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A literature review of
asynchronous, interactive
Internet-based distance
education instruction
(1993 - 2003)

CAPSTONE REPORT

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ABSTRACT

for

A literature review of asynchronous, interactive Internet-based distance education instruction (1993 - 2003)

The purpose of this study is to provide resources for asynchronous distance education teachers concerning the application of instructional methods to design interaction in asynchronous Internet-based distance education instruction. Selected literature published between 1993 and 2003 addressing the application of instructional methods to design interaction, as defined by Moore (1989), is examined using a content analysis methodology. The resources emerging from this literature review are categorized in a list, tables, and an annotated bibliography.

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CHAPTER I

Brief Purpose

The purpose of this study is to provide resources for asynchronous distance education teachers concerning the application of instructional methods (Joyce, Weil, & with Calhoun, 2004; Reigeluth, 1987) to design interaction in asynchronous Internet-based distance education (Picciano, 2001) instruction (Driscoll, 2000). Although the outcomes of this study are intended to be useful to all teachers, the resources provided are anticipated to particularly benefit teachers new to asynchronous Internet-based distance education instruction.

Asynchronous Internet-based distance education instruction differs from classroom instruction primarily due to the technology interface (Picciano, 2001) and its impact on communication and interaction (Harmon & Hirumi, 1996). These differences in communication and interaction necessitate different instructional methods when designing interaction in asynchronous Internet distance education instruction (Bermudez & Hirumi, 2000; Harmon & Hirumi, 1996; Hirumi, 2002a; Moore, 2001; Pyle & Dziuban, 2001). According to Moore (1989), interaction occurs when instruction engages the participant in learning. He identified three types of interaction which need to be considered when designing distance education instruction: (1) interaction between participants and tutors/experts, (2) interaction between participants and learning materials, and (3) interaction among participants (Moore, 1989).

Research about the use of instructional methods as they may be related to Moore's three types of interaction in asynchronous Internet-based distance education instruction is reviewed. Selected literature published between 1993 and 2003 addressing

the application of instructional methods to design interaction into asynchronous Internet-based distance education instruction is examined using a content analysis (Leedy & Ormrod, 2001; Palmquist, 2003) methodology. Specific focus is on literature describing the application of instructional methods to design interaction into asynchronous Internet-based distance education instruction. The resources emerging from this literature review are categorized in a list, tables, and annotated bibliography according to how they support the application of instructional methods to the design of interaction in asynchronous Internet-based distance education instruction.

Full Purpose

The purpose of this study is to collect, analyze, and provide resources for the application of instructional methods to design interaction into asynchronous Internet-based distance education instruction. Based on a systematic review of literature (Cooper, 1984, 1998; Leedy & Ormrod, 2001), 25 books, articles, and conference proceedings, published between 1993 and 2003 were selected from research performed in the fields of education, educational psychology, instructional design, instructional methods, and learning theory. A content analysis methodology (Leedy & Ormrod, 2001; Palmquist, 2003) was applied to identify those resources most directly addressing the application of instructional methods to design interaction into asynchronous Internet-based distance education instruction. Resources for this study were collected using online research databases and indexes.

This study focuses on the collection and analysis of published literature recommending the application of specific instructional methods as a way to design interaction, as defined by Moore (1989), into asynchronous Internet-based distance

education instruction. Identifying common definitions and interpretations for each of these terms in distance education literature can be challenging (Bannan-Ritland, 2002).

For the purposes of this study, instructional methods, distance education, and interaction are defined as:

- Instructional methods describe the models of teaching based on teaching research and practice. “Some of these practices become the objects of formal study – they are researched and polished and become models we can use to develop professional skills that we bring to the task of teaching” (Joyce et al., 2004, p. 6).
- Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements (Moore & Kearsley, 1996 p. 2).
- Interaction describes “a created environment in which both social and instructional messages are exchanged among the entities in the course and in which messages are both carried and influenced by the activities and technology resources being employed” (Roblyer & Wiencke, 2003, p. 81). In distance education instruction, Moore (1989) describes three types of interaction: learner-content, learner-learner, and learner-teacher.

Although interaction only represents one component of what comprises distance education experiences, research in this field indicates a positive correlation between the quality of distance education instruction and the application of instructional methods to

design interaction in asynchronous courses (Bermudez & Hirumi, 2000; Cuban, 2001; Harmon & Hirumi, 1996; Hirumi & Bermudez, 1996; Moore, 1989, 1993; Peter, 2002; Pyle & Dziuban, 2001; Reed & McNergney, 2000; Zappone, 1991).

Moore (1989) categorizes interaction into three types: (1) interaction between learner and content, (2) interaction between learner and other learners, and (3) interaction between learner and teacher. Interaction between the learner and content describes the “process of intellectually interacting” (Moore, 1989, p. 2) with the subject matter, resulting in transformations of the learner’s perspective, thought processes, or understanding. He states, “This is the defining characteristic of education. Without it there cannot be education . . .” (Moore, 1989, p. 2)

Interaction between the learner and other learners describes the various forms of communication occurring between learners (Moore, 1989). Communication among learners includes discussions about course content, inquiries into others’ thoughts and understandings regarding course processes, and socialization (Moore, 1989). Learner-learner interaction teaches group interaction skills, as well as motivates and stimulates learning through discussions and other forms of communication (Moore, 1989).

Interaction between learner and teacher describes the communication strategies employed by both parties essential to a learning environment (Moore, 1989). It is “regarded as essential by many educators, and as highly desirable by many learners” (Moore, 1989, p. 2). Teacher-learner interaction includes: directing, stimulating, and motivating learning; presenting information; modeling attributes, skills, and values; organizing the learning; and counseling and supporting the learners (Moore, 1989). Learner-teacher interaction includes clarifying course content and process

understandings, exploring new connections between previous education and experience and new concepts, seeking feedback regarding performance, and asking advice and counsel (Moore, 1989). “The instructor is especially valuable in responding to the learner’s application of new knowledge” (Moore, 1989, p. 3).

The absence of face-to-face communication and interaction in asynchronous distance education environments, as it occurs within a classroom setting, alters how teachers apply instructional methods to design instruction (Cuban, 2001; Harmon & Hirumi, 1996; Hirumi & Bermudez, 1996; Jung, 2001; Moore, 1989, 1993, 2001; Pyle & Dziuban, 2001). Although teachers have ideas about how to design interaction by applying instructional methods, these ideas are not easily translated into electronic learning environments (Cuban, 2001; Hill & Hannafin, 2001; Moore, 1993). Most teachers do not have training in the technical knowledge or skills of how to apply instructional methods to design interaction in asynchronous Internet-based distance education instruction (Cuban, 2001; Harmon & Hirumi, 1996; Hirumi & Bermudez, 1996; Jung, 2001; Moore, 1989, 1993, 2001; Pyle & Dziuban, 2001). The result is often a direct transfer of classroom lecture texts to the Internet and a failure to design interaction into the instruction (Cuban, 2001; Hill & Hannafin, 2001; Moore, 1993).

According to Northrup (2001), interaction, which occurs spontaneously in classroom environments, must be designed directly into asynchronous Internet-based distance education courses. Instructional methods can guide teachers in the application of familiar theories to design interaction into asynchronous Internet-based distance education learning environments, however the interaction must be purposefully planned to generate interaction in these “virtual” educational settings (Bermudez & Hirumi, 2000;

Harmon & Hirumi, 1996; Hirumi, 2002a; Northrup, 2001). To plan and design interaction in distance education instruction requires teachers understand what technology can and cannot do relative to delivering the desired instructional methods, stimulating interaction, and supporting the instructional outcomes (Bronack & Riedl, 1998; Moore & Kearsley, 1996).

This study was designed to provide resources which can help asynchronous distance education teachers understand what technology can and cannot do relative to applying desired instructional methods to stimulate interaction and support instructional outcomes. Teachers should be more aware of how to actively address the peculiarities of delivering instructional methods in distance education environments (Bronack & Riedl, 1998; Moore & Kearsley, 1996). The resources identified in this study describe research-based results about the application of instructional methods to design interaction, as defined by Moore (1989), in asynchronous Internet-based distance education instruction. These results provide experience and information suggesting how to apply instructional methods to design interaction in asynchronous Internet-based distance education instruction. It is the hope of this researcher that with this information teachers can identify the instructional methods which are most relevant to their educational environments and best meet their pedagogical, curricular, and organizational needs.

Significance

According to the National Center for Education Statistics (Waits & Lewis, 2003), 90 percent of all American two and four-year public colleges and universities offered distance education courses during the academic year 2000-2001. Of the American colleges and universities offering distance education courses, 90 percent use Internet

asynchronous computer-based instruction to deliver these courses (Waits & Lewis, 2003). Of the American colleges and universities surveyed who offer or plan to offer distance education courses within the next three years, 88 percent plan to increase the number of Internet course offerings using asynchronous computer-based instruction and 62 percent plan to use Internet asynchronous computer-based instruction as a primary mode of instructional delivery (Waits & Lewis, 2003). As more colleges and universities implement Internet asynchronous computer-based instruction courses and programs, more higher education teachers are designing distance education instruction (Jung, 2001). And, since it is often teachers who are responsible for creating the content, determining the instructional methods, and designing interaction into these courses (Crawford, 2001), this study is based on the assumption teachers need the kind of resource collection outlined in this paper.

Given the increasing use of asynchronous Internet-based distance education and the concurrent role of teachers in developing this type of instruction, this study is significant for three reasons. First, the outcome of this study provides distance education teachers with research resources identifying how to apply instructional methods to design interaction in distance education instruction. Second, the resources in this study provide new insights into how to apply instructional methods in the design of interaction in distance education instruction. Third, the research selected for this study is based on qualitative and quantitative research studies, not anecdotes, adding value by validating the resources.

Limitations to the Research

The resources provided in this study were published between 1993 and 2003. This ten-year period was selected because it includes early asynchronous Internet-based distance education research regarding the use of instructional methods to facilitate interaction, as well as recent research from the expanding field of distance education. In addition, this time frame is constrained enough to exclude research conducted using older distance education systems which would not be relevant to asynchronous distance education delivered over the Internet.

Moore's three types of interaction (1989) (e.g., learner-content, learner-teacher, and learner-learner) were chosen as the focus of this study because research indicates each of these forms of interaction, whether applied singularly or in any combination, can be positively correlated to the quality of instructional methods applied to the design of distance education instruction (Bermudez & Hirumi, 2000; Cuban, 2001; Harmon & Hirumi, 1996; Hirumi & Bermudez, 1996; Moore & Kearsley, 1996; Peter, 2002; Pyle & Dziuban, 2001; Reed & McNergney, 2000; Zappone, 1991). Each resource reviewed offers information concerning the application of instructional methods to design these forms of interaction into asynchronous Internet-based distance education instruction.

Although the focus of this study is on the application of instructional methods to design interaction in asynchronous Internet-based distance education, the reviewed literature was limited to those resources which addressed one or more of Moore's three types of interaction (1989). This study does not address forms of interaction identified by other researchers, such as interaction between learner and technology or interaction between learner and "management (feedback)" (Northrup, 2001, p. 31).

Several of the resources identified in the literature suggest ways in which teachers can easily apply instructional methods to design interaction in asynchronous Internet-based distance education. However, this study does not provide specific instructions or training about how to design distance education instruction. The diversity of instructional methods and technology used by educational organizations prevents the adoption of one approach for each of the three types of interaction. Teachers should evaluate these resources for potential relevance within their educational environments to identify those instructional methods which best meet their pedagogical, curricular, and organizational needs.

An assumption of this study is that in each organization, decisions about technology and methods for delivering asynchronous Internet-based distance education instruction have been made. Some elements representing these types of decisions include: systemic design of instruction (e.g., “strategic alignment, research and development, management operations, logistics, professional development, and program evaluation”) (Harmon & Hirumi, 1996, p. 267-268), curriculum and assessment (Harmon & Hirumi, 1996), technology decisions (e.g., course management systems, hardware, software, etc.), the visual design aspects of distance education instruction, learners or teachers’ attitudes, beliefs, and perceptions about asynchronous Internet-based distance education, learner technology training concerns, learner learning styles, strategies, and approaches, curriculum decisions, and professional support systems (PSS) or learner feedback systems. The intent of this study is to provide general resources regarding the application of instructional methods to design asynchronous interaction in distance education instruction. Teachers should be familiar with the instructional methods which

can be employed within the administrative and technology constraints of their organization.

Numerous external factors (such as attitudes, beliefs, perceptions, technology, etc.) can influence the design of instruction (Bronack & Riedl, 1998). Attempting to replicate the results described in the resources for this study may not produce the same outcomes due to the influence of external factors. Teachers should consider external factors when employing the methods described in the resources of this study, adjusting the methodology as necessary for their educational environments.

Instructional methods, learning theories, and curriculum theories evolve over time, especially when implemented through technology. “Technological advances on the Internet and the World Wide Web have tended to drive online pedagogy” (Pyle & Dziuban, 2001, para 1). Therefore, over time, some of the research reviewed for this study, as well as the study itself, may become obsolete or ineffective. As technology evolves, the role, use, and implications of interaction in distance education instruction should be reviewed, new research conducted, and resources developed.

CHAPTER II

Research Methods

This study applied qualitative research methods to locate, analyze, and interpret the data collected through a systematic review of the literature. Qualitative research methods were selected because of how they enable the researcher to explore, interpret, and synthesize complex concepts through the collection and analysis of data (Leedy & Ormrod, 2001). This synthesized data identified how distance education teachers have applied instructional methods to design interaction in asynchronous Internet-based distance education instruction.

Data Collection

A literature review was determined to be the best method for collecting data for this study in order to examine the application of instructional methods to design interaction in asynchronous Internet-based distance education instruction and identify which instructional methods created interaction in distance education environments (Cooper, 1984, 1998). The literature search was conducted using library research data bases and the Internet. The a priori search categories included: distance education, instructional methods, and interaction. The intent was to find resources which either explicitly or implicitly addressed the application of instructional methods to design interaction, as defined by Moore (1989), in distance education instruction. The resources located in this initial search were evaluated to identify major Library of Congress descriptors and key words used to categorize the articles, books, and conference proceedings in the data bases. Additional resources were located through the references

of the selected resources. An iterative process was applied to narrow the focus of the search strategy to those resources most relevant to this study.

