

# The Ideal Class Size for Online Professional Practice Doctorates

Helen Ewing\*<sup>1</sup> • Robin Reesal<sup>2</sup>

<sup>1</sup>MCPHS University, School of Arts and Sciences, Boston MA.  
<sup>2</sup>304 S. Jones Blvd., Suite 7470, Las Vegas, Nevada, 89107, USA. (480) 326-6014.

\*Corresponding author. E-mail: hewing@ymail.com.

Accepted 22<sup>nd</sup> March, 2022.

**Abstract.** A consensus on the ideal class size for online health professional practice doctorates remains elusive. Discussion about class size needs to include three essential components: students, curriculums, and teachers. Class size context is provided by discussing the following topics: the demographics of today's learners, student expectations of higher education, online learning, professional doctorate program philosophies, competency-based curricula, the community of inquiry (CoI), and constructivist teaching approaches. After reviewing the relevant data on class sizes, a discussion of the benefits of lower student-to-teacher ratios were explored, such as higher student satisfaction and retention, decreased risk of staff burnout, and financial benefits. As the demand for healthcare professionals grows, higher education institutions have a social responsibility to provide high-quality education for their students. Data supports smaller class sizes as ideal for online health doctorate programs using a student-centered and personalized approach that implements competency-based learning with a community of inquiry and a constructivist teaching approach.

**Key words:** Class size, online education, doctorate programs.

## INTRODUCTION

There is no consensus on the ideal class size for online higher education courses, specifically Professional Practice Doctorates (Burch, 2019). Yet there is a sense among those who teach these courses that workloads are heavier than many higher education institutions realize (Tynan *et al.*, 2015). Online programs differ in their content and presentation depending on the targeted profession and the teaching methods used.

The authors believe context is essential to appreciate the role class size plays for students, teachers, and institutions. Relevant to the discussion is an overview of today's learners, online teaching, health profession doctorates' philosophies, and competency-based curriculum development focusing on community of inquiry and constructivist teaching approaches. By their nature, these factors can affect the volume and intensity of work required by teachers and students. Also, class size data and the implications of the findings for students, teachers,

and institutions will be examined.

## Today's Learners

Higher education instructors are teaching a different group of students than from the past. There is a generational shift of learners in higher education and doctorate programs. As Boomers (1946-1964) age, post-graduate programs are more often composed of Generation X (1965-1980) and Millennials (1981-1996). Among the general U.S. population, Millennials are already a larger group than Boomers (Fry, 2020). Using U.S. Census Bureau data from 2019, Millennials numbered 72.1 million and Boomers 71.6 million with Generation X anticipated to surpass Boomers in numbers by 2028 (Fry, 2020). Therefore, higher education systems set up for the values, culture, and learning schemes of Baby Boomers are

retooling for Generation X, Millennials, and Generation Z (Salesforce, 2020).

The value system of Millennials and Generation Xers differs from Boomers. Millennials are more educated, racially and ethnically diverse, and slower to marry than previous generations of the same age (Brown *et al.*, 2020). Millennial young adult households earn more than most older Americans did at the same age but have less money than Boomers did at the same age, partly because of student loan debt (Brown *et al.* 2020). Millennial women, like Generation X women, are more likely to participate in the workforce than previous generations, with the number of Millennial women with a bachelor's degree higher than that of men, a reversal from the Boomers (Bialik and Fry, 2019). Educational attainment has increased for men and women over the last fifty years (Bialik and Fry, 2019).

Post-baccalaureate enrollment in programs from 2000 to 2018 increased by over 40 percent and will continue to rise (U.S. Department of Education, National Center for Education Statistics, 2021). More specifically, there is five times the number of students attending health profession programs in 2019 compared to 1970 (U.S. Department of Education, National Center for Education Statistics, 2020). Six of the ten fastest-growing occupations from 2019 to 2029 will be related to healthcare (U.S. Bureau of Labor Statistics, 2020). Communities and workplaces need more healthcare professionals, and healthcare professionals need knowledge and skill enhancement to advance their careers (Brown *et al.*, 2020).

