CLASS SIZE AND INTERACTION IN ONLINE COURSES

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This article presents findings of a study conducted to determine instructors' perceptions of optimal class sizes for online courses with different levels of interaction. Implications for research and practice are also presented. A Web-based survey method was employed. Online courses studied were those taught sometime in the last 5 years by a single instructor in undergraduate or graduate programs from U.S. higher education institutions. Instructors described the level of interactive qualities in their most recently taught online course using a Web version of Roblyer and Wiencke's (2004) Rubric for Assessing Interactive Qualities in Distance Courses, and they indicated optimal class sizes according to such qualities. Responses from 131 instructors were analyzed. On average (a) instructors described their online courses as highly interactive, (b) the actual class size of the online courses was 22.8, (c) a class size of 18.9 was perceived as optimal to better achieve the course's actual level of interaction, and (d) a class size of 15.9 was perceived as optimal to achieve the highest level of interaction. No relationship was found between online courses' actual class sizes and their actual level of interaction.

Modern distance education is a means for higher education institutions to increase enrollments and students' access to learning (Lewis, Alexander, & Farris, 1997). Between 1997 and 2001, the percentage of American higher education institutions that offered distance education courses increased from 34 to 56, and course enrollments increased from 1.7 million to 3.1 million (Wirt, Choy, Rooney, Provasnik, Sen, & Tobin, 2004). Institutions also seek to implement quality distance education that often translates into high initial fixed costs and variable costs related to delivery of instruction (Bates, 2000; Bates & Poole, 2003; Morgan, 2000). These variable costs depend on course enrollments and, hence, class sizes.

Setting class-size limits is a budget-related matter for administrators (Parker, 2003; Thomas, 1984). Administrators are faced with the issue of determining an optimal class size to balance the cost-benefit relationship, while maintaining manageable faculty workloads and ensuring quality education. Administrators often believe that the number of students can

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be as large as hundreds because there is no physical space limitation in distance education (Simonson, 2004). Conversely, in a report of a year-long faculty seminar (University of Illinois, 1999), the following was concluded:

> Because high quality online teaching is time and labor intensive, it is not likely to be the income source envisioned by some administrators. Teaching the same number of students online at the same level of quality as in the classroom requires more time and money. (p. 2)

Class size research is important to educational policy development. Despite the growth of distance higher education, little research has been reported regarding class sizes for online courses (Boettcher & Conrad, 2004; Parker, 2003; Simonson, 2004). Simonson (2004) suggested that claims of "smaller is better [or that] it really makes no difference how many, if the course is organized correctly" (p. 56) are "myths" of distance education. Most of the class sizes recommended in the literature for distance education are based on anecdotal evidence (Simonson, 2004).

In this study, the online class-size problem was approached from the perspective of the instructor. It was assumed that different online courses may have different interactive qualities. Hence, the concern was not to determine a "one-size-fits-all" optimal class size for online courses, but to determine optimal class sizes according to the interactive qualities present in online courses. For the purpose of the study, interaction was defined as "a created environment in which both social and instructional messages are exchanged among the entities in the course and in which messages are both carried and influenced by the activities and technology resources being employed " (Roblyer & Wiencke, 2003, p. 81). Interaction is achieved "through a complex interplay of social, instructional, and technological variables" (p. 1).

The purpose of this study was to determine instructors' perceptions of optimal class sizes for online courses with different levels of interaction. The level of interaction was measured with Roblyer and Wiencke's (2004) Rubric for Assessing Interactive Qualities in Distance Courses (RAIQ). The RAIQ is a validated instrument that measures interactive qualities through five observable indicators (Roblyer & Wiencke, 2004): (a) social rapport-building designs for interaction, (b) instructional designs for interaction, (c) interactivity of technology resources, (d) evidence of learner engagement, and (e) evidence of instructor engagement. The RAIQ was not used in the study as a means to imply that the highest levels of interaction were optimal, needed, or desired in an online course. As Moore and Kearsley (2005) suggested, the RAIQ was used in the study as a "means of thinking about what kind of interaction you [the instructor] want to facilitate for different types of students and different subject areas" (pp. 145-146).

Online courses studied were those that (a) counted for credit toward a degree in a bachelor's, master's, or doctoral program from an American higher education institution; (b) were taught at a distance at least 80% of the time using interactive telecommunications systems, perhaps with occasional traditional face-to-face activities; and (c) were taught by one instructor with no teaching assistant, or the like, sometime in the past 5 years. Class size was defined as the number of students maintained during instruction after the drop period. Class size did not necessarily reflect the number of initially enrolled students, or the limit set by the institution.

The study employed a Web-based survey research method. Instructors were asked to determine the level of interactive qualities in their most recently taught online course using a Web version of the RAIQ. Instructors were then asked to indicate what they perceived as optimal class sizes to better achieve the course's actual level of interaction and to better achieve the highest possible level of interaction, as measured by the RAIQ. Qualitative comments were also collected from instructors.

It was anticipated that findings would be useful as an initial approach to the class size problem in the field of distance education, specifically for online courses in higher education. It was also anticipated that results might be applicable to policy development regarding class-size limits for online courses. The importance given to interaction in the research, in best-practice guidelines, and in accreditation standards for online education served as the main framework for the study.

REVIEW OF LITERATURE

Research on class size in traditional education has been conducted for more than a century (Achilles, 1999). Research in elementary education has demonstrated that smaller classes allow for better student-teacher interaction (Achilles, 1999; Laine & Ward, 2000; Pritchard, 1999). More than 20 states in the United States have developed and implemented statewide policies that limit class sizes in public schools (Pritchard, 1999). On the other hand, class sizes in higher education usually can be as large as the institution deems necessary. According to Borden and Burton (1999), most studies focused on higher education have reported mixed results. Class size mostly affects what goes on in the classroom and not student achievement, per se (Gilbert, 1995; Hancock, 1996; Pascarella & Terenzini, 1991; Raimondo, Esposito, & Gershenberg, 1990; Toth & Montagna, 2002).

Gilbert (1995) advocated for large classes in higher education where group collaboration is best done. According to Gilbert, "Instruction which is intimate, interactive and investigative produces the most positive educational outcomes. The importance of interaction, participation and involvement of student learning are widely recognized … and are, in fact, a part of effective large class instruction" (p. 5). On the other hand, Gilbert also suggested that quality instructor-student interaction is perhaps best achieved in smaller classes. Brown (as cited in Pascarella & Terenzini, 1991) and Smith and Malec (as cited in Pascarella & Terenzini, 1991) found that students' experiences in large classes negatively impacted student-faculty interaction. Also, Pascarella and Terenzini concluded that evidence suggested that smaller classes are better than larger ones if the goals of instruction are "motivational, attitudinal, or higher-level cognitive processes" (p. 87).

The question as to whether smaller classes are more conducive for learning than large ones is also important in distance education. Instructors also believe that quality of online instruction is questionable for large class sizes (Olson, as cited in Olson, 2002; Parker, 2003; University of Illinois, 1999). Sugrue, Rietz, and Hasen (1999) conducted a study across three learning sites to determine relationships among class size, instructor location, student perceptions, and performance. Two classes were taught at a distance via two-way video and differed in class size and the third class was taught face-to-face with 36 students. Results indicated that performance in the two smaller classes was better than in the large class. The authors concluded that, without considering individual differences among learners, class size influenced performance more than location did. Also, the authors indicated that small classes must be kept for successful multisite distance learning with two-way video. However, it was not clear to them what the optimum class size was.

