Teacher Education and Special Education
2004, Volume 27, No. 3, 000–000

Improving Content and Technology Skills in ADD/ADHD via a Web Enhanced Course

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Abstract: *Attention Deficit Disorder and Attention Deficit Hyperactivity Disorder (ADD/ADHD) create concerns in public education and in teacher education programs. Because of continuous advances in technology, distance learning is a viable option for delivering coursework to preservice and inservice teacher education students challenged by geography, time constraints, professional responsibilities, family considerations, and similar obstacles. This study presents results of using Internet-based applications to enhance teacher preparation to better serve students with ADD/ADHD. Surveys addressing ADD/ADHD concepts and technology skills were administered to graduate students in a web-enhanced course. The focus of the course to the prepare general and special education teachers to learn to use higher-end technology while gaining important understanding in the growing area of ADD/ADHD. The data indicated that the online course was effective in helping students to feel more knowledgeable of ADD/ADHD concepts and skills; in addition, the students increased their efficacy in certain areas of technology.*

Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD) present challenges in behavior and academic learning (Lerner, Lowenthal, & Lerner, 1995). In past years, the identification of individuals with Attention Deficit Hyperactivity Disorder (ADHD) and Attention Deficit Disorder (ADD) has grown exponentially (Children and Adults with Attention Deficit/Hyperactivity Disorder [CHADD], 1992). It is estimated that approximately 3–5% of the school-age population has ADD or ADHD. The medical field is often the first point of contact in determining attention disorders. An analysis of ambulatory medical care revealed that the number of office visits documenting a diagnosis of ADHD increased dramatically in the 90s, from 947,208 visits in 1990 to 2,357,833 visits in 1995 (Robison, Sclar, Skaer, & Galin, 1999). The teeming growth poses challenges for both general and special education teachers, as many teachers are not prepared to serve the population of students with ADD/ADHD. (We will use the term ADD/ADHD to include both ADD and ADHD for purposes of this paper).

Continuing education programs (e.g., staff development, graduate studies) have attempted to fill the void in preparing educators to teach individuals with ADD/ADHD. However, attending staff development and continuing education programs presents problems for teachers. Often, time constraints, scheduling conflicts, and inaccessible locations are barriers to effective training programs. In attempting to deal with these obstacles, significant efforts have been made by K-12 school districts and universities to provide flexible distance education programs,

specifically in the area of special education (Blackhurst, Hales, & Lahm, 1998; Cheney, Cummings, & Royce, 1990; Collins, 1997; Collins, Hemmeter, Schuster, & Stevens, 1996).

Because of continuous advances in technology, distance learning has become a viable option for delivering coursework to preservice and inservice teacher education students challenged by geography, time constraints, professional responsibilities, family considerations, and other obstacles. Within recent years, the development and subsequent access to the Internet has enhanced traditional distance education delivery, expanding student-teacher interactivity. For instance, the tremendous growth in the World Wide Web offers students the option to participate in distance education activities via the computer and at locations away from campus (e.g., their own homes). The World Wide Web with its graphical interface and hypertext links offers easy access to university, work, or home environments. More importantly, the development of web-building software (e.g., WebCT, Frontpage, Blackboard), designed to manage the delivery of web-based instruction, has led to an application that assists instructors in the development and management of instruction delivered via the World Wide Web.

The course content was chosen as a prime candidate for online instruction because of a number of factors: (a) the wealth of information on the Internet that would be available to course participants, (b) the flexibility of the Internet resources for the diverse course participants, and (c) the ease with which students would be able to interact within the electronic format (i.e., a discussion board). A course on ADD/ADHD is a natural choice for World Wide Web instruction. The World Wide Web contains ready, recent, and relevant information regarding ADD/ADHD. Numerous sites are designed for people with ADD/ADHD and their families; these sites often contain teacher tips and ideas. In addition, many sites are devoted to medical solutions for ADD/ADHD. The existence of rich and varied content in ADD/ADHD makes a World Wide Web course especially promising.