Minority students account for roughly half of all high school graduates in the United States (Brown *et al.*, 2020). Minorities, according to the Census Bureau's statistics for 2019, be they Hispanic (18.5%), Black (13.4%), or Asian (5.9%), make up a greater number of the general population (U. S. Census Bureau, 2020). One-third of online college students are first-generation college students and 13% have no prior college experience (Clinefelter *et al.*, 2019).

To summarize the information in this section, doctorate program educators face multigeneration students with a skew towards Millennials and Generation X, more working women than men, and a higher number of racially diverse learners. Their classrooms are less homogenous, and this diversity requires adapting teaching skills to match various pre-program knowledge bases, differing interests, and varying learning styles.

### Learner Expectations

The income gap between Millennials and Generation Xers obtaining a graduate degree than their lesser-educated peers has widened compared to previous generations (Bialik and Fry, 2019). For example, according to the Pew Research Foundation, a Millennial in 2018 with a Bachelor's degree or higher was expected to earn \$105,343 per year, while a peer with some college experience would earn \$62,358 per year and both would

exceed the income of a high school graduate at \$49,363 per year. This reality is a motivating factor for students seeking long-term financial stability for themselves and their families (Bialik and Fry, 2019).

A recent survey showed more than 90% of graduate students had a professional objective for enrolling in their program (Magda *et al.*, 2020). About 25% registered for salary reasons, 25% wanted a new career path, and 15% wanted to rise within their workplace. Graduate students were more focused on promotions than undergraduates (Magda *et al.*, 2020). Approximately 70% of graduate students are employed full-time while attending class and 40% are parents (Clinefelter *et al.*, 2019).

Students want a personalized and connected learning experience in which they are engaged with other students, faculty, and staff. They expect quick connections to staff, information, and support (Salesforce, 2020). To achieve engagement and connectivity in a class, instructors use online chats, discussion boards, case studies, online videos, photo voice, video conferences, emails, and phone calls. These and other methods help class cohesiveness and meet student expectations, which enhances learner satisfaction and retention (Salesforce, 2020; Breitenbach, 2019).

Class engagement and connectivity are an integral part of active learning principles that follow the community of inquiry model and constructivist model (Taft *et al.*, 2011; Garrison *et al.*, 2000; Garrison, 2018). These teaching styles are labor-intensive and time-consuming for instructors. Teachers help students adjust; and accommodate students through their time-pressured educational goals, find resources, promote connections with peers, and facilitate student's online presence (Taft *et al.*, 2011). Students and institutions expect online instructors to be available outside of the standard nine to five hours of a face-to-face program. The "office hours" for an online instructor now include evenings and weekends to respond to emails, texts, and chats.

The bottom line for Millennials and Generation Xers is their need to obtain the most flexible online graduate degree in the shortest time. They want their doctorate to advance their career, reduce their debt, and improve their quality of life. Students are managing their families, work, school, and leisure time while attending full-time classes.

### Online Learning

Today's learners prefer online education (U.S. Department of Education, National Center for Education Statistics, n.d.b). Prior to COVID-19, higher education geared distance learning to returning adult and transfer students with close to 80% of online learning programs targeting returning students after an absence from school (Miller, 2021).

While undergraduate enrollment in the U.S. is falling, post-graduate enrollment is rising. (National Student Clearinghouse Research Center, 2019). Using information

from 5,961 higher education institutions in 2012, about 25% of students were enrolled in distance learning. By 2019 that number grew to over 35% of students (U.S. Department of Education, National Center for Education Statistics, n.d.b).

In Fall 2018, more than one-third (1.2 million) of all post-baccalaureate students participated in distance education, while 31% (933,000) took distance education courses exclusively. Among students who took distance education courses exclusively, 406,000 were enrolled at in-state schools and 495,000 were enrolled at out-of-state schools (U.S. Department of Education, National Center for Education Statistics, 2021).

Arguments that support online learning include: increased availability to learners by eliminating physical boundaries, more choice for students who prefer online vs. face-to-face learning, greater time flexibility for education, more cost-effective dissemination of course content, more learner peer activity, more learner teacher interaction, increased connectivity, enhanced collaboration, and more time for learners to reflect on information (Means *et al.*, 2013; Rudestam and Schoenholtz-Read, 2010). Cost-effectiveness and credit equivalency favor online learning also (Nguyen, 2015).