Due to perceived higher demands of student-teacher interaction in online courses, many (e.g., Ko & Rossen, 2004; Sellani & Harrington, 2002; University of Illinois, 1999) have considered that instructors' workload increases with class size. In a descriptive study conducted by Berge and Muilenburg (2001), faculty time and workload were reported as main barriers for the adoption of online courses at any stage of the institution's maturity in implementing distance education. Instructors' perceptions of more work in online courses might be due to the instructor's unfamiliarity with the use of the media (Anderson, 2003; Hislop & Ellis, 2004). Accordingly, Simonson (2004) called the

instructor-perceived-more-time issue the "'more work' myth" (p. 56) that is claimed among distance education practitioners. This group usually advocates for smaller classes. However, small classes might not be appropriate for course designs with emphasis on collaborative or group learning activities (Bates & Poole, 2003; Ko & Rossen, 2004; Vrasidas & McIsaac, 1999).

Survey research conducted by the National Education Association (NEA, 2000) showed that instructors perceived that time, or effort, is greater when teaching an online course, as opposed to a face-to-face course. However, the NEA report also showed that class size was not related to the amount of online teaching time estimated by surveyed faculty members. DiBiase (2000) concluded that the normalized teaching time per student in the online course was not greater than in the traditional version. Similarly, Hislop and Ellis (2003) found no significant difference in the total time spent by instructors teaching online versus face-to-face when time was normalized for class size. Visser (2000) conducted an experimental case-study to analyze the time to develop and teach the graduate-level distance course compared to a similar traditional course. Time was adjusted for class size. Visser concluded that online courses do seem to take more teaching and development time than the traditional course, but also noted that delivery time and effort may depend on the instructor experience and the level of institutional support.

Determining an optimal class size depends on multiple factors. According to Bates (2000), the driving factor that determines the ideal class size for an online course is the "amount and nature of the interaction between the tutor and students [and] student-teacher ratio is as much determined by educational philosophy, course design, and student numbers as by technology" (p. 129). In addition, a considerable body of literature presents sets of best practices and guidelines for course designs and for interactive strategies that promote quality distance education. Online strategies range from collaborative group activities, where interaction among students is essential, to activities in which more individualized instructor-student interaction is needed. Additionally, conventional wisdom suggests that large class sizes for online courses impact the amount of individual instructor-student interaction (Simonson, 2004). On the other hand, small class sizes negatively affect interaction in online community building (Vrasidas & McIsaac, 1999).

The importance of interaction in the design of distance courses is also highlighted in accreditation standards of the Southern Association of Colleges and Schools (2000) and the Western Cooperative for Educational Telecommunications (WCET, 2000). Accreditation is the means by which American higher education institutions are reviewed for quality (Council for Higher Education Accreditation, 2001) and recommended accreditation standards should be taken into account in the development of distance education policies (Simonson, Smaldino, Albright, & Zvacek, 2003). The Accrediting Commission of Career Schools and Colleges of Technology (2004) developed standards of accreditation that "sets forth the criteria under which the Commission will recognize programs or courses of study offered via distance education" (p. 29). Class size and interaction were addressed under the following faculty-related standards:

> The school ensures that faculty and students interact, and provides adequate means for such interaction
>
> The school must have developed policies addressing teaching load, class size, time needed for course development, and the sharing of instructional responsibilities which allow for effective teaching using distance education methods. (p. 29)

The American Association of University Professors (AAUP, n.d.) has posted suggestions and guidelines for a sample language for distance education institutional policies and contract language. The AAUP recommended the following language for policies concerning faculty workload and teaching responsibilities: "Determination of class size for a distance

education class should be based on pedagogical considerations. Large sections should be compensated by additional credit in load assignment in the same manner as traditional classes" (Workload/Teaching Responsibility section, ¶ 1). This recommendation is based on anecdotal evidence:

> In the absence of more definitive data, workload provisions should take into account the anecdotal evidence that distance education course development is taking two to three times as long as comparable courses taught in the traditional manner. The same evidence suggests that the investment of faculty time involved in teaching a distance education course is substantially greater than that required for a comparable traditional course. The time spent online answering student inquiries is reported as being more than double the amount of time required in interacting with students in comparable traditional classes. (Workload/Teaching Responsibility section, ¶ 1)

In summary, research findings, practical guidelines and standards, and anecdotal evidence suggest that interaction is affected by class size. Determining an optimal class size for an online course is complex and depends on several factors. Instructors involved in the design, delivery, and administration of courses are key elements to successful distance education and their perceptions of optimal class sizes would be useful information to policy makers. A goal of this study was to determine such perceptions as they relate to interaction in online courses.

THEORETICAL FRAMEWORK

As in traditional classrooms, interaction is considered necessary and desirable for successful online learning (Bates, 2000; Fulford & Zhang, 1993; Lock, 2002; Moore, as cited in Gresh & Mrozowski, 2000; Offir, as cited in Gresh & Mrozowski; Roblyer & Wiencke, 2003; Sorensen & Baylen, 2000). Consequently, a model that captures the essence of theoretical and practical fundamentals of interaction is useful. In this respect, Roblyer and Wiencke (2004) developed and validated a RAIQ. The model is based on findings from theory and research related to interaction in distance education (e.g., Moore, 1989; Wagner, 1994; Yacci, 2000). Roblyer and Wiencke's (2004) RAIQ served as the main framework for this study. According to Roblyer and Wiencke, the rubric can be used by instructors as a "tool to allow more meaningful examination of the role of interaction in enhancing achievement and student satisfaction in distance learning courses" (p. 77). As Roblyer and Wiencke pointed out, the RAIQ might help the "design and research of optimal distance learning environments by helping to define and quantify observed interaction and allow empirical assessment of its contribution to course effectiveness" (p. 95).

METHOD

The study examined the following questions: What are instructors' perceptions of optimal class sizes for online courses with different levels of interactive qualities? What are typical class sizes of online courses? What are typical levels of interactive qualities in online courses? A Web-based survey research method was employed. The Class Size and Interaction Questionnaire (CSIQ) was the Web-based instrument used for data collection.

Participants

According to Fowler (1993), "people who have particular interest in the subject matter or the research itself are more likely to return mail questionnaires than those who are less interested" (p. 4). Hence, in addition to faculty members who teach college-level online courses, groups of researchers in the field of distance education were also considered as potential participants. Participants were instructors who, sometime in the past 5 years,

had taught an online course as defined in the study and were sampled from five groups of interest: (a) presenters of distance education-related topics at the 2004 National Convention of the Association for Educational Communications and Technology, (b) researchers who have published in the journal *Quarterly Review of Distance Education*, (c) researchers who have published in the journal *Distance Learning*, (d) researchers who have published in the *American Journal of Distance Education*, and (e) faculty members of U.S. higher education institutions that offer online courses.

Procedures

The Web-based software Surveyor was used to construct and administer the CSIQ via the Internet. Invitations and follow-ups to participants were also administered by Surveyor. Confidentiality, anonymity, and one-time responses were guaranteed by means of a secure Web-server, automated invitation and follow-up to participants, and randomly-generated-password access to the CSIQ. A multistage clustering was conducted to compile a list of 659 e-mail addresses from the five groups of interest based on the professional profile that was published on the selected journals or posted on the Web. The initial e-mailed invitation for participation in the research used Surveyor's features for survey invitation. Thirty-four messages were automatically returned to the researcher because of invalid e-mail addresses. These 34 addresses were deleted from the invitation list. Hence, a total of 625 composed the final list of invitation recipients.

