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Mastering course content and learner satisfaction in early childhood education: A comparison of regular classroom instruction with three variations of internet delivery[☆]

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Abstract

In the spring semester 2000, a Penn State course, ECE 479 (The Young Child's Play as Educative Process), was taught by the same instructor in four delivery formats. One group consisted of a regular classroom, held on campus. A second group, also on campus, was taught in a computer lab via the Internet; and there were opportunities for interaction with peers and the instructor. A third group took the course on the Internet as part of a local distance education group; hence, there were some limited opportunities for face-to-face interaction with peers and the instructor. The fourth group took the course on the Internet, as part of a statewide distance education group, where there were no opportunities for face-to-face interaction. Twenty students who enrolled in the course (5 per group) completed questionnaires and phone interviews. Information was gathered on professional backgrounds, computer experience, and initial level of content knowledge on the topic of the ECE Internet course. Sixteen students who completed the course were interviewed again to evaluate satisfaction with the course and to estimate learning outcomes. Across the four conditions general satisfaction was expressed with the content, activities, and course requirements and with the teacher. However, students in the three computer groups expressed dissatisfaction over technical problems (all four who did not complete the course came from these computer groups). Significant gains in content knowledge occurred for the classroom group, while the learning in the three Internet-based instruction groups did not show the same gains. Concern was expressed related to the lack of face-to-face interaction, making the learning environment less desirable. Although Internet technology provides a great deal of promise, these results suggest that improvements are needed to make this delivery modality more effective for in-service distance learning. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

"I think the thing that I liked least and I know it's inherent in an Internet course is lack of human involvement. Lack of human contact. Not getting to

talk with the instructor at all, face to face. That was very tough for me. The other thing was the lack of the immediate feedback. If you had a question you had to type it in and wait for the instructor to log on and read it and then get back to you."

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"My frustration was that I don't like to fall behind in anything. I felt like I was falling behind because I wasn't able to access these readings, wasn't able to do some of the things on the computer that I should have been able to do. I was just getting frustrated and feeling like this isn't worth it for me. And that's why I dropped the course."

"The lack of being able to talk to anybody. The fact that you were doing all of this reading on your own. That was hard. I was used to sitting in classes and having someone lecture to me and then having students to interact with. It was difficult to get used to just reading it and absorbing it by yourself."

"Just simple things like just being able to print the page on my screen out. I didn't, I had no clue how to transfer stuff onto the hard drive and to be able to print something. I'm used to pressing the print button and stuff popping out. I didn't know it was that much involved."

The Internet is a new and ever expanding tool for learning (Benson & Meyers, 2000; Lan, 1999; Owston, 1998), including distance education (Williams, 1996). Whether or not the Internet can be an *effective* tool for training staff within the human services, particularly childcare staff, needs to be explored. Our project evaluated the effectiveness of the Internet training in terms of learning outcomes, its implementation (specifically, the technological aspects), and the student's level of satisfaction with the course. The impetus for our project came from two sources.

First, Pennsylvania delivers childcare training to all licensed and registered childcare providers in the state and is interested in making this system more cost effective and efficient. Discussions related to utilization of the latest technologies, such as the Internet, are being considered. Secondly, a new initiative, CyberStart, will link all licensed childcare centers in Pennsylvania to the Internet. While this initiative is specifically designed to offer Internet access and educational programming for children, it will also make this technology available to childcare staff. Hence, there is a need to evaluate the feasibility and effectiveness of Internet-based distance education as it becomes more available to childcare centers.

2. Research design

A quasi-experimental design was employed, which consisted of four groups of five students who enrolled in the early childhood education (ECE) course ECE 479 *The Young Child's Play as Educative Process*, which focused on play, communication, and curriculum. The first group experienced the traditional lecture/discussion course format. A second

group took the course on the Internet, but within the context of a computer lab (located at Penn State York) where they had the opportunity to interact with their peers and the instructor. A third group took the course on the Internet as part of a local distance education (DE) group; this group also had some face-to-face interaction with their peers and knew the instructor. A fourth group took the course on the Internet, but as part of a statewide DE group. This group had no face-to-face interaction with their peers or the instructor.

This research design enabled us to examine the available technology to determine any hardware or software constraints, as well as the efficiency of the technological support services, by comparing groups that took the course via the Internet in different environmental circumstances (i.e., the on-campus computer lab vs. a home-computer set up). The research design also permitted us to evaluate the importance of the human element as a component of the effectiveness of this training modality since participants were in controlled settings with varying possibilities for face-to-face interaction.

