ISSN: 3067-2384
Research Article

World Journal of Sensors Network Research

# The change in grading rules for architecture students with the arrival of new information technologies

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**Submitted:** 05 June 2025 **Accepted:** 19 June 2025 **Published:** 23 June 2025

**https://doi.org/10.63620/MKWJSNR.2025.**

***Citation:*** *Aguilar Zavaleta, J. P. (2025). The change in grading rules for architecture students with the arrival of new information technologies. Wor Jour of Sens Net Res, 2(3),*

***Abstract***

*The emergence of information technology (IT) has profoundly transformed assessment systems in architectural education, shifting the traditional approach toward alternative models that prioritize equity, self-regulation, and mastery of real competencies. This article examines how approaches such as specification grading, contract grading, and mastery-based assessment are reshaping grading rules in response to an increasingly digitalized and autonomous student profile. This evolution is enhanced by tools such as BIM, 3D modeling software, and virtual collaborative environments, which allow for the assessment of creative processes, problem-solving, and critical thinking in real time. Recent studies indicate that 84% of students in active classrooms report a significant increase in their motivation and academic performance (Architecture Now, 2023). However, challenges remain: the standardization of assessment criteria and the technological gap between institutions still hinder widespread implementation. The article concludes that, in a context where creativity, adaptability, and collaboration are essential, innovation in assessment strategies is not only necessary but inevitable. Architectural education must align with the complexity of the 21st century, promoting environments that reflect both professional practice and new technological realities.*

**Keywords:** Architecture, Architecture Students, Rules, Technologies

## Introduction

**summary**

The integration of new information technologies in architectural education has prompted a significant shift in grading practices for architecture students, moving away from traditional methods towards more innovative and flexible assessment approaches. As educational institutions strive to adapt to the evolving landscape of the architectural profession, these changes aim to enhance student engagement, promote mastery of complex skills, and better align assessment with real world applications. The notable shift has garnered attention within academic circles, as it reflects broader trends in education that prioritize learner centered methodologies over conventional, often rigid, grading systems [1, 2, 3].

Historically, architectural education has been characterized by assessment models that emphasize competition and surface level understanding, often resulting in discrepancies between grades and actual student learning outcomes [2, 4].

In response to these challenges, educators have begun exploring alternative grading frameworks, such as specifications grading, contract grading, and mastery grading. These methods emphasize transparency, student agency, and the mastery of learning

objectives, fostering an environment where students are motivated to take ownership of their educational experiences [4, 5, 6].

The use of technology in this context further enriches assessment practices by facilitating collaborative learning environments and enabling more sophisticated evaluation methods that reflect the complexities of architectural design. Tools like Building Information Modeling (BIM) and advanced 3D modeling software allow for dynamic assessments that capture students' problem solving abilities and creative processes in real time [3, 7, 8]. Despite the benefits, the transition to these new grading practices is not without controversy, as concerns about fairness and consistency in evaluation arise amidst varying levels of technological adoption across educational settings [2, 9, 10].

As the architectural education landscape continues to evolve, the interplay between technology and assessment will be critical in shaping future practices. Embracing innovative grading systems and pedagogical frameworks will be essential for preparing architecture students to meet the demands of an increasingly complex and collaborative industry, fostering a generation of architects equipped with the skills necessary for success in the information age [11, 12].

**Historical Context**

The evolution of architectural education and its grading systems has been profoundly influenced by historical shifts in technology, pedagogy, and cultural perceptions. At the turn of the twentieth century, architecture faced a "crisis of modernity," which shaped the discourse around design and education. This period marked a significant transition in the way architectural theory and practice were understood, particularly as they pertained to classical antiquity's influence on Western artistic and cultural debates [1].

The intertwining of architecture and archaeology during this era saw a "rediscovery" of ancient artifacts, prompting architects and artists to reinterpret historical realities and engage in a continuous dialogue with the past [1]. This cultural obsession with antiquity not only influenced architectural aesthetics but also the educational frameworks within which aspiring architects were trained. However, the lack of effective tools for communication and representation at that time limited the potential for transformative change in architectural practice and education [13].

As the century progressed, significant advancements in information technology began to reshape the architectural landscape. The introduction of new digital tools allowed for instantaneous information transfer, fundamentally altering the methods of research, design, and construction that had been established since the Renaissance. This evolution has led to new grading architectures that prioritize mastery and adaptability over traditional point based systems, which often reflected instructor biases and fostered competitive environments detrimental to learning [2].

