BALANCING ACT: OPTIMAL CLASS SIZE AND COURSE DESIGN IN ONLINE HIGHER EDUCATION

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In this paper, the authors examine the complex relationship between class size and the design of online courses in higher education. Drawing on recent research, industry reports, and U.S. government regulations, it explores how optimal class sizes vary based on course objectives, student engagement needs, and instructional approaches. The analysis reveals that effective online class sizes generally range from 12 to 30 students, but can differ significantly depending on course design, subject matter, and program type. Recommendations include that institutions must balance pedagogical best practices and regulatory requirements when determining online class sizes, emphasizing the need for flexible, context-specific approaches that align with broader institutional strategies for online learning, while considering faculty workload and the time to make adjustments to course design to accommodate changing class sizes.

Keywords: Online Education, Class Size, Course Design, Higher Education Strategy, Distance Learning Regulations, Instructional design, online learning

INTRODUCTION

Imagine a small restaurant designed to serve 20 customers at a time. If suddenly 100 customers show up, the restaurant would need to change its layout, hire more staff, and possibly even expand its kitchen to accommodate everyone. It's very likely that neither the restaurant customers nor the staff would have a positive experience. Some customers may never return, and some might leave negative comments online. The needed adjustments to properly service 100 customers cannot be made in the moment. They would take time.

Now, consider an online course designed for a certain number of students. What happens when the number of students increases? The online course does not have the same physical restrictions as the restaurant example, but there are resource constraints and design decisions to

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be considered. The instructor would have to redesign the course structure to ensure it remains effective and engaging for a larger audience. This might include new instructional designs, incorporating additional teaching assistants to manage the increased student interactions. The instructor might need to implement new assessment methods to efficiently grade a larger number of assignments and provide timely feedback, as well as handle all of the other tasks related to facilitating an online course. The course would need to change, and those changes cannot be made in the moment. We have all recently seen the variations on course quality that can result from quick changes to course design as a result of the fast change required by a transition to Emergency Remote Teaching for the COVID-19 pandemic, which was anticipated by Hodges et al. (2020). Now, online learning in higher education is growing in popularity again.

THE CHANGING LANDSCAPE OF ONLINE EDUCATION

Online classes have been an increasing part of U.S. higher education for some time (Seaman et al., 2018). In a 2019 survey, 83% percent of provosts indicated that they would "increase their emphasis on expanding online programs and offerings" (Lederman, 2019). More recently, the COVID-19 pandemic has accelerated the adoption and expansion of online learning in higher education. As institutions adjust to a new landscape with increased online demand, the impact of emergency-specific reactions versus long-lasting strategic responses is becoming more apparent. The Changing Landscape of Online Education (CHLOE) 9 Report (Simunich et al., 2024) provides evidence that online higher education has been significantly advanced by the pandemic, both in terms of student demand and institutional investment in course and program development.

According to the CHLOE 9 Report, colleges and universities are increasingly incorporating online learning into their institutional strategies (Simunich et al., 2024). Approximately one-third of surveyed institutions reported that they have fully incorporated online learning into their institutional strategy across all or most student types, while another quarter cited integration, but with a strategy that targets only specific student groups. This strategic shift reflects the growing recognition of online education's importance in meeting student needs and institutional goals.

Institutions are planning to utilize online learning in several key ways:

1. Expanding online course offerings: 69% of chief online learning officers (COLOs) reported that creating online versions of on-campus courses was a priority for their institutions.
2. Developing new online degree programs: 65% of COLOs indicated that offering online equivalents of on-campus degree programs was a strategic priority.
3. Creating new online non-degree offerings: Nearly half (48%) of respondents expressed interest in developing new online non-degree programs, such as certificate programs or microcredentials.
4. Enhancing employer partnerships: 46% of institutions reported plans to expand collaboration with employers, leverage tuition assistance benefits, and enhance employee enrollment in online programs.
5. Targeting specific student demographics: Many institutions are focusing their online strategies on particular student groups, with adult undergraduates (new and returning) being the primary focus for 78% of institutions, followed by graduate students in academic or professional degree programs (53%).

These strategic priorities demonstrate that institutions are not only responding to increased demand for online learning but also are proactively reshaping their educational offerings to

meet the needs of diverse student populations and the evolving job market.