After receiving the invitation, participants had 2 weeks to visit the URL that granted access to the CSIQ. Participants had to use the unique password randomly generated by Surveyor to access the CSIQ. To reduce the nonresponse rate, a follow-up e-mail was sent to nonrespondents as a reminder to complete the CSIQ. Surveyor automatically e-mailed the invitation letter to those who had not replied 1 week after the initial invitation. Eighty-six individuals submitted answers to the CSIQ before the follow-up reminder, and 68 more after the reminder. A total of 154 responses were collected. The response rate was 33.8%. The response rate was computed considering a total of 625 actual invitation-recipients and 211 replies to the invitation (i.e., 154 actual respondents to the CSIQ and 57 self-reported unqualified individuals).

According to Fowler (1993), "The effect of nonresponse survey estimates depends on the percentage not responding and the extent to which those that not responded are biased—that is, systematically different from the whole population" (p. 40). To maintain a nonbiased nonresponse rate, several aspects were considered: (a) sampled individuals were selected based on their professional profile (i.e., instructors or faculty members of college-level online courses), (b) individuals who did not meet the inclusion criteria were expected to reply to the e-mailed invitation and follow-up messages, (c) a conditional question in the CSIQ automatically directed respondents to the rest of the CSIQ questions only if they met the inclusion criteria, and (d) five nonrespondents were contacted by telephone to determine why they did not respond to the CSIQ.

From the five nonrespondents who were telephoned, two indicated that they usually do not take the time to answer online surveys. One did not read the e-mailed invitation or reminder, but indicated that he usually supported this kind of research and would have been pleased to participate. Another indicated that she did not teach online courses. The last nonrespondent telephoned indicated that she did not believe that the research problem was worthwhile or appropriate, and was not willing to participate.

Instruments

The CSIQ was designed following guidelines recommended by Gall, Gall, and Borg (2003) and by Schonlau, Fricker, and Elliot

(2001) for Web-based questionnaires. The questionnaire consisted of an initial question to verify that the respondent met the inclusion criteria (i.e., sometime in the last 5 years, he or she had taught an online course as defined in the study) and four main parts: demographics, general questions related to the instructor's most recently taught online course, Web version of the RAIQ, and optimal class-size questions and comments

Demographics

Questions were formulated to collect respondents' age, gender, highest academic degree, number of years since degree was awarded, number of years teaching in higher education, academic rank in faculty position, general area of teaching from the United Nations Educational Scientific and Cultural Organization's (UNESCO, 1997) Web site, level of expertise in online teaching on a scale from 1 (*novice*) to 5 (*very experienced*), number of years teaching online courses, and number of online courses taught. Respondents also indicated whether they had received formal training in online teaching methods.

General questions related to the instructor's most recently taught online course. Questions were formulated to collect the course's actual class size, academic level of the program (bachelor's, master's, or doctoral), duration in weeks, and semester credits. Questions were formulated to collect the number of credit-bearing courses that the instructor taught during the same academic term, the Carnegie classification from the Carnegie Foundation for the Advancement of Teaching (2005), and type of the institution that offered the course (public, private for-profit, private nonprofit).

Web Version of the RAIQ

Roblyer and Wiencke's (2004) RAIQ was used in its complete original form, but with a different layout format suited for the Web. Specifically, the five elements or indicators for interactive qualities in a distance course were separately displayed, as opposed to the original matrix-like display. Following is a brief description of each element:

1. Social rapport-building designs for interaction. This element is measured by the strategies designed for social interaction among participants. The instructor has control of the strategies during the design and implementation phases of instruction.
2. Instructional designs for interaction. This element is measured by the activities "designed to encourage, support, and even require interaction [among participants]" (p. 87). The instructor has control of the activities during the design and implementation phases of instruction.
3. Interactivity of technology resources. This element is measured by the various levels of interactivity that are offered by various technologies. The technologies "become meaningful components to promote interaction only in the context of course designs that make effective use of them" (p. 88).
4. Evidence of learner engagement. This element is measured by "the number of students who reply and who initiate messages on a frequent basis; send messages both when required and spontaneously; and send detailed, informative, well-developed communications that are responsive to discussion purposes" (p. 89).
5. Evidence of instructor engagement. Measured by the "consistent, timely, and useful feedback to students [from the instructor]" (p. 89).

Optimal Class-Size Questions and Comments

Two open-ended questions were formulated to collect instructors' perceptions of (a) an optimal class size that allows for the actual level of interaction in their most recently taught online course, and (b) an optimal class

TABLE 1
Highest Levels of Interactive Qualities in a Distance Course in the Rubric for Assessing Interactive Qualities in Distance Courses (RAIQ)

	Element in the RAIQ	*Description*
1.	Social/rapport-building designs for interaction	In addition to providing for exchanges of personal information and encouraging student-student and instructor-student interaction, the instructor provides ongoing course structures designed to promote social rapport among students and instructor.
2.	Instructional designs for interaction	In addition to the requiring students to communicate with the instructor, instructional activities require students to develop products by working together cooperatively (e.g., in pairs or small groups) and share results and feedback with other groups in the class.
3.	Interactivity of technology resources	In addition to technologies to allow two-way exchanges of text information, visual technologies such as two-way video or videoconferencing technologies allow synchronous voice & visual communications between instructor and students and among students.
4.	Evidence of learner engagement	By end of course, all or nearly all students (90-100%) are both *replying to and initiating messages*, both when required and voluntarily; messages are detailed, responsive to topics, and are well-developed communications.
5.	Evidence of instructor engagement	Instructor responds to all student queries; responses are always prompt, that is, within 24 hours; feedback always offers detailed analysis of student work and suggestions for improvement, along with additional hints and information to supplement learning.

Source: Roblyer and Wiencke (2004). Copyright 2004 by M. D. Roblyer. Adapted with permission.

size that allows for the highest level of interaction in the RAIQ (i.e., a maximum score of 25). Table 1 presents the interactive qualities that characterize a course with the highest level of interaction in the RAIQ. An open-ended question was formulated to collect participants' comments that they believed would contribute to the study.

Data Analysis

Data collected from Surveyor were input to a spreadsheet. The spreadsheet data were then input to SPSS Student version 7 for Windows to obtain descriptive statistics. Following is a description of how the data were organized and analyzed:

1. Determining levels of interactive qualities in the RAIQ. The overall level of a course's interactive qualities can be low, moderate, or high (Roblyer & Wiencke, 2004). To obtain the course's interactive level, points were assigned to each level-option under each of the five elements. There were five options of levels under each element: low, minimum, moderate, above-average, and high. Low interactive qualities were worth 1 point; minimum interactive qualities were worth 2 points; moderate interactive qualities were worth 3 points; above-average interactive qualities were worth 4 points; and high interactive qualities were worth 5 points. Participants could only select one level per element. The five resulting scores (i.e., one per element) were totaled, and according to the interval where the total fell, the course had one of three interactive levels: low (1 to 9 points), moderate (10 to 17 points), or high (18 to 25 points). This calculation was done for each entry in the spreadsheet (i.e., for each online course described by respondent) and saved as the course's level of interactive qualities.
2. Determining class sizes. Descriptive statistics were obtained for class sizes of respondents' most recently taught online courses. Class-size statistics were grouped according to (a) the course's level of interactive qualities, (b) academic level of the online course's program, (c) type of institution that offered the course,

and (d) Carnegie classification of the institution that offered the course.