Resource searches were conducted in WebLUIS, a State University System of Florida data base for 11 college and university libraries. Additional research indexes accessed through the University of Central Florida's online library system included:

- Academic Index/LexisNexis Academic
- Academic Search Premiere
- Academic Universe
- Bibliographic File (RLIN)
- EBSCOhost
- Education Abstracts
- Elsevier Science Direct
- ERIC
- ERIC Document Reproduction Service
- INSPEC
- Library Literature
- PsycINFO.

The Library of Congress and key words used to conduct the searches included:

- Distance education, asynchronous learning, distance learning, distance teaching, distributed learning, e-Learning, flexible learning, open learning;
- Instructional methods, models of instruction, models of teaching, instructional strategies, instruction, instructional systems, instructional design, instructional technology; and

- Interaction, interactivity, interactive.

Articles, books, and conference proceedings were collected through this search process. Each of these resources was systematically reviewed for relevance to this study's goals. The decision for inclusion in this study was based upon the following criteria:

1. The publication presented frameworks or guidelines for the use of instructional methods in the design of distance education interaction,
2. The publication was referenced in other resources as being relevant to the use of instructional methods in the design of distance education interaction,
3. The publication presented information supported by research about the use of instructional methods in the design of distance education interaction, and
4. The publication date occurred between 1993 and 2003.

Data Analysis

Twenty-five selected resources on the application of instructional methods to design interaction in asynchronous distance education instruction were analyzed using conceptual analysis (Palmquist, 2003), a type of content analysis. A conceptual analysis approach was selected to provide the researcher with a systematic method to review the chosen literature in order to identify and quantify the occurrence of selected concepts, both implicit and explicit, relevant to this study (Palmquist, 2003). This approach was applied to the categorization and organization of an annotated bibliography as well.

Moore's (1989) three types of interaction (e.g., learner-content, learner-learner, and learner-teacher) were used to identify and code the findings in the literature. These concepts were considered constant and did not change throughout the data analysis

(Palmquist, 2003). Some other generalizations also were determined to be similar enough in meaning to be considered in the analysis: learner/student-text/subject, student-student, and student-instructor/expert/tutor. These generalizations were expanded throughout the analysis to reflect the terms or phrases which surfaced from the review of the entire body of literature (Palmquist, 2003).

Once the first phase of analysis, the coding phase, was completed, each of these concepts was coded a second time for “frequency” in order to determine the importance of interaction in the resources relevant to this study (Palmquist, 2003). This second phase of the coding process enabled the researcher to systematically review the resources to determine:

1. What specific instructional method was applied into the design to achieve interaction,
2. Whether Interaction was a desired result of the research or an unanticipated outcome, and
3. What was the relevance to the goals of this study (Palmquist, 2003).

Terms and concepts which were determined through the second phase of analysis to be irrelevant to the goals of this study were ignored (Palmquist, 2003).

The results from the frequency phase of the conceptual analysis were then further examined and categorized as trends in the application of instructional methods to design interaction in asynchronous distance education instruction. A trend was determined if the intent of the research resource was to:

1. Apply a specific instructional method in the design to achieve interaction and

2. Confirm the type of interaction occurred as a result of the application of a specific instructional method.

These trends aided the researcher in selecting the resources which best met the goals of this study.

Data Presentation

The data analysis outcomes of the reviewed literature were summarized in a list, tables, and annotated bibliography according to how they support the application of instructional methods to the design of interaction in asynchronous Internet distance education instruction. The tables and annotated bibliography were included in the paper as separate appendices for easier access. The list and tables were based on information identified from 25 resources and were organized based on Moore's (1989) three types of interaction (e.g., learner-content, learner-learner, learner-teacher). The literature resources in the list were presented in alphabetical order and numbered in an ordinal manner for easy retrieval by teachers.

In addition to the list and tables, an annotated bibliography was created to assist teachers in locating specific research resources which could support them in the application of instructional methods to the design of interaction in asynchronous Internet-based distance education instruction. Only resources which were cited most frequently in the selected research literature were included in the annotated bibliography.

The list, tables, and annotated bibliography were designed to provide teachers with resources to identify instructional methods which can improve interaction in distance education instruction. These tools can be used independently or together to aid teachers in applying instructional methods to design interaction in asynchronous distance education instruction.

CHAPTER III

Problem Area

With 90 percent of the colleges and universities surveyed in academic year 2000 - 2001 offering asynchronous Internet-based distance education courses and 88 percent of these institutions planning to increase their distance education course offerings (Waits & Lewis, 2003), more teachers are expected to design and develop distance education instruction (Jung, 2001).

According to Moore and Kearsley (1996), teaching in asynchronous Internet-based distance education environments is different from teaching in traditional classroom environments in four ways:

1. Teachers cannot see how learners react to the content, the teacher, or other learners. Without physical indicators, teachers cannot easily determine whether or not the learners understand content and communications, therefore cannot address concerns and issues without communication from the learner (Moore & Kearsley, 1996).
2. Teachers need to be more aware of distance learners' motivations and emotions in order to develop the appropriate support and structure to address motivational and emotional concerns. In distance education, teachers need to help learners assume more active involvement in their learning processes. To achieve this, teachers need to instill confidence, encourage risk taking, solicit participation, and promote interaction (Moore & Kearsley, 1996).
3. Teaching effectiveness "is highly dependent" (p. 126) on the teacher's knowledge, skills, and abilities about how to use the technology to produce

the appropriate learning outcomes (Moore & Kearsley, 1996). To achieve this, teachers need to understand the functionality of the available technology, what instructional methods and learning theories are associated with the successful use of the technology, and the constraints of the technology in meeting instructional objectives (Moore & Kearsley, 1996).

4. In many educational organizations, instructional designers or course managers or tutors may be employed to assist the teachers with course design, development, and management resulting in an additional communication and interaction layer between the learner, content, and teacher (Moore & Kearsley, 1996). Teachers need to develop clear lines of communication and interaction between the content, other learners, and the teacher to ensure timely feedback and successful interaction (Moore & Kearsley, 1996).

Farmer (2002) writes, “Pedagogically, most faculty do not have training in technology-based instructional design, and many have not even experienced rigorous online instruction, they sometimes find it hard to develop pedagogically sound Web-related courseware” (p. 2). Although teachers are trained in instructional methods designed to stimulate learning and interaction, in asynchronous Internet-based distance education instruction, the factors identified by Moore and Kearsley (1996), as well as the technology interface, create a physical and psychological distance, impacting the communication and interaction (Harmon & Hirumi, 1996).

Moore (1993) describes this physical and psychological separation between teacher and learner as the “transactional distance” (p. 22), the space in which potential miscommunications between the teacher, the content, the learner, and other learners can

occur. The transactional distance shapes unique models of teacher and learner behavior and interaction, impacting both teaching and learning (Moore, 1993).

According to Moore (1993), three clusters of variables in teaching and learning determine the transactional distance in distance education courses: (1) dialogue, (2) structure, and (3) learner autonomy:

1. Dialogue refers to the quantity and quality of interaction within a course (Moore, 1993). “The term ‘dialogue’ is used to describe an interaction or series of interactions having positive qualities that other interactions might not have” (Moore, 1993, p. 24).
2. Structure describes the how well an educational environment can accommodate the needs of each of its learners (Moore, 1993). “Structure expresses the rigidity or flexibility of the programme’s educational objectives, teaching strategies, and evaluation methods” (Moore, 1993, p. 26).
3. “Learner autonomy is the extent to which in a teaching/learning relationship it is the learner rather than the teacher who determines the goals, the learning experiences, and the evaluation decisions of the learning programme” (Moore, 1993, p. 31).

Each of these variables, together or independently, is influenced by the educational environment, teacher, and learners (Moore, 1993). “This is another way of saying that within the family of distance education programmes there are many different degrees of transactional distance” (Moore, 1993, p. 23). These degrees of transactional distance increase based upon the physical separation between the learner and the environment, and decrease based upon the quality of interaction between the learner and

the environment (Moore, 1993). Moore (1993) believes the transactional distance is more difficult to overcome in asynchronous distance education due to the separation of space and time, therefore interaction is more critical.

In face-to-face classroom environments, most interactions among learners and with the teacher are synchronous, occurring spontaneously (Hirumi, 2002b; Lee & Paulus, 2001). Asynchronous Internet-based distance education technology can reduce spontaneity and impede these various types of learner interaction (Hirumi, 2002b; Lee & Paulus, 2001). To overcome this obstacle, interaction must be designed into distance education instruction (Hirumi, 2002b; Northrup, 2001). “Key interactions that occur in f2f [face-to-face] environments must be carefully planned and sequenced as an integral part of elearning” (Hirumi, 2002b, p. 141).

According to Northrup (2001), considering the diversity of asynchronous Internet-based technology used in distance education, finding the one right way of designing these types of interaction is not feasible. Teachers should consider instructional design models and delivery systems, as well as instructional methods and learning theories, when making decisions about and preparing instruction designed to stimulate interaction (Roblyer & Wiencke, 2003). This interactive instructional design should be grounded in learning theories and instructional methods (Northrup, 2001). Through interaction stimulated by the application of learning theories and instructional methods, knowledge develops and learning occurs (Harmon & Hirumi, 1996; Hirumi & Bermudez, 1996; Kozma, 1994). Such a grounded approach to instructional design can generate intellectually challenging opportunities, eliciting deeper thinking and expanding students’ critical thinking and problem solving skills (Smith, Ferguson, & Caris, 2001).

More research regarding innovative and systematic instructional methods to design interaction into asynchronous distance education instruction is needed (Hirumi & Bermudez, 1996; Pyle & Dziuban, 2001). Educational researchers and practitioners should challenge the fundamental theories governing instructional design, teaching methods, and human learning when evaluating content delivery through asynchronous Internet-based distance education in order to ascertain the best instructional methods to effectively achieve curriculum objectives and learner outcomes (Hirumi & Bermudez, 1996). The synergy created through the application of systematic instructional methods to design interaction in asynchronous Internet-based distance education instruction can lead to more effective methodologies for developing distance education curriculum content and enhanced learning opportunities (Hirumi & Bermudez, 1996).

This study was conducted based upon the assumption teachers can learn how instructional methods can be applied to improve interaction in asynchronous Internet-based distance education environments and stimulate enhanced learning. The intent of this study was to create a research resource which would extend teachers' knowledge about ways in which instructional methods can be employed to design interaction into asynchronous Internet-based distance education instruction. According to Moore and Kearsley (1996),

The single most important skill that all distance educators must develop is to make their students active participants in their educational program. It is not too difficult to present information over a distance, but getting people to participate and making learning active at a distance is much harder (p. 133).

This study assumed teachers have limited time for professional development activities and want resources which are comprehensive and easily understood. Through the synthesis of the research in this study, both teachers and students can benefit. Teachers can benefit from review of these resources, gaining insight into how instructional methods can be used to design interaction in distance education courses. When teachers apply this knowledge to the design of their distance education courses, students can benefit through improved asynchronous interaction and enhanced learning. “Group and social interaction is an important facet of educational process and however “virtual” the future learning establishments are, such communication must be retained, technologically established and enabled and transparent interfaces provided for the non computer expert!” (O'Donoghue, Singh, & Dorward, 2001, p. 521).

CHAPTER IV

Review of References

The Review of References provides an annotated description of the key resources used in this study. The references are organized into three primary sections: (1) contextual references, (2) research methods references, and (3) interaction research references. The contextual references section presents the articles, books, and conference proceedings which provided guidance relative to framing this study in the larger information management context. These references generally focused more on theories regarding distance education, interaction, and instructional methods rather than research about the application of instructional methods to design interaction. The research method references section describes the resources which guided the research approach applied in this study. The interaction research reference section provides the key research resources which framed the analysis in the data analysis section of this study.

The references presented in each of these sections appear in alphabetical order by author's last name. Each reference presents (1) the relevance of the reference to this study, (2) the role of the reference in the study, and (3) the criteria used to select the reference.

Contextual References

Clark, R. E. (1991). When researchers swim upstream: Reflections on an unpopular argument about learning from media. *Educational Technology*, 31(2), 34-40.

Richard E. Clark is most famous for his controversial 1983 article entitled *Reconsidering Research on Learning from Media*. In that article, Clark likened instructional technology media to a delivery truck; he believed the medium was merely a

delivery mechanism for instructional content and did not influence learning. “Basically, the choice of vehicle might influence the cost or extent of distributing instruction, but only the content of the vehicle can influence achievement” (Clark, 1983, p. 445). In this article, Clark presented a review of arguments and positions relating to his 1983 article. He asserted current instructional technology research focuses more on finding applications for new technology solutions rather than on problems requiring research. His insight into the need for researchers to focus on instructional methods and content rather than instructional technology when researching the effectiveness of distance education, was used to support one of the assumptions of this study (e.g., instructional methods influence learning more than instructional technology, a communication tool to enable distance education). The author concluded the article restating his original position: “The evidence is overwhelming that media do not influence achievement” (p. 37). This article was selected for inclusion in this study based on Clark’s analysis of the roles of instructional methods and media in distance education instruction, which supported the focus of this study on instructional methods rather than instructional technology.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.

This book presented the results of one of Larry Cuban’s best known studies about the use of technology in schools, especially as it related to school reform. Specifically, he studied the integration of technology in Silicon Valley schools and its effect on the faculty, students, and instruction. Cuban’s perspective of the role of instructional

technology in education helped frame the focus of this study. His analysis and findings regarding the application of technology in various educational environments identified a wide variety of concerns and issues, as well as potential solutions. Cuban suggested effective implementation of technology in instruction requires teachers “find out how students learn, figure out the issues that confound novices in a field, and teach content in ways that unravel what students find difficult” (Cuban, 2001, p. 119). This book was selected for inclusion in this study for his research perspective of the educational automation process. The author identified factors for consideration regarding the training teachers should possess prior to designing instruction delivered through technology.

Gilbert, L., & Moore, D. R. (1998). Building interactivity into Web courses: Tools for social and instructional interaction. *Educational Technology*, 38(3), 29-35.