The CHLOE 9 Report also highlights that institutions are grappling with various challenges as they expand their online offerings, including faculty autonomy, tensions around institutional mission and culture, and concerns about the adequacy of resources for online learning (Simunich et al., 2024). A critical element in these challenges is optimal class size for online classes. Class size can significantly impact the quality of instruction, student engagement, and the learning outcomes and class activities in online environments. Class size also intersects with various institutional considerations, including resource allocation, faculty workload, and compliance with federal regulations. The purpose of this paper is to consider the size of online classes as it relates to various factors related to designing and facilitating online courses.

CONTEXT

While there are notable examples of online learning at scale, such as Georgia Tech's Online Master of Science in Computer Science (OMSCS) program (Joyner & Duncan, 2024), most online instructors are not working in those environments. Also, it remains to be seen how new developments in artificial intelligence might influence online learning, including the work of instructors. This paper will not consider these unique situations that do not represent a current, typical online program. The context is that of an instructor teaching online classes who is independently responsible for various aspects of course design, delivery, and facilitation.

THE IMPORTANCE OF CLASS SIZE IN ONLINE EDUCATION

The question of optimal class size in online education has been a subject of ongoing debate among educators, administrators, and researchers (Tomei, 2006). As online learning continues to grow in popularity and necessity, understanding the implications of class size on student engagement, learning outcomes, and instructor workload becomes increasingly important (Lowenthal et al., 2019).

Martin et al. (2019) investigated practices of award-winning online instructors. Several elements of what the award-winning instructors do could potentially be impacted by large class sizes. See Table 1 for a description of their practices and potential complications in large classes. These practices might need to be adapted or scaled differently for larger class sizes, while still trying to maintain their core benefits. Some possible solutions to continue these practices in large enrollment classes might include leveraging peer review, using more automated tools, or incorporating teaching assistants. We may soon see more systematic use of artificial intelligence tools to "automate administrative tasks, freeing up valuable time for educators to focus on student engagement and critical thinking" (Hodges & Ocak, 2023), but this is not yet commonplace.

In addition to the practices of award-winning online instructors, there are typical roles that online faculty members assume in their teaching practice, each requiring specific competencies. Martin et al. (2021) identify eight key roles: subject matter expert, course designer and developer, course facilitator, course manager, advisor/mentor, assessor/evaluator, technology expert, and lifelong learner. These roles encompass a wide range of responsibilities, from demonstrating content expertise and designing learning materials to facilitating discussions, managing the course, providing feedback, and continuously improving teaching practices. For instance, in the role of course facilitator, instructors are expected to "provide timely and substantive feedback" and "foster interaction among learners" (Martin et al., 2021, p. 279).

The impact of large enrollment classes on these roles, while not directly addressed in the Martin et al. study, can be inferred from the competencies described. Course facilitation in

TABLE 1
Practices of Award-winning Instructors vs Online Classes

Practice	*Detail*	*In large online classes*
Timely response and feedback	The instructors emphasized the importance of responding to student messages within 24–48 hours and grading work within 48 hours.	This would become increasingly difficult with larger class sizes.
Availability and presence	Instructors mentioned being available by phone and email until late evening.	This level of availability might be harder to maintain with a large number of students.
Personalized interaction	The instructors stressed the importance of building awareness of who their students are and developing connections.	This would be more challenging with a large class.
Variety of assessments	The use of diverse assessment methods, including authentic assessments like creating digital content or creative projects,	might be more time-consuming to grade and provide feedback on in large classes.
Facilitating student interaction	Instructors emphasized the importance of student interaction and community building.	Managing and moderating these interactions effectively could be more complex in large classes.
Individual attention		The ability to tailor the course to meet individual student needs and provide personalized support would be more difficult with a larger student population.
Detailed rubrics and feedback	Rubrics can help streamline grading, providing detailed, personalized feedback on assignments	For a large number of students using rubrics could be very time-consuming.
Regular communication		Posting daily or weekly announcements tailored to the current state of the class might require more effort with a larger, more diverse group of students.