A meta-analysis completed by Means *et al.* that looked at an equal number of learners from K-12, undergraduate, graduate, and professional training sites found that students in online learning performed "modestly" better than face-to-face learners (Means *et al.*, 2013). In other words, online learning is at least equivalent to face-to-face learning. Nguyen's literature review identified positive online learning outcomes such as improved learning as measured by test scores, better student engagement with the class material, enhanced perception of learning by students, greater connectivity among learners, and reduced withdrawal or failure (Nguyen, 2015).

Online learning has progressed to allow for more active engagement among students through chats, phone calls, and emails. Variation of synchronous and asynchronous teaching methods adds to the course and curriculum flexibility. This flexibility facilitates a student's ability to integrate studying into their lifestyle.

How students learn has changed from the Boomer generation. Almost 75% of online learners use mobile devices, such as phones or tablets to study (Magda *et al.*, 2020). Nearly half use their mobile devices for digital readings, a third for completing videos/multimedia learning and completing practice activities, and a quarter for completing graded activities and for communicating with professors (Magda *et al.*, 2020). This data supports the hypothesis that students are learning on the go, on buses, trains, and cafes. The data in this section showed that post-graduate online learning is growing, is as effective as face-to-face learning, and fits well for today's learners who are using mobile electronic tools to learn.

### Professional Doctorate Programs

Professional doctorate degrees incorporate evidence-

based knowledge and skills to prepare working health professionals, through interprofessional learning, to reach leadership roles and become scholarly professionals (Park, 2005; Cashin *et al.*, 2017). These leadership roles are often in clinical practice, education, or administration (Jones, 2018; Ewing *et al.*, 2012).

Professional doctorate programs require students to integrate their workplace experiences with their classwork (Jones, 2018). Professional doctorates differ from their Ph.D. counterparts in the teaching methods used as students are expected to be more engaged with their peers and instructors (Breitenbach, 2019). This conceptual difference puts teachers at the forefront as providers of information, mentors, and advisors on accessing resources and researching culminating projects; while the curriculum design promotes active learning from multiple sources at any time (Ewing *et al.*, 2012; Taft *et al.*, 2011; Shepherd, 2017).

### Curriculum Design

As previously stated, students want a personalized and connected "anytime" learning experience. Personalized learning involves adjusting course experiences to match each learner's preferences (Brown *et al.*, 2020). Students, government policy, and commercialization have pushed personalized learning into the forefront (U.S. Department of Education, Office of Educational Technology, 2017). Curriculum design must support engagement which facilitates learning (Manwaring *et al.*, 2017). Faculty roles are changing in a learner-centric personalized environment; teachers become facilitators, collaborators, and coaches of active learning. Flip classes and online chats are examples of how faculty roles have become active versus passive information distributors.

Online learning commonly uses the Community of Inquiry (Col) model, which encourages student learning and satisfaction (Burgess *et al.*, 2010). The Col model, first developed by Garrison *et al.*, helps teachers implement personalized learning. The model emphasizes thinking and learning collaboratively using three components: cognitive presence, social presence, and teacher presence (Garrison *et al.*, 2000; Garrison, 2018). Cognitive presence involves examining online discourse that allows students to construct and give meaning to what they learn, connect ideas, share experiences, develop curiosity and apply concepts (Garrison *et al.*, 2000; Garrison, 2018; Taft *et al.*, 2011; Bektashi, 2018). Social presence reflects the ability of faculty and learners to project themselves socially and emotionally into a course in a trusting environment (Garrison *et al.*, 2000; Taft *et al.*, 2011; Bektashi, 2018). Teachers and students in online classes become "real" or develop a persona or personality through their expressions, collaborations, and group cohesion (Garrison *et al.*, 2000).

