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Author Biography

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Reimagining Assessment in the Organic Chemistry Laboratory: Implementing Specifications Grading and a Token-Based System at TRU

Introduction: Rethinking the Grading Gauntlet

Grading is often one of the most challenging aspects of teaching, time-consuming for instructors and anxiety-inducing for students. After being inspired at the 2024 CSC conference in Winnipeg, I set out to explore whether a different approach could make the process more equitable, transparent, and motivating for everyone involved. The result was the introduction of specifications grading paired with a token-based system in CHEM 3240: Organic Chemistry Laboratory during the Fall 2024 semester at Thompson Rivers University (TRU). This approach, grounded in the work of Nilson (2014), replaces traditional points with a binary evaluation (Mastered or Not Yet Mastered) and provides students with structured flexibility to revise their work or extend deadlines.

Specifications Grading: A Mastery-Focused Model

Specifications grading emphasizes meeting clear, measurable learning outcomes, promoting deeper understanding and reducing ambiguity (Boud & Molloy, 2013; Guskey, 2009). In CHEM 3240, students were required to meet approximately 80% of the checklist criteria to achieve mastery. For example, a lab report might include 24 rubric items, with at least 19 needing to be mastered to pass. If mastery was not achieved, students could revise and resubmit using a token.

The benefits of specification grading, supported in the literature (Boud, 2013; Delgado & Rivera, 2025; Gusekey, 2009; Harris & Simons, 2018; Howitz, 2021; Towsley & Schmid, 2020) and confirmed in practice, include:

- Clarity and transparency in expectations
- Equity in assessment standards
- Reduced anxiety through a pass/fail mastery model
- Improved feedback that is actionable and specific
- Efficiency in grading through structured checklists

The Token-Based System: Flexibility Meets Accountability

Tokens acted as a form of academic currency, inspired by classroom token economies (Wolery et al., 1988; Smith et al., 2022). Students began the semester with a small number of tokens (4), which could be redeemed for:

- Revising and resubmitting an assignment graded as Not Yet Mastered
- Requesting a 72-hour extension on an assessment
- Other negotiated uses, except for safety-related work, which could not be revised

This system gave students a sense of control over their learning, encouraged strategic decision-making, and reduced the fear of irreversible mistakes.

Research Results: Student Perspectives and Outcomes

An ethics-approved voluntary anonymous survey was conducted with 11 respondents out of 25 enrolled students. The survey contained Likert-scale and open-ended questions that investigated student perspectives on the use of specifications grading in CHEM 3240. The striking findings are outlined in Figures 1 and 2 below.