3. Determining perceived optimal class sizes. Respondents' perceptions of optimal class sizes were grouped according to levels of interactive qualities previously calculated, and to the highest possible level in the RAIQ. Hence, four possible data groups of perceived optimal class sizes resulted according to the course's level of interactive qualities. Descriptive statistics were obtained for each group of data. Subgroups were analyzed and descriptive statistics were obtained according to (a) the course's level of interactive qualities, (b) academic level of the online course's program, (c) type of institution that offered the course, and (d) Carnegie classification of the institution that offered the course.

DISCUSSION OF RESULTS

From 154 CSIQ response-cases to the CSIQ, 23 were not analyzed. The reasons for removing the 23 cases were as follows: (a) 5 respondents provided a negative answer to the initial question of the CSIQ, indicating that they did not meet the inclusion criteria (e.g., they had teacher assistants, they had not taught in an American institution, or the face-to-face component of the online course was greater than 20%); (b) 17 respondents gave an affirmative answer to the initial question of the CSIQ, but did not answer the rest of the questions; (c) 1 respondent indicated a class size of 100, and the corresponding answers were removed because they were considered outliers. Therefore, the final sample was 131 ($N = 131$).

From 131 respondents, most (61.8%) were female, had doctoral degrees (82.4%), taught in the area of education (47.3%), on average perceived themselves as very experienced in online teaching (4.2 over 5), and had received formal training in online teaching (52.7%). Most of respondents' online courses were taught in public (71.8%), doctoral-research universities (68.7%), and in graduate programs (53.4% master's and 17.6% doctoral).

Following is a discussion of results related to the study's research questions. Results were interpreted bearing in mind demographics of respondents, the type of online courses studied, and the scope and purpose of the RAIQ and of the CSIQ.

What Are Typical Class Sizes of Online Courses?

Results from the CSIQ indicated that actual class sizes (CS) for the 131 respondents ranged from 4 to 81. The mode was 20 and the average was 22.8. Almost 62% of respondents' courses had 20 or fewer students, and only 2 courses had a CS greater than 65. From the results, it can be concluded that for online courses, as defined in the study, the average CS was approximately 23, the most frequent CS for an online course was 20, and most courses (61.8%) had a CS smaller than or equal to 20.

According to data posted in *U.S. News & World Report* ("E-learning," 2005), accredited higher education institutions that offer online graduate-programs in education have reported class size limits of 23, on average. Even though the CSIQ did not examine the accreditation status of the institution, the average CS identified by the CSIQ is consistent with the data posted in *U.S. News & World Report*. On the other hand, the NEA (2000) reported that one third of online courses had 20 or fewer students, and two thirds had 21 to 40. Similarly, according to the Higher Education and Policy Council of the American Federation of Teachers (2000), only one third of instructors taught online courses with 20 or fewer students. In contrast, results of this study indicated that most respondents (61.8%) reported a class size of 20 or less, and only a 27.8% reported a class size from 21 to 40. It seems that more recent courses, taught during the years 2000 and 2005, are smaller than those taught before the year of publication of the NEA report. However, the specific characteristics of the online courses studied (see Table 2) and the limita-

TABLE 2
Characteristics of Online Courses According to Respondents to the Class Size and Interaction Questionnaire ($N = 131$)

Measure	*Min*	*Max*	*Average*	*Standard Deviation*
Actual class size	4	81	22.8	13.7
Number of weeks	4	20	14.2	2.8
Interactive level*	9	25	18.8	3.8
Semester credits	1	6	3.2	0.7

Note: Min = Smallest score reported, Max = Largest score reported.
*Interactive level = Sum of points of the five elements of interactive qualities described in the questionnaire; low interactive level = 1 to 9 points, moderate interactive level = 10 to 17 points, high interactive level = 18 to 25 points.

TABLE 3
Descriptive Statistics for Class Sizes of Online Courses According to Respondents to the Class Size and Interaction Questionnaire ($N = 131$)

Classification	*Min.*	*Max.*	*Average*	*Standard Deviation*	*n*
Carnegie Classification of Institution					
Doctoral	4	81	24.7	15.4	90
Master's	4	37	19.5	7.4	29
Other	8	35	17.3	7.7	12
Type of Institution					
Public	4	81	24.4	15.1	94
Private for-profit	8	35	20.3	7.7	10
Private non-profit	7	45	18.4	8.8	24
Other	13	23	17.0	5.3	3
Academic Level of Online Courses					
Bachelor's	7	81	31.5	18.3	38
Master's	4	55	19.7	9.7	70
Doctoral	7	35	18.0	7.8	23
Interactive Level of Online Courses*					
Low	8	20	14.0	8.5	2
Moderate	7	81	25.8	15.9	43
High	4	65	21.6	12.4	86

Note: Min = Smallest score reported, Max = Largest score reported.
*Interactive level = Sum of points of the five elements of interactive qualities described in the questionnaire; low interactive level = 1 to 9 points, moderate interactive level = 10 to 17 points, high interactive level = 18 to 25 points.

tions of the sample of participants prevent making a generalization to other distance courses. Therefore, it is not appropriate to draw conclusions about typical class sizes of online courses from comparing these studies.

Table 3 presents descriptive statistics for class sizes. A more in-depth analysis indicated that, in public doctoral-research universities, the largest average class size resulted for courses in bachelor's programs (43.5), and the smallest average class size resulted for courses in doctoral programs (15). These results were to be expected. Public institutions usually have higher enrollments than private institutions, and bachelor's programs usually enroll more students than doctoral programs. Hence, class

sizes were expected to be larger for online courses in bachelor's programs, and for courses in public institutions.

What Are Typical Levels of Interactive Qualities in Online Courses?

It was assumed that online courses may have different interactive qualities and, hence, different interactive levels (IL), as measured by the RAIQ. Results from the CSIQ showed that most respondents (65.6%) perceived that their online course had a high IL, 32.8% a moderate IL, and only a 1.5% a low IL. On average, respondents perceived that their online courses had a high-interactive level (18.8 over 25 possible points). Specifically, the online courses studied could be characterized as having above-average levels of social/rapport-building designs for interaction, of instructional designs for interaction, of evidence of learner engagement, and of evidence of instructor engagement. On the other hand, these online courses could be characterized as having a moderate level of interactivity and of technology resources. The standard deviation of interactive levels was 3.8. From these results, it can be concluded that almost all online courses (98.5%), that were taught during the years of 2000 and 2005, were moderately to highly interactive without much variability in their interactive qualities, as measured by the RAIQ.

Some respondents to the CSIQ commented that the RAIQ might not be an appropriate instrument to measure interaction in online courses. Moreover, respondents who commented about the interactive level in online courses indicated that the highest levels, as measured by the RAIQ, are not necessarily needed, feasible, or desirable. Some indicated that a high level of interaction did not necessarily require synchronous communication, video technologies, or such a demanding instructor engagement as described for the highest level of the RAIQ (e.g., 24 hours turnaround response time and instructor's detailed responses to every student query). As previously mentioned, it was not implied in this study that the highest interactive level was needed or desirable in an online course. The purpose of the study was to use the RAIQ to determine interactive levels of online courses and obtain information about class sizes according to these levels.

Most respondents described their online course as moderately and highly interactive. Also, results indicated no statistical relationship between CS and IL (see Table 4). The latter might indicate that CS does not seem to have an effect on the course's interactive qualities. Results also indicated that the average CS (21.6) of highly interactive online courses was smaller than the average CS (25.8) of moderately interactive ones. Generally speaking, because it has not been agreed upon in the literature what actually constitutes a *large* or a *small* online class, it cannot be concluded from these results that a small CS allows a higher IL than a large CS, or that highly interactive online courses have smaller CS than moderately interactive ones. From the results, it can be concluded that, even though highly interactive online courses that were studied had a smaller average CS than moderately interactive courses, CS does not seem to be related to the level of interaction. Respondents commented that other factors, which were also suggested in the literature, might affect interaction. Some of the mentioned factors were instructors' time commitment and workload in face-to-face traditional activities (e.g., administrative and teaching), course content, students' characteristics, and limitations of technology.