Evaluating whether Internet training delivered to childcare staff is an effective training modality has special significance at this time given the paucity of empirical evidence to support or refute such claims. Research is needed to help the Pennsylvania Childcare and Early Childhood Development (PA CC/ECD) Training System, and comparable systems in other states, make more informed decisions about the use of Internet-based distance education for teachers of young children.

Given the exploratory nature of this study, a qualitative approach with a small sample was employed to generate data from questionnaires and interviews, as well as from course assignments completed by students. The questionnaire included items that tapped demographic characteristics (age, sex, and prior education), current position and experience within childcare, and experience with computers. Phone interviews, administered before and after the course, and lasting in duration from 30 to 45 min each, assessed students' knowledge about play and perceptions about the course. In addition, select course assignments were independently graded to assess knowledge.

The course aimed to increase the students' knowledge about play and its practical application. Two measures of the learning outcomes were used: (1) interview responses to questions about play given before and after the course and (2) grades on selected course assignments. The latter were independently evaluated by faculty other than the course instructor. Both measures were scored without knowledge of group membership.

From the phone interviews, students' answers to four questions about play were evaluated. The questions were: (1) What is play? (2) What is the value of play? (3) What is positive play? and (4) How can adults have a positive influence on play? Content analysis revealed that numerous ideas were elicited by these four questions both before and after the course. An empirically based coding system was developed and employed to score students' answers. Appendix A provides the categories and subcategories used in scoring.

3. Course development

The course *The Young Child's Play As Educative Process* (ECE 479), offered by the Department of Curriculum and Instruction in the College of Education at The Pennsylvania State University, was selected for this experimental study of Internet-based instruction. This particular course was chosen because it was viewed as well-developed and because it included both theoretical as well as practical content relating to ECE curriculum and instruction. Developing the course for Internet-based instruction required connecting with the Penn State World Campus (online learning). A contractual relationship was formed involving Keystone University Research Corporation (KURC), the contractor for the PA CC/ECD Training System, the College of Education, and the World Campus. Technicians from the World Campus, in collaboration with ECE faculty and doctoral students, worked to develop the course in time for offering it in the Spring of 2000.

3.1. Stage one – course structure

One of the first tasks was to establish the course syllabus, which included the course objectives and requirements, along with a schedule and sequence of learning activities. Objectives included acquiring a knowledge base of theory, research and practice concerning play and ECE, improving play observation and documentation skills, analyzing playthings for use in ECE settings, planning suitable indoor and outdoor environments for play, understanding and making sound judgments about the use of play facilitation strategies, and learning how and why to become an advocate for play in education. Requirements included an observation project, designing play environments, writing letters explaining play-based teaching to parents and to a 'blue ribbon committee' of educational professionals, as well as doing an implementation project and keeping a journal. *The Instructor's Manual to Accompany Johnson/Christie/Yawkey Play and Early Childhood Development,*

Second Edition (Johnson, 1999) provided the guidelines for the overall course organization and sequencing, which followed the chapters of the text, with the content going from theory and research to policy and practice.

3.2. Stage two – course content

The course was organized into four modules with a number of online lessons or sessions in each module. There were a total of 26 sessions. Sessions were designed to last 50 min; students had a reading assignment for each session and a self-administered objective-item exam, which produced computer-generated feedback for self-evaluation. Also, open-ended discussion questions were assigned for chat room or bulletin board discussion. The objective items and the open-ended discussion questions came from the instructor's manual. Activities and problems were embedded in sessions and were sequenced and used in the same way across the four groups of students.

3.3. Stage three – course programming

The final formatting and programming of the course for Internet instruction occurred during the Fall of 1999. The course program included some special features to make the on-line learning experience more interesting. For example, an animated pop-in character (a cartoon owl) appeared on screen at various selected points throughout the sessions to ask questions as a real classmate might. The World Campus technical staff, with the assistance of the course instructor (third author), also prepared a home page for the course, which included the course schedule and contact information.

4. Participants

All 20 students were female, ranging in age from 23 to 60 with mean of 39 years. Sixteen students had a bachelor's degree and one a master's and two had a high school diploma or GED certificate. The most common college major was elementary education ($N = 7$). Only three students majored in ECE and had taken any previous courses on play. For the entire group, inservice training hours on this subject ranged from zero ($N = 5$) to 45 hours ($N = 1$), with a mean of 10.5 hours.

Fifteen students held the position of center director and three were assistant directors. One student had the title of childcare coordinator, and another was a personnel training coordinator and an assistant group supervisor. The length of time that the students worked at their current childcare center ranged from

a minimum of six months to a maximum of 23 years with the mean 9 years. The length of time that students had worked in the early childhood field ranged from 2 years to 25 years, with mean 11.9 years.