According to the Col model, teacher's presence in online

education involves the design, facilitation, and direction of learning (Garrison *et al.*, 2000; Taft *et al.*, 2011). Teachers play a role in knowledge conceptualization, instructional design, and syllabus construction. They use their organizational skills and develop learning strategies to facilitate discourse, engage with individuals and groups of students, and build a learner's understanding to promote learning. Application of educators' multidimensional knowledge and skills is necessary to implement the Col model's teaching aspect successfully (Taft *et al.*, 2011). Implementing the social and cognitive presence depends on the teacher's delivery and the student's receptiveness to the curriculum content (Garrison *et al.*, 2000).

The student-centered constructivist curriculum approach fits with personalized learning and Col. The constructivist model identifies students as active learners who learn with their teachers and fellow students (Fernando and Marikar, 2017). Students process information internally as they exchange information, ideas, and concepts with others (Taft *et al.*, 2011).

Contrasting the constructionist model to the more traditional teacher-centric objectivist approach, the traditional method supports a one-way communication style based on the input and output of student knowledge (Sugawara *et al.*, 2020). Students are passive learners and acceptors of information; they learn independently from others and retain objective test-based quantifiable information. The teacher-student relationship is not the focus of the exchange, processing information is (Sugawara *et al.*, 2020). This approach lends itself to large classes and electronic multiple-choice exams. It has less instructor participation than the newer constructivist and personalized teaching styles such as Col and competency-based learning.

Competency-based learning promotes personalized scholarship, time and content flexibility, and project-based and community-based learning, all of which enhance learner engagement (Ewing *et al.*, 2012). Competency-based assessment (CBA) involves observing and assessing a learner's ability to perform a task by applying the knowledge and skills they learn (Gallardo, 2020). In other words, learners are using their information to solve problems, make decisions and create new ideas and concepts. Examples of CBA's are using scoring rubrics and peer and teacher competency evaluations of students' final applied research projects. Gallardo identified some benefits of competency-based assessments: giving more meaning to complex learning objectives; assessing students' ability to make decisions and solve problems; integrating knowledge, skills, and attitudes into assessment and feedback; emphasizing learning processes rather than only focusing on solutions and products; and being consistent with philosophical and pedagogical CBA basics (Gallardo, 2020).

Associated with competency-based learning is problem-based learning, another teaching tool used in professional

doctorate programs (Barber *et al.*, 2015). Problem-based learning is relevant because employers want recent graduates to be proficient communicators, problem solvers, data analyzers, and leaders (Carnevale *et al.*, 2013). Barber *et al.* (2015) have discussed the importance of using problem-based learning, authentic assessment, and digital communities to advance student learning (Barber *et al.*, 2015). The problem-solving approach is labor-intensive because of the teacher's participatory role to guide discussions.

To summarize, higher education and professional doctorates have changed in terms of learner expectation, content delivery, and curriculum design. In addition to long hours of availability, online teachers manage multiple moving parts making for a changed job description when compared to face-to-face teaching and past teacher-centric methods.

### The Literature on Class Size

Taft *et al.* (2011) looked at developing a framework for determining class size for online programs. Their extensive literature review included Bloom's taxonomy, objectivist-constructivist teaching strategies, and the community of inquiry model. A second significant source of information for online class size is an evidence-based review by Barbara Burch, manager of research and development for Quality Matters (Burch, 2019).

The ratio of full-time-equivalent (FTE) students to FTE faculty in degree-granting postsecondary institutions was 15:1 in the Fall of 1999, 16:1 ten years later, and dropped to 14:1 in the Fall of 2018. A further breakdown reveals the FTE student-to-faculty ratio in 2018 was higher in private for-profit institutions (22:1) than in public 4-year institutions (14:1) and private nonprofit 4-year institutions (10:1) (U.S. Department of Education, National Center for Education Statistics, 2018).

Smaller class sizes positively correlate with the quantity and quality of interaction between teachers and students (Parks-Stamm *et al.*, 2017). Class size and a teacher's academic experience affect student learning and outcome (Lowenthal *et al.*, 2019). New teachers need a lower-class size of 12 (Sieber, 2005) while Tomei (2006) recommends 12 students per class of graduate online work.

