An Investigation of the Teaching Needs of Faculty Members with regard to Technology

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Article Info	Abstract
   	To integrate technology in teaching and learning, the need arises to investigate the teaching needs of educators making the transition from a traditional to technology mediated environment. This qualitative study selected a convenience sample of 120 faculty and administrators. Using an interview guide, interviewers met with 100 participants. Data was transcribed, and entered into a database for analysis. Findings reported were technology in teaching. Concluding statements report that participants use technology in their teaching. However, many faculty members are not integrating technology in their teaching or assessment strategies, or using technology in instructional management. Faculty members are interested in learning how to incorporate technology in their teaching and their comments suggest their need to combine technology with principles of pedagogy, andragogy, and constructivism.

Introduction

As technologies converge with the field of education, it becomes increasingly apparent that academic educators need to become conversant with the application of technologies in their teaching to support both their discipline, and pre-service and in-service teachers. To become conversant with the technologies, educators need opportunities for professional development. Many educators are using the same technologies to incorporate technology in their traditional campus based courses as the educators who are providing entire courses at a distance independent of space and time. Although reference to the use of technologies in the traditional classroom tends to be distinct from the use of technologies in distance delivered courses, many of the goals, techniques, opportunities for interaction and problem solving, and actual uses of the technologies are beginning to blend or overlap (Rogers, 2001). Whether technology is used to increase opportunity for interaction and problem solving in the traditional classroom or in a distance delivered course, it is only when the technology becomes transparent that the physical distance between teachers and learners becomes insignificant. It is more valuable for educators to use the technologies not only to reach out to learners and broaden their resources, but also to simultaneously enhance their own quality of teaching and learning (Rob, 2012; University of Missouri-Columbia, 2020).

The accelerated development of technologies and its application to the field of education prompted by Olcott and Wright (1995), for instance, to present an institutional framework to remind us that we need to renew our

commitment to our most important resource-our faculty. As a commitment to our most important resource, the purpose of this study was to investigate the teaching needs of educators with regard to technologies as their self-report, or from their perspective. Through the following research question, the study investigated the perceived teaching needs of educators moving from a traditional to technology mediated learning environment integrating technology into teaching and learning:

> What do faculty members need in other to make technology an integral part of their teaching process to enhance delivery of instruction, and to facilitate development of knowledge, skills, abilities, including problem solving and critical thinking?

Significance of the Study

As Jonatan et al. (2018) contend that little research is available on how faculty wants to participate in professional development opportunities regarding technologies; this study was significant because its findings provided the basis for understanding the basic needs of faculty members and issues integral to the process of integrating technologies in their work. This study also impacted groups of people who received information from the study to inform policy and administrative procedures with regard to professional development and technology.

Rationale

To integrate technology in teaching and learning the need arises to investigate the needs of educators making the transition from a traditional to technology mediated environment. Teaching in traditional courses and teaching using technologies are at opposite ends of a continuum with traditional lone educator centered courses at one end and educators working with teams of specialists in a learner-centered technology driven environment at the other. To use technologies in teaching, educators are being asked to be cognizant of the transition to working in a team or systems environment, adapting or developing new teaching and learning strategies including principles of andragogy and constructivism and the need for ongoing professional development with regard to technologies.

Systems View: Working Together to Use Technology

When learning about and using technologies, educators rely on the skills and expertise of many specialists to plan, develop and implement courses and work with the learners. Educators rely on the expertise and support of specialists to provide student, technical, media, instructional, audio, video, or administrative support in an inter-related and interdependent system, (Karen et al., 2007; Knowlton & Nelson, 2002). Moore (1993) supporting a systems view challenges educators to move from perceiving instruction as individual work to seeing it as work with a team of specialists- "media specialists, knowledge specialists, instructional design specialists, and learning specialists" (p. 4).

A systems view is important for educators to consider because all components are inter-related and

interdependent and one change can have rippling effects (Moore & Kearsley, 1997), thus communication skills become critical. From a comprehensive review of the literature, Thach and Murphy (1994) reported that educators using technologies require planning, communication and collaboration skills as they work with teams and support groups to develop and implement successful programs. When moving from autonomy and control of the course to a collaborative structure, and when moving from a teacher-centered to a learner-centered system, a skill gap is created for many educators for group dynamics and communication issues in course development and delivery (Thach & Murphy, 1994). To best work within the collaborative system, educators need to develop ways of thinking to establish common goals and dedication to action, recognize similar challenges, and value questions for reflection and fresh insights in order for members of the team to become resources to each other (Marquardt & Kearsley, 1999). The decision to teach using technologies involves role diversification, where educators share the role of "decision making during course creation and have a shared responsibility for the final outcome" (Kelly, 1990, p. 79). However, the responsibility for the quality of the teaching and learning and the support of learners often rests with the educators (Olcott & Wright, 1995) and when a number of people are involved in bringing a course to fruition; educators often need to assume responsibility for managing the project. Team leadership demands placed on educators require diverse organizational skills, fostering of a collegial atmosphere, and the establishing of ownership of outcomes and final responsibilities (Franklins et al., 2015; Kelly, 1990). Key to the success of learning and working with the technologies is the ability to work and learn from a network of specialists within a support structure.

Working with Technologies

Working with technologies involves tools, techniques and processes (Bates, 2019). Bates' description of technology based on reviews in the field and extensive consultations with stakeholders is adopted for this study. Within this study "technology" refers to different pieces of equipment or tools such as electronic computers and calculators. Technology refers to the techniques or ways the technologies are used or manipulated. Technology also refers to the purpose, use or application of the technology (Bates, 2019). As the study progressed, it became clear to the researchers that most, if not all participants were familiar with the term "technology," and this study's reference to Bates A. W. Tony description of technology as a tool, technique or process was upheld.

Andragogy, Constructivism

Technology can be used in teaching and learning. In teaching and learning strategies, the technologies are best learned in context, and used to support learners involved in interaction and problem solving (Bates, 2019). To support interaction, relevant content, and problem solving using technologies, attention is drawn to principles of andragogy and pedagogy. Educators working with adults can use the technologies as tools to support critical thinking, interaction, and independent learning that are integral to the theories of andragogy and constructivism (Lane, 1996). Principles of andragogy include the need for facilitated learning in a learner centered environment with regard for individuals and their learning styles, relevant and applicable content, interaction, task oriented exercises and opportunity for self-directed learning without loss of academic rigor. These principles of andragogy are recognized by Boettcher (2007) as key to constructivism. Educators use constructivist principles

to teach critical thinking, problem solving, collaboration and communication, and learners use constructivist principles when they apply their learning to their personal experiences and prior knowledge and when they learn to do for themselves (Crawford, 1998).

Andragogy and constructivism are strikingly similar in that they both promote relevance of content, participation of learners in the design and implementation stages of the course, self – directedness, facilitated learning and linking of resources to learners, reflection on experience and knowledge, and collaboration or interaction between instructors and learners and among peers to support problem solving and critical thinking. Educators need to learn to work with teams and use the technologies as vehicles for andragogy and constructivist principles to promote communication, interaction, and self-directed learning. Educators need more organization and advance planning skills that will result in interactive activities integrated with the technology to involve students in their own learning (Bates, 2016; Siantz & Pugh, 1997). Educators also need to focus on the relevance of their content, their generic and specific skills and knowledge when adapting or developing new and different teaching and learning approaches and strategies to use with the technologies.

 Assumptions and Expectations to Use Technologies

It is assumed that the educators have a content base, are experienced with or aware of their audience, and are able to effectively develop plans and deliver the lessons. In addition to assumed skills, educators are expected to have technical skills, adapted or different generic skills, and specific approaches and strategies. Educators using the technologies are asked to investigate new security, ethical, legal, and confidentiality issues; consider cultural and global concerns; gain an understanding of the culture of the learner; develop or adopt ways to humanize the teaching/learning experience; become time aware for both asynchronous and synchronous environments; distribute materials in advance as necessary; and provide support. In addition to these generic skills, educators need to continue to learn specific skills to make the technologies appear transparent. For example, specific to electronic presentation packages, educators need to learn to design and produce presentations and to work with technical people to ensure compatibility when migrating from production to delivery of the presentation.

