Knightley to examine undergraduate engineering students' perceptions of assessments in Fundamental Engineering Courses (FECs), specifically Statics [3]. PATI captures student perceptions on a one-to-four scale across five different categories: congruence with planned learning, authenticity, student consultation, transparency, and diversity. A 35-question survey was administered to undergraduate engineering students at a private university who had already completed a Statics course.

Motivation

Existing literature on assessment in higher education has largely focused on course design and learning outcomes, but less attention has been given to students' perspectives on whether assessments reflect taught course content [4 - 5]. Studies by Zeidner explored college students' reactions to key facets of classroom testing [4]. Van Etten examined students' beliefs about exam preparation [6]. Nelson analyzed student preferences for adaptations in classroom testing [7]. All these studies focus on student perceptions regarding examinations and tests. This motivates us to address a gap in the literature concerning the understudied role of students' perceptions of assessment effectiveness, with particular attention to whether these perceptions align with stated course objectives. Additionally, there are several areas of potential research on methodological inconsistencies, differing priorities between students and teachers, and the complex relationship between perception and actual academic performance [2].

A point of contention is whether the assessment methods students prefer support effective learning. Van der Kleij and Lipnevich highlight that students' preferences for feedback that is perceived as useful to them may not align with feedback that produces the most significant learning improvement [2]. For example, some students may prefer assessments that are chapter-based, as it allows for focused preparation and enable students to demonstrate depth of understanding within a specific topic. However, research conducted by Schilling and Applegate found that students' self-reported perceptions of their abilities do not align with their actual performance, with many

students overestimating their skills [8]. Their findings further suggest that positive student perceptions of a course or its assessments are not reliable indicators of successful learning outcomes [8]. This suggests that student preferences for certain assessment formats may reflect perceived effectiveness rather than actual learning.

Although student preferences may not be synonymous with pedagogical effectiveness, the main goal for this pilot study is to explore the students' perceptions of assessments in an engineering course. It is important to note that such a study can open future studies on alignment between instructional practices, course content, and assessment structure. This can reinforce the idea that the effectiveness of an assessment is not primarily based on how well an assessment is designed, but more so on how well the assessment aligns with the material that was taught. Cudney supports this, noting that while a professor's knowledge and subject mastery are crucial qualifications, they do not guarantee successful learning for the students who may prioritize other factors over pure expertise [1].

To examine student perceptions of assessment alignment, Dorman and Knightley developed an instrument to assess secondary school students' perceptions of assessment. The authors argue that while assessment is vital to education, students are rarely consulted about the methods used to grade them, which can negatively impact their academic motivation [3]. This instrument, designated as the *Perceptions of Assessment Tasks Inventory* (PATI), identified five scales of student perception. The final evaluation framework includes 35 questions, 7 for each, using a 4-point Likert scale. The five categories are presented in Table 1.

Table 1. Description of the PATI scales

Scale	Description
Congruence with planned learning	The extent in which assessments align with stated goals of the course.
Authenticity	If assessments include real-life situations applicable to the learner.
Student consultation	How much students are informed about the assessments used in the course.
Transparency	The extent to which the requirements of the assessments are communicated to the student.
Diversity	If students have equal accessibility and accommodations to complete the assessments.

The PATI instrument allows for a structured and multidimensional analysis of the students' experience with assessment by isolating key features that influence how assessment is perceived and engaged with. Using this, a survey was constructed to answer the following research question:

RQ: What do undergraduate engineering students perceive about the alignment of assessments with course objectives in Fundamental Engineering Courses (FECs)?

Method

A survey aimed at undergraduate engineering students who have taken Statics was created by adapting the *Perceptions of assessment tasks inventory* (PATI) framework as developed by Dorman & Knightley [3]. Statics was selected because it is a common course across all engineering disciplines in a private, teaching-focused university on the East Coast of the United States. There is consistent content, structure, and assessment methods in this course. This consistency makes it well-suited for comparing student perceptions of assessment tasks for a pilot study. The intended participants are undergraduate engineering students who have already completed a Statics course, recruited via email for a target sample size of 25 to ensure sufficient representation across different instructors and classroom experiences. The survey was generated and disseminated using Qualtrics, with approval by our institution's Institutional Review Board (IRB). Following the PATI framework, the survey included 35 questions, 7 for each scale, with a 4-point Likert scale ranging from almost never to almost always. A sample of the questions in the survey, one from each PATI scale, is presented in Figure 1 below.

