Comparison of Student and Instructor Perceptions of Best Practices in Online Technology Courses

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Abstract

This study investigated the perception of students and instructors in online technology courses relative to the use of seven principles that demonstrate good practices in undergraduate education. The principles were originally developed for face-to-face instruction, but are applicable in a variety of instructional delivery methods. Results show that on average, students perceived that two of the seven practices were utilized by instructors at a high level which was consistent with instructor emphasis. For the remaining five principles, students perceived these at a medium level, also consistent with instructor emphasis. The study also compared the means of the instructor to the students' means in the same online class and demonstrated that their perception of the use of the seven principles were not significantly different. Implications of these findings are discussed and recommendations are provided for how instructors can utilize strategies to increase the level of perception of use of the principles that rated medium to low.

Keywords: Quality; Seven Principles; Distance Education; Instruction; Baccalaureate

Introduction

In 1987, Chickering and Gamson led a task force composed of university instructors, administrators, researchers, and students to examine the issue of quality undergraduate education. The goal was to utilize published research and personal knowledge to outline key components and instructional strategies that would lead to quality undergraduate education. This work culminated in the derivation of seven principles to represent a simple and limited number of evaluation criteria and to provide a framework for practical application in the university classroom with the goal of improving undergraduate teaching (Chickering & Gamson, 1991). Since that time, the Seven Principles have been employed to set standards for undergraduate education and have been used by instructors in face-to-face classrooms to enhance the quality of instruction (The Ohio Learning Network Taskforce, 2002). In fact, Cross (1999) stated that "the best known, certainly the most widely distributed list, is the 'Seven Principles for Good Practice in Undergraduate Education'" (p.256). The following section provides a brief overview of these principles.

The Seven Principles

The Seven Principles assert that good practice in undergraduate education (a) encourages student-faculty contact, (b) encourages cooperation among students, (c) encourages active learning, (d) gives prompt feedback, (e) emphasizes time on task, (f) communicates high expectations, and (g) respects diverse talents and ways of learning (Chickering & Gamson, 1987). Each principle is reviewed below.

o   Principle one states that good practice encourages student-faculty contact and emphasizes that faculty who encourage contact with the student in and out of the classroom enhance the motivation of the student, the student's intellectual commitment, and the students' personal development (Chickering & Gamson, 1991).

o   The second and third principles mutually reinforce each other. The second principle emphasizes cooperation among students and third principle encourages active learning. Working with others increases involvement in learning, and research demonstrates it can also increase productivity and enhance self-esteem (Johnson, Johnson & Smith, 1990). Although active learning can be accomplished individually, when it is used in a cooperative setting it is more effective in increasing the individuals' involvement in the learning process. Research supports the growing use of both active and cooperative learning in higher education (Johnson & Johnson, 1989).

o   The fourth principle stresses prompt feedback. This refers to instructors' efficiently providing feedback on assignments, quizzes, tests, and questions. Chickering and Gamson (1991) reported that "it is clear that the use of prompt feedback in college courses shows a clear and positive relation to student achievement and satisfaction" (p. 18). Feedback must be more than just the notification that the instructor received the assignment, but rather be corrective and supportive for it to be central to student learning.

o   The fifth practice emphasizes time on task. Chickering and Gamson (1991) noted that, "there is some evidence that effective use of time in the college classroom means effective teaching for faculty and effective learning for students" (p. 20). A large scale study conducted by Franklin (1991) found a significant correlation between the effective use of class time and both the amount learned and the rankings of course and instructor.

o   The sixth principle encourages high expectations and maintains that instructors must develop high student goals which are also attainable. Chickering and Gamson (1991) reported that high expectations are crucial for all types of students and highlighted research (Cashin, 1988; Cashin & Slawson, 1977; Marsh, 1984) that demonstrated students gave higher ratings to difficult courses in which they had to work hard.

o   The seventh and final principle focuses on respect for diverse talents and ways of learning. Chickering and Gamson (1991) noted that "Faculty who show regard for their students' unique interests and talents are likely to facilitate student growth and development in every sphere-- academic, social, personal, and vocational" (p. 21). Students have different ways in which they learn and the instructor who can adjust his/her style of teaching has a better chance of reaching and developing these students (Chickering & Gamson, 1991).