Specific to using the worldwide web and computer conferencing, educators need to manage the learning environment to promote intellectual rigor; respond or write on-line; type and scan; and seek assistance in setting up a balanced view of screens conducive to learning. In addition to managing the learning environment, there is a strong need to develop ways to build, with the learners, an on- line community (Blanchette et al., 1999). Specific to using audio video conferencing, educators need to learn to work on-camera often without a visible audience, to maintain interaction, and to use a large number of visuals and activities to overcome the conditioning of television and commercials (Blanchette et al., 1999). If educators are researching theory, curriculum, or their content area, they need to learn to search and filter electronic data bases for information and they need to learn to capture the data, write and print using electronic tools. Evident from the plethora of generic and specific skills and abilities needed to work with technologies, educators need opportunities for professional development.

Opportunities for Professional Development

Educators need professional development when they incorporate technology in their teaching. Gehlauf et al. (1991) indicated a need for professional development from their survey that reveals a discrepancy between how educators want to teach (interactive methods using the technologies) and how they do teach (traditional lecture approaches using the technologies). Gibson and Nocente (1998) recognize the urgency for professional development for educators to narrow the gap between students' high expectations for educators to be role models using technologies and educators' limited use of technologies as "personal productivity tools" (p. 327). Turugare and Rudhumbu (2020) support the need for professional development based on their survey results that indicate instructors perceive they use technology in their classes more than the students perceive the use. Willis (1995) supports Gehlauf et al. (1991) by suggesting that hands-on training is not only necessary for learners, but critical for educators to deliver successful programs using the technologies. If educators are the key to successful classroom technology integration, then budgets for professional development must keep pace with the expenditure for hardware, software and connectivity (Martin, 1997). Mandefrot (2001) and Rockwell (1998) revealed a strong need to investigate the training needs of educators in areas such as collaboration, teaching/learning strategies, implementation, outcomes, adult education theory, and ways professional development can be implemented.

To implement professional development, participants need to understand the value of participating, have an opportunity to participate in the planning and implementation of a hands-on program with faculty release time, and have an effective teaching evaluation process, support, resources, incentives and recognition systems in place Rockwell, 1998). In addition to formal courses, instructors can improve their use of the technologies, instructional design and concepts of andragogy by learning from others and by learning by themselves (Armstrong, 1998), Garrels (1997) and Morales (1999) suggested workshops and mentors and Gay (1997) suggested an apprenticeship within a constructivist view to initiate the novice into using the technologies effectively. Professional development can be attained through mentoring, online communications, training, on-line courses, briefings, tours, job rotations, bench-marking, seminars and conferences. Educators can also gain professional development from working with collaborative work teams, developing partnerships, and from interaction with colleagues, administrators, learners, consultants and new hires. Self-directed learning is a choice for educators who assume responsibility for their own learning. Self-directed learning includes options such as the initiative to read, view, listen, reflect, internet surf, and to collect data to learn or monitor trends from sources such as databases of capabilities and interests of colleagues, documented lessons learned, news, policies, products, and processes. Educators can also focus on hands-on experience using technologies by becoming involved in problem solving, experimenting and demonstrations.

Literature Review

Technologies are integrated into business, industry and education and are rapidly changing the way we learn, work, live and think. As technologies open up advanced avenues of communication, and new opportunities for interaction, critical thinking, problem solving and access to resources worldwide, educators need to prepare to explore the resultant impact on their role (Isa & Julia, 2020; Snart et al., 2001). Systems theory addresses the

need for educators to move from working independently to working in a team environment. Adult learning theory and constructivist theory address the need to incorporate critical thinking, collaboration and communication in the planning, design and delivery of learner-centered courses. Professional development addresses the needs and barriers of educators making the transition to plan, design, develop, deliver, and evaluate courses in technology-mediated environments. To make the transition, educators need to know their role, what is assumed of them, what new skills and knowledge are required and where and how professional development can be obtained. However, educators' needs do not exist in isolation, therefore administrators and learners' needs are also addressed. Technologies are rapidly changing and administrators, educators and learners need to understand any gap between current and expected competencies and attributes. The purpose of the review of the literature is to investigate relevant theory, studies that identify new skills and attributes necessary for educators working in technology-mediated environments.

Systems Theory Relevant to Technologies

Systems theory is relevant when working with technologies. To supplement traditional courses or use technology in distance delivered courses, educators need to work with design specialists, resources available electronically, technical support people and people who will support the learners. To participate in professional development opportunities, educators need to know about the technologies, learn to use the technologies from professional development initiatives, and rely on specialists for application and technical support. The systems view must be considered when approaching professional development needs of educators in a technology-mediated environment.

Systems Approach

As technologies provide educational opportunities around the clock and around the world, and as technologies provide new opportunities for critical thinking and communication, the systems approach becomes critical. The systems approach is critical to consider because all components are inter-related and interdependent and if you change one component, it affects others (Moore & Kearsley, 1997). Just as airline pilots rely on the skills and expertise of others for passenger support, security, safety, baggage, airplane production and maintenance, and traffic control in the huge global airline transport and travel industry, so educators need to rely on others, services and systems to implement technology into their traditional and distance delivered programs. Any changes within the educational system can affect other components. For example, changing delivery from one technology to another within a course can change schedules and support systems with other departments and institutions; it can change physical requirements, timing, and costs; enrolment of students; the instructional strategy; and it can change training needs of instructors and learners. When change is introduced in an educational technology system, sub-systems such as course development and delivery, technical and production support systems, and administration must adapt to co-exist (Ramakrishna, 1999). The impact on the system can be enormous. Different from working in an autonomous teacher-learner classroom environment, this inter-related and interdependent system of technology-mediated instruction demands that educators work with other institutions, communication service providers, design groups, and on-site and off-site support systems in a

partnering or team environment. Educators also rely on a network of support when they are involved in their own professional development. Knowlton and Nelson (2002) confirmed this reliance in their review of educators working collaboratively in a studio setting supported by design and technical specialists. Successful integration of educational technology demands professional development, infrastructure and methodology changes, and stakeholder involvement, as well as a partnering process that encourages planning for coordination and teamwork (Banathy, 1995; Ellsworth, 1997).

Team Approach

A team approach is necessary in the instructional design and delivery of technology-mediated courses (Bates, 2006; Hardy & Olcott, 1995; Knowlton & Nelson, 2002; Maloy & Perry, 1991; Moore & Kearsley, 1997; Thach & Murphy, 1994). Learning and creating a technology-mediated course requires many different kinds of skills and experience from instructional designers, writers, media specialists, producers, technicians, and support systems. Knowlton and Nelson (2002), identified design specialists, support people and colleagues that come together in a professional development environment to design "technology - based solutions" (p.1). Maloy and Perry (1991) revealed a need for instructors to work in an interdisciplinary environment. Hardy and Olcott (1995) warned instructors of the movement from an autonomy individual (independent) teaching environment to a team approach. Thach and Murphy (1995) challenged everyone involved in distance education to be ready for collaboration, yet respect individual, group and institutional integrity. With an interest in the dynamics of small groups, Bennis (1997) states that "none of us is as smart as all of us" (p. 35) and that we need facilitators or facilitation skills to help us work together and be more productive. Although our communication skills are aided and abetted by technologies such as e-mail, we still need to have empowerment or participative management skills to work with groups (Bennis, 1997). Recognizing that no one knows all of the interesting uses or possibilities of integrating the fast changing technologies with instruction, Bates (2006) and Knowlton and Nelson (2002) suggest educators the need to learn to work with teams to develop and deliver a quality learning product and environment to facilitate higher order thinking.

Technology and Change

Russell (1997) asks why so many studies indicate that there is no significant difference in success indicators between technology-mediated and traditional instruction when we know so much about learning and the potential of the technologies. Although we know more about the technologies and learning, we need to consider technology as only one part of the system, interdependent with all other components and stakeholders. Ellsworth (1997) suggests educators need to work with and involve stakeholders and look for opportunities to use the technologies to engage learners in critical thinking rather than rote task performance. For example, by taking advantage of interconnectedness, educators can establish technology links to museums or corporations for realistic simulations, or use the internet to collaborate with authors, peers or specialists from other areas of the world. Bringing technology into a system can affect faculty and students who may feel pressures to change and it can affect a person's personal teaching learning philosophy as well. Ellsworth challenges educators to incorporate technology in their traditional courses, to address their assumptions, and to take advantage of the

technologies and interconnectedness to improve the quality and success of their courses.