In response to the shortcomings of conventional grading, educators began to explore alternative models, such as standards based grading, which emphasizes clear learning objectives and flexible assessment methods [2]. This shift is particularly relevant in the context of generational changes in student demographics, as modern learners increasingly demand educational practices that resonate with their experiences and technological proficiency [11].

**Impact of New Information Technologies**

The advent of new information technologies has fundamentally transformed the landscape of architectural education, particularly in the context of grading and assessment practices. These technologies have enabled a more integrated approach to curriculum design, instruction, and assessment, allowing educators to better evaluate students' capabilities and understanding of complex concepts within architecture.

**Integration of Technology in Assessment**

New information technologies facilitate the design of assessments that blend cognitive science with measurement practices, leading to richer and more meaningful evaluation methods. This evolution stems from various projects that have successfully merged technology with educational assessment, suggesting promising directions for future assessments in architecture education [3]. The rise of tools such as Building Information Modeling (BIM) allows for dynamic assessments that not only measure student knowledge but also their ability to apply concepts in real world scenarios [7].

**Enhanced Learning Environments**

The increasing reliance on digital design tools, such as 3D modeling software, has also changed the way architectural students learn and demonstrate their skills. These tools enable students to visualize their designs in three dimensions, enhancing their understanding and allowing for immediate feedback on their projects [14]. The ability to create detailed representations of designs encourages deeper engagement and prompts reconsideration of assessment criteria, shifting the focus toward practical applications and innovative thinking [7].

**Redefining Skills and Competencies**

As the architectural field increasingly demands competencies such as effective communication, complex problem solving, and collaboration within diverse teams, assessment methods must evolve to reflect these requirements. Students must now demonstrate a range of skills beyond traditional knowledge recall, including the ability to navigate sophisticated representations and manage multidimensional data [3]. Consequently, grading criteria have shifted to emphasize the application of knowledge and collaborative processes, reflecting the skills that are essential in today's information society [3].

**The Role of Hybrid Digital Tools**

Hybrid digital toolkits, which integrate multiple functionalities such as shaping and generative modeling, have emerged as significant assets in architectural education. These tools support a variety of interactions human dominated, tool dominated, and balanced cooperation which enhance design cognition and creativity [8]. By accommodating different interaction modes, educators can assess students more holistically, considering their creative processes alongside the final outcomes of their design work[8, 15].

**Challenges and Opportunities**

Despite the advantages that new technologies bring, challenges

remain in standardizing assessments across diverse educational settings. The fragmented nature of the architecture industry and varying levels of technological adoption complicate efforts to create cohesive grading practices. However, the potential for improved assessment methodologies that prioritize creativity and real world application continues to drive innovations in architectural education[8][15].

## Methods

### Changes in Grading Rules

The introduction of new information technologies has led to significant changes in grading rules for architecture students, shifting away from traditional assessment methods towards more innovative and flexible approaches. Traditional grading systems often present several challenges, including a lack of alignment with actual student learning and the tendency to promote surface level understanding rather than mastery of the material[2, 4]. In response, alternative grading methods such as specifications grading, contract grading, and mastery grading have gained traction, allowing for a more equitable and student centered approach to assessment.

### Specifications Grading

Specifications grading emphasizes transparency and clear criteria for passing assessments. In this model, instructors create bundles of assignments aligned with specific learning objectives, with the complexity of assignments correlating to higher grades. This approach allows students to select the bundles they wish to complete, fostering a sense of ownership and motivation in their learning process[4, 5]. The focus is on satisfactory completion of these assignments rather than traditional percentage based grading, which can reduce anxiety and promote deeper learning.

### Contract Grading

Contract grading involves an agreement between the instructor and students regarding the criteria for achieving specific grades. At the beginning of the term, students sign contracts that outline their goals and the necessary work to reach those goals. This method encourages student agency and allows for revisions and feedback, thus prioritizing the learning process over the final product. Regular feedback and the ability to adjust contracts throughout the term are key elements that enhance student engagement and responsibility for their learning outcomes[4, 6].

### Mastery Grading

Mastery grading assesses students based on their demonstration of understanding specific learning objectives, rather than through conventional grading scales. This method allows students multiple opportunities to demonstrate mastery, promoting resilience and ongoing learning. Clear criteria for what constitutes mastery are established for each assessment, enabling students to focus on their comprehension and skill development without the pressure of traditional high stakes grading environments[2, 16].