These principles represent collaborative expert opinion and build on 50 years of research on good practices in undergraduate education. They have set standards for undergraduate instruction and have enhanced the quality of instruction in traditional face-to-face classrooms (The Ohio Learning Network Task Force, 2002). However, with the increase in the volume of online education (Allen & Seaman, 2007), the principles have yet to be evaluated comprehensively in that context. The next section examines some of the general studies involving distance education and the seven principles.

Distance Education

While the principles were originally focused on face-to-face instruction, they were designed to be accessible, understandable, practical and widely applicable in a general learning context. These characteristics make it reasonable to apply and study these principles to instructional delivery other than face-to-face (Chickering & Ehrmann, 1996). With the recent increase in online instruction in higher education there have been efforts focusing on how to implement the Seven Principles in online instruction (Chickering & Ehrmann; Graham, Cagiltay, Lim & Craner, 2001).

According to Allen and Seaman (2007) enrollment in online courses has grown faster than the overall enrollment in higher education. Allen and Seaman state "Almost 3.5 million students were taking at least one online course during the fall 2006 term; a nearly 10 percent increase over the number reported the previous year" (p.1). The authors point out that nearly 20 percent of students in higher education were enrolled in at least one online course during that term. Just four years prior, about 1.6 million students were enrolled in an online class; this demonstrates that online enrollment has more than doubled since 2002. Academic leaders at higher education institutions believe that enrollment in online courses will continue to increase. With the increase in distance education courses, there is a need to ensure that

distance instruction represents the same level of quality as traditional face-to-face instruction (Distance Learning, 2001).

A report completed by the Ohio Learning Network Task Force studied the quality of distance learning in Ohio (The Ohio Learning Network Task Force, 2002). The report stated that higher education has continually tried to improve itself and the push for quality is evident in today's world and acknowledged the impact of online education and efforts made to ensure quality. "In 1999, the Ohio Learning Network (OLN) drew on Chickering and Gamson's (1987) work and other carefully selected sources to draft their initial version of the OLN Principles of Good Practice for member institutions" (The Ohio Learning Network Task Force, p. 2). They continued to note that Chickering and Gamson's Seven Principles of Good Practice for Undergraduate Education remain valid for online education.

Research on the Seven Principles

With the growth in distance education, there has been an increase in studies that examined the Seven Principles in online instruction. Research has been conducted specifically studying the seven principles in both undergraduate and graduate courses (Braxton, Olsen & Simmons, 1998; Buckley, 2003; Taylor, 2002; Batts, Colaric & McFadden, 2006). These studies investigated different components of education; yet, all of the studies had the Seven Principles for Good Practice in Undergraduate Education as an indicator of quality instruction. This body of research has also examined a number of instructional modes including traditional face-to-face, Internet-enhanced, and online undergraduate and graduate courses. This paper will focus on extending and contrasting the research conducted by Taylor (2002) and Batts et al. (2006) involving the Seven Principles and online education,

Taylor (2002) utilized the Seven Principles to evaluate the quality of teaching in fully online undergraduate courses across multiple disciplines. The surveyed population consisted of 500 instructors across the nation who taught an undergraduate course fully online with no delineation in reference to disciplines. Taylor developed an instrument that allowed the instructor to critique his or her own course. The survey instrument contained eight categories, one for each of the seven principles, and one for general information. Taylor's scale for the first seven categories ranged from rating of 1–Does not describe my class at all, to 5–Describes my class very well.

Taylor concluded that instructors were self-reporting the use of the principles in their online courses although not all of the seven were fully used. Six of the seven principles ranged from 3.10 to 3.78, with 3.0 - 5.0 considered high. The six principles with the highest rating were: (a) contact between faculty and student, (b) feedback, (c) ways of learning, (d) expectations, (e) learning techniques, and (f) relations among students. Time on task was the only principle that was rated in the lower scores with a score of 2.94. There was no discussion of how the high versus low rankings were determined and, as noted by the scores, they were all relatively close to the 3.0 mid-mark. Taylor reported that 71% of the respondents had been teaching for eight years or more, and this may be a reason why certain principles are more extensively used than others. This study was the first of its kind in evaluating the Seven Principles and their application to online instruction in a quantitative format. The study, however, was subject to bias since the survey was completed by the instructor and his/her opinion as to what he/she did or did not do in the course. No student input was involved.

As a result, there was a need for a study that examined whether instructors were using the Seven Principles by comparing the instructors' responses with the responses of their students. Batts, et al. (2006) modified Taylor's (2002) research instrument and surveyed both the students in online undergraduate courses and the instructors of these courses. The population of the survey was 548 students and 31 instructors from two small public universities granting baccalaureate and master's degrees. The participants were in online undergraduate courses in Education.