5. Findings and discussion

5.1. Prior computer experience

Students reported prior experience using personal computers ranged from no experience to 15 years. The mean value was 4.1 years. Seventeen students had a personal computer at home and were asked to indicate which specific activities they had used. Those uses included: word processing (15 responses); recreational software (12 responses); Internet (12 responses); and spreadsheets and/or databases (4 responses).

A questionnaire item asked who usually provided technical support for their home PC (e.g., installing new software or hardware, answering software questions, and fixing problems). No more than five students usually relied on themselves for technical support for their home PCs. Of the four students who chose "other," three students usually relied on a friend, and one usually relied on another teacher in her childcare center.

5.2. Knowledge about play

For the following four play questions, each student's answers given in the postcourse interview were compared with the precourse answers in order to evaluate whether there were response improvements, defined by an increase in positive responses and/or a decrease in negative responses (items 1 and 3), by an increase in the total number of distinct acceptable benefits of play given (item 2), or of distinct teacher's roles (item 4) cited.

5.2.1. Question 1: what is the definition of play?

Responses were coded into the categories and subcategories and summed into two groups. *Positive responses* tallied the number of Attributes, Distinctions, and Realizations (A, D, R), while a second group of *negative responses* summed the total of overly-inclusive, mistakes, slogans, and vague replies (X, M, S, V). Other codes were considered "neutral" answers and were not used in this evaluation.

All classroom and computer lab students improved, as did the three statewide DE students who stayed in the course. Of the three remaining local DE group students, one failed to exhibit a positive re-

Table 1

Pre- and post-course mean scores for benefits of play across four conditions

Groups	Classroom	Computer lab	Local DE	Statewide DE
Pre-course	5.2	4.0	3.8	3.0
Post-course	8.4	7.2	3.3	5.6

sponse at both times of measurement; they gave five negative responses at precourse time of measurement and three negative responses at postcourse time of measurement.

Classroom students gave a total of 25 positive responses after the course compared to only 3 positive responses before the course. This averages five positive responses per student and exceeds the averages on this index for the other three groups (1.2, 1.6, and 2.3 for lab, local DE, and statewide DE, respectively). Classroom and lab students showed few negative responses before or after the course, while local DE students gave 8 negative responses and statewide DE students gave 13 negative responses before the course. However, in postcourse interviews the six DE students made only five negative replies.

5.2.2. Question 2: what are the benefits of play?

Total scores for number of distinct benefits were derived from the coding system employed in the study. All general and expressive answers given (G and E) were added with all functional answers to yield a total benefits (G&E + F) score. Benefits of play results are shown in Table 1.

As can be seen in Table 1, the classroom and lab students performed better than the local DE and statewide DE students on this item. They were able to identify significantly more functions of play, especially after the course was taken. Nine of ten students in the classroom/lab groups improved, but only 3 of 6 in the DE groups did. Note also slight decrease in scores by local DE group.

5.2.3. Question 3: what is good play?

Here *positive responses* were the number of Nominal and Process (N and P) ideas from each student, while a second group of *negative responses* summed the total of Failure (F) responses exhibited. Other codes were considered "neutral" and were not used here.

Only seven of 16 students improved. Evidently, the course did not impact very much how well students could answer this question. The best answer, the P answer, was given by only three students, all at postcourse time. Failure to distinguish good play from play (e.g., "all play is good") happened six

Table 2
Mean scores for total roles across groups before and after the course

Groups	Classroom	Computer lab	Local DE	Statewide DE
Pre-course	3.8	2.4	4.0	3.6
Post-course	7.0	4.6	3.3	5.6

times at precourse time and eight times by the end of the course. Most students talked about types, functions and characteristics of play and failed to differentiate good play from play in an acceptable manner as determined by the coding and scoring system used in this study. This discouraging result may be because the scoring criteria were too harsh, or perhaps because interviewees did not understand the question. Also, it is possible that the course as taught, as well as the textbook as read, did not highlight the distinction well enough. In previous courses, this question has proven to be a "power question," distinguishing the "gold from the dross" in student performances.

5.2.4. Question 4: how can adults make child's play better?

Responses were analyzed with scores derived from the coding employed in the study. All general or attitudinal answers (G) per student were counted. Another group of answers covered the sum of all adult role responses (R). Total roles (G&R) were examined in the analysis. Table 2 shows mean scores across groups.

There were 11 students who improved, with all but one of them coming from the classroom or computer lab research groups. Only one student in a DE improved. Five students in DE groups actually performed more poorly in answer to this question after the course was over. In sum, the course influenced students' performance in identifying adult roles in children's play differentially depending on which research group they were in—classroom and lab students outperformed DE students.