Figure 1: Sample questions from the survey

My Statics tests are a fair indicator of what my class is trying to learn.	1- Almost Never	2- Sometimes	3 - Often	4- Almost Always
My Statics assessment tasks are useful.	1- Almost Never	2- Sometimes	3 - Often	4- Almost Always
I am asked about the types of assessment I would like to have in Statics.	1- Almost Never	2- Sometimes	3 - Often	4- Almost Always
I know in advance how I will be assessed.	1- Almost Never	2- Sometimes	3 - Often	4- Almost Always
I am given a choice of assessment tasks.	1- Almost Never	2- Sometimes	3 - Often	4- Almost Always

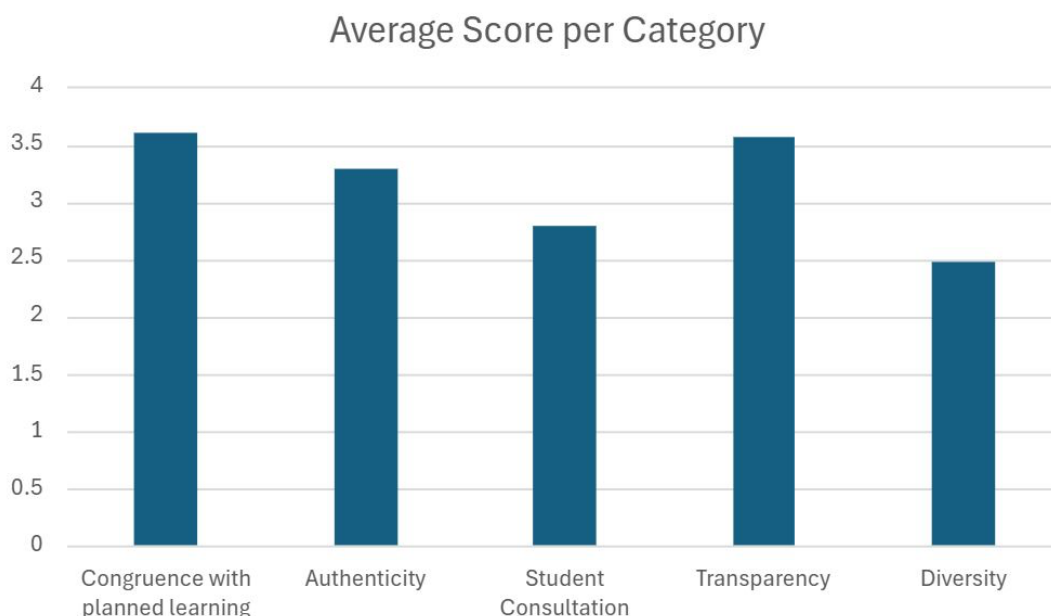
The survey was followed by an open-ended question inviting participants to elaborate on their experiences. A qualitative component was incorporated alongside the quantitative measures to provide greater depth and context to the findings [9]. As this study was designed as a pilot, the results serve as a preliminary foundation, with the intent that the survey instrument and methodology will be refined in future studies.

Additional questions collected demographic data, as well as the semester the student completed Statics. Participation in the survey was voluntary and anonymous, requiring approximately 20 minutes to complete. Upon confirmation of survey completion, participants were provided with a \$10 campus dining coupon as an incentive.

Preliminary Results

Following data collection, a total of 28 individuals initiated the survey; however, only 14 participants completed it in its entirety. Only fully completed responses were included in the analysis, as partial submissions had the potential to skew the results. It is important to note that this sample size is insufficient for a quantitative study of statistical significance; therefore, the findings reported here must be interpreted with this limitation in mind.

Figure 2: Average score per PATI category



Based on Figure 2, questions related to Congruence with Planned Learning received the highest average score ($M = 3.60$), followed closely by Transparency ($M = 3.56$), Authenticity ($M = 3.30$), and finally Student Consultation ($M = 2.79$) and Diversity ($M = 2.47$), which received relatively lower average scores. M represents the category mean.

