Comparing the Effectiveness of Classroom and Online Learning: Teaching Research Methods

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Abstract
As public administration programs extend their online education offerings to reach more time- and place-bound students, and as accredited institutions become interested in documenting teaching and learning effectiveness, the degree to which online students are successful as compared to their classroom counterparts is of interest to teaching faculty and others charged with assessment. By comparing student performance measures and assessments of learning experience from both online and traditional sections of a required graduate public administration research methods course taught by the same instructor, this paper provides evidence that student performance as measured by grade is independent of the mode of instruction. Persistence in an online environment may be more challenging in research methods classes than in other public administration classes. Furthermore, participation may be less intimidating, and the quality and quantity of interaction may be increased in online classes.

Two trends have recently converged in teaching public administration. As access to the Internet and World Wide Web has continued to grow, public administration programs have increasingly adopted Web-based instructional mechanisms. In the mid-1990s, the National Association of Schools and Public Affairs and Administration (NASPAA) noted that only eight member MPA/MPP programs offered online courses, but the number almost doubled to 15 by 2003 (Ginn & Hammond, 2012). As of June 2012, the NASPAA website listed 39 member schools offering online MPA and related degrees, graduate certificates, and courses. A recent survey of 96 NASPAA-affiliated institutions indicates that around 40% of them offered hybrid or online courses, and about 24% had programs offering fully online courses (Ginn & Hammond, 2012). Nationwide,

Keywords: learning effectiveness, online teaching, online interaction, persistence

online enrollment rates are expanding at much faster rates than traditional classroom enrollment growth; specifically, in higher education, online enrollments have grown 21%, whereas growth for traditional classroom instruction registers only 2% since 2002 (Allen & Seaman, 2007).

Concurrent with the expansion of online education, higher education programs today are wrestling with how to respond to ever-increasing accountability demands. This issue includes the federal government's concern with accrediting bodies producing evidence that students reach articulated learning goals (Suskie, 2004). Public administration programs are no exception. In 2009, NASPAA adopted new accreditation standards, demanding performance measurement throughout the public administration curriculum. For example, newly embraced standards now require programs to "engage in ongoing assessment of student learning for all universal required competencies, all mission-specific required competencies, and all elective (option, track, specialization, or concentration) competencies" (NASPAA, 2012, p. 30). As a consequence, these widespread interests and pressures push instructors to document learning effectiveness as well as to maintain their efforts at continuous improvement of learning outcomes.

The development of these two trends merging in the contemporary education setting raises a question about the effectiveness of online courses, particularly as compared to traditional classroom learning and in relation to individual student needs, perceptions, and learning outcomes. This research explores the key issues of online, as compared to classroom, learning and compares the major dimensions of learning effectiveness of the two cases. This study focuses on the multisection experience of one instructor in a research methods course in a public administration program. In the following pages, the article reviews the literature addressing the impact of the learning environment and examines past studies on online learning effectiveness. The author then describes the research setting and methodology. Finally, results and discussion are presented following the investigation, drawing conclusions as to critical issues and presenting lessons learned and directions for future research.

Online vs. Classroom Learning Environment

The impact of learning environments in relation to learning outcomes has constantly been explored by researchers of education. For example, Ramsden and Entwistle (1981) empirically identified a relationship between approaches to learning and perceived characteristics of the academic environment. Haertela, Walberg, and Haertela (1981) found correlations between student perceptions of social psychological environments of their classes and learning outcomes. Web-based technology has noticeably transformed the learning and teaching environment. Proponents of online learning have seen that it can be effective in potentially eliminating barriers while providing increased convenience, flexibility, currency of material, customized learning, and feedback over a traditional face-to-face

experience (Hackbarth, 1996; Harasim, 1990; Kiser, 1999; Matthews, 1999; Swan et al., 2000). Opponents, however, are concerned that students in an online environment may feel isolated (Brown, 1996), confused, and frustrated (Hara & Kling, 2000) and that student's interest in the subject and learning effectiveness may be reduced (R. Maki, W. Maki, Patterson, & Whittaker, 2000). The following section examines two key differences of learning effectiveness—interaction and student performance—between the online and classroom learning environments.