5.3. Assessment of course requirements

There were three assignments that were graded for all the students: implementation activity (A), a parent letter (B), and a blue ribbon letter (C). As shown in Table 3, a comparison of the grades on these assignments across all four groups did not reveal that any one group consistently scored higher than the others. However, the traditional classroom group did score the highest on assignment B and had

Table 3
Scores on course assignments across four groups

Groups	Assignment			Total
	A	B	C	
Classroom	2.86	3.86	2.75	9.47
Lab	1.90	2.63	3.00	7.53
Local DE	2.69	3.37	2.50	8.56
Statewide DE	2.99	3.61	2.35	8.95

the second highest set of scores on assignments A and C.

For assignments A and B the differences in scores for the four groups were statistically significant (Assignment A, $F=5.574$, $p < .012$ and Assignment B, $F=4.628$, $p < .023$). No significant differences were found for Assignment C. The computer lab group scored the lowest on assignments A and B while the other three groups of students all scored about the same. When all the assignments are totaled for an overall score, the traditional classroom performed significantly better than the other three groups ($F=5.221$, $p < .015$).

Students were also asked a series of questions about their expectations regarding the course, the benefits from taking the course, and their experiences in taking the course. The majority of the responses were very positive about the course in general, but the students who had taken the course via the Internet experienced a number of computer problems in either getting online or with the software. Everyone experienced problems and this delayed the start of the course for them for several weeks. There were problems with signing on, with the chat room, with passwords not being accepted, and so forth. However, once these problems were worked out, the course started and proceeded fairly well.

In sum, respondents revealed general satisfaction with the content of the course, the course activities, and course requirements. Moreover, there was a strong appreciation and high evaluation for the teacher. On the other hand, almost everyone (one or two exceptions) in the three computer groups expressed dismay over serious and continuing technical difficulties throughout the entire semester. However, even with a good course content, instructional design, teacher, and technical delivery, there were several people who clearly indicated reservations about Internet learning because it lacked face-to-face interaction. These people indicated that even if there were no technical difficulties, they would miss the human contact and would prefer courses or training taken in a classroom where there was greater opportunity for interpersonal interaction and contact.

6. Conclusion

This evaluation provides insights into offering ECE courses over the Internet. Clearly, it seems that the success of this technology is dependent upon the persistence and knowledge of the student for learning to occur. Four students who did not complete the course were from the local ($N = 2$) and statewide ($N = 2$) Internet-based distance education groups; none were from the traditional classroom or computer lab settings. The students were administrators of childcare programs, fairly familiar with computers and knowledgeable of the course content. However, even with these pluses, the students still had considerable difficulty in accessing and doing the course online. Possibly the dropout rate would have been greater if the students were at a beginning stage of their career (Cohen, 2000; but see Schrum, 1992). Students in the traditional classroom and in the computer lab groups, where there was more face-to-face interaction, scored the best on the interview play evaluations. Evidently, these two training modalities were more effective than were the local and statewide distance education training modalities where there was little or no face-to-face contact with other students or with the instructor.

On the three course requirements, the classroom group scored the highest on assignments summed together (9.47); but the computer lab group scored the lowest on the assignments (7.53), with the two distance education groups in the middle. This is inconsistent with the results from the analyses of the interview responses to the four questions about play. Here both the classroom group and the computer lab group gained the most. Although it is perhaps encouraging to see that the students in the two distance education groups scored higher on the course assignments compared to the computer lab group, their results were still lower than the students' scores from the traditional classroom group.

What have we learned from this study? For Internet instruction to be effective it seems that students must be technologically literate and knowledgeable about course content to some degree, and they must be persistent and highly motivated. Without these personal characteristics, the Internet course experience may not be a positive learning experience. The results of this study further suggest not utilizing Internet training across-the-board for childcare staff. It needs to be very targeted, beginning with directors of programs, who generally have the greatest experience

and education and potential exposure to computer technology. More generic, across-the-board training for the beginning level practitioner does not make training sense at this point.

Internet technology provides a great deal of promise for reaching childcare staff with needed specialized in-service training in ECE. But first it is necessary that the technology gets the fine-tuning to ensure its effectiveness as a training modality for the majority of childcare providers. Also, what is best for on-line learning? Professional attention must be given to criteria for deciding the kinds of training content (e.g. learning facts like state regulations or understanding and applying concepts like play in ECE) in relation to its packaging (e.g., a full course like in this study, or modules, or single sessions analogous to workshops). Setting up realistic expectations for learners and designing the right means of instruction and assessment are both very important. Finally, we recommend that priority be given to designing orientation modules to prepare potential users for Internet-based distance education.