Evaluation

Continuous feedback is needed from technologists, specialists, peers and learners to revise and improve the course and delivery. A systems approach is needed to accommodate revisions that are necessary before the course and ongoing throughout the course, revisions that are dependent on the expertise and skills of technologists, specialists and support systems (Sherry, 1996).

Adult Learning and Constructivist Theory

Using technology in education is a way to support critical thinking, interaction and independent learning that are integral to the theories of andragogy and constructivism (Guzman, 2000; Lane, 1996; Martin, 1997).

Andragogy

Coined by a German teacher in 1833, reintroduced in Europe in the 1920s but mostly forgotten until Knowles imported and popularized the term in the 1970s, andragogy reflects the growing body of knowledge about adult learners (Lee, 1998). Although Knowles studied andragogy and recognized the need for pedagogy, his focus was always on the learner, recommending the selection of the most effective instruction for the learner and the situation (Lee, 1998). When developmentally appropriate, principles of andragogy can also be applied to younger learners. Principles of andragogy include the need for interaction, task oriented exercises, and self-directedness. Fales and Burge (1984) contended that the design of distance education courses based on adult learning principles encourages learners to be independent and responsible for their own learning without loss of academic rigor. To become a facilitator using adult education principles, educators need to embody a view of:

> Students as adults, whose learning is enhanced when: Learning is facilitated rather than subject matter taught; (a) the learning is largely self-planned and self-directed; (b) individual learning styles are respected and used within the course design; (c) the learning is relevant to the individual's personal and professional life situation; (d) collaborative learning interaction among peers is encouraged; (e) resources from the wider environment, such as community and work situation, are used in the learning situation; (f) reflective, experiential and didactic learning strategies are encouraged; (g) and the learning goals include synthesis, evaluation, integration and application of knowledge as well as its acquisition. (p. 69)

The andragogical model of learning fits with technologies that provide the vehicle for two-way communication for instructors to facilitate interaction with and among learners and provide opportunities for self-directed learning (King, 2000; Lane, 1996). Fidishun (2000) and Alenezi (2017) argue that integrating technology and adult learning principles with instruction will be more effective as it can provide multiple forms of presentation, multiple paths to reflect learner needs, and multiple modes of interaction, in a learner centered environment. Boettcher (2007) recognizes the principles of Knowles' studies of andragogy as key to constructivism.

Constructivism

As technologies are advancing and providing a vehicle for teaching/learning opportunities such as interaction and communication, problem solving, and virtual learning experiences, either on-line or on-campus, Guzman (2000) suggests the introduction of principles of constructivism. Although different views of constructivism exist, Kanuka (1999) identified the following similarities from a comparison of major positions: new knowledge built on previous knowledge, active learning, the importance of language in learning, and a learner-centered environment. Bruner's constructivist theory is an "active process in which learners construct new ideas or concepts based upon their current/past knowledge" (Kearsley, 1997). Sherry (1996) discussed the symbol - processing or objectivist / behaviorist view where educators transmit their knowledge to students and students recall or regurgitate the information for exams and tests. Situated learning falls within the constructivist view where students actively construct their own knowledge.

Within the constructivist view, students learn by interacting with peers, with the instructor and with the content and by building new knowledge on their current knowledge or experiences. The influence of objectivist / behaviorist views is extensive and is ingrained into current teaching and learning methods and assessment throughout educational systems; it is what we have all experienced as learners. However, Crawford (1998) advocates that instructors need to use constructivist approaches to integrate technologies regardless of the traditional behaviorist paradigm. New and seasoned educators need opportunities for professional development to investigate how constructivist principles can be integrated into the teaching/learning experience. Educators use constructivist principles to teach critical thinking, problem solving, collaboration and communication. Learners use constructivist principles to apply their learning to personal experiences and prior knowledge, and to learn to do for themselves. Constructivism also opens up opportunities for students to become skeptic learners:

> In life, as in the classroom, each person receives information and looks at it in terms of [their] ....current understanding.... For example, thirty children who hear a reading of a classic fairy tale will emerge with thirty distinct mental images (Teaching for Understanding, 1996, p. 3).

The student whose grandfather survived the depression by visiting soup kitchens might well bring an affirming perspective to the social reforms of the 1930s. Constructivists recognize that curricula are not neutral, is not objective; it has a social form and is embedded in the social context from which it emerges. "Constructivist curriculum values the scientific method of the traditional disciplines but... appropriates the right to subject all texts, recorded and lived, to critical scrutiny" (Teaching for Understanding, 1996, p. 6).

As places such as museums become reachable through technology such as the internet, Hein (1991) reports on the relationship between museums and constructivist principles becomes important to educators. Hein states that in addition to being hands-on for viewers, exhibits such as museums also need to become minds-on-viewers, need to gain personal meaning by matching up their new knowledge with their experiences (Hein, 1991). Educators need to consider the opportunities technologies can provide in the areas of relevant content and interaction (Kanuka, 1999). With constructivism, educators need to become more of the learners' "guide on the side" rather than their "sage on the stage" to develop themes, facilitate interaction, develop content relative to real life experiences, integrate formative assessment, and anchor development and delivery in constructivist

theory (Taylor, 1997, p. 14).

Andragogy and Constructivism

There are many similarities between andragogy and constructivism (Guzman, 2000; Lane, 1996; Martin, 1997). Although constructivism traditionally focuses on youth and computer based applications, and andragogy traditionally focuses on adults, reflective thought and social interaction to facilitate discourse and discussion, both principles of andragogy and constructivism place importance on the personal meanings and experiences of learners. A central theme for creating learning environments within either framework revolves around helping the learners to see and discover themselves as learners (Martin, 1997). Experiential based learning in constructivism fits with the rich source of life experiences in andragogy, authentic tasks in constructivism fits with adult learners who seek relevance in their learning, and both constructivism and andragogy strive for problem based learning, in a self-directed interactive environment (Guzman, 2000).

Like andragogy, instructors using constructivist principles link resources to learners, and provide exercises or projects to encourage self-directed learning. Adult learners arrive in courses ready to be self-directed and responsible for their own learning. Adult learners have a wealth of experience and knowledge, and constructivists would use this experience and knowledge as a foundation for reflection to build new knowledge. Andragogy and constructivism instructors would both use experience and knowledge as rich resources for other learners to draw from. In a collaborative environment, learners would participate in discussions, simulations, field experiences, problem solving exercises, resulting in critical thinking and interaction.

Adults are ready to learn but they expect to use the learning to perform a task or solve a problem and they expect the learning to be relevant. Andragogy values adult learning where learners construct their own learning-they are said to learn more permanently and deeply if they are involved. Like andragogy, a constructivist instructor would encourage learners to be involved in the planning, process and evaluation of their courses to ensure relevancy and continuous improvement (Lane, 1996). Lane suggests that educators need to implement andragogy and constructivism principles when they plan, develop and deliver their education courses that incorporate and integrate technology.

Critical Thinking

Educators need to be encouraged and given tools to implement activities to facilitate critical thinking in a constructivist environment (Heinzen & Alberico, 1990; Huff, 1998). Motivated by the necessity for workers to learn problem solving skills in the workplace, Heinzen and Alberico (1990) studied the effectiveness of a teleconference course and found few opportunities for creative thinking and problems solving. However, Huffs (1998) study reveals opportunities for creative thinking and problem solving for remote learners. The learners in the study suggest that they were involved in critical thinking because their teacher used a checklist theorized to measure the teacher's behaviors and techniques, but in a practical way, encouraged them as learners to participate in critical thinking. Anderson and Garrison (1995) conclude from their study of student perceptions

of interactive audio-conferencing that using the technology does not automatically facilitate a community of inquiry. Opportunities for learners to participate in a community of inquiry, including in-depth discussions, critical thinking, and cooperative problem solving, can only be created if the educator plans and develops checklists or virtual checklists or activities that "capitalize on the interactive potential of the medium" (p. 42).