The CSIQ did not measure instructors' teaching-time commitment or workload in traditional face-to-face-activities. The CSIQ measured the number of online courses taught during the same term (NOCT) including the online course described. The NOCT did not measure instructor's workload completely, but it was considered to be an indicator of instructor's commitment in online teaching during an academic term. The average NOCT was 2.4 and ranged from 1 to 9. Most respondents'

TABLE 4
Intercorrelations for Selected Measures Examined With the Class Size and Interaction Questionnaire ($N = 131$)

Measure	*Age*	*CS*	*YTHE*	*NOCT*	*LE*	*OCS*	*OCSL5*	*IL*	*NCST*	*FT*	*YTO*
Age	—										
CS	−.25**	—									
YTHE	.51**	−.12	—								
NOCT	−.05	.06	.12	—							
LE	.13	−.03	.17	.34**	—						
OCS	−.19*	.79**	−.07	.00	.04	—					
OCSL5	−.20*	.66**	−.14	−.02	.08	.81**	—				
IL	.04	−.12	−.13	.13	.25**	−.18*	.08	—			
NCST	−.03	.02	.07	.15	.08	.03	−.02	−.09	—		
FT	.05	−.16	.06	−.01	.01	−.15	−.10	.01	−.01	—	
YTO	.06	.03	.28**	.70**	.43**	.02	.02	.14	.13	.09	—

Note: CS = class size, YTHE = years teaching higher education, NOCT = number of online courses taught, LE = level of expertise, OCS = optimal class size, OCSL5 = optimal class size for highest interactive levels, IL = interactive level of the course, NCST = number of online courses taught during the same term, FT = formal training in online teaching, YTO = years teaching online courses.
*$p <$ 0.05. **$p <$ .01.

(66.9%) taught, at most, two online courses at the same time. No relationship was found between the interactive level and NOCT (see Table 4).

The CSIQ did not examine characteristics of students, per se. However, to some extent, the academic level of the course is related to the type of students (e.g., students are usually younger in bachelor's programs than in graduate programs). Common wisdom suggests that graduate courses are more interactive, or should be more interactive, than undergraduate courses. However, results from the CSIQ indicated only two online courses with a low interactive level, and both were reported at the master's academic level. Fifty-nine percent of the total number of highly interactive courses was taught in master's programs, and 21% in doctoral programs. Bachelor's online courses were reported as moderately (55.3%) and highly (44.7%) interactive. Furthermore, no relationship was found when analyzing differences among average scores of interactive levels within groups of courses, per academic level.

These results indicate that there is not a strong relationship between the academic level of the course and the interactive levels of the studied online courses. Moderate and high interactive qualities reported for bachelor's online courses might be a reflection of younger students that have embraced technology-meditated courses in different ways than, perhaps older, graduate students. The assumption that traditional students at the bachelor's level are not as interactive as graduate students might not be applicable for online undergraduates. Nonetheless, highly interactive online courses were more frequent in graduate level programs than in undergraduate programs.

What Are Instructors' Perceptions of Optimal Class Sizes for Online Courses With Different Levels of Interactive Qualities?

In distance education, anecdotal class-size evidence is mostly related to two aspects that Simonson (2004) denominated "myths of distance education" (p. 56): (a) It takes more time

to teach online, therefore smaller classes are needed—the "more-work myth" usually advocated by instructors; and (b) as long as the course is organized right, it does not matter how big the class is because there is no physical space limitation—a myth usually advocated by administrators. Results from this study seem to support the more-work myth of distance education.

Respondents indicated that, on average, an optimal class size (OCS = 18.9) should be smaller than the actual class size (CS = 22.8). Results indicated a strong positive correlation (r = .79) between CS and OCS to support this conclusion. On the other hand, a very low negative correlation (r = –.18) between the interactive level and OCS seems to indicate that the higher the interactive level the smaller the OCS. Hence, it can be concluded that, in general, respondents perceived that a smaller OCS than CS was needed to allow for moderate and high levels of interactive qualities in their online courses. Table 5 presents more detailed descriptive statistics for optimal class sizes for online courses.

A more detailed analysis of the data revealed that 23% of respondents believed that the optimal class size should be greater than the actual class size. Out of this 23%, 73% taught courses with an actual class size less than or equal to 15. Most of these courses (74%) were perceived as highly interactive. This might indicate that, for class sizes of less than or equal to 15, most respondents felt that more students were necessary to better achieve the highly interactive qualities present in their online courses.

Hence, from the results of this study, it cannot be absolutely determined that higher interactive courses, as measured by the RAIQ, require small classes. These findings might be an indicative that instructors perceived that

TABLE 5
Descriptive Statistics for Optimal Class Sizes for Online Courses According to Respondents to the Class Size and Interaction Questionnaire (N = 131)

	OCS				*OCSL5*				
Category	*Min.*	*Max.*	*M*	*SD*	*Min.*	*Max.*	*M*	*SD*	*n*
Interactive Level of Online Courses									
Low	15	25	20.0	7.1	6	15	10.5	6.4	2
Moderate	10	80	21.1	15.9	5	40	15.6	6.2	43
High	7	50	17.7	7.6	6	50	16.1	6.9	86
Carnegie Classification of Institution									
Doctoral	7	80	19.4	10.1	5	50	16.4	6.9	90
Master's	8	40	18.2	6.3	8	40	15.1	6.6	29
Other	8	35	16.2	6.8	8	35	13.5	3.9	12
Academic Level of Online Courses									
Bachelor's	10	80	25.3	12.6	5	40	19.3	8.4	38
Master's	7	50	17.0	5.7	7	50	14.8	5.8	70
Doctoral	7	20	14.0	3.4	8	20	13.5	2.8	23
Type of Institution									
Public	7	80	20.2	10.1	5	50	16.6	7.4	94
Private F-profit	10	25	15.9	4.5	10	20	13.9	3.0	10
Private N-profit	8	25	15.5	4.1	8	20	13.9	3.4	24
Other	10	20	15.0	5.0	8	20	14.3	6.0	3

Note: OCS = Perceived optimal class size of online course according to its interactive qualities, OCSL5 = Perceived optimal class size of online course if it had the highest level of interactive qualities in the questionnaire, *Min* = Smallest score reported, *Max* = Largest score reported, *M* = Average of scores, *SD* = Standard deviation of scores.

they needed smaller classes than what they actually had in order to better achieve moderate and high interactive level, but large enough (e.g., larger than 15) perhaps to increase the level of interaction in low-interactive courses.

In addition to identifying a smaller average of optimal class sizes than average actual class sizes, results indicated that online courses at the highest interactive levels should have an average class size of 15.9, which was smaller than the average optimal class size (18.9). Also, a strong positive correlation (r = .81) between optimal class size and optimal class size for highest interaction was found (see Table 4). A closer examination of the data revealed that every respondent perceived that a smaller class size than the optimal class size was needed to achieve the highest possible level of interactive qualities in the RAIQ. The latter might indicate that respondents perceived that achieving the highest levels of interaction in the RAIQ might demand from them more effort per student and, thus, teaching a course with the highest interactive qualities would require a much smaller class size.