### Technology Integration

The use of information technology further enhances these alternative grading approaches by facilitating collaborative learning environments and enabling more sophisticated assessment methods. Technology tools can capture complex problem solving and reasoning skills, allowing for formative assessments that reflect real world practices. This integration supports the creation of assessment tools that not only evaluate knowledge but also promote critical thinking and application of skills in professional contexts[3].

## Results and Discussion

### Advantages and Disadvantages

### Advantages of Information Technology in Architecture Education

The integration of information technology (IT) into architecture education offers several advantages. According to Guney (2015), these benefits include alternative design creation, which allows for greater creativity and innovation in student projects. IT facilitates easier storage and sharing of work, enhancing collaboration among students and instructors. Additionally, it promotes efficient communication across disciplines, enables ease of revisions, and accelerates design stages through faster processing capabilities. Students also benefit from 3D visualization tools that improve their understanding of design concepts, allowing for better evaluation and replication of their work[11, 17].

Furthermore, the use of IT saves time and reduces human error in the design process, as noted by Gul et al. (2013), who observed that approximately 45% of architecture curricula in Turkey focuses on design related lectures that predominantly employ software like AutoCAD. This focus not only enhances students' technical skills but also prepares them for industry standards, fostering a more relevant educational experience[11, 17, 18].

### Disadvantages of Information Technology in Architecture Education

Despite the advantages, the reliance on IT in architecture education also presents notable disadvantages. Guney (2015) identifies issues such as an emphasis on high-quality visuals potentially overshadowing the importance of sound design principles. There is a concern that the reliance on CAD programs may diminish creative thinking and lead to technology dependence among students. Additionally, the reduced interaction between students and teachers can hinder the development of essential communication skills and personalized feedback opportunities, crucial in a collaborative field like architecture[11, 17].

Moreover, the challenges of inadequate literature research and the production of low quality designs are exacerbated by the ease of access to technology. This can result in a superficial understanding of architectural concepts, where students may prioritize technical proficiency over critical thinking and innovative problem solving abilities[11, 17]. As architecture education evolves with technology, addressing these disadvantages will be crucial to maintaining a balance between technical skills and creative design thinking.

### Student and Educator Responses

The introduction of alternative grading methods and technologies has elicited varied responses from both students and educators. Many students appreciate the shift from traditional grading systems to more reflective and engaging approaches. For instance, in classes that employ ungrading, students take responsibility for assessing their own learning by reflecting on their progress and assembling portfolios of work to self assign grades, with instructors typically opting to enhance these self as-

signed grades rather than reduce them[4]. This method not only promotes metacognition but also strengthens motivation for ongoing learning, as students focus on their personal growth rather than merely on their grades[19].
Educators have reported that these alternative grading strategies foster better communication regarding assessments and learning objectives. The emphasis on peer feedback and collaborative evaluation enhances the learning experience, as students engage more actively in the assessment process [20]. Moreover, the shift towards pass/fail systems has been found to alleviate the pressures of competition, enabling students to concentrate on their own learning processes and development, which is particularly beneficial for those struggling academically [21].

On the other hand, there are concerns regarding the potential inconsistency in grading fairness when shifting away from traditional measures. Research indicates that students' perceptions of fairness in grading are significantly influenced by teaching practices rather than just scoring methods [9]. Some educators express the need for clear guidelines to ensure equitable assessment practices, particularly in environments where grading standards are being re evaluated in light of new technologies and pedagogical approaches[10].

In terms of classroom design, studies reveal that the physical environment of learning spaces plays a critical role in student engagement. Spaces that facilitate movement and interaction have been associated with higher levels of academic engagement, challenging the conventional static classroom layout[22, 23]. The integration of flexible learning environments is increasingly recognized as essential for fostering active learning and maximizing student participation [22].

**Evidence of Impact on Student Performance**
The introduction of new grading rules and alternative assessment methods, particularly in the context of architecture education, has shown significant influence on student performance and engagement. A key aspect of these changes is the shift away from traditional grading systems towards models that prioritize student learning and intrinsic motivation.

**Alternative Grading Systems**
Research indicates that alternative grading systems, such as pass/fail or narrative evaluations, can alleviate the pressure associated with letter grades, thereby fostering a more conducive learning environment. Studies have found that these systems encourage students to focus on their learning processes rather than merely the grades they receive[21, 24]. By shifting attention from grades, students are able to redefine their notions of success and engage more fully with their educational experiences [21].