Interaction

An important component of classroom learning is the social and communicative interactions between student and teacher, and student and student. A student's ability to ask a question, to share an opinion, or to disagree with a point of view are fundamental learning activities. It is often through conversation, discourse, discussion, and debate among students and between instructors and students that a new concept is clarified, an old assumption is challenged, a skill is practiced, an original idea is formed and encouraged, and ultimately, a learning objective is achieved. Online learning requires adjustments by instructors as well as students for successful interactions to occur. Online courses often substitute classroom interaction with discussion boards, synchronous chat, electronic bulletin boards, and e-mails. The effectiveness of such a virtual interactive venue is not without debate.

Student-to-instructor and student-to-student interactions are important elements in the design of a Web-based course (Fulford & Zhang, 1993; Kumari, 2001; Sherry, 1996) because learners can experience a "sense of community," enjoy mutual interdependence, build a "sense of trust," and have shared goals and values (Davies & Graff, 2005; Rovai, 2002).

Some scholars suggest that interaction in an online environment promotes student-centered learning, encourages wider student participation, and produces more in-depth and reasoned discussions than a traditional classroom setting does (e.g., Karayan & Crowe, 1997; D. Smith & Hardaker, 2000). Interaction in an online environment is less intimidating between individuals and also has less time pressure on students than does interaction in a face-to-face setting (Warschauer, 1997). Online discussions also can encourage more reticent students to participate to a greater extent (Citera, 1988).

However, the advantage of online interaction may not be realized if close connection among the learners is absent. Haythornthwaite and colleagues (2000) found that students who failed to make online connections with other learners in their group reported feeling isolated and more stressed.

McConnell (2000) provides a comprehensive comparison of the differences between online and face-to-face learning. Important differences related to interaction in the two modes of instruction are adapted in Table 1.

Table 1.
Comparison of Interaction Between Online and Face-to-Face Settings

	Online	Face-to-Face
Mode	Discussions through text only; Can be structured; Dense; permanent; limited; stark	Verbal discussions: a more common mode, but impermanent
Sense of Instructor Control	Less sense of instructor control; Easier for participants to ignore instructor	More sense of leadership from instructor; Not so easy to ignore instructor
Discussion	Group contact continually maintained; Depth of analysis often increased; Discussion often stops for periods of time, then is picked up and restarted; Level of reflection is high; Able to reshape conversation on basis of ongoing understandings and reflection	Little group contact between meetings; Analysis varies, dependent on time available; Discussions occur within a set of time frame; Often little time for reflection during meetings; Conversations are less likely being shaped during meeting
Group Dynamics	Less sense of anxiety; More equal participation; Less hierarchies; Dynamics are 'hidden' but traceable; No breaks, constantly in the meeting; Can be active listening without participation; Medium (technology) has an impact; Different expectation about participation; Slower, time delays in interactions or discussions	Anxiety at beginning/during meetings; Participation unequal; More chance of hierarchies; Dynamics evident but lost after the event; Breaks between meetings; Listening without participation may be frowned upon; Medium (room) may have less impact; Certain expectations about participation; Quicker, immediacy of interactions or discussions
Rejoining	High psychological/emotional stress of rejoining	Stress of rejoining not so high
Feedback	Feedback on each individual's piece of work very detailed and focused; Whole group can see and read each other's feedback; Textual feedback only; No one can "hide" and not give feedback; Permanent record of feedback obtained by all; Delayed reactions to feedback; Sometimes little discussion after feedback; Group looks at all participants' work at same time	Less likely to cover as much detail, often more general discussion; Group hears feedback; Verbal/visual feedback; Possible to "free-ride" and avoid giving feedback; No permanent record of feedback; Immediate reactions to feedback possible; Usually some discussion after feedback, looking at wider issues; Group looks at one participant's work at a time
Divergence /Choice Level	Loose-bound nature encourages divergent talk and adventitious learning; Medium frees the sender but may restrict the other participants (receivers) by increasing their uncertainty	More tightly bound, requiring adherence to accepted protocols; Uncertainty less likely due to common understandings about how to take part in discussions

Source. Adapted from McConnell (2000)·

Researchers also attempt to identify the link between online interaction and student performance. For example, Davies and Graff (2005) found that greater online interaction was not significantly associated with higher performance for students achieving passing grades; however, students who failed in their online classes tended to interact less frequently.