Batts, et al. (2006) compared the mean ratings of the students for each principle to the mean of the instructor to determine if there was agreement between the two and also to analyze if there was consistency in perceived use of the seven principles. The research findings showed a perceived usage of the seven principles in online undergraduate education courses and that the students and instructors agreed on the perception of use of these principles. The study described in this paper broadens the work of Batts et al. (2006) by expanding the scope of the research to a different discipline (technology) to examine consistency across course content areas.

Research Methodology

This current study examined instructor and student perception regarding the use of the seven principles for face-to-face instruction in online courses. The participants in this study were instructors and students in online undergraduate technology courses at a southeastern university. The study gathered survey data to address the following research questions:

1. Do students and instructors perceive the use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in online undergraduate technology courses?

2. Do students and instructors agree upon the perception of use of Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in online undergraduate technology courses?

Participants

There were two groups of participants in this study: university instructors teaching online undergraduate technology courses and undergraduate students enrolled in those online technology courses. The courses were taught at a large public university granting baccalaureate, masters, and doctoral degrees by a department of technology that was accredited by the National Association of Industrial Technology (NAIT). The total possible population for the study was 461 students and 22 instructors.

Survey Instrument

The Online Teaching Practices (OTP) survey was developed by Taylor (2002) and modified by Batts, et al. (2006) to identify the extent in which instructors incorporated the Seven Principles for Good Practice in Undergraduate Education into their online courses. Taylor used Chickering and Gamson's (1987) Seven Principles as a guideline when developing the OTP, which is comprised of 49 items, grouped into eight sections.

The first seven sections corresponded to the Seven Principles for Good Practice in Undergraduate Education, and the eighth and final section was designed to collect selected demographic information from participants. In each section (targeted on a principle), there were six to seven questions that pertained to aspects of the principles and Table 1 highlights sample questions from each section. Participants were directed to select either "No" representing the statement "Does not describe my course" or "Yes" representing the statement "Describes my course". There was a survey for the instructor where questions were phrased from their perspective and another for the student and their perspective. However, the context of the question remained the same.

Data Collection and Analysis

Data was collected and usable responses totaled six instructors (six courses) and 93 students based on the standard that all questions had to be answered. Descriptive statistics (frequencies and means) and correlated t-tests (t statistic and p value) were used to answer the research questions comparing the mean for students and instructors for each principle. The responses were analyzed using SPSS (Statistical Packages for the Social Sciences) software program and an a priori alpha level of 0.05 was selected as a threshold for statistical significance

Findings

As noted for each principle, there were approximately seven survey questions and the respondent could answer "no" they do not perceive this happening in the course or "yes" they perceive this is taking place in the course. The responses were coded as 0 or 1 representing "No" and "Yes", respectively. For each principle, the means of the survey questions were calculated for the students and the instructors. The mean scores of both the instructor and students were then categorized into three levels, low (0-.35), medium (.36-.70), and high (.71-1). Results are summarized in Table 2 and discussed in the sections below.

Table 1. *Online Teaching Practices*

Sections	Sample Survey Items
Section One - Encourages Student-Faculty Contact	
Instructor Survey Item	I respond to comments/questions that are posted online
Student Survey Item	Instructor responds to comments/questions that are posted online
Section Two - Cooperation Among Students	
Instructor Survey Item	I assign students to teams to work on some assignments/projects.
Student Survey Item	Instructor assigns students to teams to work on some assignments/projects
Section Three - Active Learning	
Instructor Survey Item	I use hypertext links on my course website to link students to other websites about the topic of the course
Student Survey Item	Instructor uses hypertext links on the course website to link students to other websites about the topic of the course
Section Four - Prompt Feedback	
Instructor Survey Item	I use electronic quizzes/tests that immediately calculate and reveal students' scores
Student Survey Item	Instructor uses electronic quizzes/tests that immediately calculate and reveal students' scores
Section Five - Time on Task	
Instructor Survey Item	I track how frequently each student post comments online
Student Survey Item	Instructor tracks how frequently each student post comments online
Section Six - High Expectations	
Instructor Survey Item	I ask students to revise papers/projects that do not initially meet course expectations
Student Survey Item	Instructor asks students to revise papers/projects that do not initially meet course expectations
Section Seven - Diverse Talents and Ways of Learning	
Instructor Survey Item	I try to find out about my students' learning styles, interests, or backgrounds at the beginning of each course
Student Survey Item	Instructor tries to find out about the students' learning styles, interests, or backgrounds at the beginning of each course