Results from this study seem to support the literature that reports on instructors' beliefs that online teaching takes more time or effort than face-to-face courses. On the other hand, experimental studies have reported mixed results about online teaching time or effort. The literature has also suggested that perhaps this more-work perception is because of instructors' unfamiliarity with technology, or little experience in online teaching. Perhaps less-experienced instructors prefer smaller classes. However, results from this study indicated no relationship between instructors' level of expertise and both types of perceived optimal class sizes (i.e., OCS and OCSL5). The before-mentioned precludes concluding that teaching experience is related to instructors' perceptions of smaller classes to allow for higher levels of interactive qualities in online courses.

On the other hand, as seen in Table 4, a very low negative relationship resulted between respondents' age and CS (r = –.25), between age and OCS (r = –.19), and between age and OCSL5 (r = –.20). These correlations indicate that older instructors perhaps prefer smaller classes than do younger instructors. No statistical relationship was found between respondents' age and their perceived level of expertise in online teaching. Also, the number of years teaching in higher education, the number of online courses taught, the number of years teaching online courses, and the level of expertise were not related to any measure of class size. In traditional face-to-face settings, it is customary for department heads to assign larger classes to new instructors and smaller classes to instructors with more years teaching experience. Nonetheless, results of the study indicated that for online teaching, regardless of any of the studied indicator of teaching experience in higher education, instructor's age was the factor related to CS. These results might indicate that, regardless of instructors' level of expertise in online teaching, older instructors taught smaller classes, and preferred smaller OCS and OCSL5 than younger instructors.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The theoretical framework for this study was Roblyer and Wiencke's (2004) RAIQ, which was based on several theories of interaction. Because of the applied nature of the study, results had implications for practice. Such implications are mainly related to the decision-making of class size-related policies that meet accreditation standards for online programs.

Accreditation is the means by which American higher education institutions are evaluated for quality. Institutions seek accreditation through their policies, among which are class size-related policies. As stated in the literature review, regional accrediting commissions have developed a set of guidelines, or quality assurance standards, to reflect current best practices in electronically offered programs that affect more than 3,000 colleges and universities in the United States (CHEA, 2001). The follow-

ing standard exalts the importance of interaction in the design of distance courses and programs: "The importance of appropriate interaction (synchronous or asynchronous) between instructor and students and among students is reflected in the design of the program and its courses, and in the technical facilities and services provided" (WCET, 2000, p. 8).

From the mentioned standards, a main aspect that can be related to results of the study is how appropriate interaction and effective teaching can be achieved through the design of online courses. Interaction has been a concept defined and measured in multiple ways in different practical and theory-based publications. Hence, the appropriateness of interaction can be a vague term that may be measured in any way an institution decides. If the appropriateness of interaction is to be measured by the RAIQ, and moderate and high interaction were appropriate levels, then almost all online courses studied had an appropriate interaction. However, if the appropriate level is the highest possible level in the RAIQ, then very few courses met this standard for quality. Moreover, most respondents commented that the highest level in the RAIQ was not necessarily needed, feasible, or desirable.

Hence, two major implications for practice can be derived from this study: accrediting organizations might need to clearly indicate how they expect institutions to measure the appropriateness of interaction; and the highest interactive level of the RAIQ is not always an appropriate level of interaction for an online course. Inherent to these implications is that a design of the online course that reflects the appropriateness of interaction is subject to the characteristics the course. Once again, if the RAIQ is to be used to assess the design of the course through each of its five elements, then multiple combinations (i.e., scores for each element in the RAIQ) yield a certain level of interaction. That is, each element contributes to determine the level of interaction of the course. Thus, determining whether the design reflects an appropriate interaction is a complex task.

Results from this study, in addition to the literature about interaction and class size, could be used by accrediting organizations to indicate that different levels of interaction can be appropriate for an online course, and that different course designs can allow for appropriate levels of interaction. Furthermore, the literature and research does not support that more interaction in online courses is necessarily more conducive to learning, party because of the different ways to define and measure interaction.

Regarding class size and interaction, common wisdom has held that smaller class sizes for online courses allow for more interaction. In their recommended standard for distance education courses, the AFT (2000) stated that "class size should encourage a high degree of interactivity [and that] given the time commitment involved in teaching through distance education, smaller class sizes should be considered, particularly at the inception of a new course" (p. 11). However, experimental research has not supported that smaller classes allow for a high level of interactivity. Furthermore, it has not been agreed upon in the literature what actually constitutes a large or small online class. In essence, determining what actually constitutes a large or a small class is a complex task that does not depend on absolute criteria, but the perceptions of instructors might give some insight to approaching the problem. In this sense, results from this study could be used to set practical lower and upper bounds of class sizes for online courses with moderately interactive and highly interactive levels.

Other implications for practice are similarly related to institutional policy-making. Results indicated no statistical relationship between actual class size and the interactive level of the studied online courses, but results did indicate a low negative correlation between optimal class size and interactive level. Generally speaking, respondents seemed to have perceived that they would require more time and

commitment if the number of students increased, when they indicated smaller optimal class sizes to achieve the highest levels of interaction in the RAIQ. However, it cannot be concluded from these results that class size alone determines the levels of interaction in an online course.

Respondents to the CSIQ commented that other factors might determine the level of interaction in online courses. Some of the mentioned factors were instructors' time commitment, instructors' workload in face-to-face traditional activities, and the role of the adjunct figure as part-time faculty. In this regard, Gellman-Danley and Fetzner (1998) considered that policies related to labor-management (e.g., class size, assignment of full-time or adjunct faculty, and workload) were among the most difficult to develop and included the toughest questions to ask. Johnstone (2004) raised the question on whether full-time faculty members are completely ready to adapt to online teaching, or whether they were really the best ones to assist students online. The figure of readily skillful professionals, as part-time adjunct faculty, is an alternative for institutions to fill this possible gap. As Johnstone pointed out,

> One institutional practice that is challenged by distance learning focuses on who should be doing the "teaching" [and that] if part-time faculty members, or adjunct faculty, are to be the core workforce for online instruction, then institutions that use a lot of online teaching may need to develop a new category of professional employees. (p. 396)

Nonetheless, adjuncts usually hold other full-time jobs that prevent them from trying to reach higher interactive levels in their online courses, regardless of class size. Respondents to the CSIQ commented the following: "If I'm teaching a class (as an adjunct) in addition to my 'regular' full-time job, I may not incorporate as many interactive activities, regardless of class size" (Respondent 32); and "most adjunct professors have other jobs and tend to do feedback two or three times a week … not daily" (Respondent 7). Incorporating this kind of professional workforce, in addition to the new required roles of full faculty, suggest that institutions need to develop better ways to determine teaching workloads that adequately measures the effort, time-commitment, and dedication of the instructor in online teaching tasks, especially interacting with individual students.

RECOMMENDATIONS FOR FUTURE RESEARCH

More research in online education is needed to support or reject the assumption that smaller class sizes are needed for higher interactive levels, or even that higher interactive levels are more conducive to learning than lower interactive levels. Examining the following questions might support or reject the commonly held belief that more interaction is better for learning, and might also help examine whether what instructors perceived as optimal class size is better for interaction and learning outcomes: Is there a relationship between class size and learning outcomes? Is there a relationship between the level of interaction, as measured by the RAIQ, and learning outcomes? Are there significant differences in levels of interaction and learning outcomes among different online courses with the same perceived optimal class size? Are there significant differences in levels of interaction and learning outcomes among similar online courses with different perceived optimal class size?