Student Performance

Student performance is a multidimensional concept; successful completion of a course, course withdrawals, grades, added knowledge, and skill building are among some of the aspects. Nevertheless, researchers have been interested in differences in performance between the two modes of instruction. McLaren (2004) found significant differences in persistence between the two instructional modes, though no significant performance difference was noted as measured by the final grade. Carr (2000) reported dropout rates as high as 80% in online classes and suggested a rule of thumb that course completion rates are often 10 to 20% higher in traditional courses. This result can be attributed to the demographic that distance education students are frequently older and have more life obligations. It also can be attributed to the mode of instruction itself, because online classes are often viewed as easier to drift away from or sever ties with.

Comparable performance findings were identified in different academic curriculums. Moore and Thompson (1990, 1997) reviewed much of this type of research from the 1980s through the 1990s and concluded that distance education was effective in terms of achievement of learning, attitudes expressed by students and teachers, and return on investment (1997). Harrington (1999) compared classroom and online statistics instruction for master's-level social work students and suggested that students who previously have been successful academically can do just as well with a distance learning approach as can students in a traditional classroom course. Thirunarayanan and Perez-Prad (2001), in their study of education programs, found that although the online group scored slightly better than the campus group on the class post-test, the difference in performance was not statistically significant. L. Smith (2001) compared instruction in an MBA marketing planning course, providing descriptions of the differences needed in the two environments to achieve the same learning objectives. McLaren (2004), in comparing performance measures of an undergraduate business statistics course, provided evidence that the final grade for students who successfully completed the course is independent of the mode of instruction.

Despite the proliferation of literature, performance measurement for online instruction is quite difficult and often problematic. For example, Brown and Wack (1999) point out the difficulty of applying a clinical experimental design to educational research and suggest the efforts to compare distance and conventional courses and programs are problematic, especially as distance and campus programs and populations are increasingly integrated. Within the limited amount of original

research, three broad measures of the effectiveness of online education are usually examined: (a) student outcomes, such as grades and test scores; (b) student attitudes about learning through distance education; and (c) overall student satisfaction toward distance learning. Such research studies have often demonstrated weak designs, especially in control of the populations under comparison, the treatment being given, and the statistical techniques being applied (Moore & Thompson, 1990).

A study by Phipps and Merisotis (1999) found that several key shortcomings are inherent within the original research on the effectiveness of online learning, including no control for extraneous variables (and therefore no demonstrable illustration of cause and effect), lack of randomization for sample selection, weak validity and reliability of measuring instruments, and no control for any "reactive effects."

It is important to note that, despite the proliferation of literature on online learning, there is a relative scarcity of true, original research dedicated to examining online learning effectiveness in the field of public administration.

Research Method

The purpose of this study is to compare student performance in online and face-to-face classes in terms of interaction and efficacy in a public administration class. The study compares learning effectiveness in six (three online and three face-to-face) research methods classes taught by the same instructor in the MPA program at the California State University–San Bernardino from the fall academic quarter of 2010 to the spring quarter of 2012. The university offers a fully online program that parallels the traditional MPA program. Each of the nine required core courses is offered in two modes. The program requires all online courses to be comparable to their in-class counterparts. MPA students, based on their own needs, have the option to enroll in a course either online or face-to-face. They may complete the program with all online courses or all face-to-face classes; or they may take some classes online and others face-to-face.