Principle One

Chickering and Gamson's (1987) first principle refers to student-faculty contact and mean scores are shown in Figure 1. An interesting point, the mean scores for responses related to this principle for both instructors and students were generally above 0.50 indicating that this principle was important to instructors and was perceived by the students. Generally, students perceived the use of the principle

higher than the instructors' perceived use of the principle in five of the six courses. For Courses One (p=0.839), Four (p=0.437), Five (p=0.918), and Six (p=0.676), this difference in perception between student and faculty was not significant. On the other hand, Course Two had a significant difference in the means at 0.001 (99.9% confidence) with the students perceiving student-faculty contact higher than the instructor. Conversely, Course Three had the reverse at a significance of p=0.160 (confidence in difference of 0.84). The overall average means for both students (0.76) and instructors (0.71) was high and consistent.
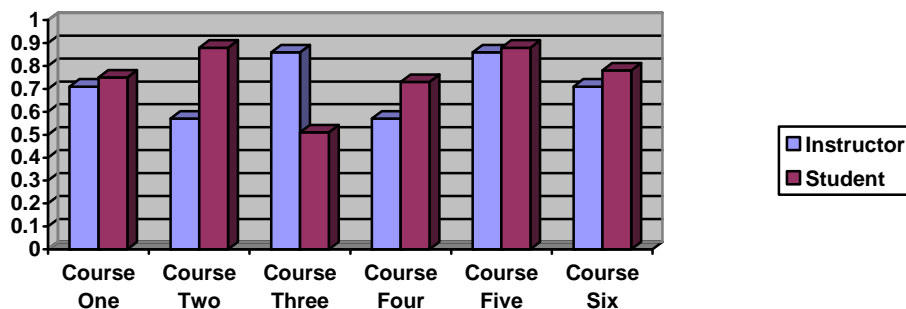
Figure 1. Principle One - Student Faculty Contact

Principle Two

The second principle refers to student cooperation. The mean scores of the six questions for both the instructors and students were drastically lower in this principle as seen in Figure 2. One instructor reported no emphasis on active learning in his/her course and another instructor had a 0.17 mean which is considered low. This may indicate that online technology course instructors do not emphasize the importance of this teaching concept. Students had a higher level of perception of use in this principle than the corresponding instructor in four of the six courses.

The p-values of the difference in instructor and student responses ranged from 0.297 to 0.852, and thus there was not a significant difference at 0.05 in student and instructor perception of the second principle, student cooperation, in the courses. In general both students (0.46) and instructors (0.42) were consistent in the overall average for this principle in the low half of medium.
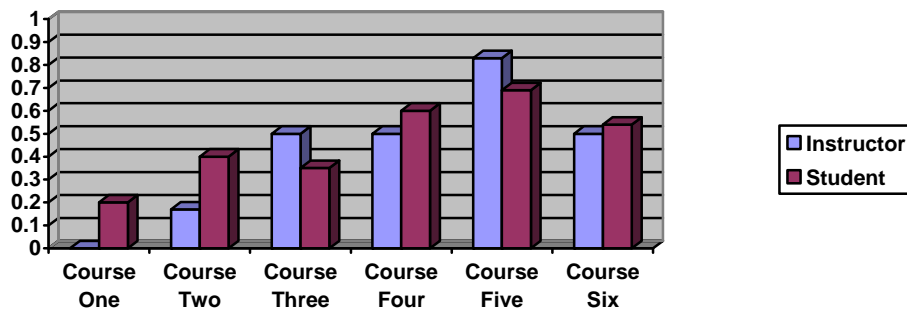
Figure 2. Principle Two – Cooperation Among Students

Principle Three

Active learning is the third principle, and Figure 3 summarizes the students' and instructors' means for the six questions reflecting this area. Student mean responses were higher than instructor means in five of the six courses and were categorized as three high (>.0.71) and two medium (0.36< x <0.70) means.

Instructor means included two courses in each category of low, medium, and high.