On the other hand, respondents' perception of smaller optimal class size than actual class size, on average, might be an indicator that instructors believed that a larger class size implies more time commitment and workload. Nonetheless, class size itself might not be an aspect that affects online-learning outcomes. The literature in traditional education has suggested that what happens in the class is what is actually affected by the class size. Respondents commented that the characteristics of the online course and of the students, as well as

instructor's workload, are elements that affect interaction in an online course. As the IHEP (2000) suggested for online courses, "Maximum class size relates more to faculty course workload than student outcomes. It appears, therefore, that a specific benchmark for class size is ill advised, and much more experimentation needs to be conducted" (p. 18).

Hence, additional research questions can be examined to determine relationships between instructor's workload and online class size: Is there a significant difference between online-teaching time commitments among online courses with the same class size and taught by instructors with different workloads? Is there a significant difference between online-teaching time commitments among online courses with different class sizes and taught by instructors with similar workloads? How is online teaching time-commitment affected by class size? How is interactivity affected by the overall workload of instructors?

Results of this study did not support the commonly held assumption that graduate students interact more than undergraduate students. Considering students' characteristics is paramount when designing any instruction. Online instruction poses new challenges to designers because younger generations of students have practically embraced communications technology as living style. Online education requires a self-motivated student capable of using communications technology, regardless of the program's academic level. Both types of students (i.e., graduate and undergraduate) in online courses that were offered no more than 5 years ago were perhaps more technology savvy than students of online courses that were offered longer ago. Results indicated a larger average class size for undergraduate online courses, and that undergraduate online courses were also moderately and highly interactive, as measured by the RAIQ. Future research could be conducted to support or reject the assumption that larger class sizes are adequate for younger undergraduate students because, perhaps, they do not interact as much as older graduate students.

Some of the before recommended research issues involve exploring the interactive level of online courses, as measured by the RAIQ. Other instruments that have been reported in the literature can also be used to measure interaction. Moreover, respondents to the CSIQ commented about possible limitations of the RAIQ to measure interaction. Results of this study indicated no relationship between actual class size and interactive levels of the studied online courses, but perhaps different indicators of interactive levels would show a relationship. Thus, future research is recommended to examine the relationship between interaction and class size as measured by other instruments.

Qualitative research can also contribute to examine the optimal class-size problem. From the standpoint of quality in online courses, students and instructors might have different perspectives of what is an optimal class size. On the other hand, as respondents to the CSIQ commented, administrators usually establish class-size limits and then the instructor must accommodate the teaching methods accordingly. If results of optimal class size from this study are taken as benchmarks, a qualitative study might examine the question: How do instructors and students behave in similar online courses with the average optimal class size?

An assumption that was derived from the literature is that perhaps less experienced instructors prefer smaller classes. Results of this study indicated that regardless of instructors' level of expertise in online teaching, older instructors taught and preferred smaller classes than did younger instructors. Also, more experienced instructors seemed to have perceived their courses as having higher levels of interactive qualities. Some research questions that arise from these results are related to instructor's age: If older instructors perceive themselves as having similar levels of experience in online teaching than younger instructors, why do they prefer teaching smaller classes? If older instructors can achieve similar interactive levels in their online courses, why do they

prefer teaching smaller classes? Should department heads assign larger classes to younger faculty members?

CONCLUSIONS

Results of this study were intended to be practical. Optimal class sizes from the perspective of the instructor were thought to be helpful to policymakers who are trying to establish class-size limits for online courses. Limitations of the study were inherent to the research method employed (i.e., recruitment of participants, availability and credibility of respondents, and limitations of the instruments), and results are likely to be applicable to online courses as defined in the study. Future research is recommended to examine class size and interaction from the perspectives of administrators and of students.

Findings indicate that, even though the actual class sizes of the studied online courses were not related to their actual interactive qualities and that most respondents perceived their online courses as moderately and highly interactive, respondents still believed that they needed smaller classes to achieve higher interactive levels (i.e., an average class size of 22.8 versus a perceived average optimal class size of 18.9). Furthermore, the data indicate that every respondent believed that even smaller class sizes were needed to achieve the highest interactive level possible in the RAIQ (i.e., an average of 15.6).

Because interaction is a concept that has been measured in different ways in research and practice, accrediting organizations might need to clearly indicate how an institution is to measure for appropriate interaction reflected in the design of the online course in order to meet quality standards. Also, institutions should take recommendations from consortia cautiously. Specifically, recommendations of having smaller classes to allow for high interactivity because it has not been supported by research and it has not been agreed upon what actually constitutes a large or a small online class. However, respondents perceived that smaller classes were needed to achieve the actual interactive level in their online courses. This might be because of a perceived increased effort if they had more students. Hence, for future research, it is highly recommended to examine the relationship between class size and instructors' workload and between class size and online teaching time commitment.

REFERENCES

Achilles, C. (1999). *Let's put kids first, finally: Getting class size right*. Thousand Oaks, CA: Corwin Press.

Accrediting Commission of Career Schools and Colleges of Technology. (2004). *ACCSCT standards of accreditation.* Retrieved January 14, 2005, from http:// www.accsct.org/library/ fullstandards.pdf

American Association of University Professors. (n.d.). *Suggestions and guidelines sample language for institutional policies and contract language*. Retrieved September 9, 2004, from http: //www.aaup.org/Issues/DistanceEd/Archives/ speccmt/deguide.htm

American Federation of Teachers. (2000). *Distance education: Guidelines for good practice*. Washington, DC: Author. Retrieved April 7, 2004, from http://www.aft.org/higher_ed/ downloadable/distance.pdf

Anderson, T. (2003). Modes of interaction in distance education: Recent developments and research questions. In M. G. Moore & W. G. Anderson (Eds.), *Handbook of distance education* (pp. 129-144). Mahwah, NJ: Erlbaum.

Bates, A. (2000). *Managing technological change*. San Francisco: Jossey-Bass.

Bates, A., & Poole, G. (2003). *Effective teaching with technology in higher education: Foundations for success*. San Francisco: Jossey-Bass.

Boettcher, J., & Conrad, R. (2004). *Faculty guide for moving teaching and learning to the Web* (2nd ed.). Phoenix, AZ: League for Innovation.

Borden, V., & Burton, K. (1999, May/June). *The impact of class size on student performance in introductory courses*. Paper presented at the annual forum of the Association for Institutional Research, Seattle, WA. (ERIC Document Reproduction Service No. ED433782)

Berge, Z., & Muilenburg, L. (2001). Obstacles faced at various stages of capability regarding distance education in institutions of higher education. *TechTrends*, *45*(4), 40-45. (ERIC Document Reproduction Service No. EJ631362)

Carnegie Foundation for the Advancement of Teaching. (2005). *Category definitions*. Retrieved February 2, 2005, from http://carnegiefoundation.org/Classification/CIHE2000/defNotes/Definitions.htm

Council for Higher Education Accreditation. (2001). *Fact sheet #2: The role of accreditation and assuring quality in electronically delivered distance learning*. Retrieved April 29, 2004, from http://www.chea.org/pdf/fact_sheet_2_dist_learn_02.pdf

DiBiase, D. (2000). Is distance teaching more work or less? *The American Journal of Distance Education*, *14*(3), 6-20.

E-learning, online graduate degrees: Education regionally accredited. (2005). Retrieved May 29, 2005, from http://www.usnews.com/usnews/edu/elearning/tables/edu_reg.htm

Fowler, F. J., Jr. (1993). Survey research methods (2nd ed.). In L. Brickman & D. J. Rog (Series Eds.), *Applied social research methods series: Vol. 1*. Newbury Park, CA: Sage.

Fulford, C. P., & Zhang, S. (1993). Perceptions of interaction. *The American Journal of Distance Education*, *7*(3), 8-21.