Burruss *et al.* (2009), in their research, recommended 8 to 15 students for graduate online learning. In their view, these numbers promote the best student education and participation results. Parks-Stamm *et al.* (2017) based on their review of over 500 online courses, found that student class participation increased when there were 14 or fewer students in a class. Taft *et al.* (2011) stated the "preponderance of the evidence" points to no more than 20 students should be in a constructivist designed course. From a faculty standpoint, it is self-evident that the number of students in a class drives faculty workload when

applying the constructivist and Col principles.

### The Benefit of Smaller Class Sizes

Small class sizes promote interaction and engagement among students and with faculty (Carnevale *et al.*, 2013; Taft *et al.*, 2011). Class engagement and connectivity help class cohesiveness and meets student expectations, which helps achieve learner satisfaction and retention (Salesforce, 2020; Breitenbach, 2019; Taft *et al.*, 2011). Low teacher-pupil ratios help learners achieve the critical thinking skills needed to meet the workplace demands (Burch, 2019; Carnevale *et al.*, 2013). High student class numbers and high faculty workloads increase the risk of faculty burnout and affect a teacher's ability to engage with other students (Lowenthal *et al.*, 2019; Parks-Stamm *et al.*, 2017; Magda *et al.*, 2020).

Bigger may not be better. Students may feel like "just a number" in a large class which works against personalized learning. Anonymity and a depersonalized class persona lead to unhappiness and decreased student participation; this lack of connectivity affects students' ability to learn (Lowenthal *et al.*, 2019; Parks-Stamm *et al.*, 2017; Breitenbach, 2019).

Negative student perception of a program can affect word-of-mouth endorsements and create a negative social media presence (Fry, 2018). Both word of mouth and social media variables are used by students when choosing programs (Magda *et al.*, 2020). Advertising and marketing costs can go up to reverse negative online and student perceptions. From a financial standpoint, large class sizes that follow the objectivist model may not be as cost-effective as smaller classes. Larger class sizes promote attrition and decrease school reputation (Magda *et al.*, 2020; Salesforce, 2020). The long-term financial outlay for a high student-to-teacher ratio may not be worth it; additionally, the quality of student education may suffer (Burch, 2019; Carnevale *et al.*, 2013).

### CONCLUSION

Higher education institutions have a social responsibility to provide the best possible learning experience for their students. Given the change in student demographics and student expectations, student-centered and personalized teaching with small class sizes are necessary to implement competency-based learning that uses the community of inquiry and constructivist principles. Small class sizes of 12 to 20 may be best for online professional doctorate programs. More research is needed in this area to provide evidence to support best practices for designing and delivering doctorate programs with the most effective class size.

