EXPLORING REFLECTIVE JOURNALING IN DESIGN EDUCATION: CHALLENGES AND OPPORTUNITIES

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ABSTRACT
Structured reflective journaling is a valuable tool in design education, helping students critically evaluate their learning, track progress, and refine design decisions. This study explores its impact in a five-week modular furniture design course at Tecnológico de Monterrey. Using a rubric-guided format, students documented progress, insights, challenges, and self-assessments. Analysis of journals and questionnaires shows that journaling supported idea development and progress tracking, though challenges included time constraints and limited engagement. The rubric played a key role in guiding deeper reflection. Findings suggest that flexible milestones, alternative formats, and structured prompts can enhance journaling's effectiveness. This paper highlights its potential to foster critical thinking and self-directed learning in design students, offering insights for educators integrating structured reflection into project-based courses.

Keywords: Reflective journaling, design education, educational innovation, higher education, critical thinking

1 INTRODUCTION
Reflection is a fundamental process in design education, enabling students to critically evaluate their decisions, refine their approaches, and develop a deeper understanding of their learning experiences. It is particularly important in fostering student agency, as it encourages learners to take ownership of their progress, make independent decisions, and navigate complex design challenges. Reflection has long been recognised as an essential component of learning, with John Dewey [1] arguing that structured reflection transforms experience into meaningful knowledge by enabling individuals to systematically examine their actions and decisions. His work has influenced various pedagogical approaches, particularly those that emphasise student-centred learning and critical thinking.
Beyond education, reflection plays a particularly vital role in design education, where students must integrate technical, creative, and user-centred considerations into their work. Donald Schön [2] explored how designers and other professionals engage in "reflection-in-action," refining their decision-making processes through iterative cycles of doing and thinking. His concept of the reflective practitioner has since become a foundation for design pedagogy, reinforcing the importance of reflection in developing problem-solving skills and adaptability.
Reflective journaling has been widely studied as a pedagogical tool to encourage critical thinking [3,4,5] in various disciplines such as teacher training [6] nursing [7] music therapy [3], and design education [8,9]. Despite its benefits, reflection does not naturally occur at a deep level without structured guidance [10]. Students often engage in superficial reflection, summarising tasks rather than critically analysing their learning processes.
This paper examines the use of structured reflective journaling in an undergraduate design course, aiming to improve its implementation given its central role in the Tec21 model. Drawing on student feedback and educator analysis, the study explores learning benefits, engagement challenges, and opportunities to enhance journaling as a pedagogical tool. To guide engagement, we used a rubric. While rubrics can risk performance-driven responses, we included one to promote consistency and depth, based on prior experience with uneven reflection depth in similar Tec21 courses.

2 CONTEXTS OF THE STUDY
This study was conducted as part of a five-week intensive design course, Modularity and Optimisation, at Tecnológico de Monterrey, structured under the Tec21 educational model. Tec21 Educational Model

is designed to develop student competencies through Challenge-Based Learning (CBL), immersing students in real-world problems that foster critical thinking, adaptability, and self-directed learning [11, 12]. Reflection is a key component of CBL, enabling students to assess their learning, refine their approaches, and connect experiences to broader competencies [13, 14]. Previous studies highlight how structured reflection within Tec21 courses enhances problem-solving, decision-making, and competency development, reinforcing metacognition as an essential learning tool [15, 11]. The Modularity and Optimisation course was designed for fifth-semester undergraduate design students as an intensive Tec21 "block" lasting five weeks with twenty instructional hours per week. The course, co-taught by the three authors, emphasised concept-driven design, iterative prototyping, and real-world constraints in collaboration with a local design studio as an Educational Partner. Students were given the design challenge of addressing the needs of professionals relocating to Querétaro and living in compact spaces. While the design project was developed collaboratively in teams, reflective journaling was assigned as an individual activity to help students critically assess their contributions, think independently, and refine their learning strategies.