Communication Collaboration

Collaboration and interaction among students, and between students and the instructor are vital links to constructivism (Rogers, 2000) and this "need for interaction is so well documented that it is practically a given" (Hillman et al., 1994 as cited in Siantz & Pugh, 1997). If a critical predictor of learners' motivation or intention to persist is instructor-learner interaction, and if a critical predictor of learners' satisfaction in courses is learners' perception of interaction, then educators using the technologies need the skill to facilitate interaction. The results of Pearson study that a significant relationship exists between learners' intention to persist and learner-instructor interaction has implications for instructors (Pearson, 2004). It is a strong indicator that interaction strategies need to be implemented to positively influence motivation of learners. From a survey of current practitioners, Kochery (1997), reports the most frequently mentioned training need was for help with facilitating interaction and feedback during interactive television courses. Fulford and Zhang's theory of cognitive speed helps explain this phenomenon (Fulford & Zhang, 1993). If people speak at 125-150 words per minute and the mind can process information at twice that rate, then listeners only need to use half their capacity to comprehend. Using their other capacity, listeners re open to outside distractions and internal conversations or *renegade thought patterns*. Fulford and Zhang's cognitive theory is important for educators to consider when working with learners in a virtual classroom.

Educators need to engage learners (listeners) by involving them in conversations and discussions with the instructor and among other learners and with the content, and by using a variety of hands-on, audio, and visual activities. Although the findings from the study of Fulford and Zhang (1993) provide strong evidence to support the need for two-way communication for learners' motivation and satisfaction, they note that it is not always possible. They ask what happens in learning experiences where it is impossible for all learners to interact because of variables such as the class size, time, technology, content, or type of presentation. Fulford and Zhang reference the findings of Kruh and Murphy (1990) and Yarkin-Levin (1983) for answers. The findings suggest that it is the learners' perception of interaction that correlates to satisfaction.

The perception of "vicarious interaction" is the interaction that happens internally and silently, where learners respond to questions, agree with answers, and ponder experiences to themselves. Yarkin- Levin provides yet another key-anticipated interaction linked to positive attitudes and recall of facts. When questions and encouragement to answer are thrown around like a ball, learners remain alert because they are not sure where the ball will land. To encourage interaction, Willis suggests the use of advance organizers, practice sessions using the technologies, electronic journals for feedback, open office hours, management of discussions, and use of on-site facilitators as the instructor's eyes and ears (Willis, 1995). Willis encourages the use of technologies to provide feedback because learners are motivated to continue with the course if they have frequent contact

with the instructor (Willis, 1995). Anderson and Garrison (1995) challenge educators to participate in professional development to learn to implement learning activities that will take advantage of the interactive potential of the technologies. Success of technology-mediated instruction such as teleconferencing and computer conferencing is dependent on the teachers' ability to manage discussions and help learners create knowledge through interaction and critical thinking.

Adult Learning and Constructivist Theory Summary

Principles of andragogy and constructivism can be combined with teaching strategies using technology to support critical thinking, interaction, and independent learning. Challenged to help teachers learn to teach, to ultimately create students who are problem solvers, innovators, and comfortable learning new technologies in a constant world of change, Guzman suggest the merging of andragogy, constructivism and technology in a learner centered environment (Guzman, 1999). Crawford suggests educators need professional development opportunities to learn to integrate technologies with the principles of andragogy and constructivism in their teaching (Crawford, 1998). Knowlton and Nelson suggest principles of andragogy and constructivism which are also keys to educators when they themselves are involved in professional development (Knowlton & Nelson, 2002).

Professional Development (PD)

Broad and Newstrom (1992) estimate that less than 20% of the content in corporate training is used or applied on the job. Broad and Newstrom's need for more relevant corporate training supports this study's objective to investigate how professional development can assist educators with the use of technology in their work (Broad & Newstrom, 1992). The identification of participant's needs is critical to the success of training programs to increase the application or transfer of leaning from professional development or corporate training to the workplace. Professional development is investigated to explore why educators need professional development when using technologies in their research and teaching, what skills and competencies educators could be involved in, within what support structure, and how educators can be involved.

PD Needs – Training

Distance educators often become better classroom instructors, (Hardy & Olcott, 1995). However, Willis (1995) sees hands on training as critical to their success. Models of education suggest that institutions must investigate training needs for faculty (The Institute for Distance Education, 1997). Faculty need to learn to use the technologies effectively, to participate in up front orientation and training so changes to the course and technologies can be made before the start of the course, and to work with teams of instructional designers, video producers, and other specialists. Of interest to the selection of faculty and professional development, Models of Distance Education (1997), notes that instructors who volunteer for distance education are typically more successful, experience greater satisfaction, and are better at recruiting than faculty who are assigned. Findings based on Gehlauf et al. (1991) study of faculty perceptions of interactive television indicate that instructors cling

to traditional approaches although they believe audio-visual and interactive methods would be more effective. Analyses of the survey results reveal a distinct discrepancy between how the instructor would like to instruct (audio-visual and interactive methods) and how they do instruct (traditional lecture approaches). The instructors in the study of Gehlauf et al. indicate a need for training. Maloy and Perry (1991) send a strong message to educators to acquire skills and expand their vision of *what can be.* Findings in Maloy & Perry's study of lessons learned in a te1etraining project confirm the need for retraining of instructors including new communication styles and body language, acting skills, subject matter expertise, ability to encourage student interaction through deliberate techniques, and design and delivery of visuals. Wolcott's (1993) study raises the question of who really is in charge of providing training or professional development for the instructors.

PD Barriers

Barriers to professional development are well documented in the literature. Finding time to learn or participate in learning and curriculum development activities involving technologies is extremely difficult for faculty members to allocate. At many institutions research is supported and rewarded, but time, funding and both financial and professional recognition for learning to teach with technologies is not. Traditional higher educational institutions do not have incentives to encourage educators to become involved with the technologies. From an investigation of what faculty members want, Chizmar and Williams (2001) identify lack of release time and lack of rewards as barriers to their participation. As part of the solution, Chizmar and Williams recommend an incentive structure to provide release time and recognition including salary, promotion, and credit in the tenure process (Chizmar & Williams, 2001).

Method

A qualitative research method was selected for this study. An interview template was established to guide and focus the interview. After a beta test, the interview guide and procedures were revised. Permission was granted from the faculty to contact faculty members. Invitations were sent to prospective participants asking them to participate in the study. Further contact was made by telephone, email and personal encounters. When meeting with the participants, the participants were asked to sign a release form indicating that the ethics and procedures of the study were understood. The interviews proceeded and results of the interviews on tape were transcribed. The data were transferred to an electronic database format for analysis. After the analysis, the findings and recommendations were developed and recorded.

Demographics

Of the 100 participants in the study, 58% were male and 42% were female. With regard to teaching, 47% identified strategies to integrate technology, of which 29 males (61 %) and 18 females (39%) responded. Of the 14% who identified strategies to integrate technology in assessment, 5 males (35%) and 9 females (65%) responded; and of the 32% who identified strategies in instructional management, 24 males (75%) and 8 females (25%) responded. Most who responded to assessment were female, whereas most who responded to

management were male. However, the percentage of males (58%) and females (42%) in the study closely matched the percentage of males (61 %) and females (39%) integrating technology.

Findings

The participants were from the population of the entire faculty and administrators of the faculty of education from one university. From the 120 invited faculty members and administrators representing all departments within the faculty of education, 42 female and 58 male invitees participated. Of the 20 who did not participate, two suggested a conflict of interest, 6 were out of the city or on sabbatical, and 12 either said no or did not respond.

After signing a release form that outlined the ethical and confidentiality procedures and right to refrain from participation, the 100 participants were interviewed. Interviews were audio taped and transcribed and combined with interviewer field notes for each participant. Entries cut from transcripts and pasted in the database included a variety of short answers, keywords and enough data from transcripts to understand the entry in context. Queries to the database were established, and reports were run and analyzed. Within each category or field in the database, each faculty member participant (participant) in the study was assigned a database number to maintain confidentiality of names. When the findings reference a participant or participant's comments, the database number is recorded in parentheses. Participants were asked about their use of technology with regard to integrating technology into their teaching. Participants were asked about their use of technology in their planning, teaching, assessment and instructional management strategies.