In classes that adopt ungrading methodologies, students take on greater responsibility for their learning by reflecting on their own progress and self assessing their work [4]. This approach not only enhances student engagement but also allows instructors to provide constructive feedback without the constraints of a grading scale. As a result, students often report increased motivation and a greater ability to achieve their personal learning goals[4, 22].

**Classroom Design and Student Engagement**
Classroom environments specifically designed for active learning play a crucial role in enhancing student engagement and performance. Data from studies on classroom design reveal that spaces fostering collaboration and interactive learning experiences lead to higher levels of student motivation, creativity, and engagement [22]. Approximately 84% of students in these environments reported moderate to exceptional increases in their engagement, and 72% felt that they were better positioned to achieve higher grades [22].

**Long-Term Effects on Learning**
The long term implications of these grading reforms and environmental adjustments are an area ripe for further research. Preliminary findings suggest that by deemphasizing grades, students develop stronger metacognitive skills and intrinsic motivation, which can lead to improved educational outcomes[2, 19]. As educational institutions increasingly recognize the impact of both grading practices and classroom design on student performance, there is a growing call for continued innovation in teaching and assessment methods to meet the diverse needs of learners in architecture and beyond[18, 25].

## Conclusions

**Future Directions**
The integration of new information technologies in architectural education heralds significant changes in both assessment and pedagogical approaches. As technological tools become more prevalent, future directions for architecture students will likely focus on enhancing creativity, learning outcomes, and adaptability in a rapidly evolving field.

**Embracing Hybrid Digital Tools**
Future research should prioritize the exploration of hybrid digital tools and their long term effects on students' cognitive processes and creativity in architectural design. This includes assessing the feasibility of implementing these technologies across diverse educational settings to ascertain their impact on student learning and design outputs.[8, 13] The interplay between technology and architecture will necessitate educational frameworks that support continuous innovation and adaptation.

**Personalized Learning Experiences**
As advancements in technology progress, personalized learning experiences tailored to individual student needs will become increasingly vital. Architectural education may embrace flexible learning paths that accommodate the diverse schedules and demands of working professionals. This lifelong learning approach aims to keep architects current with industry trends and skill requirements, ultimately ensuring their relevance in the field [12].

**Incorporating Interactive Technologies**
The future of architectural education will also likely involve the incorporation of interactive digital tools that facilitate design experimentation. Techniques such as extended reality could be integrated into early design stages, allowing for a more dynamic and engaging learning environment.[8, 13] This shift toward interactive learning is expected to foster deeper engagement with technical and digital design tools, thus enhancing the overall educational experience.

**Addressing Challenges**
While the adoption of new technologies presents numerous opportunities, it also raises challenges that need to be addressed. These include evaluating the effective ness of different technological applications in assessment design and implementation, as

well as ensuring that the tools align with educational objectives [3]. Ongoing research will be essential to identify best practices and mitigate potential drawbacks associated with these innovations in architectural education.