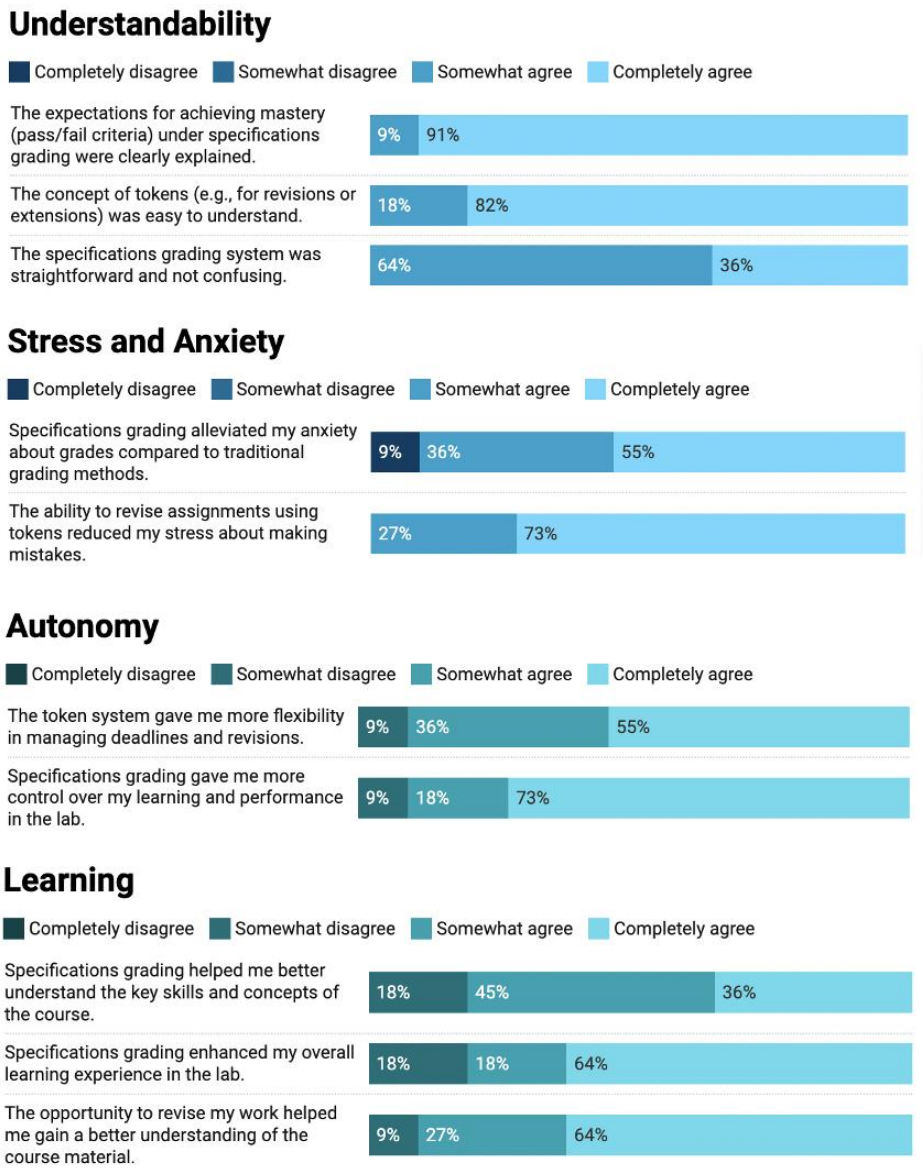


Figure 1. *Student survey responses to the Likert-scale questions on the implementation of specifications grading and a token-based system in CHEM 3240: Organic Chemistry Laboratory (n = 11). Results are grouped into four categories: Understandability, Stress and Anxiety, Autonomy, and Learning, and show the percentage of respondents who completely agreed, somewhat agreed, or somewhat disagreed with each statement.*