Technology in Planning/Design

In the area of planning, 86% of the participants indicate they use technology. As noted in Table 1, participants are using technology to search library data bases and the internet for information and ideas relevant to their courses and areas of interest. Many participants organize their data electronically and design and prepare course outlines and materials for their courses using computer applications such as word processing, spreadsheets, calendars, and presentation packages. Although participants are hesitant to use technology because of keyboarding skills, or because they prefer to do their conceptual work with paper and pencil, or because they do not know the possibilities of using the technology, other participants depend on it. "It would be absurd to produce materials by hand" (68). Also, one of the participants involved in online courses or distance education or courses developed in partnership with the specialized technology unit reports on the importance of planning and working with a group of specialists: "Traditional course, I feel I could begin to teach it with a few days' notice, maybe that's exaggerating a bit, but with short notice. However, web based courses you need more preparation to do it and you need to depend on more people, as well as be vulnerable to the technology. Web based adds a layer of delivery. Web sites must be updated for each course, course outline and contents" (65). Most participants (86%) use a variety of technologies when they research and think about the courses they are going to teach, and when they plan the design, delivery and assessment.

Table 1. Planning Using Technologies

Advantages	Concerns
Course outlines/syllabus, assignment sheets, exams, transparencies (1, 2). Outlines, course notes (6). Calendar (63). Organize on PowerPoint (3). Spreadsheets (10). Library data bases on campus-outstanding (7). E-journals for content, access other schools, different universities and check their course outlines. Ideas from the web (11). Research, including internet, looking for information, looking at other universities for course outlines and readings, data bases, libraries (46). Search internet for books, research available (18). Word processing for lecture notes, outlines, bibliographic sources, indexes, readings from web (16). Produce overheads for every written document that I use for students. I couldn't function without my computer. Also statistics package (67). Word processing for planning and design (handouts, overheads) (68).	Don't have good keyboard skills (2). Putting syllabus online - that is an interesting question because I have never thought of doing it, but then nobody has ever suggested it to me that we could do that (2). I need pen in hand to sketch out (33). Partnerships-instructional designer, graphic designer, video specialists, WebCT specialists. Collaborative design, 2/3 time planning philosophy, design issues, what I want students to achieve, why, how, constructivist approaches (64). Teleconferencing - handouts have to be in the student's hands ahead of time - more organization (40).

Technology in Teaching

In the area of teaching, 74% of the participants indicate they use technology. Participants indicate that they are using technology as a communication tool, a development tool, as a vehicle to deliver courses, and as a tool incorporated into their teaching and learning strategies. Within their role as teacher, participants also discuss their present and anticipated future use of technology to supplement courses, deliver entire courses, deliver courses at a distance, and the importance of considering the impact of technology on society.

Teaching - Technology to Communicate

As noted in Table 2, participants comment about their use of technology for communication with their students. A variety of ways are suggested by the participants (27%) to use the technology to encourage communication with students and among students. Participants include their email address on their hard-copy course outlines, post course outlines and events or calendars online, promote shared student email lists and chat groups, use electronic newsletters to keep students in the courses updated, and exchange email messages and attachments. Electronic mail and the posting of information on the internet quicken the right information to the right students at the right time. "You don't have to wait until the next class to update folks, you can do it this way" (4). Electronic communication also supports the incorporation of technologies within the participants'

teaching/learning strategies.

Table 2. Communicating Using Technology (74%)

Activity
Email address on hard-copy course syllabus. Calendar of events, housekeeping information and course outlines or syllabus online (2, 5, 8, 12, 16, 38, 39, 63, 65, 3).
Email on shared class list (5, 7, 22, 58, 65, 68, 74, 92, 93).
Electronic newsletter to highlight guest speakers, reminders (4).
Distribution lists (7, 61, 74, 87). Website of questions, chat groups (63, 7).
Attachments to send course materials (88).

Teaching - Technology in Development, Delivery and Integration

Participants are using technology in their planning. Participants are also using technology to develop their courses, as a vehicle to deliver their courses, and as a tool incorporated into their teaching and learning strategies. As noted in Table 3, participants are using computer applications such as word processing, spreadsheets, presentation and concept mapping packages, graphic programs, color copiers, scanners, digital cameras, and specialized equipment to plan and build their courses. As noted in Table 3, participants are using the technologies and support systems to deliver the courses with equipment such as smart boards and smart classrooms, audio and video conferencing equipment, computers, projectors, and the internet. Comments from participants confirm the use of segments of film, videos, audio, and slides on equipment such as recorders, VCRs, computers, televisions, and amplification equipment (8, 9, 11, 18, 20, 21, 23, 24, 28, 34, 48, 49, 74, 75, 96).

Participants are attempting to model the use of technology and the integration of technology with the content. As noted in Table 3, participants integrate technology by setting up online readings, guiding questions to online reading, virtual field trips, virtual case studies, analysis of papers online, analysis of statistics, and team scavenger internet hunts that end with a debrief on team work. Several participants are involved in distance delivered courses.

Participants indicate that they are making every effort to demonstrate various kinds of emerging software, hardware, equipment and special applications in their courses (71, 72, 73, 74, 77, 79, 80, 85, 100) such as statistical analysis packages, and language analysis programs (11). Participants also stated that they locate websites as resources and ask students to search for websites as well, all to supplement the course content (6, 20, 23, 32, 33, 35, 36, 43, 44, 50, 52, 56, 77, 84, 86, 87, 89, 90, 93, 97). Although many suggest the use of the internet to search for ideas for the course, others stress the importance of discerning what information on the internet is valid and what is trustworthy (34, 4) especially for graduate students doing research. To incorporate technology into their teaching, participants also note their involvement with programs such as WEBCT and their experience supplementing courses or delivering distance courses.

Table 3. Integrating the Technology

Technology	Technology Integration
Smart classrooms (3). Word, Excel, SPSS, PowerPoint, Inspiration (3, 7, 86, 98, 100, 93), telephone, video conferencing (7, 23, 42,94), specialized equipment such as scanners, photography, graphics, cameras, short wave radio, CD's, digital (39, 23, 43), segments of film, videos, audio, slides on recorders, VCRS, computer, television, amplifier equipment (8,9, 11, 18,20,21, 23, 24, 28, 34, 48, 49, 74, 75, 96). Online / distance courses (27, 32, 42, 49, 90, 10). Develop online courseware/WEBCT (86, 90, 94, 91). Variety as key to effective teaching for different learning styles (visual, tactile), hands-on, books, visual demo, small group, slides, overheads, videos, laser, CDS, music, sound, lighting arrangements, connections to websites for content and professional associations (17).	Free access to E-magazines (23). Library data bases (7). Model use of software (38, 46, 68). Help people use (54). Setup online course packs of readings (49). Provide questions to guide reading (8). Get students to analyze statistics (4, 67). Post drafts of papers to do elaborate analysis on (13). Setup virtual field trips (64). Case studies (89). Attachments (5). Team scavengerhunt (85). Suggest websites to students where they can learn more (20, 23, 32, 33, 35, 36, 43, 44, 50, 52, 56, 77, 84, 86, 87, 89, 90, 93, 97, 6). Demo web pages, electronic access (16, 57, 59, 60). Demo software/CD, photography, hearing / seeing technologies, new technologies (71, 72, 73, 74, 77, 79, 80, 85, 100). Analysis of language demo (11). Internet searches (8). Critical scholarship. Can the data be trusted, how much faith can you put in, where are the weaknesses; compare different viewpoints (34). Provide a unit on problem solving through technology (14).

Teaching - Technology - Specialized Tools

A low number of participants are using technology such as WEB CT to either deliver an entire course or to supplement a course. As indicated in Table 4, when asked about incorporating technology into entire courses, 7% of the participants indicate they use WEB CT and 2% of the participants indicate they use something similar to WEB CT. As indicated in Table 4, when asked about incorporating technology as a supplement to courses, 10% of the participants indicate they use WEB CT and 18% of the participants indicate they use something similar to WEB CT. Several participants (6%) who are not using any technology such as WEB CT do not know what it is all about: "I don't mean to be glib, but really, I don't know the answer to that question" (32). "WEB CT - what is that - where can you get it?' (18).

Table 4. Technology - Integration Such as WEB CT

Type of course	Using WEB CT	Similar to WEB CT	Not using WEB CT	What is WEB CT?
Entire Course	07	02	85	06
Supplement to a Course	10	18	66	06

Teaching - Technology - Delivery from a Distance

When asked about distance delivered courses, 19% of the participants have experience and they describe their use of technologies. As noted in Table 5 and Table 6, participants describe advantages of distance education and give advice and participants also outlined disadvantages and concerns. From the comments, we see that distance delivered courses demand more organization and planning to prepare and deliver materials for online publishing, to work with technical and design specialists, and to plan and setup teaching/learning activities such as online conferences or virtual guest speakers.