This article was one of the most commonly referenced in the resources reviewed. It presented a well-developed overview about the design of interaction into distance education instruction. The focus of the article was primarily upon the technological media available to generate interaction. Gilbert and Moore developed guidelines to support instructional decisions about the type of interaction desired, a taxonomy of instructional and social interactivity, and an explanation about how the taxonomy works. This information provided background for the development of the Brief and Full Purposes and Problem Area sections of this study. Gilbert and Moore’s perspective about the design of interaction in distance education instruction proved a valuable complement to several of the other authors mentioned in this Review of References.

Harmon, S. W., & Hirumi, A. (1996). A systemic approach to the integration of interactive distance learning into education and training. *Journal of Education for Business, 71*(5), 267-271.

This article presented a systems perspective of the merger of educational institutions with instruction to create a holistic distance education environment. Harmon and Hirumi detailed six primary elements which comprise a distance education system: (1) strategic alignment, (2) research and development, (3) management objectives, (4) logistics, (5) professional development, and (6) program evaluation. In the systematic design of distance education instruction, the authors described the three primary components: (1) curriculum, (2) instruction, and (3) assessment. The proposed systematic design of instruction focused on a student-centered distance learning model. This article was selected for inclusion in this study for its presentation of a systems perspective toward distance education environments and instruction. The concepts presented would be especially valuable to organizations new to or inexperienced with distance education.

Kozma, R. B. (1994a). A reply: Media and methods. *Educational Technology Research and Development, 42*(3), 11-14.

Kozma explored conditions in which educational technology media could influence learning. This article presented a counter perspective to Clark's (1983) article, *Reconsidering Research on Learning from Media*. Kozma provided another perspective to the influence of educational technology media on learning and interaction discussion. He presented recommendations for ways in which technology capabilities need to be

considered and employed in order to produce the desired interactions and generate the appropriate cognitive and social processes for learning. This article was selected for inclusion in this study because it presented a different perspective from Clark's articles about the value of educational technology in instruction. The author's summary about the implications for educational technology in instructional practices proposed a blended approach between instructional methods and media.

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

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 272). New York, NY: Routledge.

Moore, M. G. (2001). Surviving as a distance teacher. *American Journal of Distance Education*, 15(2), 1-5.

Most of the authors of the interaction research resources reviewed for this study referenced Michael G. Moore's (1989) editorial *Three Types of Interaction*. Although Moore may not have been the first to identify the importance of interaction in distance education, he often is viewed as the expert.

In the first article reviewed for this study, *Three Types of Interaction* (1989), Moore identified the primary interactions in learning environments as: (1) learner-content, (2) learner-instructor, and (3) learner-learner. Most of the research articles reviewed which focused on defining interaction in instruction identified Moore's three types of interaction prior to identifying additional interactions due to instructional technology. Moore's three-tiered definition is the one used to describe interaction in this

study. These definitions of interaction provided a structured approach and comprehensive parameters for differentiating between each type of interaction in the research for this study for data analysis purposes.

Moore's (1993) article, *Theory of Transactional Distance*, also was pivotal in the research for this study. In this article, Moore defined and described the physical and psychological separations learners experience in distance education. This separation, also known as transactional distance, can have a negative affect on interaction in distance education. The information was used to support the development of the Problem area of this study. This article was selected for inclusion in this study because it elaborated on and helped clarify the importance of interaction in distance education instruction.

The third Moore article to be included in this study was *Surviving as a Distance Teacher* (2001). This article presented teachers' roles in the preparation, presentation, and participation of distance education courses and issues they encountered. Moore addressed topics including: the types of teacher writing skills necessary, approaches teachers can use to motivate learners and encourage independence and responsibility, and communication and interaction methods which enhance learning. This article was selected for inclusion in this study because it provided general guidelines teachers should consider prior to designing or teaching an online course.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing Company.

This book presented a comprehensive systems perspective of distance education. Moore and Kearsley explained the various components comprising a distance education

system and how those components work together as a system. The synthesis of key concepts in distance education research, theories and issues provided a global perspective of distance education for the Brief and Full Purposes and Problem Area sections of this study. This book was selected for inclusion in this study because it provided a good description of the various elements of distance education, especially course design and development. This foundation provided a useful framework for examining the various research resources compiled for this study.

Research Method References

Cooper, H. M. (1984). *The integrative research review: A systematic approach*.

Thousand Oaks, CA: SAGE Publications, Inc.

Cooper, H. M. (1988). Organizing knowledge synthesis: A taxonomy of literature reviews. *Knowledge in Society*, 1(1), 104-126.

Cooper, H. M. (1989). *Integrating research: A guide for literature reviews*. Thousand Oaks, CA: SAGE Publications, Inc.

Cooper, H. M. (1998). *Synthesizing research: A guide for literature reviews*. Thousand Oaks, CA: SAGE Publications, Inc.

Taken together, these three books and article provided a comprehensive explanation of literature review processes, as defined by Cooper. These processes were supported with useful examples of research methods and review approaches. Cooper's systematic approach to literature reviews provided this researcher with the processes needed to collect, analyze, and review the resources for this study, as well as layout the data.

Leedy, P. D., & Ormrod, J. E. (2001). *Practical research: Planning and design* (7th ed.). Upper Saddle River NJ: Merrill Prentice Hall.

This book presented a broader perspective of research methodologies, including a detailed, yet high-level, overview of both qualitative and quantitative research methods. This researcher found Leedy's description about evaluating, organizing, and synthesizing literature especially helpful. This book was selected for inclusion in this study because it presented excellent examples of research processes. The examples clarified ways in which resources are incorporated in the study.

Palmquist, M. (2003). *Writing@CSU: Writing guide*. Retrieved September 22, 2003, from <http://writing.colostate.edu/references/research/content/index.cfm>

This Internet site presented a comprehensive, yet understandable, approach to designing, developing, and writing a research document. The sections on content and conceptual analyses provided definitions, examples, and links to other research and writing resources. The step-by-step approach to content analysis clarified the process and added to the researcher's understanding of research methodology. This Internet site was selected for inclusion in this study because it provided a systematic approach to data collection, analysis, and presentation when employing content and conceptual analyses. The writing and grammar recommendations also were valuable.

Interaction Research References

Bermudez, A. B., Ed.D., & Hirumi, A., Ph.D. (2000). Examining the effectiveness of systematically-designed Web-based instruction. *Interactive Learning Environments*, 8(3), 279-290.

This article presented the findings from a study about learner-content and learner-learner interactions in a higher education distance education course. The research method used in this study was a “28-item Likert scale type instrument measuring attitudes and knowledge” (p. 284). Information from this article informed the discussion of the use of cooperative learning instructional methods to create interaction in a distance education course in the Brief and Full Purpose and Problem Area sections of this study. The article compared the knowledge gained in learner-content and learner-learner interactions. This article was selected for inclusion in this study because the results contribute to an understanding of the application of collaborative learning instructional methods to design interaction in distance education.

Hirumi, A. (2002). The design and sequencing of e-Learning interactions: A grounded approach. *International Journal on E-Learning*, 1(1), 19-27.

This article proposed a process for the design and sequencing of learner-content, learner-learner, and learner-teacher (as well as others not covered in this study) interactions. The process proposed was a grounded-learning systems design approach to the designing and sequencing of eLearning interactions. Grounded-learning systems design is defined as “the systematic implementation of processes and procedures that are rooted in established theory and research in human learning” (Hannafin, Hannafin, Land,

& Oliver, 1997, p. 102). The information provided in this article was used to develop the Brief and Full Purpose and Problem Area sections of this study. The research provided in this article also was the foundation for the next article in this review.

Hirumi, A. (2002). A framework for analyzing, designing, and sequencing planned elearning interactions. *The Quarterly Review of Distance Education*, 3(2), 141-160.

This article provided a framework for depicting the types of interaction which facilitate e-Learning. The framework suggested “three basic, interrelated levels of interaction” (p. 143) believed to be essential components of eLearning: Level 1 - learner-self interactions; Level 2 – learner-human interactions and learner-non-human interactions; Level 3 – learner-instruction interactions. These levels of interaction contributed to this researcher’s understanding about learner-centered instructional design in distance education. This article was selected for inclusion in this study because Hirumi expanded upon the grounded-learning systems design process described in the previous article. The visual representations of the theory illustrated the framework in an effective manner.

Hirumi, A., & Bermudez, A. B., Ed.D. (1996). Interactivity, distance education, and instructional systems design converge on the information superhighway. *Journal of Research in Computing in Education*, 29(1), 1-16.

This article presented findings from a study about the systematic design of an asynchronous graduate level course. A case study research approach was used to

demonstrate “how models and theories of human learning and instructional design were adapted to develop” (para. 4) an asynchronous online program. Hirumi and Bermudez’s perspectives about the application of systems design to the development of asynchronous distance education instruction contributed to the development of the Problem Area of this study.

Northrup, P. T. (2001). A framework for designing interactivity into Web-based instruction. *Educational Technology, 41*(2), 31-39.

Pamela T. Northrup was one of the more commonly referenced authors in the resources reviewed for this study. Her perception of the role of interaction in distance learning environments was often cited to support other authors’ findings about interactions.

This article presented a framework for designing interaction into distance education courses. The framework provided five interaction attributes (e.g., learner-content, learner-learner, learner-teacher, learner-interface, and learner-management/feedback) which can be applied to the selection of strategies and tactics to design interaction. Northrop identified two primary instructional methods categories (e.g., teacher-centered and learner-centered) and how those relate to the five interaction attributes. According to the author, the five interaction attributes were: “(1) interaction with content, (2) collaboration, (3) conversation, (4) intrapersonal interaction, and (5) performance support” (p. 37). The information from this article contributed to the development of the Brief and Full Purpose and Problem Area sections of this study.

This article was selected for inclusion in this study because of its perspective about how to apply instructional methods to the design of interaction (e.g., learner-content, learner-learner, learner-teacher, learner-interface, and learner-management/feedback) in online courses. According to the author “The trick is to provide levels of interaction appropriate to the learning outcomes of the course, while constantly ensuring that the communications loop is perceived by the online learner to be “complete” (p. 37).

Northrup, P. T. (2002). Online learners' preferences for interaction. *The Quarterly Review of Distance Education*, 3(2), 219-226.

This article presented the results of a study applying the constructs identified in the previously mentioned article to a graduate level Internet-based course. The focus of this study was what learners perceived to be important types of interaction for online learning. The interaction attributes studied were: “(1) content interaction, (2) conversation, (3), collaboration (4) intrapersonal/metacognitive skills, and (5) need for support” (p. 320). Northrup’s insight into the students’ perceptions of eLearning interactions and the description of a positive correlation between the quality of learner interactions and satisfaction with distance education instruction were used to help frame the Problem Area section of this paper.

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

This article was one of the most commonly referenced articles by the resources reviewed for this study. Ellen D. Wagner's definition of interaction in distance education was frequently cited to support other authors' research studies. In addition to providing a functional definition for interaction as it is used in this paper and elsewhere, this article provided a framework for future interaction research studies. The framework identified four domain constructs: (1) learning theories, (2) instructional theories, (3) instructional design, and (4) instructional delivery. Wagner suggested each of these constructs has an affect on interaction in educational environments. Based on these observations, she recommended research about interaction in learning should examine each of these constructs to accurately determine which affected the interaction being studied.

This article was selected for inclusion in this study for its perspective about how these different domains affect interaction in distance education. According to Wagner "Until investigators are able to focus their collective attention on the outcomes of learning and the instructional interventions that are meant to encourage interaction or interactivity, future discussion is likely to emphasize semantics and definitions rather than human performance improvement" (p. 26).

CHAPTER V

Results of Literature Synthesis

This chapter describes the results of the content and conceptual analyses of 25 selected research references detailing the application of instructional methods to design interaction in asynchronous Internet-based distance education instruction. As described in Chapter II, Method, of this study, a systematic review of selected concepts was used to identify the references described in this chapter.

Each of the references chosen presented some empirical findings or provided taxonomies or guidelines for the application of instructional methods to design one or more of the three types of interaction in distance education instruction. (Some of these references also appear in the Review of References section of this study.) The 25 references are listed below in alphabetical order:

1. Barab, S. A., Thomas, M. K., & Merrill, H. (2001). Online learning: From information dissemination to fostering collaboration.
2. Bermudez, A. B., Ed.D., & Hirumi, A., Ph.D. (2000). Examining the effectiveness of systematically-designed Web-based instruction.
3. Blignaut, S., & Trollip, S. R. (2003). Developing a taxonomy of faculty participation in asynchronous learning environments - An exploratory investigation.
4. Bober, M. J., & Dennen, V. P. (2001). Intersubjectivity: Facilitating knowledge construction in online environments.

5. Cannon, M. W., Umble, K. E., Steckler, A., & Shay, S. (2001). "We're living what we're learning": Student perspectives in distance learning degree and certificate programs in public health.
6. Carswell, A. D., & Venkatesh, V. (2002). Learner outcomes in an asynchronous distance education environment.
7. Chang, S. L. (2001, November 8-12). *What types of online facilitation do students need?*
8. Chou, C. C. (2001, November 8-12). *Model of learner-centered computer-mediated interaction for collaborative distance learning.*
9. Daradoumis, T., & Marques, J. M. (2002). Distributed cognition in the context of virtual collaborative learning.
10. Gibbs, W. J., & Powell, P. J. (1997). Virtual courses and visual media.
11. Hirumi, A. (2002). The design and sequencing of e-Learning interactions: A grounded approach.
12. Hirumi, A. (2002). A framework for analyzing, designing, and sequencing planned elearning interactions.
13. Hirumi, A., & Bermudez, A. B., Ed.D. (1996). Interactivity, distance education, and instructional systems design converge on the information superhighway.
14. Hung, D. (2002). Situated cognition and problem-based learning: Implications for learning and instruction with technology.
15. Hung, D. W. L., & Chen, D.-T. (2001). Situated cognition, Vygotskian thought and learning from the communities of practice perspective: Implications for the design of Web-based e-Learning.