The p-values of the difference in instructor and student responses were inconsistent, ranging from 0.106 to 0.870 and did not meet the significance level test of 0.05. However, there were four courses (Course One, p=0.106; Course Three, p=0.250; Course Four, p=0.273; and Course Six, p=0.251) that were significant at the 73% confidence level up to nearly 90%. In general both students (0.67) and instructors (0.53) were consistent in the overall average for this principle in the medium range.
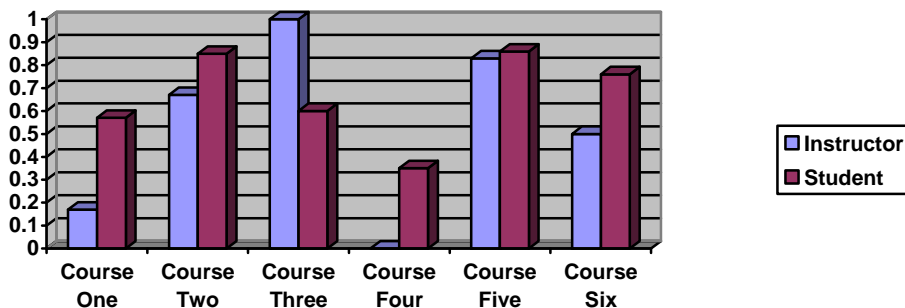

Figure 3. Principle Three – Active Learning

Principle Four

The fourth principle refers to prompt feedback and mean scores are shown in Figure 4. An interesting point, the mean scores for responses related to this principle for both instructors and students were generally above 0.5 indicating that this principle was important to instructors and was perceived by the students. Another interesting point is that students perceived the use of the principle higher than the instructors perceived the use of the principle in five of the six courses.
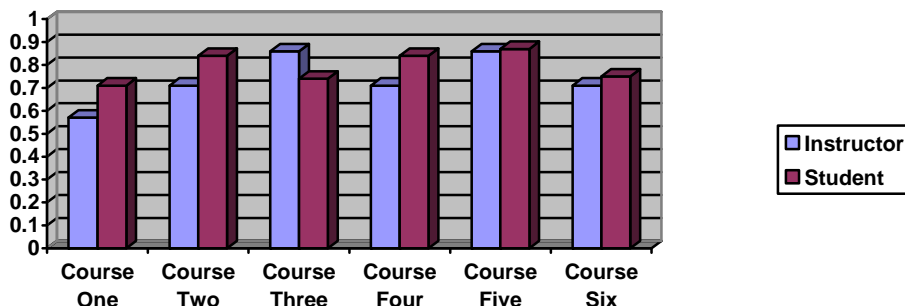

Figure 4. Principle Four – Prompt Feedback

Comparing the two groups mean values, the resulting p-values ranged from 0.158 to 0.977, above the significance target of 0.05, and thus there was not a significant difference at this target level in student and instructor perception of the fourth principle, prompt feedback. However, Course Four had a low p-value of 0.158 and was significant at about 84% confidence; however, both ratings were in the high range. In general both students (0.79) and instructors (0.74) were consistent in the overall high average rating for this principle.

Principle Five

Time on task is the fifth principle, and mean scores of the six questions for the students and instructors are shown in Figure 5. All the students' mean scores were categorized as medium, while four of the six instructors' means were categorized as low (<0.35). An interesting point, instructors in five of the six courses perceived less use of the principle than their corresponding students.

The p-values of the difference in instructor and student responses ranged from 0.069 to 0.879 which indicates there was not a significant difference at 0.05 in students and instructor perception of the fifth principle, time on task. However, there were four courses (Course One, p=0.069; Course Three, p=0.142); Course Four, p=0.216; and Course Five, p=0.155) that were significant at the 78% confidence level up to nearly 93%. In general both students (0.53) and instructors (0.36) were consistent in the overall rating for this principle in the medium range. However, instructor ratings were near the low threshold.
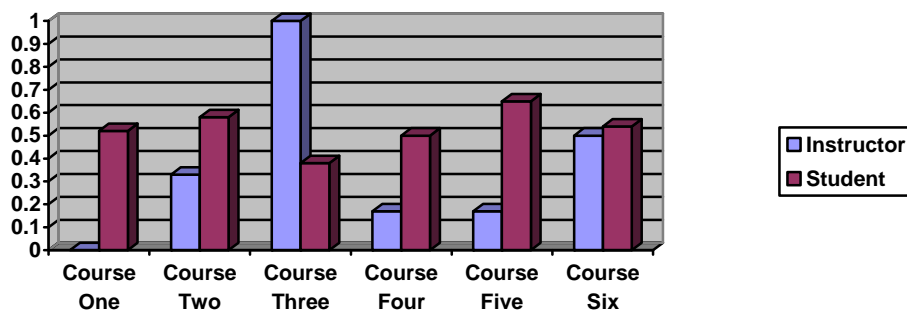

Figure 5. Principle Five – Time on Task

Principle Six

This principle refers to high expectations and Table 6 shows the means of seven questions for both the students and instructors. The students' mean scores had three high level means and three medium level means, while the instructors had two high level means and one low level mean.