For the most part, what is known about distance education/distance learning comes from disciplines other than education. Moore and Thompson (1997) compared research studies in distance education, from the earliest studies to modern studies. Their findings reflect no differences in cognitive factors (e.g., academic performance) between the distance and traditional classes. When other factors (e.g., student satisfaction with the course, comfort and convenience) were examined the outcomes were mixed, that is, the distance condition provided some advantages and some disadvantages (e.g., Crump, 1928; Kuramato, 1984; Pirrong & Lathen, 1990; Ritchie & Newby, 1989). In the majority of studies where instructional factors were examined (e.g., opportunities for interaction between students and with the instructor) distance appeared to negatively affect the outcome (Davis, 1984; Koch, 1998; Pirrong & Lathen, 1990). Students in general felt that the distance condition decreased the amount and quality of interaction with the professors and with other students. In the final analysis, student variables investigated in the Moore and Thompson (1997) comparisons suggested that students liked the convenience of studying at a distance, but if given the choice, most students preferred being in the same physical space with the instructor. Russell (1997) corroborated these findings in his analysis of studies that investigated the use of technological learning systems since 1992. Russell also asserted that individual differences in students' learning styles dictate whether individual student learning will be affected by technology.

This article describes results of using Internet-based applications to enhance teacher preparation to better serve students with ADD/ADHD. Surveys addressing ADD/ADHD concepts and technology skills were administered to graduate students in a web-enhanced course. "Web-enhanced" refers to a course that has significant online activity in addition to face-to-face instruction. Graduate students enrolled in a web-enhanced course in ADD/ADHD in the fall and spring semesters. The focus of the course was to prepare general and special education teachers to gain an important understanding of the growing area of ADD/ADHD while learning to use higher end technology.

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Method

The purpose of the present study was to compare instruction provided in a web-enhanced course to instruction provided in a traditional course. Specifically, a web-enhanced course and a traditional course were compared relative to students' opinions with regard to instruction. Comparisons occurred along two different domains: (a) knowledge in ADHD, and (b) technology knowledge and skills. Results of these comparisons provide a context for evaluating the usefulness of web-based courses. Of interest were similarities and differences in responses to selected aspects of professional knowledge about ADHD and skills related to technology.

Participants

Students in graduate programs in Special Education, Administration, and Psychology participated in the study. In addition, a majority of the participants were beginning special education teachers, many in their first year or two of teaching. Students in the experimental group were enrolled in a course entitled ADD/ADHD-Issues, Concepts, and Strategies. Thirteen females and six males comprised the experimental group (n = 19). Students in the comparison group were enrolled in a methods course in Learning Disabilities, and were graduate students in Special Education. Pretest data were available for 26 students. Pretest data and posttest data of 17 students were analyzed. Surveys were conducted early in the semester and during class for each group.

Procedure

Students who were enrolled in one of two special education courses completed two surveys, one in the area of ADHD, and the other in the area of technology. The two courses differed along two key dimensions. First, the courses were delivered in different formats: one course was web-enhanced; the other course was traditional in format. Second, the courses differed in content. The web-enhanced course addressed ADHD specifically; the traditional course addressed ADHD concepts within learning disabilities.

The web-enhanced course, ADD/ADHD-Issues, Concepts, and Strategies, offered a general introduction to the characteristics, treatment, and education of individuals with ADD/ADHD. Offered through the Department of Special Education at the University of Florida, the graduate course targeted full-time teachers enrolled (part-time) in a graduate program. The course emphasized identification and educational issues for students with ADD/ADHD while reviewing related legislation, identification concerns, and similar issues that apply to the general curriculum environment.

The course included three distinct themes: (a) a person with ADD/ADHD, (b) a family member of a person with ADD/ADHD, and (c) a teacher of a person with ADD/ADHD. Directed by these three perspectives, participants explored ADD/ADHD issues via online activities and face-to-face discussions. Topics for the course included definition, diagnosis, assessment, lifespan issues, and academic and behavioral interventions.

WebCT (http://www.webct.com), a Web-based instructional management tool, was used to develop the course. WebCT provides assistance to novice, intermediate, and experienced computer users in developing and delivering Web-based courses. WebCT facilitates the creation of Web-based courses by offering many tools and features that can be integrated into the organization of a course. Examples of WebCT tools include online chat, student progress tracking, evaluation, grade maintenance and distribution, navigation tools, course calendar, and student home pages.