16. Kochery, T. S. (1997). Distance education: A delivery system in need of cooperative learning.
17. Lee, M., & Paulus, T. (2001). An instructional design theory for interactions in Web-based learning environments.
18. Mortera-Gutierrez, F. (2002). Instructor interactions in distance education environments.
19. Mortera-Gutierrez, F., & Murphy, K. (2000, January 25-28). *Instructor interactions in distance education environments: A case study*.
20. Northrup, P. T. (2001). A framework for designing interactivity into Web-based instruction.
21. Northrup, P. T. (2002). Online learners' preferences for interaction.
22. Quitadamo, I. J., & Brown, A. (2001, June 25-27). *Effective teaching styles and instructional design for online learning environments*.
23. Sutton, L. A. (2001). The principle of vicarious interaction in computer-mediated communications.
24. Vrasidas, C. (2000). Constructivism versus objectivism: Implications for interaction, course design, and evaluation in distance education.
25. Wang, C. Y. J., Resta, P. E., & Miller, P. (2001). The medium is the message - The design of an online collaborative learning community.

Each of the references was analyzed using the three a priori types of interaction detailed by Moore (1989) and reviewed in Chapter II of this study. A synthesis of the findings, taxonomies, and guidelines discovered through the analysis is provided in this section. The findings are organized based upon Moore's three types of interaction:

learner-content, learner-learner, and learner-teacher. Because one type of interaction rarely occurs independently of other types of interaction, some references may appear more than once in this section. Findings, guidelines, and taxonomies are quoted from the source with minor edits to provide a synopsis of the research articles reviewed for this study. As a way to further synthesize the findings for each type of interaction, the information also is presented in tables located after the Appendices at the end of this study.

Learner-Content Interaction

The learner-content type of interaction coded in this study produced the least number of research resources – nine of the total 25. Often, references to learner-content interaction appeared in research regarding all three types of interaction. For example, the focus of Gibbs and Fewell's (1996) study was learner-teacher interaction in primarily a direct instruction distance education environment, however part of that interaction directly correlates with the teacher's role in the design and development of the content with which the learner interacts. Due to the correlation between content and teacher, it would be difficult to study learner-content interaction and exclude learner-teacher.

Gibbs and Fewell (1996) suggested distance education instruction requires teachers modify “traditional instructional methods and media” (p. 180). Due to the visual nature of much distance education media, “using them to facilitate interactions and convey course content requires, among other things, a clear understanding of how to convey information visually” (p. 180). A few of Gibbs and Fewell's (1996) guidelines proposed for learner-teacher interaction which also apply to the development of content include: “To maintain interest, instructors should use written language in a skillful way

including the use of humor and metaphor” (p. 181); “For best legibility, use lowercase letters, adding capitals only where normally required” (p. 181); “Text lines should not be too close together or separated too far apart” (p. 181); “Use headings and white space effectively” (p. 181); “Present a sensible ordering of information by topic” (p. 182); “create conceptual maps for instructional content. . .(to) demonstrate structural knowledge or how a particular topic or concept is structured relative to other topics and sub-topics” (p. 182); “categorize (WWW) links into two major groups: 1) essential links which lead to essential information, and 2) supplemental links which provide related but divergent information” (p. 182); “Create a consistent navigational design that enables students to easily obtain documents that relate to the documents being viewed” (p. 182); “Do not make documents longer than necessary if they can be segmented into more than one file. . . reword or abbreviate text so it will fit within the visual design of the screen” (p. 182); “provide a linear pathway through documents” (p. 182); use Internet screen frames to enhance instructional content; frames “helped to visually organize information. . . (and) enabled consistent visual referents (e.g., menu selections) to be used which assisted user navigation” (p. 183).

In his grounded approach to design interaction in e-Learning, **Hirumi (2002a)** suggested a taxonomy for teachers to use to identify an instructional method to design interaction in distance education instruction. The taxonomy was designed to accommodate a variety of instructional methods and interactions. Hirumi proposed a five-step process to apply the taxonomy within a systematic design model:

“Step 1 – Identify essential experiences that are necessary for learners to achieve specified goals and objectives (optional).

Step 2 – Select a grounded instructional strategy based on specified objectives, learner characteristics, context and epistemological beliefs.

Step 3 – Operationalize each event, embedding experiences identified in Step 1 and describing how the selected strategy will be applied during instruction.

Step 4 – Define the type of interaction(s) that will be used to facilitate each event and analyze the quantity and quality of planned interactions.

Step 5 – Select the telecommunication tool(s) – chat, email, board system – that will be used to facilitate each event based on the nature of the interaction” (para. 22-26).

Hirumi (2002b) expanded upon this taxonomy by proposing a framework which could be “used to analyze, design, and sequence planned eLearning interactions” (p. 143). This framework is comprised of “three basic, interrelated levels of interactions” for eLearning: Level I – Learner-self; Level II – Learner-Human/non-human interactions; and Level III – Learner-instruction. Learner-content interactions are categorized under this framework’s Level II – Learner-Non-human interactions because content is an inanimate construct. According to Hirumi, in eLearning environments, learner-content interactions “occur when learners access audio, video, text, and graphic representations of the subject matter under study” (p. 146). Based on his review and analysis of prior research findings, Hirumi posited “instructional design has a greater impact on student achievement than the media used to deliver the content” (p. 146). From this perspective, he identified four criteria teachers need to consider when designing learner-content interaction: “First, are the plug-ins and other software applications necessary to read various multimedia file formats readily available to learners? . . . Second, is the expertise necessary to generate the desired multimedia resources available on staff or are funds

available to outsource such development requirements? Third, how durable are the multimedia resources? . . . Finally, what is the return on investment for creating such files? Creating and maintaining multimedia content costs a lot more than text. Is the resulting effect on student attitudes, learning or performance worth the price?" (pp. 146-147).

In a different study, **Hirumi and Bermudez (1996)** illustrated a systematic design for stimulating interaction in an asynchronous Internet-based graduate course. Gagné's Nine Events of Instruction were used to design the three types of interaction. Several of the Nine Events of Instruction designed learner-content interaction:

“(1) Gaining Attention. Various stimuli (e.g., video clips, still photos, scenarios, sound bites, readings, and cartoons) are used to gain and sustain learners' attention. . .

(2) Inform Learners of Objectives. Within each lesson, an introduction acts as an advance organizer, describing what learners are expected to know as a result of instruction. . . The lesson maps are also designed to help learners understand the relationship between the objectives and course content. . .

(3) Stimulate Recall of Prior Learning. In the introduction to each lesson, students are given a brief description of what they should already know and be able to do before the new lesson (Figure 3). If students decide that they are not prepared to continue, hypertext links allow them to go directly to prerequisite information.

(4) Present Stimulus. Information and examples were provided in each lesson. Again, various stimuli and sensory modalities were used to accommodate a variety of learning styles (Figure 4). The stimulus ranged from video clips, still photos, written scenarios, sound bites, readings, and cartoons. Particular attention was placed on

minimizing the amount of text provided on each page and on keeping audio and video clips relatively short to facilitate access over the Internet.

(5) Provide Learning Guidance. As Figure 2 demonstrates, the Lesson Maps graphically illustrate the relationship between lesson objectives and content and help students navigate through the program. Clear and concise instruction shows students where and why they are at every point in the program. In addition, a complete student handbook documenting the use of technology and describing key program features is available online. . .

(6) Elicit Performance. Strategies for eliciting student performance are grounded in Vygotsky's (as cited in Cole et al., 1978; 1986) stance that concepts are developed and refined through social interactions. . . Each lesson contains individual and group activities to help students' construct meaning based on their own knowledge structures . . . the activities challenge students to apply what they know and to extend it beyond prescribed parameters. Most activities do not require a "right" or "wrong" answer; instead they help students develop informed opinions or analyses. . .

(9) Enhance Retention and Transfer. To enhance retention and transfer, activities were designed that required learners to apply learned skills and knowledge in novel situations. . ." (para. 17-26).

Based upon the application of Gagné's Nine Events of Instruction within a systematic design for an asynchronous Internet-based graduate course, Hirumi and Bermudez (1996) posited three factors contributing to learner-content interaction. The three factors are "the systematic-design approach imitates how knowledge is acquired and retained. . . (and) creates a continuous flow of information that branches out and

integrates previously established knowledge” (para. 35); “Matching instructional goals with learner outcomes creates a . . . focus on what students are supposed to learn and do. As a result, instructors relinquish to the learners the responsibility for creating and acquiring knowledge” (para. 36); and “the ongoing formative evaluation aspect of the project also alters the content of the pre-planned material and makes it more relevant and clear for the intended audience” (para. 36).

Lee and Paulus (2001) also applied a grounded-learning systems design to develop an asynchronous Internet-based graduate course. In their case study, cognitive domain instructional methods were used to design four types of interaction: (1) learner-self, (2) learner-learner, (3) learner-teacher, and (4) learner-resources. The findings relevant to learner-content included: teachers need “to identify the prerequisite skills, knowledge and the needs of the individual before and during the instruction;” “learners were interested in discussions and assignments that were relative to their lives and needs;” “For reflection on learning, the learners were required to complete self-reflections after each project. . . (reflecting) upon what resources they used to complete the projects and how their understanding changed during the unit activity. . . (providing) a synthesis framework in which to place the theories and the self-reflections. . . helpful in fostering metacognitive development;” “In an online environment, it proved to be efficient to provide additional Web-based resources to supplement the text . . . having models or examples of expected work were extremely helpful, . . . (as well as) more guidelines for collaborative assignments, more specific grading rubrics and more advice for successful online collaboration” (pp. 249-250).

These observations supported **Northrup's (2001)** assertion "The instructional content is the central component of a Web-based course, as this is where new knowledge, skills, and abilities are presented. . . the way in which knowledge is shared sets the stage for all interactivity within the Web-based course" (p. 32). In both Northrup (2001) and **Mortera-Gutierrez's (2002)** research, they found a strong correlation between teachers' pedagogical beliefs and their choice of instructional methods and techniques. Northrup (2001) categorized teachers' pedagogical beliefs into two primary approaches: teacher-centered and student-centered. According to Northrup, teacher-centered instruction worked best when "procedural, declarative, or well-defined in role and definition" (p. 33) aspects applied; learner-centered instruction worked best "When the outcomes of instruction are to analyze, synthesize, or evaluate, or when ill-defined authentic problems are the focus" (pp. 32-33). In a teacher-centered approach, "*information* is presented, *examples* are provided, *practice* exists, and in many cases, *feedback* is available through mentors and instructors" (p. 33). "Examples of student-centered learning in a Web-based environment include demonstrations, debates, simulations, role-plays, case studies, and discussion groups" (p. 34).

In another case study, **Northrup (2002)** found both of these approaches to learner-content interaction are "appropriate given the learning outcome and topics of the course content" (p. 223). Within this study, she discovered learners felt "most comfortable with the "feeling" of a traditional class. With the highest reported perceptions of positive interaction (learner-content) in the areas of audio-narrated presentations and readings text followed by discussions" (p. 223).

Vrasidas (2000) compared the application of objectivism (a teacher-centered approach) and constructivism (a learner-centered approach) instructional methods to design interaction in an asynchronous Internet-based distance education course. To illustrate his findings, Vrasidas provided a framework for both an objectivist and a constructivist approach to instructional design. The framework for each consisted of three phases. In an objectivist approach, the three phases are: input, process, and output; in a constructivist approach, the three phases are analysis, design, and evaluation.

In the input phase of “a traditional objectivist approach. . . the distance educator breaks down the content in small chunks, analyzes it, and identifies the major issues. . . Clearly specified boundaries are set for what is relevant in the course. . . tasks that the learner is expected to perform during, and at the end of instruction” (para. 15-16) are identified. “There is one correct and efficient way of performing each task and the teacher identifies that in advance and employs strategies that map those steps in the correct sequence on the learner’s mind” (para. 16). In the process phase, “the two (types of interaction) most valued by an objectivist distance educator are the learner-teacher and learner-content interaction. Therefore, in designing a distance education course, the distance educator will structure the course so that there is a lot of learner-content and learner-teacher interaction. . . . To promote learner-content interaction, the teacher assigns readings, literature reviews, reaction papers, asks specific questions about the content, and so forth. . . (with) a set of predetermined assignments, readings, and deadlines for submitting homework” (para 19-20). In the output phase, Vrasidas (2000) identified two processes which promote learner-content interaction: “the specification of objectives, which indicate the expected observable behavior from the part of the learner.

Then, the teacher identifies the specific situation in which the learner will demonstrate the particular behavior” (para. 20).

In the analysis phase of a traditional constructivist approach, “Context and content are crucial (to learner-content interaction). . . they determine the method and strategies employed in a course. . . the goal is to provide students with opportunities to think like experts in making decisions about selecting systems for appropriate use, structuring learning activities, and employing sound pedagogical strategies in real-life contexts. . . the emphasis is not on the learner’s prior knowledge but on his cognitive processes, self-reflective skills, and the learning process itself. The goal is to cultivate the learners’ thinking and knowledge construction skills. . . The constructivist teacher does not expect that all students learn the exact same thing. . . (or) know in advance all the specific knowledge that each student will construct. What the teacher can know is the broad area of knowledge and provide opportunities for learners to develop skills necessary to further explore a given domain” (para. 28-31). In the design phase, learner-content interaction was stimulated by “tasks, activities, and assignments. . . should be parts of a broader scope that ties all the little tasks together. . . The constructivist teacher structures the learning environment so that the teacher has the opportunity to model expert behavior to students in the related subject” (para. 34-38). “Reflection papers and student’s self-reflective journals” (para. 43) were identified as two examples of instructional methods creating learner-content interaction in the evaluation phase.

Learner-Learner Interaction

The majority of research articles reviewed for this study applied instructional methods to design learner-learner interaction – 12 of the total 25. Most of the studies

applied learner-centered instructional methods to design this type of interaction; several of these studied the development of cognitive or collaborative learning environments to stimulate interaction. Another trend in the articles depicting learner-learner interaction was the focus on creating an environment which encouraged and supported this type of interaction.