The resulting p-values ranged from 0.192 to 0.939, above the significance level of 0.05, and thus there was not a significant difference at this level for student and instructor perception of the sixth principle, high expectations. However, Course One (p=0.192) and Course Five (p=0.278) had the only low p-values which indicated a significance in 70% confidence or greater level. In general both students (0.68) and instructors (0.55) were consistent in the overall medium average rating for this principle. Students; however, were near the threshold for the high category.
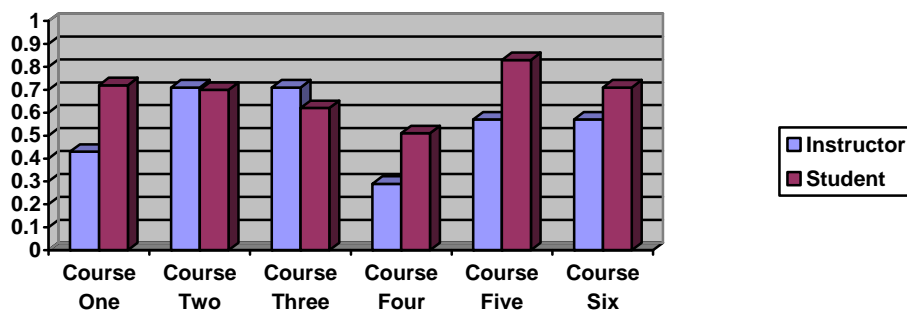

Figure 6. Principle Six – High Expectations

Principle Seven

Chickering and Gamson's (1987) seventh principle is diverse talents and ways of learning, and Figure 7 shows the mean scores of seven questions for students and instructors. The students' means had three high level means and one low level mean. The instructors' mean scores had one low level mean and only two high level means.

The p-values of the difference in instructor and student responses ranged from 0.138 to 0.653, and were thus above the significance level of 0.05 in both student and instructor perceptions of the seventh principle, diverse talents and ways of learning. There were three courses (Course One, p=0.138); Course Five, p=0.275; and Course Six, p=0.188) that were significant at the 72% confidence level up to nearly 86%. In general both students (0.66) and instructors (0.60) were consistent in the overall medium average rating for this principle. However, both of these rating are approaching the high threshold of 0.71.
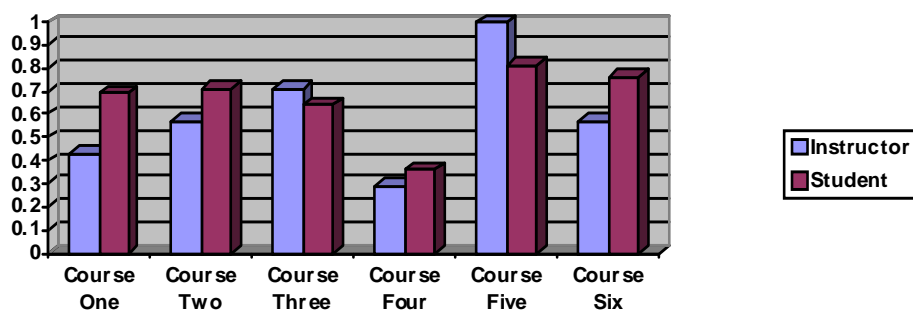

Figure 7. Principle Seven – Diverse Talents and Ways of Learning

In Table 2, the means for the instructors and students are shown for each course and principle along with the corresponding p-values. The overall means are shown for each principle and also for the instructors and students in the six courses. It is interesting to note that in five of the six courses, the students perceived a higher use of the principle than the instructor. The table also shows the difference between courses of how the instructors and students perceive the use of the principles in the course. The overall means for the principles mirrored the results of the Batts et al (2006) study except for three principles. For principle six, instructors in this study perceived less use of the principle by 0.25 while the students perceived higher level of use of 0.02. The perception of use was less in this study for both instructor (0.15) and students (0.24) for principle two and finally, instructors perceived less use of principle three by 0.17 while the students perceived less of the use of the principle by 0.05.