particular may be significantly affected, as providing individualized attention and fostering meaningful interactions becomes more challenging with a larger number of students. The advisor/mentor role, which involves "advising learners on their academic development" and "motivating the students to succeed" (Martin et al., 2021, p. 279), may be compromised due to time constraints as well. Assessment and evaluation tasks, such as using "a variety of assessments" and "monitoring individual student and group progress" (Martin et al., 2021, p. 279), would likely become more time-consuming and potentially less detailed. Course management responsibilities, including being "responsive to individual student needs" (Martin et al., 2021, p. 279), would require additional effort and resources. These challenges demonstrate the potential need for adapted strategies and/or additional support when teaching large online classes to maintain the quality of instruction across all faculty roles. Other researchers have noted that "course design and instructional effectiveness are two of the most significant challenges for instructors teaching large online courses" (Trammell & LaForge, 2017, p. 8), and that instructors "may provide less quality feedback as class size increases" (Sorensen, 2014, p. 574).

RESEARCH FINDINGS ON OPTIMAL CLASS SIZE

Research on optimal class size for online courses has evolved over the past several years, revealing a range of perspectives and findings. Early studies, such as Tomei's 2006 work, sug-

gested a relatively small optimal size of 12 students for online classes. This view was somewhat expanded by Orellana's research in the same year, which found that instructors perceived 18.9 students as optimal for achieving desired interaction levels, with an even smaller size of 15.9 students ideal for maximizing interaction. As online education matured, later studies proposed broader ranges. Nagel and Kotzé (2010) suggested that effective class sizes could range from 12 to 30 students. More recent research has introduced nuanced approaches, considering factors such as course level and learning objectives. Taft et al. (2019) proposed that class size should be determined by educational goals, with larger classes suitable for basic knowledge transfer and smaller ones for developing advanced thinking skills. Throughout these studies, a consistent theme emerges. The learning activities students complete in courses and the amount of feedback and mentoring faculty provide are directly related to class size with smaller class sizes allowing for more interaction and more feedback and mentoring. Insights from key studies are shown in Table 2.

While these results from the literature provide valuable insights into optimal online class sizes, there are other considerations in the administration of online programs such as government regulations. Regulatory requirements add another layer of complexity to determining appropriate class sizes for online courses.

FEDERAL REGULATIONS RELATED TO CLASS SIZE

The U.S. Department of Education's Final Rule on Distance Education and Innovation (2020) introduced several changes that could influence considerations of class size in online education. Let us consider additional details of the interplay between class size and federal regulations.

- Regular and Substantive Interaction: The regulations clarify the requirements for "regular and substantive interaction" between students and faculty in distance education (U.S. Department of Education, 2020). This clarification may impact decisions about class size, as larger classes could make it more challenging to meet these interaction requirements.

TABLE 2
Key Findings on Class Size

Author(s)	*Year*	*Key Findings*
Orellana	2006	A class size of 18.9 was perceived as optimal to better achieve the course's actual level of interaction, and a class size of 15.9 was perceived as optimal to achieve the highest level of interaction.
Tomei	2006	Optimum class size is 12 for an online class
Nagel and Kotzé	2010	Good class size is between 12 and 30
Taft, Perkowski, & Martin	2011	Authors suggested ranges of course sizes associated with higher or lower levels of teaching intensity
Lowenthal, Nyland, Jung, Dunlap, & Kepka	2019	"The results of our inquiry reveal that faculty in this sample believe online courses with smaller enrollments are better for student learning and faculty satisfaction…in general, faculty perceive design, delivery, communication, and assessment as the major challenges in implementing an effective high-enrollment online course."
Tomei & Nelson	2019	"The ideal class size for online teaching expanded the range from 9 students (doctoral courses) to 12 students (undergraduate) to 13 students (graduate) (p. 10)."
Taft, Kesten, & El-Banna	2019	Class size should be determined by educational goals. Larger classes (40+ students) work well for basic knowledge transfer, while smaller classes (15 or fewer) are better for developing advanced thinking and skills.

- Instructional Teams: The regulations explicitly permit the use of instructional teams in delivering distance education (U.S. Department of Education, 2020). This allowance could potentially support larger class sizes by enabling multiple instructors or teaching assistants to manage student interactions and feedback.
- Competency-Based Education (CBE) and Direct Assessment Programs: The regulations provide more flexibility for CBE and direct assessment programs (U.S. Department of Education, 2020). These program types often allow for more individualized pacing and may be less dependent on traditional class size constraints.
- Subscription-Based Programs: The regulations recognize and simplify rules for subscription-based programs, which allow students to work at their own pace (U.S. Department of Education, 2020). This model could potentially accommodate larger numbers of students, as the focus shifts from synchronous group instruction to individual progress.
- Clock-to-Credit Hour Conversions: The simplification of clock-to-credit hour conversions (U.S. Department of Education, 2020) may indirectly affect class size considerations, particularly in programs that blend online and hands-on components.