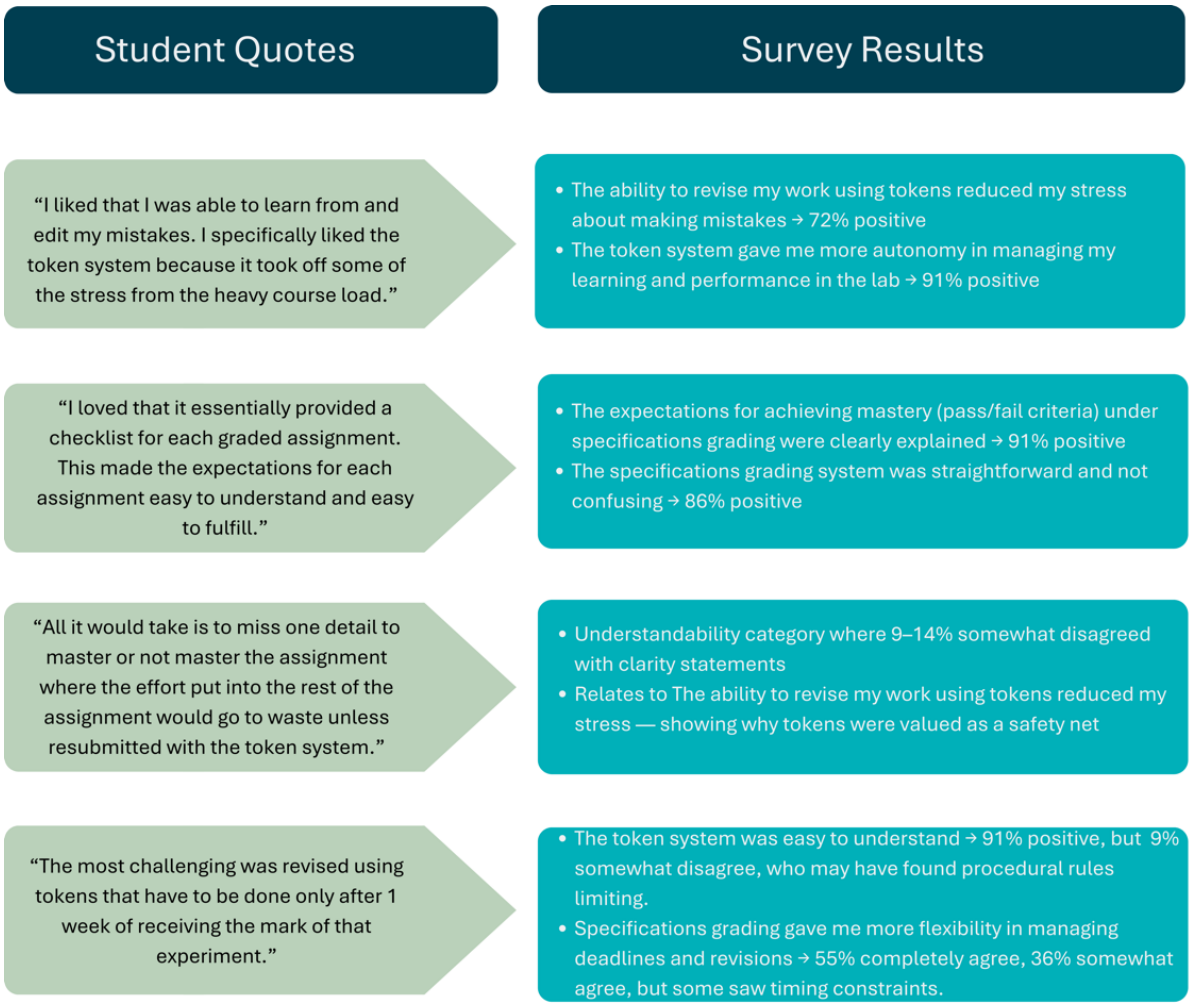


Figure 2. *Alignment of student quotes with corresponding survey results from CHEM 3240: Organic Chemistry Laboratory (n = 11) on the implementation of specifications grading and a token-based system.*

Overall, the results indicate that most students felt specifications-based grading provided them with greater autonomy, particularly through increased flexibility in managing deadlines and more control over their own learning and performance. While they were somewhat less convinced that the approach directly improved their understanding of the key skills and concepts in the course, they expressed stronger agreement that it enhanced their overall learning experience and that the opportunity to revise work contributed to a deeper grasp of the material. In general, students demonstrated a solid understanding of how specifications grading, and the token system operated, though some found the mechanics of the system itself slightly less clear, yet still rated it positively. In terms of stress and anxiety, only one student completely disagreed that specifications grading reduced their grade-related stress compared to traditional methods; the majority reported that it did help, with the token system perceived as even more effective in alleviating pressure. Students enjoyed the implementation of this model in their third-year organic chemistry laboratory, valued the control it afforded them, and appreciated the reduced stress that came from being able to revise and resubmit their work.

Reflections: Benefits, Challenges and Future Direction

Implementing specifications grading alongside a token-based system in *CHEM 3240* has proven to be a valuable shift, moving the emphasis from point accumulation to genuine mastery of learning outcomes while empowering students with greater control over their progress. The approach offered clear benefits: flexibility when unforeseen challenges arose, stronger alignment between assessments and course objectives, more efficient marking through checklists, and richer formative learning via revision opportunities. While challenges remain, including streamlining token management, adapting digital tools to a binary grading model, and addressing perceptions of rigidity, these are balanced by the overwhelmingly positive student feedback and measurable gains in engagement and autonomy. Looking ahead, planned refinements, such as improved gradebook integration into the learning management system, clearer communication of expectations, the introduction of a lab contract, and expansion into a fourth-year course, aim to strengthen the system further. Overall, the results suggest that this model not only supports deeper learning and reduces stress but also fosters a more equitable and student-centered laboratory environment.

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52nd College Chemistry Canada Conference

Chemistry for All

Nunavut Arctic College
Nunatta Campus

Iqaluit, NU
29 May – 01 June 2026



Details for the 2026 College Chemistry Canada Conference can be found at the conference website.
Information will be continuously updated as planning progresses.

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