The Research Methods in Administration course is one of the required introductory classes in the program. Most students would take the class during the first quarter of their MPA program, and most of them have neither online learning experience nor experience with the program. A student may choose between online or face-to-face classes based on commuting distance, working schedule (for students in employment), and tuition difference (due to an additional fee for online classes) instead of previous performance in a different learning environment.

This study uses student performance records from the six classes as well as student survey responses from two (one online and one face-to-face) of the six classes. Students' participation in the survey was anonymous and voluntary.

To provide comparable learning experiences across the two modes of teaching, the content and structure of the two types of classes were designed to be as similar as possible. Table 2 compares the content delivery mechanisms between the two instructional modes. Students in both online and face-to-face classes were given access to the Blackboard system. In the online classes, all course materials and

Table 2.
Comparison of Content Delivery

Mode of Teaching	**Online**	**Face-to-Face**
Readings other than textbook	Online	Online
Multimedia resources	Online	Online
Lectures	Narrative PowerPoint	Instructor and PowerPoint
Discussions	Discussion board	Classroom interaction
Group projects	Online group setting	Face-to-face groups
Assignments submitted	Online	Online
Quizzes	Online	Classroom
Feedback to student work	Online	Online

activities were delivered via Blackboard. In the face-to-face classes, required readings other than the textbook and multimedia resources (mainly video cases for discussion) were made accessible online. In addition, the instructor also requires the students to use the assignment function on Blackboard to submit assignments and retrieve feedback. Otherwise, classroom activities such as lectures, discussions, and group projects were carried out in the classroom. The main difference between the two types of class is the mode of interaction between instructor and students as well as that among students. This research explores two hypotheses:

H0: There is no significant difference in learning effectiveness between online and face-to-face classes.

H1: Online class differs from face-to-face class in learning effectiveness.

The research attempts to assess the dependent variable—learning effectiveness—with multiple measures, including grades, self-evaluation of achieving learning objectives, and student assessment of online interaction.

Results

Table 3 presents the grade distribution of the six classes under study. The observed and expected frequencies for student grades are shown in Table 4. The single student with a grade of Incomplete in the face-to-face class of spring 2012 has been eliminated from this analysis. A chi-square test of independence leads to a statistic of 8.16 (p-value .32). A separate chi-square test of independence by eliminating the grade F generates a statistic of 6.51 (p-value .37). Therefore, we cannot reject the null hypothesis: Learning effectiveness as measured by student grades is independent of the mode of instruction.

Table 3.
Grades Comparison Between Online and Face-to-Face Classes

		Online			Classroom		
Grade	**Value**	**Winter 2012 *N* = 26**	**Winter 2011 *N* = 28**	**Fall 2010 *N* = 27**	**Spring 2012 *N* = 19**	**Spring 2011 *N* = 28**	**Fall 2010 *N* = 24**
A	4	6	5	4	4	3	3
A–	3.67	10	13	9	7	9	10
B+	3.33	4	5	3	3	9	5
B	3	2	3	5	1	5	5
B–	0	0	0	0	1	0	0
C+	2.33					1	
D	1	1	1				
Incomplete					1		
F	0	3	1	4	1	1	1
Failing rate		12%	4%	15%	4%	4%	4%
Average without F		3.52	3.49	3.22	3.55	3.42	3.49
Average		3.12	3.37	2.74	3.35	3.30	3.35

Two of the online classes have higher failure rates as compared to face-to-face classes (see Table 3). Ten percent of students failed in online classes, whereas only 4% did in classroom sessions among the six classes under study (see Table 5). Students who failed the class were often those who discontinued their study. This result is in agreement with findings from previous research results that the online classroom experiences a higher dropout rate as compared to face-to-face classroom (McLaren, 2004; Carr, 2000). Table 5 compares the failure rates of the research methods classes under study to that of the same classes taught by all instructors as well as to that of other public administration courses during the same period of time, from winter quarter of 2010 to spring quarter of 2012. The failure rate is calculated by including the withdrawals, by which students discontinue the class with legitimate reasons after the census. The results indicate that failure rate is consistently higher in online research methods classes no matter who teaches the class: 8% of students fail in online class as compared to 3% in face-to-face class in general. The discrepancy does not exist in a similar introductory course