These regulations and how they are interpreted may influence several factors related to online class size and program delivery.

FACTORS INFLUENCING OPTIMAL CLASS SIZE CONSIDERING FEDERAL REGULATIONS

Several factors influence the determination of optimal class size in online education, now further contextualized by federal regulations:

- Course Design: The structure and design of the course play a crucial role in determining appropriate class size. The new regulations' emphasis on regular and substantive interaction may necessitate smaller class sizes or innovative instructional approaches to manage larger classes effectively.
- Student-Instructor Interaction: Research has consistently shown that learner-instructor interaction is a significant predictor of student satisfaction in online courses (Kuo et al., 2013). The clarification of "regular and substantive interaction" in the federal regulations underscores the importance of this factor in determining class size.
- Student Engagement: Martin and Bolliger (2018) found that student engagement increases satisfaction, enhances motivation, and improves performance in online courses. The federal regulations' support for innovative models like competency-based education and subscription-based programs may allow for new approaches to maintaining engagement in various class sizes.
- Instructor Workload: The workload associated with grading, providing feedback, and managing course discussions increases with class size. The regulations' recognition of instructional teams may provide effective options for managing larger classes while maintaining quality interactions.
- Technological Integration: The regulations encourage the use of innovative technologies in distance education. Leveraging appropriate educational technologies can help manage larger class sizes while maintaining quality interactions (Taft et al., 2019).
- Program Type: The regulations provide specific guidance for different types of programs (e.g., competency-based, direct assessment, subscription-based). Each of these program types may have different optimal class sizes based on

their unique structures, goals, and delivery methods.

Taken together, these factors offer a set of parameters to guide decision-making regarding the optimal size of online classes. Given these considerations, it is important to explore the implications for such decisions for different stakeholders in online education.

PRACTICAL IMPLICATIONS

Given the research findings, federal regulations, and the strategic shift towards online learning reported in CHLOE 9 (Simunich et al., 2024), several practical implications emerge for online education:

Flexible Approach

Taft et al. emphasize that "one size does not fit all" (2019, p. 188) when it comes to determining the ideal enrollment for online courses. Institutions should consider adopting a flexible approach to class size, taking into account the specific needs of each course and program, as well as the requirements for regular and substantive interaction. This flexibility aligns with the varied strategic approaches institutions are taking to online learning, as reported in CHLOE 9 (Simunich et al., 2024), including targeting new audiences of learners, offering a broader range of educational experiences to meet specialized needs, and expanding modality options, all of which have direct implications for class sizes

Course Redesign

As class sizes increase, courses may need to be redesigned to address targeted learning outcomes and maintain student satisfaction while meeting regulatory requirements. This could involve restructuring assignments, incorporating peer-review components, reconsidering assessment strategies, or leveraging instructional teams. The high priority given to creating online versions of on-campus courses (69% of COLOs in CHLOE 9) suggests that many institutions will be engaged in this redesign process. Class size should be given special attention during instructional strategy selection and assessment planning during the course redesign process, as these are the key design phases impacted by the number of students enrolled in a given course. Additionally, redesign activities can be leveraged to rethink regular and substantive interaction requirements through the lens of Anderson's equivalency theory (2003), carefully considering what types of interaction are needed for what purpose. Instructional and assessment methods that involve higher levels of student-student or student-content interaction can facilitate learning in online contexts while reducing faculty workload without impacting instructional effectiveness. Explorations of evidence-based online teaching and assessment strategies offer a variety of options for faculty and course designers to consider as a means of rethinking interaction requirements and possibilities (Boettcher & Conrad, 2021; Davidson-Shivers & Rand, 2022; Holden & Westfall, 2010; Shank, 2011)

Faculty Input and Training

Decisions about class size should involve input from faculty members who understand the specific requirements and challenges of their courses (Lowenthal et al., 2019). Additionally, faculty may need training on how to effectively manage larger classes while meeting the "regular and substantive interaction" requirements. The CHLOE 9 report highlights faculty autonomy as a significant challenge in online initiatives, underscoring the importance of faculty involvement in these decisions (Simunich et al., 2024). Ultimately, faculty expertise related to the instructional goals and aligning pedagogical approaches should inform decision-making related to class size and the feasibility of maintaining effective learning experiences for online students.