Because of the overlap in learning disabilities (LD) and ADD (Fowler, 1992), a methods course in LD was selected to provide an appropriate comparison group for the study. Lerner (1995) comments on the relationship of LD and ADD/ADHD: "ADD is not synonymous with learning disabilities, but many children with attention deficit disorders also display symptoms of learning disabilities, further complicating identification and treatment" (p. 14). The methods course addressed teaching methods and curriculum that assist learners with learning disabilities in special education and general education settings and was targeted toward students

TABLE 1. ADD/ADHD Survey Item Categories and Sample Questions

Item Categories	Sample Questions
General (I Am)	I can generate a comprehensive list of strengths of a person with ADHD.
Parents/Family (I Have)	I can access appropriate resources about medical diagnosis to support the family of a person with ADHD.
Teacher Interventions (I Teach)	I feel competent in identifying an appropriate referral for ADHD.
Medical	I can access appropriate resources about medication to support the family of a person with ADHD.
Legal	I feel well-informed regarding the legal implications of ADHD in the classroom.
Academic Interventions	I can evaluate academic interventions for students with ADHD.
Behavioral Interventions	I can access appropriate resources about behavioral interventions to support the family of a person with ADHD.
Referral/ID Process	I feel competent in my role as part of a multidisciplinary team during the evaluation process. (Ex. I can judge whether an evaluation is appropriate and thorough.)
Educational Programming/Evaluation	I feel competent in communicating with parents about evaluating instruction for a student with ADHD.
Support Colleagues	I can assist other teachers of students with ADHD in medical, legal, educational-behavioral, and educational-academic aspects.

Note. A five-point Likert response scale was provided for each question.

preparing to be teachers of students with learning disabilities.

Instrumentation

The authors administered a survey regarding knowledge and efficacy of ADD/ADHD. Participants were asked to self-assess their skills and knowledge in two areas: content and technology. In addition, students were asked to self report their confidence in technology skills, particularly skills related to the use of the Internet. Sample items from each survey are presented in Tables 1 and 2. Participants in experimental and comparison groups completed surveys at the beginning (pretest) and at the end (posttest) of their respective courses.

ADD/ADHD Survey Item Categories

The survey questions used in this study were categorized into three major areas: General questions (3 questions), Parents/Family questions (13 questions), and Teacher Intervention questions (13 questions). These three major categories reflected three viewpoints addressed in the course: I am a person with ADD/ADHD (General), I have a person with ADD/ADHD in my family (Parents/Family), and I teach a person with ADD/ADHD (Teacher Intervention). Within the course, students assumed various roles to learn about these viewpoints.

I am a Person with ADD/ADHD

This perspective allowed the students to increase their understanding of the experiences of persons with ADD/ADHD. Topics addressed in this area include definition of ADD/ADHD, cognitive and behavioral characteristics of persons with ADD/ADHD, and support organizations such as Attention Deficit Disorder Association (ADDA). Factors such as age of the person and severity of the condition were included in presentations and activities.

I have a Person with ADD/ADHD in my Family

As students "become" family members of persons with ADD/ADHD, they become more concerned with intervention. Activities included gathering support information from sources such as CHADD. Topics in this area included diagnosis of ADD/ADHD, medical issues in the treatment of ADD/ADHD, and legal issues for families and individuals with ADD/ADHD. A variety of family arrangements (e.g., child with ADD/ADHD, sibling with ADD/ADHD, parent with ADD/

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TABLE 2. Tech Survey Item Categories and Sample Questions

Item Categories	Sample Questions
General Skills	*Describe your basic computer skills.
Knowledge of terms and functions	*Describe your knowledge of search engines.
Access to technology	I have e-mail or internet access that I can use anytime. (yes/no)
Experience	I have used the following computer software (check all that apply). ex. Office, Word, PowerPoint . . .
Training	*The level of staff development in technology that I have had so far has been of what quality and quantity?
Distance Learning	*The impression that I have of distance learning, as I know it, is mostly . . .
Use of technology in general	On average, how many hours per week do you spend on the following technologies . . . (range of 0 to more than 5 hours per week)
Importance of Technology skills	*How important is communicating with others who have similar interests?
Competence in Technology skills	*I feel comfortable in using simple web-based navigation techniques.
Frequency of use	How frequently do you use the computer as a tool to assist parents? (Students filled in the blank with a descriptor such as "rarely", or frequently.")