Discussion of Findings

Two findings emerged in this study. First, students and instructors perceived the use of the seven principles in online undergraduate technology courses. Second, the students and instructors generally agreed on the perception of use of these principles.

1. Perceived Use of Principles

On the whole, students and instructors perceived the use of the seven principles in online undergraduate technology courses. Considering the level categories (low (0-.35), medium (.36-.70), and high (.71-1)), in two of the seven principles, the students and instructors means were medium to high. These principles included (a) student-faculty contact, and (b) prompt feedback. This indicated that the principles are evident in these online courses. The sixth principle, high expectation, also had medium to high means with the exception of one instructor who had a mean of 0.29. Thirteen of 84 means were rated low, with three of the means being instructors who did not perceive the principle to be evident in their course (cooperation among students, active learning, and time on task). In general, viewing the responses as a whole, the study indicated perceived use of Chickering and Gamson's (1987) Seven Principles in online

undergraduate technology courses.

Table 2. *Online Teaching Practices*

Categories: low (0-.35), medium (.36-.70), and high (.71-1)

		principle 1	principle 2	principle 3	principle 4	principle 5	principle 6	principle 7	Overall Average
Course 1	instructor	0.71	0.00	0.17	0.57	0.00	0.43	0.43	0.33
	student	0.75	0.20	0.57	0.71	0.52	0.72	0.69	0.59
	p-value	0.839	0.446	0.106	0.512	0.069	0.192	0.138	
Course 2	instructor	0.57	0.17	0.67	0.71	0.33	0.71	0.57	0.53
	student	0.88	0.40	0.85	0.84	0.58	0.70	0.71	0.71
	p-value	0.001	0.424	0.386	0.479	0.445	0.939	0.411	
Course 3	instructor	0.86	0.50	1.00	0.86	1.00	0.71	0.71	0.81
	student	0.51	0.35	0.60	0.74	0.38	0.62	0.64	0.55
	p-value	0.160	0.692	0.250	0.472	0.142	0.751	0.756	
Course 4	instructor	0.57	0.50	0.00	0.71	0.17	0.29	0.29	0.36
	student	0.73	0.60	0.35	0.84	0.50	0.51	0.36	0.56
	p-value	0.437	0.297	0.273	0.158	0.216	0.386	0.653	
Course 5	instructor	0.86	0.83	0.83	0.86	0.17	0.57	1.00	0.73
	student	0.88	0.69	0.86	0.87	0.65	0.83	0.81	0.8
	p-value	0.918	0.581	0.870	0.977	0.155	0.278	0.275	
Course 6	instructor	0.71	0.50	0.50	0.71	0.50	0.57	0.57	0.58
	student	0.78	0.54	0.76	0.75	0.54	0.71	0.76	0.69
	p-value	0.676	0.852	0.251	0.842	0.879	0.489	0.188	
	overall instructor	0.71	0.42	0.53	0.74	0.36	0.55	0.60	
	overall student	0.76	0.46	0.67	0.79	0.53	0.68	0.66	

The principle that had a largest proportion of low responses was time on task. The instructors had four low means and one medium mean; however, the matching students had five medium means. This result mirrored Taylor's (2002) and Batts, et al. (2006) findings that reported the lowest score of the seven principles was time on task and the only principle to report in the low score category.

The next principle that had a considerable proportion of low responses was active learning. The instructors had two low means (one instructor reported showing no active learning in the course) and two medium means. The course where the instructor indicated no active learning, the students reported a low mean of 0.35. The rest of the respondents had medium to high level means, with one instructor reporting a mean of 1.0 and students from two courses having a 0.85 and 0.86 means.

The cooperation among students principle also had two instructor and two groups of students reporting low means with one instructor reporting no cooperation among students in their course. The corresponding student group to this instructor showed a low mean score of this principle as well with a 0.20.

The final principle that had low mean scores was diverse talents and ways of learning. In one course, both the instructor and students reported low means, 0.29 and 0.36, respectively. However, there were two instructors reporting high means for this principle and three groups of students also reporting high means.