Table 5. Technology and Distance Delivered Courses - Advice from Participants with Experience

Topic	Advice to Teachers
Organization	Instructor needs to be seriously organize (40).
	Need facts. This is what you are going to learn, this is the purpose, prerequisite. Assignments, references, each module laid out in the same way (40).
	Provide course outline, description of activities for the week, electronic readings, seminar on list serve asynchronous one topic per week, virtual guests, monitor of discussions (16).
	Ask four general questions and four applied questions. Administration for courses needs to be online. Printing online, cheaper to tell student to purchase a book (65).
Delivery	Encourage students to interact with each other in the chat section. I would read things and ask further questions. Almost everybody was participating. I think the technology encouraged it (90).
	Two audio conferences - yes fair amount of interaction (90). Site visits at the beginning and end is good (89).
Expertise	I haven't the foggiest how the data went in, I just said here's what's got to go in, and they put it in (34).
	I'm almost computer illiterate, but I have used First Class, a person helps faculty set it up (42).
	Did have tech person (37).
	Would love to [from participant without experience] (33).
Outreach	Excited for distance to reach students in remote area (4).
Assessment	The net combined with a face-to-face meeting - surprised at amount of work students did, they submitted stuff (articles they had written, reactions) and I turned it around quickly, there was lots of communication back and forth primarily of a written nature. I like that, but still prefer a course in which I see students on a regular basis (90).

From the comments we also see it is important to learn to monitor and encourage student participation and interaction online or in audio/video conferences. Comments also suggest that some courses do not lend

themselves to the online environment, and remind us to investigate our pedagogy beliefs before embarking on a distance delivery graduate degree and ask us to consider the learner's needs and culture. "What makes us think we have the right courses for their culture? Context always matters" (87). Participants with experience in distance delivery suggest that anyone teaching a distance delivery course should investigate the amount of time needed for preparation and delivery and what equipment/software needs to be installed, updated and maintained and what student training, technical and academic support systems needs to be in place. Participants who have experienced distance delivery comment on the demands. "Need to work at home evenings and weekends, otherwise you get inundated. Need separate phone line at home" (89). Comments also suggest that teachers need to be cognizant of young people between the ages of 18 and 24 who might need more human interaction to foster motivation than older adults. Teachers are also challenged to think about emotional connections and ask if it is possible for teachers and students to be emotionally connected in distanced delivered courses (90). Administration is also challenged to handle administration of online courses, online (17).

Table 6. Technology and Distance Delivered Courses - Concerns

Topic	Comments
Awareness	I don't know it (29).
Concerns	No, it doesn't lend itself to text (38).
	Against total distance delivered degree, doesn't mean individual courses ….. our beliefs about pedagogy (5).
	Master's degree through learning - I think that is a travesty. WEB CT, I would never deliver a whole course that way, so never is the word, "I would have to be really convinced of the value of it, and I am not" (87).
	To do a wrap of a conference, I usually do the hardcopy, to see the picture. Need to include something like a happy face -learning to communicate online (89).
	Most adults are self-motivated ... they are more organized and more disciplined, they will read more. Undergraduates between the ages 18-24, you actually need some kind of interaction with another human being to get them to learn or to initiate their own learning. I think that you need that contact, that very personal interaction between two human beings. Question - will machines lose what I value, the emotional involvement. It is important that a student have a sense of the teacher concerned about whether or not they are learning and is willing to spend time and effort in order to enhance that process (90). Polled my grad students and they would prefer, in my particular course, to meet on an ongoing basis (96).

The participants who have been involved in distance delivery are encouraging new educators but are also attempting to raise awareness of the differences to consider in the journey to successfully using technology in distance delivered courses.

Teaching - Technology – Future

As noted in Table 7, when asked if participants have plans to incorporate a technology such as WEB CT as a supplement to their courses or as an entire course in the future, 25% responded positively of whom 18 participants indicate they have not used the technology before. When asked if participants have plans to develop and deliver a distance course using the technologies, 18% responded positively of whom 11 participants have not used the technology before to supplement or deliver an entire course. From the comments, the reasons participants are not using a technology such as WEB CT might be a lack of understanding and access. "How would you provide manipulative resources" (9). "I need models to look at, talk to people see what they are doing" (28).

Table 7. Future use of Technology Supplement, Entire Distance Courses

Type of Course	Plan to use	Used previously	Not Used
Future - Supplement	25	07	18
Future - Distance delivered	18	07	11

Teaching - Technology - Core Technical Skills

Of the 100 participants in the study, 25% are teaching or including core technical skills in their courses. As noted in Table 8, participants are including in their courses programs such as data bases, graphing programs, spreadsheets, analysis software, web searches, development and process tools, video, adaptive and specialized equipment. Three comments suggest participants assume students have the skills, and others rely on students to teach themselves or teach each other.

Table 8. Teaching-Core Technical Skills

Teaching Core Technical Skills	Not Teaching Core Technical Skills
Build data base of readings with core themes (1). Create data file, create variables (44). How to use attachments, how to organize information using spreadsheets or tables (34). Computer graphics (39). Word processing, PowerPoint, Inspiration, Excel (48, 56). Authorware (56, 63). Troubleshoot when students are having problems (56). Word, Office, Studio, Eudora, Web tools (65). Bibliography, Excel, SPSS (66, 67). Inspiration, WEB CT (71). Teach about sound (75). WEB CT, video (100). Teach learning concepts in structured technology courses (80). Adaptive devices (98).	And Authorware does what? (18). I assume they know it (21). My assumption that students have the skills (86) (87). The course includes internet. Students teach each other (32). Cohorts know the technology (42) (89). Links to tutorials (49). TA's [teaching assistants] handle it directly (55). They don't seem to need me to teach them (59). Anything you use, use it effectively (87)

Other participants assume the responsibility for teaching the technical skills in specific courses and within other courses for a variety of reasons. Students need to acquire the skills to operate or use the technology to become more technology literate, students need to acquire the skills to communicate and participate in distance delivered courses or technology assisted courses, and students need to have a role model of integrating technology with the content and delivery of courses. "You need people with technology skills that can teach IT in humanities, arts, English, in all the curriculum subjects as well as in administration. We should be overlapping what C&S [computer and network services] and Computer Science are doing. I think the students that learned how to use the Internet to find those exam questions are a billion times more up to date than if we did a section using the internet. You want to learn how to use a website, not in a computer course, but in a science course. Technology is a process, not the end result (21)."

Teaching - Technology - How to Teach at a Distance

Of the 100 participants in the study, 12% of the participants comment that they feel they are demonstrating skills on how to teach at a distance, most of whom are doing so by modeling. As noted in Table 9, participants' comments suggest that if others were to learn to use the internet, they would need to investigate the potential, consider the learner and learn by role modeling. Like modeling technical skills, some participants feel they need to model distance delivery to students who may need the skills in their teaching career.

Table 9. How to Teach at a Distance

Teaching Tips	Teaching by Modeling
Integrate the WEB and potential of WEB (16). Consider what it means to be a distance learner (seven years old, fifteen years old, adult) (49). Investigate use of satellite map technology (23).	Informally (65). Indirectly (64). The course itself is a model for example (80). Yes by modeling it (86) (91) (94). It is different culture of learning and how can you make that work (4).

Teaching - Technology - Integration / Pedagogical Skills

Participants are becoming aware of the need to integrate technology into courses generally. Of the 100 participants interviewed in the study, less than one-half of the participants (47%) are attempting to demonstrate or teach the integration of technology into the curriculum. As noted in Table 10 and Table 11, participants need to model skills to pre-service teachers. "Give people enough experience so that they see how they can do it and more to break the ice and get them willing to try" (25). One participant comments that you can teach integration by providing students with readings and classroom activities, yet others suggest integration is best communicated be example or modeling. Participants support the need to teach integration of technology for special groups such as those acquiring a new language, the handicapped, or the gifted. Several participants also express concern that they are the ones who need to be doing the modeling to help pre-service teachers, teachers and graduates. Participants can lead by example to show that teachers are responsible for using technology to engage the minds of children, for helping students become critical of the technology, and also to be astute to the hindrances such as the many personalities students can take on when chatting online.