Gall, M., Gall, J., & Borg, W. (2003). *Educational research: An introduction* (7th ed.). Boston: Allyn & Bacon.

Gellman-Danley, B., & Fetzner, M. (1998). Asking the really tough questions: Policy issues for distance learning. *Online Journal of Distance Learning Administration, 1*(1). Retrieved April 29, 2004, from http://www.westga.edu/~distance/danley11 .html

Gilbert, S. (1995). Quality education: Does class size matter? *Association of Universities and Colleges of Canada research file*, *1*(1). Retrieved June 2, 2004, from http:// www.aucc.ca/pdf/english/publications/researchfile/1995-96/vol1n1_e.pdf

Gresh, K., & Mrozowski, S. (2000, October). *Faculty/student interaction at a distance: Seeking balance*. Paper presented at EDUCAUSE 2000: Thinking IT Through, Nashville, TN. (ERIC Document Reproduction Service No. ED452805)

Hancock, T. (1996). Effects of class size on college student achievement. *College Student Journal, 30*, 479-481.

Hislop, G., & Ellis, H. (2004). A study of faculty effort in online teaching [Electronic version]. *Internet and Higher Education, 7*(1), 15-31. Retrieved May 27, 2004, from http://www.sciencedirect.com

Johnstone, S. M. (2004). A policy perspective on learning theory and practice in distance education. In T. M. Duffy & J. R. Kirkley (Eds.), *Learner-centered theory and practice in distance education: Cases from higher education* (pp. 395-403). Mahwah, NJ: Erlbaum.

Ko, S., & Rossen, S. (2004). *Teaching online: A practical guide* (2nd ed.). Boston: Houghton Miffin.

Laine, S., & Ward, J. (Eds.). (2000). *Using what we know, a review of the research on implementing class-size reduction: Initiatives for state and local policymakers*. Oak Brook, IL: North Central Regional Educational Laboratory.

Lewis, L., Alexander, D., & Farris, E. (1997). *Distance education in higher education institutions* (NCES 98-062).Washington, DC: U.S. Government Printing Office. Retrieved May 19, 2004, from http://nces.ed.gov/pubs98/98062.pdf

Moore, M. (1989). Three types of interaction. *The American Journal of Distance Education*, *3*(2), 1-6.

Moore, M., & Kearsley, G. (2005). *Distance education: A systems view* (2nd ed.). Belmont, CA: Wadsworth.

Morgan, B. (2000). *Is distance learning worth it? Helping to determine the costs of online courses*. (ERIC Document Reproduction Service No. ED446611)

National Education Association. (2000). *A survey of traditional and distance learning higher education members*. Washington, DC: Author. Retrieved April 28, 2004, from http://www.nea.org/he/abouthe/dlstudy.pdf

Olson, C. (2002). Leadership in online education: Strategies for effective online administration and governance. In K. Rudestam & J. Schoenholtz-Read (Eds.), *Handbook of online learning: Innovations in higher education and corporate training* (pp. 237-256). Thousand Oaks, CA: Sage.

Parker, A. (2003). Motivation and incentives for distance faculty. *Online Journal of Distance Learning Administration, 6*(3). Retrieved April 27, 2004, from http://www.westga.edu/~distance/ojdla/fall63/parker.htm

Pascarella, E., & Terenzini, P. (1991). *How college affects students*. San Francisco: Jossey-Bass.

Pritchard, I. (1999). *Reducing class size: What do we know?* (SAI 98-3097) [Electronic version]. Washington, DC: U.S. Department of Education. Retrieved May 7, 2004, from http://www.ed.gov/pubs/ReducingClass/title.html

Raimondo, H., Esposito, L., & Gershenberg, I. (1990). Introductory class size and student performance in intermediate theory courses. *Journal of Economic Education, 21*(4), 369-381.

Roblyer, M., & Wiencke, W. (2003). Design and use of a rubric to assess and encourage interactive qualities in distance courses. *The American Journal of Distance Education, 17*(2), 77-98.

Roblyer, M., & Wiencke, W. (2004). Exploring the interaction equation: Validating a rubric to assess and encourage interaction in distance courses. *Journal of Asynchronous Learning Networks, 8*(4). Retrieved December 21, 2004, from http://www.sloan-c.org/publications/jaln/v8n4/v8n4_roblyer.asp

Schonlau, M., Fricker, R., & Elliot, M. (2001). *Conducting research surveys via e-mail and the Web*. Retrieved December 8, 2004, from http://www.rand.org/ publications/MR/MR1480

Simonson, M. (2004). Class size: Where is the research? *Distance Learning, 1*(4), 56.

Sellani, R., & Harrington, W. (2002). Addressing administrator/faculty conflict in an academic online environment [Electronic version]. *The Internet and Higher Education*, *5*(2), 131-145. Retrieved December 8, 2004, from http://www.sciencedirect.com/science/journal/10967516

Simonson, M., Smaldino, S., Albright, M., & Zvacek. S. (2003). *Teaching and learning at a distance: Foundations of distance education* (2nd ed.). Upper Saddle River, NJ: Prentice-Hall.

Sorensen, C., & Baylen, D. (2000). Perception versus reality: Views of interaction in distance education. *Quarterly Review of Distance Education*, *1*(1), 45-58.

Southern Association of Colleges and Schools. (2000). *Best practices for electronically offered degree and certificate programs*. Retrieved April 27, 2004, from http:// www.sacscoc.org/pdf/commadap.pdf

Sugrue, B., Rietz, T., & Hasen, S. (1999). Distance learning: Relationships among class size, instructor location, student perceptions, and performance. *Performance Improvement Quarterly*, *12*(3), 44-57.

Thomas, E. (1984). *Class size*. Eugene, OR: ERIC Clearinghouse on Educational Management. (ERIC Document Reproduction Service No. ED259454)

Toth, L., & Montagna, L. (2002). Class size and achievement in higher education: A summary of current research. *College Student Journal*, *36*(2), 253-260.

United Nations Educational, Scientific and Cultural Organization. (1997). *International standard classification of education: ISCED 1997*. Retrieved February 2, 2005, from http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm

University of Illinois. (1999). *Teaching at an internet distance: The pedagogy of online teaching and learning.* Retrieved June 3, 2004, from http://www.vpaa.uillinois .edu/reports_retreats/tid_final-12-5.pdf

Visser, J. (2000). Faculty work in developing and teaching Web-based distance courses: A case study of time and effort. *The American Journal of Distance Education, 14*(3), 21-32.

Vrasidas, C., & McIsaac, M. S. (1999). Factors influencing interaction in an online course. *The American Journal of Distance Education, 13*(3), 22-36.

Wagner, E. (1994). In support of a functional definition of interaction. *The American Journal of Distance Education, 8*(2), 6-29.

Western Cooperative for Educational Telecommunications. (2000). *Statement of the Regional Accrediting Commissions on the evaluation of electronically offered degree and certificate programs and guidelines for the evaluation of electronically degree and certificate programs*. Retrieved January 14, 2004, from http://www.wcet.info/resources/publications/Guidelines.PDF

Wirt, J., Choy, S., Rooney, P., Provasnik, S., Sen, A., & Tobin, R. (2004). *The condition of education 2004* (NCES 2004–077). Washington, DC: National Center for Education Statistics. Retrieved March 3, 2005, from http://nces.ed.gov/pubs2004/ 2004077.pdf

Yacci, M. (2000). Interactivity demystified: A structural definition for distance education and intelligent computer-based instruction. *Educational Technology, 40*(4), 5-16.