2. Agreement on Perception of Use of Principles

Overall, the students and instructors agreed on the perception of use of Chickering and Gamson's (1987) Seven Principles in select online undergraduate technology courses. There was also no significant difference in perception of use of the principles found between the students and the corresponding instructor. Although there was one principle in one course that found a significant difference in the perception of use, the remaining 41 principles showed no significant difference. Therefore, when the responses were viewed as a whole, the research question was answered by the agreement of perceived use of Chickering and Gamson's (1987) Seven Principles by students and instructors in online undergraduate technology courses.

Implications

This study indentified three implications and are listed below followed by a discussion of each implication.

1. Chickering and Gamson's (1987) principles are evident in online technology courses; however, there were 13 of 84 means that were considered low. While these principles have been accepted by the academic community as quality instructional strategies in undergraduate education (Chickering & Gamson, 1991), only three of the seven principles had perceived means of medium to high in these online *technology* courses. In previous research (Batts, et al., 2006) six of the seven principles had medium to high means in online *education* courses. Administrators in technology departments should consider institutionalizing the principles by training, assessment, and course design. Instructors in the study perceived low to no evidence of four of the seven principles in their courses.

Nahata (2001) states "Department chairs and deans plays an important role in leading the faculty to define, develop, and implement effective methods to assess the quality of teaching and learning by multiple approaches" (p. 421). Although Chicking and Gamson (1987) state that instructors and students have the main responsibility of ensuring quality education, they also state that administrators can also assist in this endeavor. Areas where administrators can assist faculty are with release time for professional development, criteria for hiring and promoting faculty members, and keeping class size low enough to create a sense of community. The Ohio Learning Network Task Force (2002) also stated there needs to be institutional commitment to support and train faculty and to assess distance education courses.

Even though some instructors ranked high in these areas, there is need for education and training implementing these principles. Additionally, Chickering (1991) and Poulsen (1991) reported that training on how to use the Seven Principles is needed. If the training is offered for faculty to learn about online teaching, instructors who typically would not attend training for face-to-face teaching may be exposed to the principles. Chickering also concluded that the principles can be used for formal and informal review and self-assessment, and the principles should be used in course design. The result of all of these efforts can lead to the institutionalization of the principles.

2. Technology instructors can use this study to consider improvement in the four principles: time on task, active learning, cooperation among students, and diverse talents and ways of learning, which had a low perception of use. Once aware of these weaknesses, instructors can then address and improve their courses accordingly.

   a. In the area of time on task, instructors can track the frequency of student posts in discussion board threads to help gauge the amount of time a student is spending in their online course. Instructors can also provide guidelines for the minimum amount of time expected of students on class preparation and assignments. Electronic platform technical advancements have improved and there are systems for tracking student activity which support the instructor in achieving this principle in their online course.

   b. Instructors can improve active learning in their online courses by providing real-time online discussions throughout the semester. Instructors can also utilize online resources to foster student engagement by having students to utilize these resources for their assignments. Finally, instructors can relate past experiences and real life situation with students through examination of case studies in their courses.

   c. In regards to cooperation among students, instructors can make use of discussion board threads for dialogue about difficult ideas associated with the course. Discussion board threads can also be used as a social interaction thus having a threaded discussion about items outside of the course. This discussion does not need to be monitored by the instructor and it gives students interaction that face-to-face students might take for granted. Finally, instructors can require students to complete peer critiques of each other's work to increase cooperation among students.

   d. To increase the seventh principle, diverse talents and ways of learning, the instructor can have students fill out a questionnaire at the beginning of the course about their background, interests and learning styles. This will assist the instructor in engaging with the students. Instructors can also have the students work in groups and independently on various assignments throughout the course to help increase this principle.

Conclusion

Students and instructors perceived that Chickering and Gamson's (1987) Seven Principles are evident in the online technology courses studied in this research. However, compared to previous research (Batts, et al., 2006) there were considerably more low means indicated by the student and the instructor. This research found four principles that had numerous low level means and there were three instances where an instructor saw no evidence of the principle in the course. Additionally, the students and instructors agree on the perception of use of the principles in their online courses. Higher education administrators should consider providing instructors with training on online instruction that includes these principles. Institutions and instructors must be attentive to the issues related to online course instruction. The author provided recommendations for instructors to improve their instruction in the areas that had low mean scores. Instructors can also use the TLT Group website (2008), http://www.tltgroup.org/Seven/home.htm to find more ideas of how to implement the Seven Principles into their courses. Further studies related to online course instruction are warranted and would add to the literature available to quality of online instruction.

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