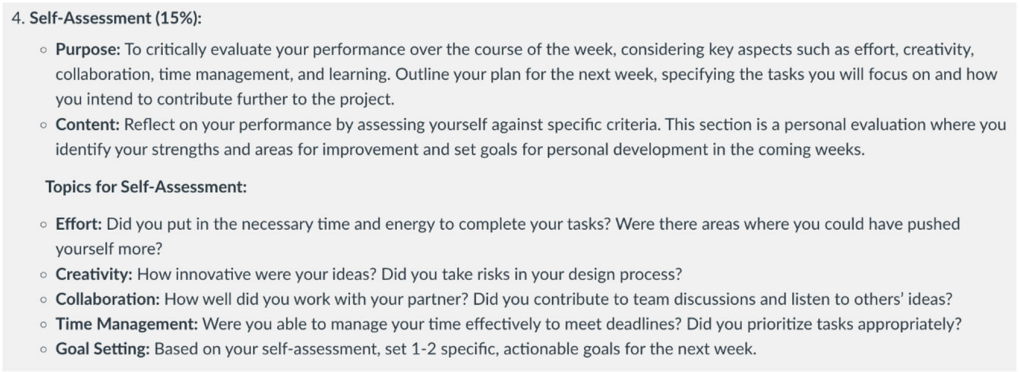
3 METHODOLOGIES

Twelve students participated in a five-week design course, keeping daily reflections compiled into weekly journals. In addition, an end-of-course questionnaire captured students' perceptions of journaling. Using these two data sources allowed for a richer understanding of the reflective process: while surveys revealed students' attitudes and perceived challenges, journal entries showed how students engaged with reflection in practice—even when they undervalued journaling yet demonstrated meaningful reflection in their writing.

3.1 Journal Structure

The weekly journals were structured using a rubric to guide students toward consistent and deeper reflection. The rubric consisted of five evaluation criteria, four of which corresponded the required sections of each journal entry. Each criterion included a description outlining its purpose, expected content, and grading weight (e.g. Figure 1). The fifth criterion, Professionalism, carried a weight of 15% and assessed overall journal quality, including structure, clarity, completeness, use of visual elements, and adherence to formatting guidelines. Students were expected to write between 2,000–2,500 words each week, distributed across the four main sections according to their respective grade weights. The journal structure included:

1. Day-by-day progress (40%) – A chronological record of tasks and reflections (Figure 2).
2. Learning and insights (15%) – Key takeaways from the design process.
3. Challenges and solutions (15%) – Difficulties encountered and strategies to overcome them.
4. Self-assessment (15%)– A personal evaluation of performance, growth, and contributions to the team.


4. **Self-Assessment (15%):**
   - **Purpose:** To critically evaluate your performance over the course of the week, considering key aspects such as effort, creativity, collaboration, time management, and learning. Outline your plan for the next week, specifying the tasks you will focus on and how you intend to contribute further to the project.
   - **Content:** Reflect on your performance by assessing yourself against specific criteria. This section is a personal evaluation where you identify your strengths and areas for improvement and set goals for personal development in the coming weeks.

   Topics for Self-Assessment:

   - **Effort:** Did you put in the necessary time and energy to complete your tasks? Were there areas where you could have pushed yourself more?
   - **Creativity:** How innovative were your ideas? Did you take risks in your design process?
   - **Collaboration:** How well did you work with your partner? Did you contribute to team discussions and listen to others' ideas?
   - **Time Management:** Were you able to manage your time effectively to meet deadlines? Did you prioritize tasks appropriately?
   - **Goal Setting:** Based on your self-assessment, set 1-2 specific, actionable goals for the next week.

Figure 1. Description of Self-Assessment criterion in the rubric

Figure 2. Example page for Day-by-Day progress

3.2 Student Questionnaire

An anonymous end-of-course questionnaire included four Likert-scale questions addressing journaling's usefulness for task management, perceived difficulties, the clarity of the rubric, and its support in addressing course themes (e.g., sustainability, modularity). Each was followed by an open-ended prompt for elaboration.

3.3 Teaching Team Analysis of Reflective Journals

The teaching team conducted a qualitative review of the journals to identify examples of strong and weak reflective practice. All journals were first reviewed collaboratively to ensure a shared understanding of the grading criteria, then divided among instructors to extract illustrative examples. The analysis focused on identifying entries that demonstrated clarity, depth, and consistent engagement, as well as those that lacked structure, insight, or reflective quality. The analysis results were then compared and incorporated with student questionnaire responses. Patterns across both data sources were interpreted to develop broader themes—such as learning benefits and engagement challenges—which are presented in Section 5. These themes later informed considerations for future implementation.