### REFERENCES

Barber W, King S, Buchanan S (2015). Problem based learning and

- authentic assessment in digital pedagogy: Embracing the role of collaborative communities. *The Electron. J. e-Learn.* 13(2):59-67.
- Bektashi L (2018)**. Community of inquiry framework in online learning: Use of technology. <https://techandcurriculum.pressbooks.com/chapter/coi-and-online-learning>.
- Bialik K, Fry R (2019)**. Millennial life: How young adulthood today compares with prior generations. <https://www.pewresearch.org/socialtrends/2019/02/14/millennial-life-how-young-adulthood-today-compares-with-prior-generations-2>.
- Breitenbach E (2019)**. Evaluating a model to increase doctorate program completion rates: A focus on social connectedness and structure. *Int. J. Doctoral Stud.* 14:217-236.
- Brown M, McCormack M, Reeves J, Brooks DC, Grajeck S, Alexander B, Bali M, Bulger S, Dark S, Engelbert N, Gannon K, Gauthier A, Gibson D, Gibson R, Lundin B, Veletsianos G, Weber N (2020)**. 2020 Educause horizon report teaching and learning edition. Louisville, CO: EDUCAUSE. [https://library.educause.edu/media/files/library/2020/3/2020\\_horizon\\_report.pdf](https://library.educause.edu/media/files/library/2020/3/2020_horizon_report.pdf).
- Burch B (2019)**. Class size in online courses: What the research says. <https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/research-on-class-size>.
- Burgess M, Slate JR, Rojas-LeBouef A, LaPrairie K (2010)**. Teaching and learning in second life: Using the Community of Inquiry (COI) model to support online instruction with graduate students in instructional technology. *The Internet and Higher Education*, 13(1-2):84-88.
- Burruss NM, Billings DM, Brownrigg V, Skiba DJ, Connors HR (2009)**. Class size as related to use of technology, educational practices, and outcomes in web-based nursing courses. *J. Profess. Nurs.* 25:33-41.
- Carnevale A, Smith N, Strohl J (2013)**. *Recovery: Job growth and education requirements through 2020*. Washington, DC: Georgetown University. [https://1gyhoq479ufd3yna29x7ubjn-wpengine.netdna-ssl.com/wp-content/uploads/2014/11/Recovery2020.FR\\_Web\\_.pdf](https://1gyhoq479ufd3yna29x7ubjn-wpengine.netdna-ssl.com/wp-content/uploads/2014/11/Recovery2020.FR_Web_.pdf).
- Cashin A, Casey M, Fairbrother G, Graham I, Lindesay I, McCormack B, Thoms D (2017)**. Third-generation professional doctorates in nursing: The move to clarity in learning product differentiation. *Int. Pract. Dev. J.* 7(2):1-14.
- Clinefelter DL, Aslanian CB, Magda AJ (2019)**. *Online college students 2019: Comprehensive data on demands and preferences*. Louisville, KY: Wiley Edu, LLC.
- Ewing H, Mathieson K, Alexander J, Leafman J (2012)**. Enhancing the acquisition of research skills in online doctoral programs: The Ewing Model. *J. Online Learn. Teach.* 8(1):34-44.
- Fernando S, Marikar F (2017)**. Constructivist teaching/learning theory and participatory teaching methods. *J. Curr. Teach.* 6(1):110-122. <https://files.eric.ed.gov/fulltext/EJ1157438.pdf>.
- Fry R (2020)**. Millennials overtake baby boomers as America's largest generation. <https://www.pewresearch.org/fact-tank/2020/04/28/millennials-overtake-baby-boomers-as-americas-largest-generation>.
- Gallardo K (2020)**. Competency-based assessment and the use of performance-based evaluation rubrics in higher education: Challenges towards the next decade. *Problems of Education in the 21<sup>st</sup> Century*, 78(1):61.
- Garrison D, Anderson T, Archer W (2000)**. Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Educ.* 2(2-3):87-105.
- Garrison D (2018)**. Designing a community of inquiry. <http://www.thecommunityofinquiry.org/editorial9>.
- Jones M (2018)**. Contemporary trends in professional doctorates. *Stud. Higher Educ.* 43(5):814-825.
- Lowenthal PR, Nyland R, Jung E, Dunlap JC, Kepka J (2019)**. Does class size matter? An exploration into faculty perceptions of teaching high enrollment online courses. *Am. J. Dist. Educ.* 33(3):152-168.
- Magda AJ, Capranos D, Thompson S, Davis J, Hansell J, Marvel II, Hack J, Swanberg C, Swiertz M, Lewis-Prati K, Bouton M, Wheeler M (2020)**. *Online college students 2020: Comprehensive data on demands and preferences*. Louisville, KY: Wiley Education Services. <https://edservices.wiley.com/wp-content/uploads/2020/06/OCS2020-Report-ONLINE-FINAL.pdf>.