## References


1. Carnegie Mellon University, School of Architecture. (n.d.). Courses. In Course Catalog. Retrieved June 19, 2025, from http://coursecatalog.web.cmu.edu/schools-colleges/collegeoffinearts/schoolofarchitecture/courses/
2. Mori, T. (n.d.). Innovate or perish: New technologies and architecture's future. Harvard Design Magazine. Retrieved [date], from https://www.harvarddesignmagazine.org/articles/innovate-or-perish-new-technologies-and-architectures-future
3. Center for Transformative Teaching. (2023). Alternative grading for college courses. University of Nebraska–Lincoln. Retrieved June 19, 2025, from https://teaching.unl.edu/resources/alternative-grading/
4. Bayhan, H.G., Karaca, E. Technological innovation in architecture and engineering education - an investigation on three generations from Turkey. Int J Educ Technol High Educ 17, 33 (2020). https://doi.org/10.1186/s41239-020-00207-0
5. Pellegrino, J. W., Chudowsky, N., & Glaser, R. (Eds.). (2001). Information technologies: Opportunities for advancing educational assessment. In Knowing what students know: The science and design of educational assessment (pp. 261–289). National Academy Press. https://doi.org/10.17226/10019
6. Illustrarch Team. (2025, February 11). Use of modern technologies in architectural education. Illustrarch. Retrieved June 19, 2025, from https://illustrarch.com/articles/42289-use-of-modern-technologies-in-architectural-education.html
7. The Decor Journal India. (n.d.). The role of technology in architecture: AI, digital design, and more. The Decor Journal India. Retrieved June 19, 2025, from https://www.thedecorjournalindia.com/the-role-of-technology-in-architecture-ai-digital-design-and-more#:~:text=Technology%20has%20revolutionized%20the%20way,accurate%2C%20and%20collaborative%20design%20processes
8. Al-Rqaibat, S., Al-Nusair, S. & Bataineh, R. Enhancing architectural education through hybrid digital tools: investigating the impact on design creativity and cognitive processes. Smart Learn. Environ. 12, 26 (2025). https://doi.org/10.1186/s40561-025-00370-9
9. Ceylan, S., Şahin, P., Seçmen, S., Somer, M. E., & Süher, H. K. (2024, July). The contribution of digital tools to architectural design studio: A case study. Ain Shams Engineering Journal, 15(7), Article 102795. https://doi.org/10.1016/j.asej.2024.102795
10. Derek Bok Center for Teaching and Learning. (n.d.). Alternative approaches to assessment [Web page]. Derek Bok Center for Teaching and Learning. Retrieved June 19, 2025, from https://bokcenter.harvard.edu/beyond-the-grade
11. Streifer, A. C., Palmer, M. S., & Taggart, J. (2024). From expectations to experiences: Students' perceptions of specifications grading in higher education. To Improve the Academy: A Journal of Educational Development. Advance online publication. https://doi.org/10.3998/tia.577
12. 31 -The Role of "Effort" or "Work" in an Alternative Grading ...
13. University of Miami Academic Technologies. (n.d.). Alternative grading [Technology summary]. University of Miami. Retrieved June 19, 2025, from https://academictechnologies.it.miami.edu/explore-technologies/technology-summaries/alternative-grading/index.html
14. Kandsari, I. M. (2021). Information technology and its entry into architectural engineering. Turkish Journal of Computer and Mathematics Education, 12(13), 5665–5672.
15. Lewis, D. (2022). Impacts of standards-based grading on students' mindset and test anxiety. Journal of the Scholarship of Teaching and Learning, 22(2), 67–77. https://doi.org/10.14434/josotl.v22i2.31308
16. Kesler, T. (2024). This course is ungraded: The impact of ungrading practices on students and their instructor. International Journal of Changes in Education. Advance online publication. https://doi.org/10.47852/bonviewIJCE42023565
17. University of Miami Academic Technologies. (n.d.). Alternative grading [Technology summary]. University of Miami. Retrieved June 19, 2025, from https://academictechnologies.it.miami.edu/explore-technologies/technology-summaries/alternative-grading/index.html
18. American University School of Education. (n.d.). 6 alternative grading systems that foster student development. SOE Online. Retrieved June 19, 2025, from https://soeonline.american.edu/blog/alternative-grading-systems/
19. Burger, R. Student perceptions of the fairness of grading procedures: a multilevel investigation of the role of the academic environment. High Educ 74, 301–320 (2017). https://doi.org/10.1007/s10734-016-0049-1
20. Chiaravalli, A. (2023, July 30). We need to talk about standards-based grading [Blog post]. Grow Beyond Grades. Retrieved June 19, 2025, from https://growbeyondgrades.org/blog/we-need-to-talk-about-sbg
21. Konyndyk, R., & Scott-Webber, L. (n.d.). How classroom design affects student engagement [White paper]. Steelcase Education. Retrieved June 19, 2025, from https://www.academia.edu/9610786/White_Paper_How_classroom_design_affects_student_engagement
22. ANFArch. (n.d.). Exploring the impact of architectural design on educational engagement. ANFArchi–User Experience and Well Being. Retrieved June 19, 2025, from https://anfarch.org/research-topics/user-experience-and-well-being/page/exploring-the-impact-of-architectural-design-on-educational-engagement
23. Potkalitsky, N. (2024, August 28). Upgrading the letter grading system in middle and high school [LinkedIn article]. LinkedIn. Retrieved June 19, 2025, from https://www.linkedin.com/pulse/upgrading-letter-grading-system-middle-high-school-potkalitsky-phd-cwaee/
24. Kollman, A., & Sinner, E. (2023, November 3). Making the switch to evidence based grading. Edutopia. Retrieved June 19, 2025, from https://www.edutopia.org/article/transitioning-to-evidence-based-grading/
25. ArchEyes Team. (2024, October 8). Innovative approaches to architecture education in the digital era. ArchEyes. Retrieved June 19, 2025, from https://archeyes.com/innovative-approaches-to-architecture-education-in-the-digital-era/in apa format as it is same numbering dont change their place