3.4 Ethical Considerations

To ensure ethical integrity, informed consent was obtained in both written and oral form. Questionnaire responses were anonymised and analysed only after final grades were submitted to avoid potential bias and protect student privacy.

3.5 Limitations

This study focused on a single course and cohort, aiming to explore rather than generalise. While student self-reports provide valuable insights, they may also reflect bias, as is common with self-reported data. Future research could integrate the recommended journal structure and implement it across multiple cohorts.

4 STUDENT EXPERIENCES WITH JOURNALLING

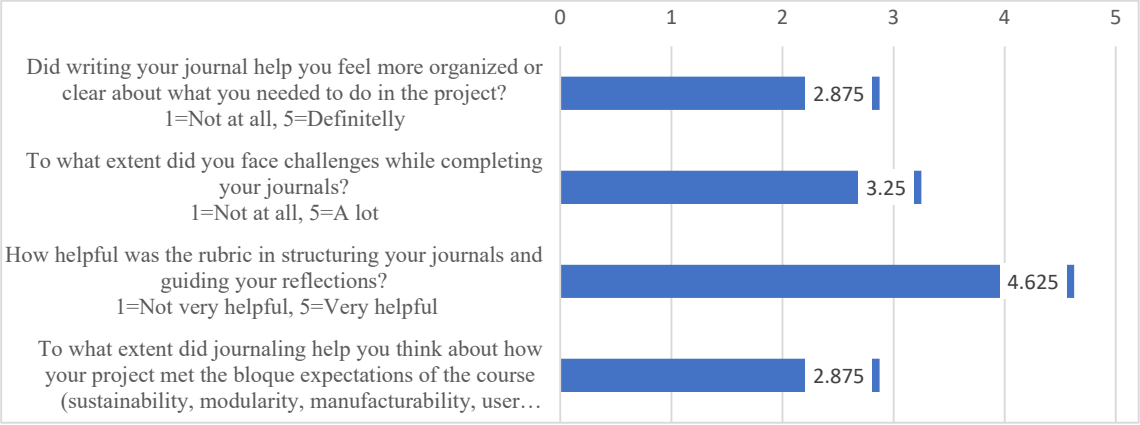
Most students found journaling somewhat challenging but manageable, noting that it required effort and consistency. At the same time, students valued the rubric, describing it as a clear and effective guide for structuring their journal entries (Table 1).

4.1 Writing Journals for Organisation and Clarity

While journaling was intended to help students organise their tasks and clarify their workflow, most did not find it as an effective task management tool. Instead, students referred to its role in tracking progress and reviewing past decisions. Some mentioned that their planning was guided more by course activities

than journaling. Others found the journal most useful for reviewing their work at the end, rather than during the process.

Table 1. Average Ratings of Likert Scale Questionnaire Questions



4.2 Challenges in Completing Journals

Students reported a range of challenges while completing their journals. These included the time it took to write entries, difficulties in forming a habit of daily writing, and challenges in recalling past activities when writing retrospectively.

Some students highlighted that writing itself was a challenge, either due to disinterest or perceived repetition. Others mentioned specific obstacles, such as forgetting to document their process with photos or meeting length requirements. A few students noted a preference for simplified or non-traditional formats, such as annotated visual progress, less frequent entries, or end-of-week summaries rather than daily writing.

4.3 Usefulness of the Rubric in Structuring Journals and Guiding Reflections

Students described the rubric as highly useful for structuring their journals and maintaining clarity. Many indicated that it helped them stay focused and prevented them from omitting key insights. Several commented that having clear criteria supported the overall organisation of their writing.

While the rubric was generally well received, some students mentioned that daily journaling felt repetitive or excessive. A few suggested that the applying the rubric effectively could be easier to approach with example entries.