- Manwaring KC, Larsen R, Graham CR, Henrie CR, Halverson LR (2017).** Investigating student engagement in blended learning settings using experience sampling and structural equation modeling. *The internet Higher Educ.* 35:21-33.
- Means B, Toyama Y, Murphy R, Baki M (2013).** The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record*, 115:1-47.
- Miller C (2021).** Online education statistics. <https://educationdata.org/online-education-statistics>.
- National Student Clearinghouse Research Center (2019).** Term enrollment estimates current spring 2019. <https://nscresearchcenter.org/wp-content/uploads/CurrentTermEnrollmentReport-Spring-2019.pdf>.
- Nguyen T (2015).** The effectiveness of online learning: Beyond no significant difference and future horizons. *J. Online Learn. Teach.* 11(2):309-319.
- Park C (2005).** New variant PhD: The changing nature of the doctorate in the U.K. *J. Higher Educ. Pol. Manage.* 27(2):189-207.
- Parks-Stamm E, Zafonte M, Palenque S (2017).** The effects of instructor participation and class size on student participation in an online class discussion forum. *Brit. J. Educ. Technol.* 48:1250-1259.
- Rudestam KE, Schoenholtz-Read J (2010).** The flourishing of adult online education: An overview. In Rudestam, K.E. and Schoenholtz-Read, J. (Ed.), *Handbook of online learning*. Los Angeles, CA: Sage.
- Salesforce (2020).** Connected student report. <https://www.salesforce.org/wp-content/uploads/2020/05/highered-connected-student-report-first-edition.pdf>.
- Shepherd I (2017).** We Have a choice: Transdisciplinary research or action research for a professional doctorate research programme? In: Gibbs P. (eds) *Transdisciplinary higher education*. Springer, Cham.
- Sieber J (2005).** Misconceptions and realities about teaching online. *Sci Eng Ethics*, 11:329-340. <https://link.springer.com/article/10.1007/s11948-005-0002-7>.
- Sugawara R, Okuhara S, Yoshikazu S (2020).** Study about the aptitude-treatment interaction between learning using the e-learning system and learning type of learner. *Int. J. Inform. Educ. Technol.* 10(7):488-493. <http://www.ijiet.org/vol10/1412-WT0014.pdf>.
- Taft SH, Perkowski T, Martin LS (2011).** A framework for evaluating class size in online education. *Quart. Rev. Dist. Educ.* 12(3):181-197.
- Tomei J (2006).** The impact of online learning on faculty load: Computing the ideal class size for online learning. *J. Technol. Teach. Educ.* 14:531-541. <https://www.utm.edu/departments/ncate/documents/onlinefacultyload.pdf>.
- Tynan B, Ryan Y, Lamont-Mills A (2015).** Examining workload models in online and blended teaching. *Brit. J. Educ. Technol.* 46(1):5-15.
- U.S. Bureau of Labor Statistics (2020).** Employment projections and occupational outlook handbook news release, employment projections-2019-2029. <https://www.bls.gov/news.release/ecopro.htm>.
- U.S. Census Bureau (2020).** *Quick facts*. <https://www.census.gov/quickfacts/fact/table/US/PST045219>.
- U.S. Department of Education, National Center for Education Statistics (2021).** Percentage of Postbaccalaureate students enrolled in degree granting postsecondary institutions, by participation in distance education and control of institution. [https://nces.ed.gov/programs/coe/indicator\\_chb.asp](https://nces.ed.gov/programs/coe/indicator_chb.asp).
- U.S. Department of Education, National Center for Education Statistics (2020).** Doctor's degrees conferred by postsecondary institutions by field of study, 1970-71 through 2018-19. [https://nces.ed.gov/programs/digest/d20/tables/dt20\\_324.10.asp](https://nces.ed.gov/programs/digest/d20/tables/dt20_324.10.asp).
- U.S. Department of Education, National Center for Education Statistics (2018).** Total and full-time-equivalent (FTE) staff and FTE student/FTE staff ratios in postsecondary institutions participating in Title IV aid programs, by degree-granting status, control of institution, and primary occupation: Fall 1999, fall 2009, and fall 2018. [https://nces.ed.gov/programs/digest/d19/tables/dt19\\_314.10.asp](https://nces.ed.gov/programs/digest/d19/tables/dt19_314.10.asp).
- U.S. Department of Education, National Center for Education Statistics (n.d.b).** Percent of students enrolled in distance education courses. <https://nces.ed.gov/ipeds/TrendGenerator/app/answer/2/42>.
- U.S. Department of Education, Office of Educational Technology (2017).** Reimagining the role of technology in education: 2017 national education technology plan update January 2017 (version 2.0). Washington D.C.: U.S. Government. <https://tech.ed.gov/files/2017/01/NETP17.pdf>.