Note. A five-point Likert response scale was provided for questions marked with an asterisk (*).

ADHD, spouse with ADD/ADHD) were addressed.

I Teach a Person with ADD/ADHD

We addressed the issues of teaching persons with ADD/ADHD after a firm foundation of first-hand experience and family issues has been established. Our belief was that a thorough understanding of the condition allows the teacher to be more sensitive to student needs in searching for and implementing educational strategies. In this area, teachers gathered information regarding effective instructional strategies (both behavioral and academic) to be used with persons with ADD/ADHD. Teachers also learned about supports designed for the educator who teaches persons with ADD/ADHD.

Twenty-six of the thirty-one survey questions were also placed into seven specific categories: Medical Issues (4 questions), Legal Issues (2 questions), Academic Interventions (3 questions), Behavioral Interventions (3 questions), Referral/Identification Process (8 questions), Educational Programming/Evaluation (2 questions), and Colleague Support (2 questions). These specific categories reflect various aspects of ADD/ADHD that are addressed in texts (e.g., Lerner) and websites (e.g., add.org, chadd.org). Table 1 presents a sample question from each category.

Technology Survey Item Categories

The technology survey included 10 subcategories that addressed students' perceived efficacy in dealing with technology, their perceptions on using technology and its importance, and their access to technology. The categories were as follows: General Skills (2 questions), Knowledge of terms and functions (12 questions), Access to technology (3 questions), Experience (2 questions), Training (1 question), Distance Learning (1 question), Use of technology in general (1 multipart question), Importance of Technology skills (9 questions), Competence in Technology skills (7 questions), and Frequency of use (3 questions). Table 2 presents a sample question from each category.

Design and Data Analysis

A series of independent and dependent *t*-tests were completed to evaluate the effects of the web-enhanced course. Responses to survey items were compared between students in web-enhanced and traditional courses during the first week of the semester (i.e., pretest); posttest comparisons were completed during the last week of the semester. Additionally, pretest-posttest comparisons were completed for web-enhanced and traditional separately.

Results

Means and standard deviations for pretest and posttest comparisons across ten dimensions of knowledge about ADD/ADHD for experimental and comparison subjects are presented in Table 3. There were no pretest differences between the two groups (all *t*-test comparisons not significant at 0.05 level). Significant improvements were evident in the experimental group for all of the categories. Significant improvements were also evident in the comparison group for the following categories: parents/family issues ($t = 2.243$, $df = 15$, $p < 0.05$), teacher interventions ($t = 2.588$, $df = 15$, $p < 0.05$), medical ($t = 2.288$, $df = 15$, $p < 0.05$), academic interventions ($t = 3.955$, $df = 15$, $p < 0.05$), behavioral interventions ($t = 2.626$, $df = 15$, $p < 0.05$), and educational programming/evaluation ($t = 3.149$, $df = 15$, $p < 0.05$). Improvements in the experimental group were greater in all areas. No differences were evident in the comparison group for the following categories: general questions ($t = 1.000$, $df = 16$, $p > 0.05$), legal questions ($t = 1.964$, $df = 15$, $p > 0.05$), referral and identification process ($t = 0.947$, $df = 14$, $p > 0.05$), and colleague support ($t = 2.103$, $df = 14$, $p > 0.05$).

Means and standard deviations for pretest and posttest comparisons across ten dimensions of knowledge and skills in technology for experimental and comparison subjects are presented in Table 4. There were no pretest differences between the two groups (all *t*-test comparisons not significant at 0.05 level). Significant improvements were evident in the experimental group for the following categories: knowledge of terms and functions ($t = -6.313$, $df = 17$, $p < 0.05$), importance of technology skills ($t = -3.058$, $df = 17$, $p < 0.05$), and competence in technology skills ($t = 2.969$, $df = 17$, $p < 0.05$). There were no significant improvements in the comparison group.