Select responses to the open-response questions reflecting each category are presented in the following tables:

Table 2. Open responses from survey that reflect congruence with planned learning

Q: Please describe your overall experience with the assessments in the statics course. You are welcome to include language about your feelings, thoughts, and other relevant information about your experience here.

“Assignments and exams closely reflected the material covered in lectures and problem-solving sessions”

“...based on the SD and SCDs that we do for homework”

“Nothing new nor different from what we had seen in the past”

“Assessments were almost identical to the problems taught in class and on the homework”

“The in-class problems and homework definitely help you to prepare for the exam.”

Table 3. Open responses from survey that reflect authenticity

Q: Please describe your overall experience with the assessments in the statics course. You are welcome to include language about your feelings, thoughts, and other relevant information about your experience here.

“Most tests required not only memorization of formulas but also a solid conceptual understanding and the ability to apply principles to new problems.”

“Statics assessments are in a good position between using what is learned in class and applying it to new situations”

“Ability to apply what I was taught to a problem.”

Table 4. Open responses from survey that reflect transparency

Q: Please describe your overall experience with the assessments in the statics course. You are welcome to include language about your feelings, thoughts, and other relevant information about your experience here.

“expectations were generally clear, and I usually knew in advance what topics would be covered and what format to expect”

“Assessments are brought to the attention of students well, so we know what's coming up.”

“clear on what will be on assessments and what I’m being asked... not been true for every unit”

“we were told how many questions would be on each test and what type of questions they would be.”

Student Consultation and Diversity scored the lowest among all PATI categories, and no qualitative responses directly addressed these areas.

Discussion

The preliminary results of this pilot study indicate high levels of congruence with planned learning and transparency within the Statics courses at this university, albeit with a small sample size. In contrast, the scales of student consultation and diversity scored lower. This pattern is similar to trends reported in prior studies employing the PATI framework, although those investigations were conducted primarily within secondary education contexts.

Gao used the Student Perception of Assessment Questionnaire (SPAQ), a framework adapted from PATI, to examine 248 American high school students' perceptions of mathematics assessments [10]. The findings indicated strong perceived alignment between classroom instruction and assessment, along with adequate transparency. However, student consultation and student diversity scored lower, like this pilot study [10]. In the initial study from Dorman & Knightley using PATI, in a sample of 658 British secondary school students, a similar trend was observed where transparency and congruency scored high, with diversity scoring lower [11]. Notably, both studies employed cluster analysis to group PATI dimensions, while this pilot study does not utilize such an approach. Alkharusi also used SPAQ to study 330 Omani 11th-grade science students, with similarities to Gao and Dorman, with shared strengths in Transparency and Congruence [12].

The results of this pilot study suggest that undergraduate students exhibit similar patterns to secondary school math and science students, indicating that perceptions of assessment may remain relatively consistent across educational levels. Badjie et al. deployed a similar survey using SPAQ on 557 undergraduate engineering students across four universities in Bangladesh regarding their classroom assessments [13]. Their study also produced similar results, with congruency and transparency scoring high, and diversity scoring low. Their research also highlighted a significant disparity based on academic level. First-year students perceived the alignment, authenticity, and transparency of assessments much more favorably than third and fourth-year students [13]. However, unlike this pilot study, Badjie et al. deployed their survey across multiple engineering departments across multiple universities, rather than focusing on a specific course.

As this pilot study focuses on Statics, which is normally taken by second-year students at this university, responses may be influenced by participants' current academic standing. Since this survey was open to all students who had completed Statics, upper-level students may interpret the questions within the broader context of their academic journey, whereas second-year students may base their responses more directly on recent course experiences. This introduces a potential source of variability in perception, representing a limitation of the present study that should be addressed in future research.

Future Work

This study will continue to be conducted into the next academic semester at this university to increase the sample size and enable a more comprehensive statistical analysis of responses. With a larger dataset, statistical analysis will be used to examine trends in students' perceptions of assessment across different engineering courses, allowing patterns and correlations to be identified that may not have been detectable within the current sample. The findings of this ongoing work seek to contribute to a broader understanding of how assessment design can be better aligned with student learning experiences in engineering education.