For example, **Barab, Thomas, and Merrill (2001)** studied an asynchronous Internet-based distance education graduate course which applied collaborative learning instructional methods to stimulate learner-learner and learner-teacher interaction. Four virtual spaces provided opportunities for interaction: discussion group area, announcement message board, general discussion area, and chat room. “In this online course, only very simple interactive tools (e.g., asynchronous message boards, chats, and some e-mail) were used. Participants did not interact with computers; they interacted through computers with each other” (para. 118). “The course began with students posting autobiographies, . . . followed by URL reviews of three sites. . . they posted and discussed individually selected research articles and books they read, had small group discussions around group projects, and . . . posted course reflections” (para. 19). “The course supported the emergence of a positive, caring, non-threatening environment” (para. 107) which encouraged “reflective and critical thinking, allowing for deep and meaningful learning to occur” (para. 114) among the learners and contributing to the formation of a learning community.

Bermudez and Hirumi (2000) studied a more structured, systematic approach to the application of cognitive instructional methods in an asynchronous distance education course. The authors wrote, “The program also incorporated the characteristics of

effective technology-mediated interactive learning defined by Dede (1990): (a) the use of a technological medium that either intervenes between direct person-to-person interaction or provides a shared environment that shapes the process of interpersonal communication; (b) spontaneous participant interactions; and (c) the use of technology-based tools experiences that enhance the collective learning of the people involved, as well as their individual accomplishments. The choice of technological mechanisms for our program (i.e., e-mail, listserv, World Wide Web activities, and video conferencing) created a climate which promoted shared environments; thus enhancing the potential for user interactions” (pp. 282-283). In this study, the learners were divided into two groups; in one group the learners worked independently while the learners in the other group worked collaboratively. “The purpose of working in groups (helping each other interpret content information, examining alternative perspectives and group problem solving), as well as additional information on effective team work was given to this group. Training in learning heuristics specific to working in collaboration included (a) listening strategies, (b) practicing the critique of ideas, not people, (c) assuming roles within the group, etc.)” (p. 284). “Although findings associated with individual versus cooperative group learning in this study proved inconclusive, they provided insights into the challenges of creating effective cooperative learning environments in higher education settings as well as the need for extensive formal training in cooperative learning strategies” (p. 287).

Bober and Dennen (2001) explored the application of cognitive instructional methods to create intersubjectivity and learner-learner interaction in distance education. “Intersubjectivity is shared understanding that helps us relate one situation to another” (p. 241). To achieve these types of interaction, a computer-mediated communication

environment was developed to “support the type of collaborative exchange and mutual understanding incumbent to successful instructional discourse (and therefore characteristic of Intersubjectivity)” (p. 242). A learner-centered approach was developed within this technological environment. “Learner-centeredness fosters community building . . . Instructional settings that are community-oriented treat errors and mistakes (in understanding, for example) as learning opportunities without negating or discounting behavioral norms and expectations” (p. 242). Various communication methods (e.g., chats, discussions, e-mail) were designed into the instruction. “Sharing personal perspectives helps learners validate their own viewpoints while being exposed to and coming to understand other positions” (p. 242). The authors cautioned teachers, however, to be “aware of how their own voice affects learner participation and how scaffolding techniques can be used to build learner interaction and investment” (p. 245).

Based on the results of this study, “asynchronous interactions, thus, can be seen to hold greater potential for building community knowledge. Salmon (2000) describes five steps of online learning, which can be used as a framework for assessing whether or not shared knowledge is developed in an online class. The first two steps, access and motivation and online socialization, prepare learners for participation at the higher three steps, information exchange, knowledge construction and development. . . On the third stair, information exchange, instructor dissemination of information and student messages written to the instructor, is the most prevalent. . . Negotiation of shared meaning and responsiveness to peers occurs at the fourth stair, knowledge construction. . . At this fourth stage, the hierarchy of instructor and students is said to have flattened, with peer interactions taking the central role through the use of examples and debate. . . At the

fifth stair, development, students are using their shared knowledge to create something altogether new. . . Students who can navigate peer relationships at this level in an online course have become both sensitive readers and writers, and are comfortable admitting when they lack knowledge or feel there may be a miscommunication” (pp. 248-249).

In another learner-centered and collaborative instructional methods distance education course, **Chou (2001)** posited Moore (1989) and Hillman’s (1994) definitions for the four types of interaction (e.g., learner-content, learner-learner, learner-teacher, and learner-interface) “highlight the importance of the interrelationship among learners, content, and technology. In the design of a learner-centered distance learning course, it is important to include the four types of interaction in the design. Furthermore, learner-centered principles (LCPs) also provide “an essential framework to be incorporated in new designs for curriculum and instruction, and assessment systems for evaluating educational goal attainments” (American Psychological Association, 1997, p. 1). LCPs consist of the following areas of learning: cognitive and metacognitive factors, motivational and affective factors, developmental and social factors, and individual differences” (p. 75). To apply these instructional methods to the course design, she applied Jonassen et al.’s (1995) four constructivist attributes for building learning systems: context, construction, collaboration, and conversation. “*Context* refers to the “real world” implications. . . Learning tasks should have real-world implications so that learners can connect what they learn in the classroom with the real world. . . *Construction* concerns knowledge that is built on the “active process of articulation and reflection within a context” (Johanssen, 1995, p. 8). . . Learners master a subject better in the process of constructing knowledge. *Collaboration* helps learners to develop, test, and

evaluate their ideas with peers. . . *Conversation* is engaged in by group members for purposes such as planning, collaboration, and meaning making. It is most important for distance learning because most communication is done through online exchanges. . . Distance learning courses that are based on the LCPs and constructivism have demonstrated enhanced interaction and academic achievements” (p. 75). Based on this study, the findings indicated constructivist instructional methods “do contribute to different patterns of interaction” (p. 79). Some of the specific findings included: “asynchronous peer review provides the opportunity for collaboration on building knowledge bases and information sharing;” “in asynchronous mode, students seemed to be more interested in expressing opinions than challenging each others’ views;” “student-moderated conferences. . . allows learners to take initiatives in their learning and be efficient in communication;” “forming small groups for online seminars or group projects helped to reduce the initial disorientation and confusions of online learners” (p. 79).

Daradoumis and Marques (2002) studied another example of a distance education collaborative learning instructional methods course. The primary focus of this course was developing learners’ problem-solving skills. In this study, the authors tested an approach for “analyzing and modeling asynchronous collaborative interactions” (para. 1). Based on the findings of this study, “the cognitive factors that affect the learning process of the student are:

- The type and purpose of the dialogue episodes that take place in the interaction.
- The number of exchanges that involve knowledge transfer (give-information exchanges), problem-solving activities (ascertain-information exchanges),

questioning and elicitation of knowledge (elicit-information exchanges), and the number of exchanges that each participant initiates.

- The number of contributing and supporting moves made by a participant. . .
- The type and the effectiveness of the contributing or supporting moves made...
- The types of activities in which the participants have been involved; these include planning activities, knowledge contribution, reflection, and revision of the methodology of both the problem-solving situation and the way collaboration is performed, evaluation of the progress made, expressing opinions, beliefs, reasoning, attitude, needs, desires, capabilities, rights, and consciousness. . .

There are also cognitive factors that influence the group dynamics and roles, such as:

- mutual confidence;
- acquisition of the compromise and responsibility to pursue and accomplish the shared objectives. . .
- support and motivation of each other;
- work pace . . .
- well-defined member attitudes . . .
- group organization and task planning . . .
- group interaction . . .” (para. 36-38).

Another example of a study of problem based learning within a cognitive environment was conducted by **Hung (2002)**. In this study, Hung proposed an approach

to problem-based learning. The following conditions are necessary to design a problem-based learning process:

1. students' active learning through posing own problems, questions, and seeking the respective solutions;
2. instructors facilitate integrated learning. . .
3. instructors can also introduce tools to help students think (e.g., mind mapping, problem-solving strategies, etc.). . .
4. students go through a process of cumulative learning. . .
5. students learn for understanding, rather than for recall of isolated facts, through appropriate opportunities to reflect on their educational experiences, and through frequent feedback from peers and instructors, linked with opportunities to practice the application of what has been learned;
6. instructors need to assess students, particularly at the formative process of learning. . .
7. instructors need an acceptance that students will need time to change their assumptions and expectations about learning and to develop and practice new skills;
8. instructional support needs to be provided with realistic and pragmatic goals that can be achieved; and instructors need to adopt a pragmatic and realistic approach. . ." (para. 63-71).

Hung further asserted changes to traditional instructional design approaches are required to accommodate situated cognition tenets:

1. "instructor's role changes from sage to facilitator.

2. instructional plans should be artifacts (resources) of our reasoning about actions;
3. instructional strategies should be oriented for broad and appropriate “real world” situated contexts;
4. instructional systems should also be developed to facilitate discourse and collaboration between individuals;
5. technologies can assist in monitoring students’ progress. . .
6. technologies, for example, intelligent agents, can assist by searching for related information from different perspectives to students’ problems;
7. tools such as epistemic structures, for example, tree structures, can be incorporated in systems to guide students in planning. . .
8. dialog should be encouraged among teachers and students as far as possible. . .
9. students’ role conflict from passive learner to active learner. . .
10. transfer of learning needs to be considered through multiple problem contexts;
11. multiple formative assessment, in addition to summative assessment methods, need to be adopted; and
12. adequate time to engage in problem-solving with proper instructional support for students is crucial” (para. 73-84).

Hung and Chen (2001) also found in their study of situated cognition in eLearning environments that there are four dimensions of learning principles:

“(1) Situatedness fostered by: contextualized activities. . . . and implicit and explicit knowledge. . .

(2) Commonality fostered by: shared interests; . . . and shared problems. . .

(3) Interdependency fostered by: varying expertise; . . . varying perspectives or opinions; . . . varying needs; . . . mutual benefits; . . . and complementary motives. . .

(4) Infrastructure fostered by: rules; . . . accountability mechanisms; . . . and facilitating structures. . .” (p. 10).

To address each of these dimensions, the authors proposed the following eLearning design considerations:

Situatedness:

- “E-Learning environments should be Internet or web based so that with such a common networked platform, learners can access the learning environments in their embedded and situated contexts – anywhere and anytime.”
- “E-Learning environments should be portable as far as possible so that they can be used in the context.”
- E-Learning environments can focus on tasks and projects, thus enabling learning through doing and reflection-in-action.
- E-Learning environments can focus on depth over breadth, thus enabling learners to analyze communicative ‘speech acts’.

Commonality:

- E-Learning environments should create a situation where there is continual interest and interaction through the tools (e.g., mind-tools) embedded in the environment.
- E-Learning environments should capitalize the social communicative and collaborative dimensions allowing mediated discourse.

- E-Learning environments should have scaffolding structures which contain the genres and common expressions used by the community.

Interdependency:

- E-Learning environments should create interdependencies between individuals where novices need more capable peers capitalizing on the zone of proximal development.
- E-Learning environments should be designed to capitalize on the diverse expertise in the community.
- E-Learning environments should be made personalized to the learner with tasks and projects as embedded in the meaningful activity context.
- E-Learning environments can track the learner's history, profile, and progress and tailor personalized strategies and content.

Infrastructure:

- E-Learning environments should have structures and mechanisms set up to facilitate the activity (project) processes where learners are engaged in.
- E-Learning environments have the potential to radically alter traditional rules and processes that were constrained by locality and time" (p. 8).

Kochery (1997) also concluded learner-centered instructional methods, such as cooperative learning, in a distance education environment require "changes in the professor's attitudes and behaviors as well as changes in students' attitudes and behaviors. For example, professors must learn to share ownership of classroom activities with students and make the transition from "sage on the stage" to the "guide on the side". Likewise, students must take on more responsibility for their own learning and strive to

become active participants with the educational process, not merely passive recipients” (p. 156). However, he believed these changes are worth the effort to implement cooperative learning in distance education instruction. “The use of cooperative learning methods in distance education should provide an extremely pertinent instructional strategy, which would be particularly effective at “overcoming the distance” and “maximizing interactions” (p. 156).

The cooperative learning models Kochery presented included: Slavin’s Student Team Learning (STL) which “emphasizes “group rewards” to motivate students performance. . . A second element is “Individual Accountability”: the responsibility of each team member to learn, and the group’s responsibility for explaining concepts to one another and thus assuring the individual development that will ultimately benefit the overall team achievement. . . The last major element of the STL is “Equal Opportunity for Success”, which means that each student contributes to their team by constantly improving their individual performance” (p. 153); Aronson’s “Jigsaw” method also stresses both individual and team performance: “Each member of the “home” groups then disbands to meet with students from different teams. . . to form an “expert group”. . . Within these “expert groups” information is researched, shared and refined. . . The “expert groups” then disperse and return to their “regular” teams, where each “expert member” teaches the other group members about their content section. The only way for the students to learn about the material outside their assigned section is to depend on the knowledge and the instructional resources of their teammates” (p. 153); Sharan and Sharan’s Group Investigation method combines cooperative inquiry and classroom collaboration: the student groups “select a sub-topic from the unit of classroom study,

divide this sub-topic into individual assignments, and then present a group report to the entire class. Emphasis is placed on the interdependence of the larger classroom group to these smaller investigation groups, and evaluation occurs at many levels” (p. 153); Johnson and Johnson’s “Learning Together” model “focuses on interactive social processes and team building activities which are predicated on developing important interpersonal social skills (leadership, trust-building, constructive communications, conflict management). . . the analysis and evaluation of the actual “group process” . . . (is) an integral component of the learning experience. . . (This) cooperative learning model is predicated on structuring the learning experience to promote collaborative activities by implementing these following five basic elements:

1. Positive Interdependence. . .
2. Face to Face Promotive Interaction. . .
3. Individual Accountability. . .
4. Interpersonal and Small Group Skills. . .
5. Group Processing. . .” (p. 153);

““Turn to Your Partner” or “Bookends” involves breaking down instructional material into manageable thematic “chunks” and having learner dyads discuss these key questions or review points. This presentation method aids in the pacing, processing, and retention of the content material” (p. 154); “Teams can also be effectively engaged in role-playing simulations, where they must adopt, represent, and advocate a certain perspective” (p. 155).