Table 4.
Chi-square Test of Student Grades: Classroom vs. Online

Grade	Classroom	Online	Total
A	10	15	25
	11.66	13.34	
A–	26	32	58
	27.04	30.96	
B+	17	12	29
	13.52	15.48	
B	11	10	21
	9.79	11.21	
B–	1	0	1
	0.47	0.53	
C+	1	0	1
	0.47	0.53	
D	0	2	2
	0.93	1.07	
F	3	8	11
	5.13	5.87	
Total	69	79	148

Notes. The grade of incomplete is eliminated from the test. Chi-square = 8.16; d.f. = 7; *p*-value = .32.

(Public Administration Theory and Practice), in which 8% of students failed in online classes as compared to 10% in face-to-face classes. The difference in failure rate is also not obvious in all other public administration core courses (including Public Administration Theory and Practice, Public Financial Management, Public Management Information Systems, Human Resource Management, Public Budgeting and Finance, Management of Public Organizations, Administrative Regulation, and Public Policy Analysis); these courses have an average failing rate of 5% in online classes and 4% in face-to-face classes. It seems that students are more likely to fail in online research methods classes.

To obtain the student's self-assessment of teaching objectives and evaluation of online interaction, a survey was distributed in two classes, one in the winter (online) and one in the spring (classroom) of 2012. Based on voluntary participation,

the response rate is 58% for the online classroom and 53% for the traditional classroom section, respectively. Demographic information shows that online students are slightly older and more likely to have full-time employment (see Table 6).

Table 5.
Comparison of Fails/Withdraws Between Online and Face-to-Face Class Across Curriculum From Winter 2010 to Spring 2012

Course		**Online**	**Face-to-Face**
Research Methods courses by one instructor	Number of students	81	71
	Number of fails/withdraws	8	3
	Percentage of fail/withdraw	10%	4%
Research Methods courses by all instructors	Number of students	185	103
	Number of fails/withdraws	14	3
	Percentage of fail/withdraw	8%	3%
PA Introduction courses by all instructors	Number of students	135	135
	Number of fails/withdraws	11	13
	Percentage of fail/withdraw	8%	10%
All Other PA core courses by all instructors	Number of students	745	924
	Number of fails/withdraws	35	40
	Percentage of fail/withdraw	5%	4%

Table 6.
Comparison of Survey Samples

		Online (Winter 2012)	**Classroom (Spring 2012)**
Class		26	19
Sample size		15	10
Gender	Male	40%	50%
	Female	60%	50%
Average		32.07	29.3
Full-time employment		93%	70%

The Research Methods in Administration class has a set of instructor predetermined teaching objectives, such as

- *Intellectual level*: Able to identify and read academic research and articulate theoretical orientations
- *Analytical skill*: Able to explore/describe/explain social problems
- *Critical thinking skill*: Able to critique research design and evaluate research results
- *Communication skill*: Able to debate/discuss/present and write in academic and administrative style
- *Research ethics*: Understand and able to practice researcher's code of conduct

The teaching objectives were communicated to the students both via the course syllabus and during the lectures. The survey asked the students to assess the effectiveness of the class in achieving the objectives on a scale of 1 (poor), 2 (fair), 3 (good), 4 (very good), and 5 (excellent) and then rank the importance of these objectives on a scale of 1 (very unimportant), 2 (unimportant), 3 (neither important nor unimportant), 4 (important), and 5 (very important). The result is presented in Table 7. Classroom students tended to evaluate and rank the five teaching objectives as more important than the online students did, but they assessed the effectiveness in achieving the five objectives lower than the online students did. The largest discrepancy occurs in the assessment on the effectiveness of improving writing skills. An explanation for this discrepancy is that online students are required to write more than classroom students, because most communication in the online environment is carried out by writing and then posting that writing. However, all classroom students considered that the learning experience was successful, whereas only 87% of the online students did so.