4.4 Journaling as a Tool for Reflecting on Course Expectations

Student responses varied on whether journaling supported reflection on course expectations such as sustainability, modularity, manufacturability, or user needs. Some students shared that journaling helped them recall user needs or review feedback, especially during later stages of the project. Others noted that class activities played a larger role in shaping their understanding of these themes.

A few students mentioned that journaling helped them remember feedback from industry collaborators or reflect on how they approached manufacturing challenges. Others expressed that the journal felt more like a record of tasks than a tool for thematic reflection.

5 TEACHING TEAM ANALYSIS OF REFLECTIVE JOURNALS

The teaching team analysed the reflective journals to identify learning benefits and engagement limitations, and to compare them with student perceptions from the questionnaire. Journals helped students document feedback, visualise concept evolution, and reflect on how different stages of the design process (e.g., research, ideation, prototyping, feedback) related to one another, allowing them to develop a deeper understanding of their own work (Table 2).

Additionally, students included photos of themselves performing tasks or showing context, as well as sketches and mock-ups. This supported developing storytelling skills and helped clarify their design rationale. Educators also benefited from journals as diagnostic tools, using them to identify student struggles and provide more targeted support. Interestingly, while student responses to Likert scale questionnaire questions indicated that they did not perceive journaling as a helpful planning tool, the

analysis revealed that some students included goal setting within the self-assessment sections of their journals, as instructed.

Despite these benefits, some limitations observed in how students engaged with journals. A key issue was the tendency for students to treat their journals as reports rather than spaces for personal reflection, focusing more on technical details than on critically analysing their decisions and learning process. Some students also used their journals as spaces for complaints, listing challenges without reflecting on how they addressed them or what they learned. This imbalance made it harder for them to fully engage in problem-solving. Additionally, some students relied heavily on step-by-step guidance from instructors, rather than using their journals as a tool for independent thinking and self-direction.

Table 2. Learning benefits and engagement limitations

Themes	Key Observations
Learning Benefits	**Journaling as a Documentation Tool:** Helps students track progress, receive feedback, and visualise concept evolution. **Fostering Self-Reflection:** Encourages deeper understanding of research impact and critical thinking. **Identification of Design Tools:** Students identified which design tools they used at different stages and sometimes explained their reasoning. **Teaching Diagnostic Tool:** Helps educators identify struggles and provide targeted support. **Narrative Development:** Combining reflections and images improves storytelling and design communication.
Engagement Limitations	**Risk of Losing Reflective Purpose:** Some students treat journals as technical reports rather than self-assessments. **Journals as Complaint Spaces:** Some entries focus on frustrations without discussing solutions. **Lack of Independent Thinking:** Students rely on external guidance instead of developing initiative.

6 DISCUSSION AND CONCLUSION

Reflective journaling, an integral part of the Tec21 educational model, aligns with established theories on the role of reflection in learning and professional development [1,2]. This study examined structured reflective journaling, aiming to improve its implementation. Our findings reveal key tensions between the pedagogical benefits observed by educators and students' own perceived experiences.

6.1 Revisiting the Role of Reflective Journaling in Design Education

Although the rubric was designed to include planning, many students perceived journaling as retrospective documentation rather than a tool for organising tasks. While they appreciated the structure, daily entries were often seen as burdensome, suggesting a need to better align journaling with designers' natural workflow. The rubric was helpful in guiding reflections, though several students recommended adding example journals to clarify expectations.

6.2 Challenges and Areas for Improvement

Students' difficulties with journaling stemmed from three main issues: the cognitive and time demands of writing (probably in their second language), the struggle to build a consistent habit, and the disconnect between reflective writing and the visual, practice-based nature of design. Some used journals to vent frustrations rather than reflect on challenges and solutions, highlighting the need for refined prompts.

From the educators' perspective, journals provided insights into student progress, supported team planning, and helped diagnose learning challenges. Yet some students saw them as a requirement rather than a meaningful activity, pointing to the need for better integration into the course.

6.3 Future Directions for Implementation

To increase engagement with journaling, we suggest the following improvements:

- Flexible Milestones – Use prompts at key project points instead of requiring continuous entries.
- Alternative Formats – Allow video, audio, or visual reflections to better suit design students' strengths.
- Problem-Solving Prompts – Encourage students to reflect on both challenges and how they addressed them.