Lee and Paulus (2001) incorporated some of the same learner-learner instructional methods in their study. To build a sense of community, they developed an

icebreaker activity which required the teacher and learners “to post eight nouns that best described themselves” (p. 249). Some of the other collaborative learning methods used included: “collaborative team tasks for unit assignments;” “For teamwork, the learners were required to provide feedback on the contribution of team members after the completion of projects. It served the purpose of providing feedback and closure as well as building the sense of a team;” “The learners were also asked to facilitate the whole class discussion by choosing to be either the “facilitator” or the “wrapper” for the unit discussion;” “Peer to peer responses were also encouraged throughout the course” (p. 249).

Northrup (2001) concurred with the use of collaborative learning instructional methods to design learner-learner interaction. “Designing collaborative online learning environments is an obvious strategy for promoting interactivity” (p. 35). In her opinion, for collaborative groups to be effective, “members should be committed to the “group goal” and to maximizing each other’s learning. . . (and) positive interdependence, group and individual accountability, promotive interaction, and interpersonal skills” (p. 35) are required. Northrup (2001) also believed in the value of e-discussions to facilitate learner-learner interaction and form a learning community. “To facilitate successful online conversation, Chism (1998, pp. 7-8) suggests six strategies (as cited in Sherry, 2000):

- *Building group coherence* by getting to know one another online. . .
- *Sharing information* by assigning collaborative groups to become resident experts in specific areas – then requiring the collaborative group to share its knowledge with others online.

- *Processing ideas* by elaborating on discussions, sharing cases, and asking questions of one another. . .
- *Online tutoring* as a tool for asking peers questions in preparation for an upcoming test.
- *Refining communication skills* by framing arguments and leading e-discussions.
- *Providing feedback to students* through peer critique and instructor critique online” (p. 36).

In **Quitadamo and Brown’s (2001)** case study about a learner-centered graduate distance education course, one observation indicated learners’ perceptions of others’ work affected their performance expectations. “In traditional face-to-face classrooms, student work is generally not publicly displayed, and the instructor is many times limited to teaching to students with the worst performance to try and increase average class performance. In the online classroom, students were encouraged to submit work in progress to the listserv as project development proceeded. This had the unexpected effect of increasing average class performance, presumably because less motivated students were exposed to high-quality projects and were prompted to increase their efforts by class overachievers. In this case, the instructor was not limited to teaching to the lowest performing students; instead students tried to emulate the project quality of the best students” (p. 7).

Sutton (2001) identified another form of learner-learner interaction in a distance education learner-centered environment: vicarious interaction. She described learners “who actively observe and cognitively process the interactions of other participants”

(para. 4) as “vicarious interactors” (para. 15). Vicarious interactors “can enjoy benefits that are essentially equivalent to those achieved by direct interactors. . . The vicarious interactor cognitively processes content while absorbing the interactions of others. The cognitive processing that takes place at this stage, although relatively passive, nonetheless enhances the learning process. . . (This) does not assume that all kinds of learners will benefit from vicarious interaction. . . However, learners who are not interested in or have not learned the skills associated with social learning or those who tend to be withdrawn, shy, or reluctant to participate in overt interaction may benefit the most from interacting vicariously” (para. 26-30). Although “the benefits of interacting vicariously will not be as great as in the case of direct interactors. . . this kind of student can experience most of the achievement and satisfaction benefits enjoyed by their more extroverted peers” (para. 41).

Wang, Resta, and Miller (2001) also explored distance education in a constructivist and collaborative learning environment. In their study, the authors suggested six factors which should be designed into the course to facilitate effective collaborative learning:

“1. Course assignments should be made as clear as possible, taking into consideration that in real world settings a considerable amount of ambiguity is inevitable...

2. A source of practical information about the courses’ collaborative tools would be an important element in the technical support network and would fill a need not met by the courseware technical support staff. . .

3. For many students new to online collaborative learning, some direct instruction or required reading about forming collaborative teams might ease their transition from the tradition of individuals working competitively to teams working collaboratively in a constructivist classroom. . .

4. Much of what the teams devoted themselves to might more correctly be thought of as collaborative work rather than collaborative learning although all boundaries between the two are often unclear. . .

5. Feedback in the course for team projects as well as for individual contributions and reflections was relatively sparse. One feature of constructivist theory is time for reflection on the learning process. . .

6. At its best, collaborative learning can produce a learning experience and artifacts of that experience are greater than what an individual student could achieve working alone. The time and opportunity for risk-taking are essential for reaching this higher level of achievement. . .” (p. 527).

The authors also recognized the value of individual accountability, designing peer assessments into the team projects. “Team members assessed their own contributions as well as those of all other team members at the end of each learning module. The positive aspect of the peer evaluations was that it helped individual team members who were late in contributing their work or participating minimally in collaborative task to become more active members of the learning team” (p. 528).

Learner-Teacher Interaction

Learner-teacher interaction was mentioned most frequently in the articles reviewed (17 out of 25 articles), however the information did not necessarily contribute

to the purpose of this study. In many of these instances, the mention of learner-teacher interaction was in reference to how it influenced other types of interaction or how these other types influenced learner-teacher interaction. The articles appearing in this section identified applications of instructional methods to create learner-teacher interaction.

In **Blignaut and Trollip's (2003)** study of faculty participation in asynchronous post-graduate courses, they believed “quality faculty participation is crucial for successful learning in asynchronous online environments” (p. 152). To test this hypothesis, the authors created a taxonomy based on a content analysis of faculty participation in online discussions. The six evaluation criteria for the instructor posting classifications used in the taxonomy included:

- “Administrative (with no academic content) – Postings that relate to general administrative topics. . .
- Affective (with no academic content) - Postings that acknowledge learner participation and provide affective support. . .
- Other (with no academic content) – Postings that contain non-content related messages, as well as the postings of discussion topics. . .
- Corrective (with academic content) - Postings that correct the content of a learner’s postings. . .
- Informative (with academic content) - Postings that comment on a learner’s posting from a content perspective and provides individual feedback. . .
- Socratic (with academic content) – Postings that ask reflective questions (Socratic questions) about the learner’s posting. . .” (p. 157).

Based on the criteria in this taxonomy, the authors made the following findings:

- Administrative messages are “a crucial aspect of instructor-led online learning” (p. 161). Both teachers and learners appreciated clear communication of expectations, due dates, etc.
- “All learners felt the need to be acknowledged personally” (p. 161).
- “In general, content-based comments (e.g., Corrective, Informative and Socratic questions), rich in content (information) and structure, are what many learners crave most” (p. 163).
- When “capturing misconceptions and guiding learners in a new direction” in an online environment, “it is important to avoid direct criticism and to maintain intellectual trust;” learners generally regard “corrective feedback as very valuable” (p. 163).
- Informative messages are useful for “guiding the learner to follow particular procedures to complete a specific task effectively; reinforcing the learner’s view by providing adjunct materials; providing an executive summary of what the learner(s) has reasoned; providing an encompassing summary of the week’s communications...” (p. 164).
- Socratic question messages produce a “give and take between the instructor and student with questions leading to learning. . . Although some learners clearly appreciate instructor interaction of this type, others feel intimidated by Socratic questions and experience performance anxiety to the extent that they would not take on the additional effort to respond” (pp. 164-165).
- Instructors need to be “well organized, give helpful, content-related feedback, and challenge learners to stretch intellectually” (p. 166).

- Responsiveness and timeliness in communication are two of the most important aspects of teaching online.

Cannon, Umble, Steckler, and Shay (2001) studied learner-teacher interaction based on student surveys and interviews. “Students expressed a variety of concerns, including the quantity and quality of their interactions with faculty and teaching assistants (TAs)” (p. 54). “The greatest dissatisfaction was with direct faculty feedback on student work. Many students indicated they had not received timely feedback, if any, from some faculty members on some assignments” (p. 55). The authors found “students’ concerns about instructional methods were directly related to their desire to have consistent interactions with faculty and TAs” (p. 55). Specifically, the study discovered a correlation between student satisfaction and teachers’ skills managing online discussion forums. Five elements were identified as necessary for satisfying discussion forums: “clear and thought-provoking discussion questions on topics, an appropriate time period in which to complete the forum, skilled moderators, faculty or TA participation, and keeping the size of forums to seven or fewer learners” (p. 55). The findings of this study indicated “Instructional methods and course designs are important components of overall satisfaction and learning. Because faculty and TA time availability, interest, preferences, and technical skills vary, interactions with students also vary. Some teaching methods and assignment designs do not foster interaction between students and faculty, especially with respect to feedback on student products, and lead to student dissatisfaction with courses. This can make students uncomfortable and uncertain about their progress. . . . When distance learning programs use only Internet, special efforts must be made to foster substantive student-student and student-instructor interaction” (pp. 57-58).

This theme about the importance of quality and timeliness in learner-teacher interaction also was validated in **Carswell and Venkatesh's study (2002)**. In this quantitative/qualitative study, the authors found two essential factors to successful online learning experiences: "instructor involvement (and) the instructor's ability to present information in a Web environment" (p. 487).

Chang (2001) studied learner-teacher interaction in the form of online facilitation. It was explored in terms of a "pedagogical strategy to increase interaction and, then, to enhance learning achievement" (p. 495). Five types of online facilitation messages were identified:

1. "Assignments and grades: Messages that asked questions about due dates, the instructor's expectations, grading criteria of assignments, and course grades
2. Network access: Messages that asked questions about the access to WWW network and online course materials in the course site
3. Online discussion: Messages that asked questions about clarification, reflections, and suggestions of online discussion
4. Group activities: Messages that asked questions about group activities
5. Other course materials access: Messages that asked questions about the access to the textbook, study guide, the university, and local libraries" (p. 496-497).

The findings of this study included: "the most desired facilitation is assisting them (learners) to complete the assignments and to obtain high grades. The second most needed facilitation is the assistance in network access to course materials and participating in the activities in the course site;" although the descriptions of assignments and grading criteria may be clearly stated in the course site, students may overlook them.

Instructors should instruct students to the location of specific pages or even demonstrate to students how to access this particular information containing assignments and grading criteria in the course site” (p. 499). Based on these findings, the author offered the following suggestions for Internet-based course design and teaching:

1. “Make due dates of assignments and activities flexible and explicitly clear
2. Thoroughly communicate with students about the expectations of assignments and grading criteria
3. Seek immediate supports from system support team to solve problems in the event that network access problems occur
4. Design instructional strategies emphasizing peer interaction in Web-based courses and encourage peer interactions in teaching web-based courses
5. Employ learner motivational strategies in order to encourage low GPA students and non-experienced students to request facilitation online” (p. 501).

In his article proposing an interaction framework, **Hirumi (2002b)** reported “A recent study of distance educator competencies revealed seven key learner-instructor interactions: to establish learning outcomes/objectives; to provide timely and appropriate feedback; to facilitate information presentation; to monitor and evaluate student performance; to provide (facilitate) learning activities; to initiate, maintain, and facilitate discussions; and to determine learning needs and preferences” (p. 145). Of these key interactions, he found feedback to be “vital to learner-instructor interactions (Northrup , in this issue; Northrup & Rasmussen, 2000) and elemental to both behavioral and cognitive theories of learning” (p. 145). The reasons feedback was determined to be necessary for learner-instructor interactions included: it “compares actual performance to

set standards (Johnson & Johnson, 1994);” “informs learners of the accuracy of their responses to instructional questions (Cohen, 1985; Kulhavy, 1977) and may be used to increase response rate or accuracy, reinforce correct responses to prior stimuli, or change erroneous responses (Kulhavy & Wager, 1993);” “may provide learning guidance, lesson sequence advisement, motivational messages, critical comparisons and information about answer correctness and timeliness (Hoska, 1993); closes “message loops (Yacci, 2000; Northrup & Rasmussen, 2000), informing learners that communications are complete (Berge, 1999; Liaw & Huang, 2000; and Weller, 1988, as cited by Northrup, 2001)” (p. 145).

To evaluate the appropriateness of course interactions, Hirumi (2002b) proposed the teacher should analyze the number and types of interaction in the initial draft of the distance education course design. Analyzing the instructional design in the preliminary stage helps “reduce or eliminate the need for costly revisions after program development or implementation” (p. 151) and reduce or eliminate “overuse or misuse of interactions” which “can lead to (learner) frustration, boredom, and overload;” difficulty discerning “the relative importance of content information and each interaction” (pp. 151-154); and “both learner and instructor dissatisfaction, inadequate learning, and insufficient performance, requiring additional time, effort, and expertise to revise instruction resources that could have been spent on other projects” (p. 156). According to Hirumi (2002b), “Two potential causes for such overload are: too many planned learner-instructor interactions, and poorly designed interactions that require considerable clarification, explanation and elaboration” (p. 154). If too many interactions are initially planned, “it may be helpful to group two or more interactions together to reduce the total

number of interactions that must be handled by the instructor. Other options include grouping students to reduce the total number of assignments that must be reviewed by the instructor, eliminating some interactions or further automating the interaction so that preprogrammed responses are provided based on users' input" (p. 154).

Lee and Paulus (2001) confirmed these findings in their study. According to the authors, "The primary goals of learner-instructor interaction were to build communication, support learner control and self-regulation, and to provide feedback; . . . periodically checking in on teams' progress and whole class discussion;". . . guide and redirect off track discussion (p. 249). The study also discovered feedback which "focused both on (learners') strengths and areas of improvement" (p. 249) was important to learners. The authors cautioned teachers to remember in Internet-based environments, "where tone is not apparent in writing, increased care is necessary when instructors formulate criticisms" (p. 249).

To **Mortera-Guierrez (2002)**, "the types of interactions implemented by instructional and teaching practices are basic strategies in the instructional design process itself" (para.36). He believed there are "different kinds of instructional strategies based on learning interactions such as: strategies to increase participation, to develop communication, to receive feedback, to enhance collaboration and retention, and to support learner control/self-regulation (Cyrus, 1997b)" (para. 36). In her 1999 study, she observed and found "eight concrete instructional design strategies and practices" employed by teachers: "(a) organizing and planning, (b) communicating, (c) delivering, (d) management, (e) learning activities, (f) motivation, (g) feedback and supervision, and (h) evaluation and revision (Mortera, 1999)" (para. 36).