Table 10. Teaching Integration – Pedagogical Skills. General and Special - Concerns

Topic	Concerns
Integration	Almost implicit in the application (2).
	Nothing organized, students are doing some of that kind of integration, if anything, they are leading the way (28).
	Any piece of machinery is not a substitute for good teaching. The technology must work with the teacher to engage the minds of students and get them thinking (87).
	Yes, how to integrate, but not in core subject areas. Lots of talk about potential, but very little has been shown to be useful so not advocating or adverse (11).
	How teaching and learning in general has changed; gender and computers, chat lines where children take on identities (12).
	Where does a computer fit in the education process? Is it patient and kind and give feedback that is critical for kids slower in math, slower in reading. Is it for making smart kids smarter? (20).

Table 11. Teaching Integration - Pedagogical Skills, General and Specific, Advantages of Promoting

Topic	Advantages of Promoting Integration
Need	I would, if I were teaching undergraduates (5).
	I work hard to make certain that everybody has a clue because once they get teaching, the more they know, the better off they'll be (32).
Ethics	Talk about ethics/guidelines (6).
Reading, activities	Talk about multimedia in the language arts classroom ... through readings and class activities not through technology itself (9).
	Use programs to demonstrate "What if' scenarios (30).
Model	Yes by practice. The textbook has a website with practice questions, discussion questions, additional readings, links and multiple choice questions. Exams include 6 questions from the website (21).
	Show by example. There is no other way around, I put it in as part of the requirements and most of the students appreciate it (56). I model it (86). Yes, informally (94).
Specialized	Language lab (24).
	Work with multiple handicapped children (25).
Strands	Whole technology strand (38).
	Integration - must integrate content / technology (39) (52) (57) (60) (63) (64) (83) (16).
	Integration with social studies, an important element, and history, geography, sociology, anthropology (23).
	Students must provide at least 4 internet sites and CDs, AV material, work with cameras, slides, videos, they are expected to know that they can do this (23).
	Calculators can be used to help learn patterns in basic math or games for place values (46).
	Integration of technology into humanities. Teaching training courses (48). Managing technology, integrating technology (49).
	How to use in language arts (70). Inspiration and WEB CT (71).
	Graphic calculator, spreadsheet, graphic software (74).
	Rewriting courses to include technology (77). Yes with pedagogical skills (80).
	Yes, want students to critique (87). Integration for gifted (98).

Teaching - Technology - Impact on Society

Most participants (67%) in the study indicate the importance of incorporating the topic "technology's impact on society" in their courses in either a small way or part of the requirements of the course. As noted in Tables 12 to 15, participants stress the importance of the impact of technology and identify components that need to be addressed. As noted in Table 12, participants draw attention to the impact technology has on learning and communicating. Technology has the potential to radically improve life in the deaf and hard of hearing world, for children with special needs, and for gifted children. One example for educators is learning if and how to use technology. "It is not, should you use calculators? But how will you use calculators" (74).

Table 12. Impact of Technology - Learning / Teaching

Impact	Impact Concern
Technological changes taken place in the deaf world (2). Impact on them [deaf, hard of hearing] and their future absolutely phenomenal (closed captioning, email) (77). Yes, the Gazillion kids who can't seem to make it in the classroom (32). Students with special needs. Example, students with physical handicaps who need more pragmatic kinds of technological assistance, students with cerebral palsy who need different ways to provide responses (53). Special education, gifted (98).	Spell check, we don't have the same kind of spelling skills (11). Impact of computers, calculators on learning (55, 60). How students experience virtual space (45, 100). Difference talking about a novel, difference between oral and written (71). Electronic verses print (43). Technology comes up all the time, pedagogy, and post modernism (13). Technology is a social phenomenon. Affect to classroom environment on learning, future of electronic education (48, 58). Regarding physical activity-60 minutes a week you're supposed to get them fit and enjoying physical activity, there's just not enough time. Doing heart rates, for example, on children and making charts-to me that's taking away time (36). Used to take 2-3 days to run, now two or three seconds. Tests computer scored-reports unethical in terms of standards of practice... they're so generic, they could be about Joe Blow or Joan Blow and it doesn't make any difference....does not address individual ….needs (50).

Participants also draw attention to the need to investigate the impact of technology on learning, the classroom environment, and pedagogy. Participants suggest the investigation of the impact of technology on students themselves who have participated virtual learning environments. For examples, what is the difference between a face-to-face group discussion of a novel and an online discussion of a novel; what is the impact of technology on spelling skills? When students rely on electronic spell checkers, what are the experiences of recording and graphing heartbeats or studying video clips of physical education maneuvers rather than physically participating in activities? "On the internet, look up videos of gymnastics where he can slow motion look at a picture of executing a double one and half something, so he is mentally going over this in his mind. This is good, but not in the physical "time" (36). Participants are asking educators to be aware of the impact technology has on learning.

Educators are also challenged to think about the impact of technology when they are evaluating or grading. Computer scoring is fast but the testing is too generic (50). "It's got so if a student turns something in on a typewriter, we frown, as if the quality of the thinking is related to the typeset" (85). Participants stress the need to consider finances as it is related to the greed of technology. "The funding education – the bottomless pit, the insatiable appetite that technology has" (27). Participants are also asked to include the philosophy of education in courses and the impact of technology on and from society. "Yes, both impact on society and society's impact on technology" (14).

Table 13. Impact of Technology Concerning Educators - Philosophy, Policy, Issues

Impact
Philosophy, yes, in all courses (3) (8) (10).
The philosophy of technology is very important (5).
Yes, both impact on society, and society's impact on technology (14). Policy impact issues around technology (28).

Participants ask educators to consider society that benefit from e-commerce, electronic sharing of information, and travel opportunities that open up the possibilities of global trading and a sharing of cultures. However, participants also ask educators to consider the impact technology can have in other countries. For example, we are asked what assumptions we make of people in other countries, what is the impact on gender, is there gender bias in systems such as the Dewey classification system, what about the disparity between nations (16). "The first world and the rest of the world, how technology actually makes things worse for those countries because they can never catch up" (24). "Where there is no electricity, the minister of education thinks the answer is bring in a computer to every community, that just doesn't make sense to me, let's start with electricity before we go to computers" (33). Impact on gender / globalization.

Table 14. Impact of Technology Concerning Educators - Society

Impact	Impact Concerns
Effects such as ecommerce (56) (63) (64) (66). Impact on global economy, changes how we do business, interact, use data bases (4). Planes that can get you anywhere in the world... see different cultures and languages (33).	Take things for granted internationally, several people might share one account (16). How technology affects communities, identities; connected globally but not locally (45). Impact on internet, citizenship, notion of community, national identity, social and cultural affects, concern with fragmentation (48) (58). Impacts gender / globalization (16).

The impact of technology on society brings up the issues of security and ethics. Educators are asked to consider the ethics of online testing and assessments, online therapy, and trustworthiness of data on the internet. Educators also need to be especially aware of ethics and security regarding children. Educators need to encourage awareness of the possibility of lurches using technologies to prey on children. For example,

'pedophiles going fishing in chat rooms" (23) or children gaining access to sexual, or racist or dangerous information. "What are the ethics behind porn sites? Children have access to things like bomb making" (33). Participants suggest the need to be aware of and investigate the need for security and ethics and discernment.

Table 15. Impact of Technology Concerning Educators - Ethics / Security

Topic	Impact
Ethics	People doing therapy online (99).
	About adolescence and media (21).
	How neo-Nazi could show up if looking for something like "race" or "African" or "Jews". Ethical applications of technology (23).
	Global ethics (97).
	Ethics behind porn sites (33).
Impact	Concerning discernment (87).
	Barriers, constraints, successes (89).
	Impact, this is a good area for research. Everybody has an opinion. I don't think it should be money where we start, it is what are the needs of the people, how do we get them, and then how do we develop colleges and programs to meet them (29).
	What is it, how does it work, how does it change what you are using it for (39).
	Impact of hardware /software/ network, societal impacts (52).
Security	Effect of hackers and cyber control (73).
	Negative impact on students, Freedom of Information Act (30). Access, see Neil Postman (80) (96).
	My limitation also (33).