References

- [1] E. A. Cudney *et al.*, “Exploring student perceptions of teaching effectiveness factors in higher education,” *Total Quality Management & Business Excellence*, pp. 1–23, Apr. 2025, doi: <https://doi.org/10.1080/14783363.2025.2486007>.
- [2] F. M. Van der Kleij and A. A. Lipnevich, “Student perceptions of assessment feedback: a critical scoping review and call for research,” *Educational Assessment, Evaluation and Accountability*, vol. 33, Aug. 2020, doi: <https://doi.org/10.1007/s11092-020-09331-x>.
- [3] J. P. Dorman and W. M. Knightley, “Development and validation of an instrument to assess secondary school students’ perceptions of assessment tasks,” *Educational Studies*, vol. 32, no. 1, pp. 47–58, Mar. 2006, doi: <https://doi.org/10.1080/03055690500415951>.
- [4] M. Zeidner, “COLLEGE STUDENTS’ REACTIONS TOWARDS KEY FACETS OF CLASSROOM TESTING,” *Assessment & Evaluation in Higher Education*, vol. 15, no. 2, pp. 151–169, Mar. 1990, doi: <https://doi.org/10.1080/0260293900150206>.
- [5] J. Lingard, L. Minasian-Batmanian, G. Vella, I. Cathers, and C. Gonzalez, “Do students with well-aligned perceptions of question difficulty perform better?,” *Assessment & Evaluation in Higher Education*, vol. 34, no. 6, pp. 603–619, Dec. 2009, doi: <https://doi.org/10.1080/02602930802287249>.
- [6] S. Van Etten, G. Freebern, and M. Pressley, “College Students’ Beliefs about Exam Preparation,” *Contemporary Educational Psychology*, vol. 22, no. 2, pp. 192–212, Apr. 1997, doi: <https://doi.org/10.1006/ceps.1997.0933>.
- [7] J. S. Nelson, M. Jayanthi, M. H. Epstein, and W. D. Bursuck, “Student Preferences for Adaptations in Classroom Testing,” *Remedial and Special Education*, vol. 21, no. 1, pp. 41–52, Jan. 2000, doi: <https://doi.org/10.1177/074193250002100106>.
- [8] K. Schilling and R. Applegate, “Best methods for evaluating educational impact: a comparison of the efficacy of commonly used measures of library instruction,” *Journal of the Medical Library Association : JMLA*, vol. 100, no. 4, pp. 258–269, Oct. 2012, doi: <https://doi.org/10.3163/1536-5050.100.4.007>.
- [9] W. M. Lim, “What Is Qualitative Research? An Overview and Guidelines,” *Sage Journals*, vol. 33, no. 2, Jul. 2024, Doi: <https://doi.org/10.1177/14413582241264619>
- [10] M. Gao, “Classroom assessments in mathematics: High school students’ perceptions,” *International Journal of Business and Social Science*, vol. 3, no. 2, pp. 63–72, Jan. 2012.
- [11] J. P. Dorman and W. M. Knightley, “Initial use of the perceptions of assessment tasks inventory (PATI) in English secondary schools,” *Alberta Journal of Educational Research*, vol. 52, no. 3, pp. 196–199, Fall 2006.

- [12] H. A. Alkharusi, “Construct validation of the perceptions of assessment tasks inventory,” *Electronic Journal of Research in Educational Psychology*, vol. 17, no. 3, pp. 665–682, 2019.
- [13] O. Badjie, Y. Velankar, and M. A. Al Mamun, “Investigating how students perceive assessment in the context of engineering education,” *Proceedings of the Research in Engineering Education Symposium (REES 2024)*, Hubballi, India, Jan. 2024, doi: <https://doi.org/10.52202/073963-0013>
- [14] J. M. Etchegaray and W. G. Fischer, “Understanding Evidence-Based Research Methods: Descriptive Statistics,” *HERD: Health Environments Research & Design Journal*, vol. 3, no. 1, pp. 111–117, Oct. 2009, doi: <https://doi.org/10.1177/193758670900300110>.