In another study, **Mortera-Guierrez and Murphy (2000)** discovered distance education teachers develop three types of instructional interactions: “(a) instructor-learner, (b) instructor-content, and (c) instructor-technology” (p. 3). The authors believed instructional interactions to be “complex processes” which should be considered when designing distance education instruction “to produce effective, efficient, and high quality distance education courses” (p. 4). Based on the results of their study, the authors found:

- “Instructional design components and variables differ in purpose, sequence, and implementation methods among the instructors. . . These findings are supported by research on whether or not instructors of online courses use the components put forward by Reigeluth and Merrill (1979). Kodali discovered that all of the instructors used some of the components of the model, whereas only a few used all of them in designing and delivering online courses. Specifically, the most frequently used component was methods, whereas the conditions were used least. Further, the application of instructional design stages, constituents, and variables may depend on the instructor’s educational and philosophical background - - behaviorist or constructivist” (p. 9).
- “Instructors’ previous professional experience with distance learning and distance delivery technology also shapes the purpose, sequence, and ways to implement instructional design variables. . . The current study suggests that instructors with broad experience in distance education are likely to be more effective in interacting with far-site students, designing the course content, and using technology than are instructors with little or no distance education experience” (p. 10).

- “The conclusion that educational paradigms and instructors’ previous instructional experiences guide their design and delivery of instruction at a distance stresses the need for training on appropriate instructional design and delivery of instructional design principles and models suitable for specific distance education environments” (p. 10).
- “Instructors must be capable of using at least seven types of interaction, unlike their students, who are likely to use fewer types of interaction. Three instructor interactions shared with students are instructor-learner, instructor-content, and instructor-technology interaction. The remaining instructor interactions include instructor-facilitator, instructor-peers, instructor-support staff/technicians, and instructor-institution interaction. The quantity and quality of instructional interactions depend on the characteristics of learners, the institution, costs, distance delivery technologies, instructional design model applied, instructional strategies used, course content, and course materials. Personal and unique styles of each instructor determine the dynamic of the instructional interactions” (p. 10).

Quitamo and Brown (2001) also found teachers’ pedagogical beliefs influenced their application of instructional methods to design interaction in distance education courses. “The results of this study suggest that specific teaching styles can be used to promote effective student learning in online learning environments” (p. 6). Specifically, the authors discovered in their study “Facilitator and Delegator teaching styles were used extensively by the instructor, and were characterized by such activities as problem-based project development, guided student exploration, online group discussion, self-discovery

exercises, learning debates, case studies and independent, student-designed research, and using the instructor as an independent resource (Grasha, 1994). In addition, the Personal Model style was used by the instructor to illustrate alternatives, demonstrate ways of thinking, outline the thought processes involved in research-based project development, and to share personal viewpoints (Grasha, 1994). Finally, both Expert and Formal Authority teaching styles were used to provide a modicum of content expertise. . . to provide structure within the independent learning environment, and to emphasize the high-learning and performance standards set for the students” (p. 6). The authors also posited the “interplay between the teacher’s and students’ personalities were essential to productive learning” (p. 6). To develop this level of learner-teacher interaction requires the teacher to “establish a level of trust, professional credibility, and community with the students” and provide initial responses which are “confident and competent” (p. 6).

CHAPTER VI

Discussion

The purpose of this study was to collect, analyze, and provide resources for the application of instructional methods to design interaction into asynchronous Internet-based distance education instruction. This study focused on the collection and analysis of published literature recommending the application of specific instructional methods to design interaction as defined by Moore (1989) (e.g., learner-content, learner-learner, learner-teacher). The synthesized data identified how distance education teachers have applied instructional methods to design interaction in asynchronous Internet-based distance education instruction.

Qualitative research methods were applied to locate, analyze, and interpret the data collected through a systematic review of the literature on the application of instructional methods to design interaction in asynchronous distance education instruction. The a priori search categories included: distance education, instructional methods, and interaction. The intent was to find resources which either explicitly or implicitly addressed the application of instructional methods to design interaction, as defined by Moore (1989), in distance education instruction. The literature search was conducted using library research data bases and the Internet. Additional resources were located through the references of the selected resources.

Twenty-five literature resources published between 1993 and 2003 were collected, reviewed, and analyzed using conceptual analysis, a content analysis approach to synthesizing and extracting associated concepts from a body of literature (Palmquist, 2003). Each resource was systematically reviewed for relevance to this study's goals.

The decision for inclusion in this study was based on four criteria: (1) the publication presented frameworks or guidelines for the use of instructional methods in the design of distance education interaction; (2) the publication was referenced in other resources as being relevant to the use of instructional methods in the design of distance education interaction; (3) the publication presented information supported by research about the use of instructional methods in the design of distance education interaction; and (4) the publication date occurred between 1993 and 2003.

This study produced three products: (1) an analysis and presentation of findings from the research reviewed; (2) three tables synthesizing these findings; and (3) an annotated bibliography of 20 print resources this researcher believes frame and contribute to the fields of distance education and instructional design. These synthesized research outcomes were designed to facilitate the transfer of research into practice by guiding the instructional methods application of teachers interested in or developing distance education courses.

According to the National Center for Education Statistics (Waits & Lewis, 2003), 90 percent of the colleges and universities surveyed in academic year 2000 - 2001 offer asynchronous Internet-based distance education courses and 88 percent of these institutions plan to increase their distance education course offerings. As distance education programs and courses increase in numbers, more teachers are expected to design and develop distance education instruction (Jung, 2001).

Although teachers are trained in instructional methods designed to stimulate learning and interaction, in asynchronous Internet-based distance education instruction, a variety of factors, as well as the technology interface, change how teachers design and

deliver instruction. Teaching in this type of educational environment differed from teaching in traditional classroom environments in four ways: (1) the lack of physical indicators makes it difficult for teachers to address concerns and issues without communication and interaction from the learner; (2) the educational environment created in asynchronous classes requires learners assume a more active involvement in their learning processes; (3) the use of technology to produce the appropriate learning outcomes necessitates teachers understand the functionality of the available technology, what instructional methods and learning theories are associated with the successful use of the technology, and the constraints of the technology in meeting instructional objectives; (4) to ensure timely feedback and successful interaction in distance education environments, teachers need to develop clear lines of communication and interaction between the content, other learners, and the teacher (Moore & Kearsley, 1996).

To address some of these differences, several of the resources reviewed for this study suggested teachers remember various guidelines when designing distance education instruction:

- Internet-based distance education is a visual medium, necessitating visual design for effective communication (Gibbs & Fewell, 1996).
- Developing learning objectives prior to selecting instructional methods facilitates the design of appropriate types and number of interaction and helps communicate clear expectations and processes (Hirumi, 2002a; Hirumi & Bermudez, 1996; Lee & Paulus, 2001; Mortera-Gutierrez, 2002; Mortera-Gutierrez & Murphy, 2000; Vrasidas, 2000).

- Understanding how technology facilitates the delivery of different instructional methods helps determine the best method for achieving the desired types of interactions (Hirumi, 2002b; Mortera-Gutierrez & Murphy, 2000; Northrup, 2001).

Moore (1993) described the physical and psychological separation between teacher and learner in distance education environments as the “transactional distance” (p. 22); the space in which potential miscommunications between the teacher, the content, the learner, and other learners can occur. The transactional distance shapes unique models of teacher and learner behavior and interaction, impacting both teaching and learning (Moore, 1993). Moore (1993) believes the transactional distance is more difficult to overcome in asynchronous distance education due to the separation of space and time, therefore interaction is more critical.

Asynchronous Internet-based distance education technology can reduce spontaneity and impede these various types of learner interaction (Hirumi, 2002b; Lee & Paulus, 2001). The resources reviewed for this study indicated using instructional methods to create interaction in asynchronous, Internet-based distance education instruction is not only possible, but an essential element for successful eLearning requiring consideration, planning, and purposeful designing to effectively achieve (Bannan-Ritland, 2002; Bermudez & Hirumi, 2000; Hirumi, 2002a, 2002b; Hirumi & Bermudez, 1996; Lee & Paulus, 2001; Moore, 1989, 1993; Moore & Anderson, 2003; Moore & Kearsley, 1996; Northrup, 2001, 2002; Pyle & Dziuban, 2001; Wagner, 1994).

The importance of interaction, as defined by Moore (1989), in instruction appeared in most of the resources reviewed for this study (Bermudez & Hirumi, 2000;

Hirumi, 2002a, 2002b; Hirumi & Bermudez, 1996; Northrup, 2001, 2002). Wagner (1994) posited “Because of the importance it plays in the learning process, interaction has been featured as a critical variable in instructional theory” (p. 15). General consensus among the distance education literature reviewed indicated: (1) interaction was a result of instructional methods application (Bermudez & Hirumi, 2000; Chang, 2001; Hung, 2002; Lee & Paulus, 2001; Mehrotra, Hollister, & McGahey, 2001; Mikovsky, 1997; Quitadamo & Brown, 2001; Vrasidas, 2000); (2) interaction needed to be designed into distance education instruction because it does not occur spontaneously (Chou, 2003; Gilbert & Moore, 1998; Harmon & Hirumi, 1996; Pyle & Dziuban, 2001); (3) the effectiveness of the interaction was related to the appropriateness of the instructional method and the delivery technology (Bermudez & Hirumi, 2000; Hannafin et al., 1997; Hillman, 1999; Hirumi, 2002a; Moore & Kearsley, 1996; Mortera-Gutierrez, 2002; Mortera-Gutierrez & Murphy, 2000; Northrup, 2001).

According to Wagner (1994) “If interaction is being prescribed as a treatment to improve performance, instructional theories may be useful as conceptual reference points for further discussion. . . Instructional design considerations should be approached from two levels: one views interaction as a desired outcome in instructional situations. . .” (p. 26). Teachers should consider instructional design models and delivery systems, as well as instructional methods and learning theories, when making decisions about and preparing instruction designed to stimulate interaction (Bermudez & Hirumi, 2000; Harmon & Hirumi, 1996; Hirumi, 2002b; Hirumi & Bermudez, 1996; Mehrotra et al., 2001; Pyle & Dziuban, 2001; Quitadamo & Brown, 2001; Roblyer & Wiencke, 2003; Vrasidas, 2000). This interactive instructional design should be grounded in learning

theories and instructional methods (Hannafin et al., 1997; Hirumi, 2002a; Northrup, 2001). Through interaction stimulated by the application of learning theories and instructional methods, knowledge develops and learning occurs (Harmon & Hirumi, 1996; Hirumi & Bermudez, 1996; Kozma, 1994). According to Berge (2002) “There are a dozen or more instructional interventions that, if done properly, have consistently improved learning. . . it takes careful planning, delivery, and feedback regarding pre-learning, learning activities, interactivity, and reflection for eLearning to be successful” (p. 187).

Although all of the resources reviewed in this study described the application of instructional methods to design interaction, the majority of the research focused more on how to design effective distance education instruction which encouraged interaction and learner satisfaction than how different instructional methods stimulated various types of interaction and why that type of interaction occurred. Some of the recurring themes appearing throughout the analysis included:

- Most learner-content interaction studies described the use of direct instruction and other teacher-centered instructional methods (Gibbs & Fewell, 1996; Hirumi & Bermudez, 1996; Northrup, 2001; Vrasidas, 2000).
- Most learner-learner interaction studies described the application of collaborative and cooperative learning instructional methods (Barab et al., 2001; Bermudez & Hirumi, 2000; Daradoumis & Marques, 2002; Kochery, 1997; Northrup, 2001; Wang et al., 2001). The learner-learner interaction studies which did not apply collaboration or cooperative learning most frequently proposed learner-centered instructional methods as opposed to

teacher-centered (Bober & Dennen, 2001; Chou, 2001; Hung, 2002; Hung & Chen, 2001; Lee & Paulus, 2001; Quitadamo & Brown, 2001; Sutton, 2001).

- Most learner-teacher interaction studies applied learner-centered instructional methods (Blignaut & Trollip, 2003; Cannon et al., 2001; Carswell & Venkatesh, 2002; Chang, 2001; Hirumi, 2002b; Lee & Paulus, 2001; Mortera-Gutierrez, 2002; Mortera-Gutierrez & Murphy, 2000; Quitadamo & Brown, 2001).

These trends indicated gaps in the literature based on a conceptual analysis of Moore's three types of interaction in distance education courses. The data synthesis revealed additional areas which could clarify and broaden research focused on interaction:

- Relatively few learner-content interaction studies focus upon learner-centered instructional methods. Considering the visual nature of the Internet, learner-centered approaches could enhance course content presentation and stimulate a more robust interaction (Gibbs & Fewell, 1996).
- Hirumi (2002b) identified nine potential instructional methods to create interaction in distance education, however most of the resources applied either collaborative or cooperative learning approaches. Additional studies involving other forms of learner-centered and blended instructional methods would enrich and stimulate further discussion, enhancing instructional practices.
- The field also could benefit from more research specifically focused on learner-teacher interaction. As indicated in the Analysis of Data section of

this paper, although learner-teacher interaction was frequently mentioned, the application of specific instructional methods to design this type of interaction was not provided in the resources.

- Most of the resources reviewed for this study employed case study and other qualitative methods, such as content analysis and descriptive data. Although a variety of research methods were applied, studies which combined quantitative and qualitative approaches provided the most forceful defenses for their findings.
- Very few of the resources reviewed compared the application of one instructional method to another in an attempt to identify the most appropriate application for each within a given distance education environment. To facilitate the transition from research to practice, more specific instructional methods guidelines are needed.

The intent of this study was to provide resources which can help asynchronous distance education teachers understand what technology can and cannot do relative to applying desired instructional methods to stimulate interaction and support instructional outcomes. The list, tables, and annotated bibliography were designed to provide teachers with resources to identify instructional methods which can improve interaction in distance education instruction. It is hoped this study moves research closer to practice related to the application of instructional methods to design interaction in asynchronous, Internet-based distance education instruction.

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APPENDIX A

*Definitions**Asynchronous*

Indicates the teacher and learner do not communicate at the same time in a distance education environment (Picciano, 2001).