Technology Integration

Institutions should invest in and leverage appropriate educational technologies that can help manage larger class sizes while maintaining quality interactions and meeting regulatory requirements. This aligns with the CHLOE 9 finding that many institutions are prioritizing the expansion of online course offerings and degree programs (Simunich et al., 2024). Recently proposed strategies for teaching and learning with artificial intelligence (AI) tools (Bowen & Watson, 2024; Trust et al., 2023) offer excellent potential for gaining efficiencies for educators and providing learning support for students. These strategies are also applicable in online learning environments and may provide a mechanism to more effectively monitor student engagement and progress. Reviews of research focused on AI applications in online courses and programs indicate that these tools are being used to determine learner prior knowledge, develop personalized educational pathways, recommend supporting instructional resources, and assess learning both formatively and summatively (Dogan et al., 2023; Ouyang et al., 2022).

Program-Specific Considerations

Different types of programs (e.g., competency-based, subscription-based) may require different approaches to class size. Institutions should carefully consider how to optimize class sizes within the context of each program type and the relevant regulations. This is particularly relevant given the diverse range of online offerings institutions are planning, from degree programs to non-degree credentials and employer partnerships. The development of new online programs that meet the needs of nontraditional students, for example, may need to employ an asynchronous delivery mode in order to align with the scheduling demands of busy adult learners. This kind of independent learning approach may accommodate larger student enrollments, but the provision of regular and sustained interaction mandated by federal regulations will require additional planning and effort on the part of the faculty.

Strategic Alignment

Decisions about class size should align with the institution's broader online learning strategy. As CHLOE 9 reports, institutions are targeting specific student demographics and focusing on particular types of online offerings (Simunich et al., 2024). Class size considerations should support these strategic priorities. For example, if experiential learning is a hallmark curricular feature to be incorporated across educational programs at the institution, this priority would drive online course design strategies and have direct implications for the number of students that could be accommodated in a given class.

Resource Allocation

The CHLOE 9 report indicates that many institutions are concerned about the adequacy of resources for online learning (Simunich et al., 2024). Optimal class size decisions should balance educational quality with resource constraints, potentially leveraging larger classes where appropriate to generate revenue that can support smaller, more intensive classes where needed. As indicated by Taft et al. (2019), pedagogical considerations should ultimately drive the decisions related to class size. If increasing the number of students is a practical necessity, faculty may require additional resources to support the impact on their increased workload related to course redesign and implementation efforts.

CONCLUSION

The question of optimal size for online classes is complex and context-dependent. Some key studies suggest that effective online class sizes range from 12 to 30 students, with important variations based on course level, subject mat-

ter, and pedagogical approach. One should keep in mind also, that a single instructor often is teaching more than one course. Assume an instructor is teaching three online courses, each with an enrollment of 20 students. If a few students, say 3, are added to each course, then the instructor is teaching 9 additional students, essentially taking her or his load to three and half classes. These additions have a way of silently increasing faculty workload, while at the course level appearing to be "just a few students more." Also, well-designed online learning experiences take time to create and one of the important input variables to that process is the number of students in the class. If the number of students in an online class is going to increase, instructors need significant lead time to make well-informed changes to a course design. Those changes may require additional resources, including compensation for the time to make the revisions.

The new federal regulations on distance education and innovation provide both opportunities and challenges in determining optimal class sizes (U.S. Department of Education, 2020). They offer flexibility for innovative program models that may be less constrained by traditional class size considerations, while also emphasizing the importance of meaningful student-instructor interactions. Furthermore, the strategic shift towards online learning reported in CHLOE 9 underscores the growing importance of these considerations. As institutions increasingly incorporate online learning into their core strategies and expand their online offerings, decisions about class size will play a crucial role in ensuring the quality and sustainability of these initiatives.

As online education continues to evolve, further research is needed to refine our understanding of optimal class sizes across different disciplines, educational contexts, and program types always keeping student learning outcomes and satisfaction, as well as instructor welfare, at the forefront of decision-making processes.

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