Table 7.
Comparison of Student Evaluation of Learning Effectiveness

Learning Objectives	Online		Classroom	
	Effectiveness	Importance	Effectiveness	Importance
	Mean	Mean	Mean	Mean
Improving my intellectual level	3.47	3.67	3.20	3.78
Improving my analytical skill	3.60	3.47	3.30	3.78
Improving my critical thinking skill	3.67	3.53	3.30	4.11
Improving my writing skill	3.20	3.27	2.60	3.56
Improving my awareness of ethical issues	3.47	3.07	3.03	4.11
The learning experience was successful	87%		100%	

A few design flaws in the research may explain the disparity of findings. First, though the learning objectives were embedded in course material, the instructor noted and emphasized the teaching objectives during the lectures from time to time in the classroom. Second, whereas the survey administered to the online class was distributed at the end of the quarter, the face-to-face class survey was distributed 3 weeks before the end of the quarter. Students at that time may not feel they have accomplished all the learning objectives. Third, the online section has a higher failing rate (12%) than the face-to-face section (4%). Students who failed the class may be predisposed to think that the learning experience was not successful. However, since the survey was anonymous and the research could not link the grades to the survey responses, the conjecture cannot be proved.

To compare the effectiveness of interaction, the online students also were asked to evaluate the different aspects of interaction as compared to their previous classroom experience. Although most of them perceived no change regarding the different aspects of interaction and learning experience, more students concluded that the online experience was better than that of the traditional classroom instruction. The evaluation regarding the quality of interaction with other students had the most divergent results. Whereas some students commented in the survey that they were pleased or encouraged by other student's responses to their discussion,

Table 8.
Assessment of Online Interaction

In comparison to traditional classroom instruction, in this online course	**Definitely Decreased**	**Somewhat Decreased**	**No Change**	**Somewhat Increased**	**Definitely Increased**	**Mean N = 15**
The quality of my learning experience	1	2	6	2	4	3.40
The intensity of my learning experience	1	1	6	4	3	3.47
The amount of interaction with other students	1	2	6	3	3	3.33
The quality of interaction with other students	1	4	5	2	3	3.13
The quality of interaction with the instructor	1	1	8	2	3	3.33
The quantity of interaction with the instructor	1	1	8	2	3	3.33
My motivation to participate in class activities	1	2	6	2	4	3.40
My comfort level of participating in class activities	1	1	4	5	4	3.67

a few of them expressed frustrations about nonresponsive group members in the group project setting. The most significant affirmation about online interaction is regarding the comfort level of participation. Most of the respondents (60%) reported that the comfort level of participation increased in online class work (see Table 8). This result is in agreement with previous findings that the online environment is less intimidating and may encourage student participation (Citera, 1988; Warschauer, 1997).

Discussion

Given that knowledge of online learning effectiveness in public administration education is very limited, this research intends to explore the critical issues related to online learning effectiveness rather than to provide strong empirical evidence supporting theoretical arguments. Although the study uses a sample from a single MPA program, since most MPA—and most master's-level—programs include research methods in their curriculums, the study may offer some insights to similar classes and similar programs. The study controls some critical factors relevant to learning effectiveness, such as course content and instructor, but fails to control students' personal traits and other exogenous factors. Despite the limitations, this study points to a number of critical issues about online learning and raises questions for further study.

First, learning effectiveness is a complex concept with multiple dimensions; it should be assessed with multiple measures. Even though student grade distribution does not present significant differences between online and face-to-face classes in this study, the nuanced differences in student's persistence rate and assessment of interaction demonstrate that the two instructional modes are not equal. It is necessary to direct more carefully delineated research efforts to explore the various aspects of learning effectiveness that can be affected by the online instructional mode.