Collaborative Learning

Describes instructional methods which create collaboration among a group of learners, encouraging the sharing solutions and new insights (Driscoll, 2000).

Cooperative Learning

Describes instructional methods which create learning and interaction among a group of learners, encouraging cooperation and sharing of knowledge (Joyce et al., 2004).

Conceptual Analysis

Describes the process of choosing a concept to examine and analyzing the concept in order to count and quantify its occurrence in the literature (Palmquist, 2003).

Constructivism

Believes knowledge is constructed based upon the learner's prior knowledge and experiences. Social constructivism believes the construction of this knowledge also requires the learner to interact within a social context (Driscoll, 2000).

Content analysis

Describes a "detailed and systematic examination of the contents of a particular body of material (e.g., television shows, advertisements, textbooks) for the

purpose of identifying patterns, themes, or biases within that material” (Leedy & Ormrod, 2001, p. 114).

Content interaction

“Is based on the theory of learning that is most appropriate to achieve educational outcomes within the course itself” (Northrup, 2001, p. 31).

Course management system (CMS)

Is “a set of computer software tools designed to enable users to create Web-based courses;” (Picciano, 2001, p. 243) also called courseware, BlackBoard, eCollege, WebCT, Collegis, etc.

Delivery technology

“Packages and gives students access to necessary information and methods” (Clark, 1991, p. 35).

Dialogue

Describes “an interaction or series of interactions having positive qualities that other interactions might not have” (Moore, 1993, p. 24).

Distance education

Describes an educational environment in which the teacher and student are physically separated; also called asynchronous learning, distance learning, distance teaching, distributed learning, e-Learning, flexible learning, open learning (Picciano, 2001). “Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of

communication by electronic and other technology, as well as special organizational and administrative arrangements” (Moore & Kearsley, 1996, p. 2).

Feedback (management)

Refers to the closing of “the communications loop” between learners and teachers, as well as learners and learners, through electronic responses (Northrup, 2001).

Frequency

In conceptual analysis, describes the number of times a concept relevant to this study appears in the literature (Palmquist, 2003).

Grounded design (also called grounded-learning systems design)

Describes a systematic approach which applies learning theories and instructional methods to the design and development of instruction (Northrup, 2001).

Grounded-learning systems design is defined as “the systematic implementation of processes and procedures that are rooted in established theory and research in human learning” (Hannafin et al., 1997, p. 102).

Interaction

Describes the use of two-way instructional methods to achieve the intended instructional objectives (Moore, 1989).

Interaction among participants

Describes the communication between and among participants in a distance education course (Moore, 1989).

Interaction between participant and instructors/experts

Describes the communication between and among teachers and other instructional experts (Moore, 1989).

Interaction between participant and learning materials

Describes the manner in which the course content (e.g., subject matter) is presented and the reaction and motivation students have towards it (Moore, 1989).

Instruction

Describes the purposeful organization of activities or events to assist the attainment of an instructional objective (Driscoll, 2000).

Instructional design

Provides a systematic method for planning instruction (Morrison, Ross, & Kemp, 2004; Reigeluth, 1999).

Instructional methods

Describes research guided teaching practices or strategies (e.g., inquiry, direct and nondirective instruction, mastery learning, advance organizers, etc.); also called methods of instruction, models of instruction, models of teaching (Joyce et al., 2004; Reigeluth, 1999). “An instructional method is any way to shape information that compensates for or supplant the cognitive processes necessary for achievement or motivation” (Clark, 1991, p. 35).

Instructional objectives

Describes specifically what a learner should know or be able to do after successfully completing the instruction; also called learning outcomes, learning

objectives, instructional outcomes; also called educational outcomes, instructional outcomes, learning outcomes (Morrison et al., 2004).

Instructional technology

Describes the resources (hardware, software, materials) employed for instruction (Morrison et al., 2004). “Engineers both the information and the instructional methods required for the necessary psychological support of students as they learn” (Clark, 1991 p. 35).

Instructional theory

Answers what instructional method should be used when (Reigeluth, 1987).

Internet

Describes “the network of networks that provides the basic protocol standard for allowing data communications systems to link themselves together throughout the world;” (Picciano, 2001) also called World Wide Web, WWW, Web, net.

Learner autonomy

“Is the extent to which in teaching/learning relationship it is the learner rather than the teacher who determines the goals, the learning experiences, and the evaluation decisions of the learning programme” (Moore, 1993, p. 31).

Learner-centered Instruction

Describes instructional and curricular methods which encourage and develop individual knowledge through the learner’s personal and social educational experiences, supporting the learner’s ownership of personal learning (Joyce et al., 2004).

Management (feedback)

Refers to the closing of “the communications loop” between learners and teachers, as well as learners and learners, through electronic responses (Northrup, 2001).

Medium (plural: media)

Describes the instructional technology systems used to deliver instruction (Clark, 1994).

Social interaction

Is the “primary vehicle for student communications in a Web-based learning environment” (Northrup, 2001, p. 32).

Structure

“Expresses the rigidity or flexibility of the programme’s educational objectives, teaching strategies, and evaluation methods” (Moore, 1993, p. 26).

Systematic review of literature

Describes a literature search based on locating key words and concepts relevant to the study’s goals (Leedy & Ormrod, 2001; Palmquist, 2003).

Teacher-centered Instruction

Describes instructional and curricular methods which are controlled and directed by the teacher, creating a central role for the teacher and minimizing learner independence (Joyce et al., 2004).

Technology

Describes the hardware and software used to deliver instruction (Kozma, 1994).

Transactional distance

Describes the space in which potential miscommunications between the teacher, the learner, and other learners can occur (Moore, 1993).

Virtual

“Being functional and effective without existing in a traditional mode. Virtual learning, for example, is learning that can functionally and effectively occur in the absence of traditional classroom environment” (Picciano, 2001, p. 250).

APPENDIX B

Annotated Bibliography

Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). *The McGraw-Hill handbook of distance learning*. New York, NY: McGraw-Hill.

This book provides guidelines for designing, developing, and implementing a distance learning program. The practical advice is explained simply and in easy to understand terminology. The distance learning guidelines describe synchronous, asynchronous, and blended environments, as well as a variety of instructional technology systems (e.g., Internet, audio, video, teleconferencing, etc.). Some of the topics covered include: creating organizational support; developing recommendations through cross-functional teams; identifying costs and generating financial support; selecting appropriate distance education technologies; designing training for instructors; developing the appropriate support system for learners; strategizing technology changes; implementing an evaluation and improvement program; knowing when expansion is necessary.

Dills, C. R., & Romiszowski, A. J. (Eds.). (1997). *Instructional development paradigms*. Englewood Cliffs, NJ: Educational Technology Publications.

This book provides a compilation of chapters describing instructional design theories and models. Each chapter is written by different authors, believed by the editors to be prominent in their schools of thought. The editors' intent is to present six elements of instructional design: philosophical; cultural; theoretical; design and development strategies which reflect the philosophical, cultural, and

theoretical perspectives presented; analysis of instructional design strategies; current trends in the use of technology-based delivery systems.

Hanna, D. E., Glowacki-Dudka, M., & Conceicao-Runlee, S. (2000). *147 practical tips for teaching online groups: Essentials of Web-based education*. Madison, WI: Atwood Publishing.

The authors of this book present several practical suggestions for developing learner-centered, constructivist, creative and interactive distance education instruction. The suggestions can be used in asynchronous, synchronous, and blended environments. The activities are intended for delivery over the Internet. The book is divided into four chapters: teaching online; myths of online learning and teaching, designing online instruction (including evaluating learning strategies), and implementing online instruction.

Holmberg, B. (1995). *Theory and practice of distance education* (2nd ed.). London: Routledge.

In this book, Holmberg studies the theories, facts, and applications of distance education as an academic discipline. His analysis provides a foundation for why distance education has “vast application potentials” (p. 17) rather than how to develop a distance education program. Some of the subjects covered include: historical and present perspectives; systems approach to planning distance education; principles of course development; different structures for distance education courses; learner-teacher/organization interaction; special application for

distance education; instructional approaches and outcomes; evaluation processes; administration of distance education courses.

Jain, L. C., Howlett, R. J., Ichalkaranje, N. S., & Tonfoni, G. (Eds.). (2002). *Virtual environments for teaching and learning*. River Edge, NJ: World Scientific.

This anthology presents divergent distance education theories and experiences.

The information presented analyzes instructional approaches, eLearning frameworks and models, group learning activities, and distance education issues.

Jonassen, D. H., Tessmer, M., & Hannum, W. H. (1999). *Task analysis methods for instructional design*. Mahwah, NJ: Lawrence Erlbaum Associates.

This book focuses on the importance of task analysis to effective instructional design. The authors demonstrate applications of their analysis methods when developing guided learning, cognitive task, activity-based, and content analysis instructional models. These same task analysis concepts could be applied to the development of distance education courses in a grounded approach.

Keegan, D. (2000). *Distance education: Taking stock at a time of change*. New York, NY: RoutledgeFalmer.

Keegan, D. (1986). *Foundations of distance education*. New York, NY: Routledge.

Keegan, D. (Ed.). (1993). *Theoretical principles of distance education*. New York, NY: Routledge.

Keegan provides a variety of perspectives in these three books. In *Distance education*, Keegan provides an overview and analysis of the strengths and weaknesses of distance education as a business. He uses case studies and data analysis to support his findings. *Foundations of distance education* could be a precursor to *Distance education*. In *Foundations*, Keegan again studies the concepts and theories of distance education, however in this book he proposes a framework for planning and developing distance education systems, as well as an evaluation process. Keegan's *Theoretical principles of distance education* offer the theoretical perspectives of various distance education authors. The five perspectives include: didactic, academic, analytical, philosophical, and technological. Moore's *Theory of transactional distance* appears in this book.

Kouki, R., & Wright, D. (1999). *Telelearning via the Internet*. Hershey, PA: Idea Group Publishing.

This book provides a high-level overview of distance education. The authors describe the technology needed for Internet-based distance education including: examples of educational applications; various Internet access options; issues regarding Internet access (e.g., copyright, accreditation, security). The information is easy to read and understand, making it useful for readers new to instructional technology, the Internet, and distance education.

Mehrotra, C. M., Hollister, C. D., & McGahey, L. (2001). *Distance learning: Principles for effective design, delivery, and evaluation*. Thousand Oaks, CA: Sage Publications.

The authors of this book offer their experiences promoting and teaching distance education courses. The book covers distance education from an applications perspective, addressing the planning and preparation phases of distance education instruction. The topics include: marketing, selecting delivery methods and support services, preparing a syllabus, motivating learners to ensure high completion rates, assessing instructional outcomes; evaluating the program; program accreditation. The authors' illustrations and written descriptions of processes make it easy to follow and comprehend.

Moore, G. S., Winograd, K., & Lange, D. (2001). *You can teach online: Building a creative learning environment*. Boston, MA: McGraw Hill.

This book is another example of an easy to follow explanation of instructional technology and its applications within distance education instruction. The authors present some background information about online learning, including advantages and disadvantages, and the technology used to deliver it. Also included are techniques for applying and evaluating instructional methods in an online environment.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing Company.

Moore, M. G., & Anderson, W. G. (Eds.). (2003). *Handbook of distance education*.

Mahweh, NJ: Lawrence Erlbaum Associates, Inc.

Moore is the author of the interaction theory used to define this study. In his book with Kearsley, they describe a systems approach to designing, developing, and implementing a distance education program. The book provides: an overview of the history, theories, fundamentals, technology, scope, research, and future of distance education; instructional systems design approaches; the importance of interaction; management and administration issues. In *Handbook of distance education*, Moore and Anderson compile a variety of perspectives about the theories of distance education. Some of the theories covered include: history, distance education concepts, learning, students and audiences, design and instruction, management and administration, economics, and international viewpoints.

Peters, O. (2001). *Learning and teaching in distance education: Pedagogical analyses and interpretations in an international perspective*. Great Britain: Kogan Page.

This book provides a global perspective of distance education. Peters' premise is "the likelihood of the creation of an internationally discussed and agreed system of distance-teaching pedagogies is encouragingly good" (p. 7). To address this premise, the author analyzes three constitutive concepts of distance education: dialogue, structure, and autonomy; and reviews specific teaching models and perspectives from around the world. The fact so many teachers and administrators around the world wrestle with the same issues is of interest.

Picciano, A. G. (2001). *Distance learning: Making connections across virtual space and time*. Upper Saddle River, NJ: Merrill Prentice Hall.

This is another book providing easy to follow descriptions about designing, developing, and implementing a distance education program. Picciano supplies good, basic definitions for technical aspects of distance education; this study uses several of these definitions. The distance education course guidelines offer a step-by-step approach. This would be another good reference book for teachers new to distance education.

Porter, L. R. (1997). *Creating the virtual classroom: Distance learning with the Internet*. New York, NY: John Wiley & Sons, Inc.

In its overview of distance education, this book identifies recommendations and principles for planning effective courses and programs. Checklists and questions guide the teacher through the development of online courses. The author also provides various online and print resources to facilitate learning more about distance education.

Reigeluth, C. M. (1987). *Instructional theories in action: Lessons illustrating selected theories and models*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Reigeluth, C. M. (Ed.). (1999). *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. II). Mahwah, NJ: Lawrence Erlbaum Associates.

Reigeluth was one of the most cited instructional design theorists in the references reviewed for this study. Both of these books present the use of instructional design theories to design and deliver instructional methods. In *Instructional theories in action*, the author offers several examples of learner-centered instructional methods developed using instructional design models. In *Instructional-design theories and models*, the author compiles the work of other instructional design theorists to present a sample of new instructional methods and current trends and issues in instructional design. The synthesis the author provides at the beginning of each chapter helps the reader select the theories of interest.

Tennyson, R. D., Schott, F., Seel, N. M., & Dijkstra, S. (1997). *Instructional design: International perspectives* (Vol. 1: Theory, research, and models). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

This book presents a compilation of international foundations for instructional design. The authors' intent is to "bridge the gap between instructional design foundations and application. The section exploring instructional design models offers several concepts of interest: systematic designs, knowledge objects, instructional task analysis, and cognitive skills training.