Discussion

This online course in ADD/ADHD used Internet resources and online activities to enhance students' knowledge and skills. Students used the World Wide Web to investigate resources for persons with ADD/ADHD, their families, and their teachers. This course in ADD/ADHD also required students to develop a certain level of technology skills as they learn content.

The data indicate that the online course was effective in helping students to feel more knowledgeable regarding ADD/ADHD concepts and skills. The data from the technology survey indicate that the online course was effective in helping students to feel more capable in the following certain areas of technology (i.e., knowledge of terms and functions, importance of technology skills, and competence in technology skills).

It is interesting to note that students in the traditional methods course in learning disabilities also experienced gains in their perceived concepts and skills in ADD/ADHD in parents/family issues, teacher interventions, medical, academic interventions, behavioral interventions, and educational programming/evaluation. Evidently the course content in the LD methods encouraged students to apply knowledge in LD to the areas of ADD/ADHD. This is to be expected due to the high degree of overlap in these populations. Students who are diagnosed with ADD/ADHD often have a learning disability as well. Mayes, Calhoun, and Crowell (2000) found a 70% overlap of learning disabilities within an ADHD population of 119 children ages 8 to 16 years.

Limitations

Two limitations to this study should be addressed. First, students enrolled in a methods course in learning disabilities were compared to students in a course in ADHD. A more appropriate comparison group would be a traditional course in ADHD. At the time of the study, there was no such course available. The learning disabilities course was chosen because of its strong ADHD component. Second, the number of surveys completed by the students decreased from the time of the pretest to the time of the posttest, resulting in data from 17 students. While 26 students completed the pretest survey given at the beginning of the semester, only 17 students completed the both the pretest and posttest surveys. The posttest survey was administered on the last

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TABLE 3. Means (M) and Standard Deviations (SD) for ADHD Survey Responses

		Pretest		Posttest	
Composite Scores		Web-Enhanced	Traditional	Web-Enhanced	Traditional
General	*M*	2.39	1.88	1.04 (c)	1.71 (b)
	SD	0.60	0.59	0.11	0.37
Parents/Family	*M*	2.54	2.12	1.16 (c)	1.75 (d) (a)
	SD	0.46	0.66	0.20	0.39
Teacher Interventions	*M*	2.68	2.14	1.18 (c)	1.77 (d) (a)
	SD	0.60	0.62	0.26	0.38
Medical	*M*	2.75	2.50	1.18 (c)	2.11 (d) (a)
	SD	0.64	0.79	0.28	0.60
Legal	*M*	3.00	2.53	1.29 (c)	2.16 (a)
	SD	0.61	0.67	0.36	0.63
Academic Interventions	*M*	2.44	2.06	1.07 (c)	1.48 (d) (a)
	SD	0.70	0.52	0.18	0.40
Behavioral Interventions	*M*	2.25	1.98	1.08 (c)	1.50 (d) (a)
	SD	0.69	0.66	0.22	0.44
Referral/ID Process	*M*	2.63	1.94	1.22 (c)	1.76 (b)
	SD	0.56	0.76	0.30	0.56
Educational	*M*	2.61	2.19	1.25 (c)	1.50 (d) (a)
Programming/Eval	*SD*	0.58	0.85	0.39	0.55
Support Colleagues	*M*	2.82	2.23	1.21 (c)	1.83 (a)
	SD	0.71	0.70	0.36	0.31

a → Obtained *t*-statistic not significant at 0.05 level for experimental vs. comparison.
b → Obtained *t*-statistic significant at 0.05 level for experimental vs. comparison.
c → Obtained *t*-statistic significant improvement for experimental group (pretest-posttest).
d → Obtained *t*-statistic significant improvement for comparison group (pretest-posttest).
Note. A five-point Likert response scale was provided for questions. A score of "1" is considered most positive and/or confident about abilities. A score of "5" is considered least positive and/or confident about abilities.

night of class, and attendance was optional for students if they had completed their assignments for the semester. A more appropriate time to administer the survey would have been when all students were required to attend class.