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Appendix Table 1

Question 1: What is play?

- A1 Attribute of play given. For example, play is process-oriented, marked by positive affect, often non-literal, active, intrinsically motivated, etc.
- A2 Tangential attribute of play given. For example, play is something adults like to see in children; child and adult do play of own free will, etc.
- E Example of play is given. For instance, play is like playing with dolls or blocks.
- F Function of play is noted as a way to define it. A way to learn things. A way to release feelings.
- C Context of play is noted. Play can be solitary or done in a social group.
- X Overly inclusive or general statement about play is made, such as "it is a creative process."
- D Distinction is made, contrasting play with other similar behaviors such as imitation or exploration.
- R Realization is indicated, such as play is multidimensional, complex, or hard to define.
- T1 Type of specific play is given, such as constructive or dramatic play.
- T2 Type of general play is noted, such as educational play, dark play, and recreational play.
- M Mistake is made, a falsehood is uttered.
- S Slogan is cited; such as play is the child's work.
- V Vague pronouncement is made, unclear or hard to decipher.

Question 2: What is the value of play? What are its benefits?

General (educational) values include:

- G1 Teaches skills and abilities or is a learning experience
- G2 School preparation
- G3 Allows for the practice of skills
- G4 Generates further learning and development; allows children to go as far as they can with what they are learning
- G5 Avenue for creativity
- G6 Creates a well-rounded child
- G7 Allows child to explore and discover on one's own
- G8 Allows child to experiment

Expressive values include:

- E1 Enjoyment, fun, makes happy, love of life
- E2 Relaxation, release energy, tension
- E3 Vent frustration
- E4 Be self
- E5 Express self

Functional values include:

- F1 Cognitive: abstract thinking * imagination * learning content * creativity * learn on own terms-relevancy, meaningfulness * problem-solving * meta-cognition * memory * social cognition, empathy, perspective-taking * theory of mind * sense of self * sense of others * assimilation, integration, application of learning
- F2 Affective: motivating, feel good about self * self empowerment, sense of control * reduce anxiety, therapeutic, cathartic * self confidence, sense of self-assuredness
- F3 Social: learn to resolve conflicts * cooperation * group cooperation, team member * leadership skills * learn to share * learn to take turns * learn to help
- F4 Physical: gross motor * fine motor * learn to challenge self physically * self-help skills
- F5 Attentional: concentration * attention regulation * persistence
- F6 Assimilation
- F7 Language: communication skills * literacy * become good story-teller * vocabulary
- F8 Academic: reading and writing * shapes for math * science
- F9 Life skills, careers

Question 3: What is good play? Positive play?

- N Nominal answer is given, like educational play is good play.
- P Process of play is said to be important, "perking along", playing up to capacity.
- C Characteristic of play in general is given without really answering the question.
- T Type of play in general is given without really answering the question.
- F1 Function of play in general is given without really answering the question.
- F2 Failure to provide sensible reply, such as, "all play is positive."

(continued on next page)

Appendix Table 1 (continued)

Question 4: How can adults make play better for children?

There are many roles to perform in the ECE profession with respect to children's play. Some are general or attitudinal such as:

- G1 Value play, allow it to happen, be aware of your biases and those of others
- G2 Realize when attitude change about play occurs in self or others
- G3 Show an interest in play as a matter of public or educational policy
- G4 Lobby and advocate on behalf of children's right to play as an integral part of childhood

Other roles in the ECE profession with respect to children's play pertain to classroom or home or child development center situations where young children learn and are cared for. These include:

- R1 Stage manager, set up over-all positive and attractive environments, provide materials, playthings, space, toys, storage areas, time for play, literacy props, allow children choice of areas and activities, organize settings, rotate toys
- R2 Be a careful and systematic observer, evaluate play, change own behavior as a result of observations, document play process and products
- R3 Provide preparatory experience, bring in guest visitors, field trips
- R4 Play facilitator, scaffold, support, challenge children at play, do not be overbearing, ask questions, offer comments, suggestions, ideas for play, teach play
- R5 Co-player, be a play leader, model play behavior
- R6 Supervise play, make sure play is safe, monitor activities, mediate conflicts, enforce rules, help children negotiate, guide and discipline, be a referee

Other roles inherent in the ECE profession connected with play have to do not with the children but with other adults. These include:

- R7 Help adults be comfortable with play of children in educational settings, train teachers, educate staff about play in ECE
- R8 Inform and involve parents in quality play with young children in formal and informal educational settings