- Peer and Faculty Feedback – Integrate journaling into group discussions to strengthen habits and accountability.

6.4 Conclusion

This study highlights both the value and the challenges of using structured reflective journaling in design education. While it supports reflection, its impact depends on how well it aligns with students' cognitive styles and workflows. With thoughtful adjustments to its format, journaling can help design students build reflective habits that support both academic and professional growth.

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REFERENCES

[1] Dewey J. (1933). How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process. D.C. Heath & Co.

[2] Schön D. A. (1983). The Reflective Practitioner. Basic Books.

[3] Barry P. and O'Callaghan C. (2008). Reflexive Journal Writing: A tool for Music Therapy Student Clinical Practice Development. *Nordic Journal of Music Therapy*, 17, 55–66. https://doi.org/10.1080/08098130809478196.

[4] Cisero C. A. (2006). Does Reflective Journal Writing Improve Course Performance? *College Teaching*, 54, 231–236. https://doi.org/10.3200/CTCH.54.2.231-236.

[5] Hubbs D. L. and Brand C. F. (2005). The Paper Mirror: Understanding Reflective Journaling. *Journal of Experiential Education*, 28, 60–71. https://doi.org/10.1177/105382590502800107.

[6] Otienoh R. O. (2009). Reflective Practice: The Challenge of Journal Writing. *Reflective Practice,* 10, 477–489. https://doi.org/10.1080/14623940903138332.

[7] Chirema K. D. (2007). The Use of Reflective Journals in the Promotion of Reflection and Learning in Post-Registration Nursing Students*. Nurse Education Today*, 27, 192–202. https://doi.org/10.1016/j.nedt.2006.04.007.

[8] Betrabet Gulwadi G. (2009). Using Reflective Journals in a Sustainable Design Studio. *International Journal of Sustainability in Higher Education*, 10, 96–106. https://doi.org/10.1108/14676370910945918.

[9] Tosun M., Öztoprak A. and Berkman A. (2019, July 9). Project Process Cards: A Self Evaluation Tool for Design Studio*. Insider Knowledge - Proceedings of the Design Research Society Learn X Design Conference*, 2019. https://doi.org/10.21606/learnxdesign.2019.09125.

[10] Hatton N. and Smith D. (1995). Reflection in Teacher Education: Towards Definition and Implementation. *Teaching and Teacher Education,* 11, 33–49. https://doi.org/10.1016/0742-051X(94)00012-U.

[11] Lara-Prieto V., Ruiz-Cantisani M. I., Arrambide-Leal E. J., de la Cruz-Hinojosa J., Mojica M., Rivas-Pimentel J. R. and Membrillo-Hernández J. (2023). Challenge-Based Learning Strategies Using Technological Innovations in Industrial, Mechanical and Mechatronics Engineering Programs. *International Journal of Instruction*, 16(1), 261–276. https://doi.org/10.29333/iji.2023.16115a.

[12] Olivares Olivares S. L., López Islas J. R., Pineda Garín M. J., Rodríguez Chapa J. A., Aguayo Hernández C. H. and Peña Ortega L. O. (2021). Tec21 Educational Model: Challenges for a Transformative Experience. Instituto Tecnológico y de Estudios Superiores de Monterrey. https://hdl.handle.net/11285/643159.

[13] Gutierrez L. M. (2023). Designing A New Curriculum: Competency-Based on Design Education. *25th International Conference on Engineering and Product Design Education.*

[14] Rodríguez Santibáñez I. and López Montiel G. A. (2020). Change in Educational Models for Facing Challenges to Lead Students into a New Way of Learning. In *Educational Leadership*. IntechOpen. https://doi.org/10.5772/intechopen.89093.

[15] Gonzalez-Almaguer C., Saavedra V., Caballero E., Acuña A., Zubieta C., Barbosa E. and Lule M. (2021). Design Thinking and Design of Experiments: The Fusion of the School of Design and Industrial Engineering to Create Learning Experiences in the Tec21 Educational Model*. 23rd International Conference on Engineering and Product Design Education.*