As with most distance education efforts, questions regarding feasibility arise in the determination of suitable distance education contexts for learning. In addition, implications for improving current practice and researching future distance education endeavors should be discussed.

Feasibility

Because this course combined online activities and five face-to-face meetings, factors viewed as negative in "true" distance learning environments (e.g., no face-to-face meetings) had less effect than in the environments studied by researchers such as Pirrong and Lathen (1990). Although overall there were fewer opportunities for traditional interaction between students and with the instructor, interaction was fostered through class discussions and electronic discussions via the discussion board.

As we struggle with challenges of instructional delivery across time and space, and the need to make learning more efficient and accessible, the question of whether to and how to modify the web-enhanced course into a true distance course becomes apparent. Future renditions of this course will lean more toward web-based (true distance) rather than web-enhanced, with more attention given to planning and conducting online activity. Factors that have emerged in the research as being problematic for distance learning (e.g., more isolation, less feeling of belonging or contributing) will need to be addressed through planning and monitoring of instruction and interaction. Building and maintaining a sense of community within the online environment will be of paramount importance.

TABLE 4. Means (M) and Standard Deviations (SD) for Technology Survey Responses

Composite Scores		Pretest		
		Web-Enhanced	Traditional	Web-Enhanced
General	*M*	3.67	4.00	3.86
	SD	0.77	0.68	0.51
Knowledge of terms and functions	*M*	2.69	2.97	3.39 (b)
	SD	0.66	0.84	0.63
Access to technology	*M*	1.72	2.00	1.81
	SD	0.63	0.49	0.61
Experience	*M*	0.28	0.32	0.37
	SD	0.15	0.15	0.13
Training	*M*	2.33	2.88	2.89
	SD	1.28	1.45	1.37
Distance Learning	*M*	3.22	3.41	3.33
	SD	1.11	1.23	1.33
Use of technology in general	*M*	2.27	2.37	2.19
	SD	0.94	0.92	0.79
Importance of Technology skills	*M*	3.09	3.72	3.72 (b)
	SD	0.91	0.80	0.68
Competence in Technology skills	*M*	2.10	1.94	1.44 (b)
	SD	0.78	0.74	0.51
Frequency of use	*M*	1.24	1.67	1.65
	SD	1.09	1.09	1.00

a → Obtained *t*-statistic not significant at 0.05 level for experimental vs. comparison pretest.
b → Obtained *t*-statistic significant improvement for experimental group (pretest-posttest).
c → No difference for comparison group (pretest-posttest).
Note. A five-point Likert response scale was provided for questions. A score of "1" is considered least positive and/or confident about abilities. A score of "5" is considered most positive and/or confident about abilities.

Implications for Improvement of Practice

The data indicate that the online course was effective in helping students feel more knowledgeable regarding ADD/ADHD concepts and skills and in certain areas of technology. The course content was chosen as a prime candidate for online instruction because of a number of factors: the wealth of information on the Internet that would be available to course participants, the flexibility of the Internet resources for the diverse course participants, and the ease with which students could interact within the electronic format. Course developers who consider online courses may consider similar factors as they weigh the advantages of online learning versus traditional learning.

Future Research

Distance learning contexts have been found to be lacking when considering variables that affect student appreciation of a course, such as interaction and communication. Although cognitive variables seem to hold up in a distance vs. traditional contest (Moore & Thompson, 1997), factors relating to belonging and connectedness will continue to influence student satisfaction with courses they take. In the long run, these same factors will influence student choice in their future educational endeavors. Research in special education courses that incorporate significant online learning will need to address both cognitive and affective experiences.

The depth, breadth, and accessibility of the World Wide Web provided a rich context for learning about ADD, a condition that challenges the learner, his/her family, and the professionals from whom he/she receives services and consultation. Students who participated in the course found that they grew in their ability to deal with issues in ADD/ADHD while honing certain technological skills. The effectiveness of this course provided encouragement for continued delivery of this important course content in other distance formats.

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