Second, the low persistence rate of online students in research methods class raises the question: Would online teaching be equally effective in different course? Some educational programs may simply not fit into an online setting (e.g., medical, physical education). Designers of online programs should take into consideration that online environment may have different effects on student learning in different courses. The low persistence rate also points to several research questions: What are the specific issues in methodology classes (i.e., theoretical concepts, specialized notations) that may affect student's learning in an online environment? What courses in the public administration curriculum may be a better fit for online rather than face-to-face classes, and vice versa? How could we improve the design of an online course to be effective, especially for some topics that are more challenging in the online environment?

The result also points to the importance of pre-enrollment counseling and post-enrollment advising. Pre-enrollment counseling may be used to eliminate students who may not persist through the program. The counseling may design a module to allow students to self-assess their likelihood of finishing the program

by providing a clearer picture of the estimated time commitment and intensity of the program. Once students are enrolled, it is also important to retain them in the program through additional or continued advising. Advising programs may consider inviting student feedback for improvement, sharing successful student stories, teaching time management skills, and establishing student-to-student or faculty-to-student connections to eliminate the feeling of isolation in the online environment. For example, Frankola (2001) suggests that motivation, realistic expectations, highly integrated live sessions, and application of advanced technologies contribute to persistence in both the academic and corporate distance learning environment. More important, counseling and advising may put more emphasis on those courses that present more challenges to students to succeed.

Third, the less intimidating virtual space may be used by traditional classroom sections to enhance participation. Most students nowadays are part of the so-called Net Generation that grew up with the Internet. Virtual space has been an integral part of their daily life. Face-to-face classes may exploit this venue to accommodate students who feel intimidated about participating in the classroom. Instructors may design supplemental online discussion modules (e.g., by using Blackboard discussion boards) to extend participation opportunities to those who may not open up as readily in the classroom. This approach may also enhance the quality of participation, because past studies show that an online setting may encourage in-depth and reasoned discussion (Karayan & Crowe, 1997; Smith & Hardaker, 2000).

Last but not least, the difficulties in controlling exogenous factors make the learning effectiveness comparison between online and face-to-face classes a challenging task, calling for a more concerted research effort. Though this research has attempted to control several of those factors encountered—such as instructor, course content, and assignments—some exogenous factors, such as different levels of emphasis in course content and teaching objectives, could have biased the students' self-evaluation of learning effectiveness. Carefully designed and implemented research may discover the nuanced differences in learning effectiveness between the two instructional modes.

Conclusion

This study compares the effectiveness of online and classroom learning, attempting to go beyond grades and to include a logical assessment of interaction, effectiveness in achieving learning objectives, and student persistence. The results of this study indicate that although student performance is independent of the mode of instruction, certain courses (such as Research Methods in Administration) are more challenging to students who persist in the virtual environment than in the classroom. Furthermore, participation may be less intimidating and the quality and quantity of interaction may be increased in online classes.

The findings have several implications for student learning, course development, and curriculum design. Online interaction can be used to enhance learning, especially for students who tend to be reserved in the classroom setting. In developing

online courses, we should realize that some courses may be more challenging to students who persist in the online environment. Course developers of such courses need to carefully analyze what are the specific subjects that may hinder persistence and supplement instruction with face-to-face consulting, advising, or tutoring. Although an online class offers a comparably effective learning alternative, we should recognize that online learning has its unique advantages and disadvantages. In curriculum design, we need to consider how to exploit and integrate the comparative advantages of different modes of instruction to specific courses by offering not only fully face-to-face or online but also hybrid classes to overcome the constraints of time, place, and resources.

The implications also extend into the research and practice of measuring online learning outcomes. This research effort shows that we can constantly determine—through observations, surveys, interviews, and analyses of student demography and course design—what leads to a greater, more effective learning outcome. This approach, in turn, will contribute to the training of online instructors in methods and the designing of educational support programs that allow students to succeed in the online environment. As we continue to assess, improve, and therefore accumulate knowledge of teaching and learning effectiveness in an online environment, we hope that students, too, will achieve a greater understanding of and enjoy greater benefits from this new mode of instruction.

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