Most participants (67%) support the need for the investigation of positive and negative impacts of technology on education and society. Participants also support the need to consider the impact of technology on education and society in the future. Participants support the need to raise awareness and for the investigation of security and ethical issues and the need to foster critical thinking with regards to technology.

Teaching - Technology - Graduate Students

Specific to encourage graduate students to be critical thinkers, seven participants suggest it is every educator's responsibility to alert their students about new technologies. As noted in Table 16, graduate students need to be aware of hate sites, of how information is inter-linked, of what subjects or topics are missing, and how knowledge is being developed and by whom (4). Participants also see that the internet can be an opportunity for graduate students to participate in discussions, communicate with other academics, see how information can be disseminated in the future, and how they can make contact with former students, authors or specialists in particular fields.

Table 16. Graduate Students

Communication	Critical Thinking
Set meetings. Provide opportunity for graduate students to participate in forums, to see knowledge production and dissemination in the future (4). See what other academics are saying and relate it to sites (4). Tell students after they read a dissertation to contact that student by email or telephone or in person. Example: "how did this research that you have done, take you into the future, influence what you are doing now, what have you done since, or I was wondering about. .. " (22). Suggest sites to student in my 600 level courses, things that I find sort of serendipitously, I will pass (3).	Use internet critically to see competing knowledge sites around the same topics and how it is hooked to economics, politics, culture and needs of government, business and industry - to see the big picture of how knowledge is produced (4). Ask grad students to look at hate sites from different groups to give students a sense of how new technologies are being used to communicate long standing historical hatreds. Try to get students to understand the insidious ways that power is still at playing on the internet (4). Search for absences on the internet (4).

Technology in Teaching Summary

Most participants (74%) are using the technologies in their teaching. Participants indicate they use technologies to connect with their students and encourage students to interact with each other in a timely manner. "Best time to write down your problem is when you have the problem (2:00 a.m.) and mail it, even if it isn't answered until 9:00" (63). Participants are using technologies to assist with the development of their courses and as a vehicle for the delivery. Several participants are using technology to supplement or deliver entire courses at a distance and several more are interested in future development. In their teaching, participants are also demonstrating technologies, referring students to websites for additional information, and integrating technology into their teaching and learning strategies. Participants expressed their concerns and recommendations regarding the teaching of core technical skills, the integration of technology, the need to include the impact of technology on education and society in their courses, need for critical thinking, and the need to teach the use of technology by modeling. As teachers begin to email and post information to communicate with students, and as teachers begin to integrate technology in their design and delivery, teachers also look at how technology can be of value in assessment.

Technology in Assessment

In addition to comments about planning and teaching, the use of technology in assessment is also addressed as noted in Tables 17 to Table 20. In the area of assessment, 68% of the participants indicate they are using technology. Participants are using technology to collect documents or test assignments through electronic attachments, and they are beginning to integrate technology with their assessment strategies (6, 18, 56). As noted in Table 17, participants are using technologies to help develop their assessment strategies and to help them manage the assessment process. Participants use the technologies to develop test banks, generate tests, and

analyze test questions to discern how well each question on the test performed. Participants also manage the assessment process by storing and sorting assessments electronically, by providing electronic feedback and by comparing achievement with provincial standards posted online.

Table 17. Technology in Assessment - Test Development - Management

Development	Management
Have a database of questions to draw from (6). I use a database to generate test questions (18). Use test bank to develop exams, generate answer sheets, subject to test scoring system here at the university so I can get back an itemized list as to how well the test performed (56). Used SPSS to find out what questions were or were not discriminating (6).	Store assessments (33). Keep my responses to students on computer (19). Print out summary feedback sheets (33). I will give credit for readings online (90). Can look at achievement exams at Education site and professional sites (46).

As noted in Table 18, comments both support and oppose the use of technology to send/receive assessments electronically. Comments that do not support attachments or the use of technology in assessment indicate hesitancy due to compatibility problems of attachments, possibility of fraud, preference of students to receive and review hard copy before or while writing, course content that does not lend itself well to technology, and strong preference for hard copy to evaluate and provide feedback on. Comments that support the technology suggest that students submit assessments in a variety of formats including attachments, word documents, web sites, links, CDs, videotapes, and computer presentation packages.

Table 18. Technology in Assessment (68%) - Submit Electronically. Advantages/Concerns

Advantages	Concerns
Students produced a portfolio or website (9). Submit on CD without support of university (19). Students use PowerPoint (21, 83, 44, 45). Joint assignments using CD (46). Submitted using PowerPoint, word processing. Web page. Inspiration (48). That's very common, assignments as web documents (49). Students have submitted on Web and PowerPoint (74). Submit on videotape and CDs (75). Online courses - yes assessment (27). Yes for students at a distance (68).	Difficulty downloading (10, 75). Concerned about fraud (24). Give copy out in paper, saves students printing, they're happy about that. When we go through it, they have a copy right in front of them (52). Prefer to give out in person (55) Nature of assignments don't quite fit the format, it's not that I'm unwilling though (70) But only if they are out of town (82). No space or desire to read from students who are on campus (68)

As noted in Table 19, a low number of participants (14%) give examples of how they have integrated technology in assessment strategies. Examples include a request for submission of reflective papers, emailed exams at specific times to be submitted by specific times, computer generated questions to be answered and submitted electronically, participation in electronic discussion groups, submission of assignments electronically to be compiled and pressed on a CD and redistributed back to the class (71), and credit for assigned web searches (72).

Table 19. Technology in Assessment - Integrate Assessment

Integrated Assessment Activities
Short reflective papers, mark electronically and return, not essays (16). Reflective papers emailed in (64, 36). Students can use visual data bases and submit work as computer files (39). In the form of appraisals (30). Use of video equipment (99). Group activities, submit, and critique (100). I email exams - the student contacts me by phone or email or in person and tells me when they want to write it, and then I send the document and then they have to return it to me in five hours, and if they want to do it at midnight, I know what time I gave it to them (21).Exams have a computer component to them, not during every exam, but at least during one of the exams, run a computer program in order to generate the answers to a certain set of questions (66). Insist students use computers on all assignments, submit using word processor (56). Electronic discussions - would do a wrap to see if objectives were met (86). Undergrads submit the assignment electronically, then we can press a CD to give them to everybody, so they came away with 10 or 12 (71). Students have assignments where they have to do some web searches (72). Post on common drive students can access (52).

Participants involved with distance delivered courses combine the technology with assessment strategies, but many participants prefer on campus students to submit hard copies. As noted in Table 20, when participants receive attachments for evaluation, they are either returned electronically or in hard copy. Of the 68% who use attachments, 5 indicate that they provide electronic feedback and 13 feel strongly that they need to print hard copy, and read and supply feedback on hard copy. "Students want comments submitted electronically… I don't like reading stuff on the computer" (42).

Table 20. Technology in Assessment (68%) (Edit Online)

Advantages	Concerns
Electronic feedback on assignments through email, instant clarifications about questions (12). Edit online (37). Give students feedback on computers (33). Respond and return electronically (89, 96).	Need to edit hard copy even if sent as attachment (12). Would print because don't like reading on screen and I want to write copy (14). I will print and respond on hard copy (22). I don't feel I can edit stuff from the screen as well as I can edit on paper (25). I prefer hard copy but I am flexible (35). I enjoy doing my marking in either my living room with music on or at a cafe or at some nice place, not in front of my computer (42). Students submit electronically, secretary will print it for me (45). Difficult for me to edit online (56). I don't like seeing one page at a time on my monitor, I like to flip back and forth quickly and I don't find it quick when I am trying to read on the monitor (68). Would rather have hard copy. I hate reading things off the computer screen. I don't want email assignments (75). Only if they are out of town. Prefer hard copy. Edit online is too difficult. Always print (82). Hard to get the gist scrolling (87). Print, write on it, and turn it back within a day (90).

As noted in the comments, hard copy is preferred because it is easier on the eyes to read than on screen, it is easier to flip pages back and forth, it is easier and more efficient to edit when you can see more than one screen at a time, it is easier to comprehend, it is more portable to mark in more desirable places than in front of the computer screen, and editing on hard copy is more personal. "Students prefer handed back with comments. Typing is impersonal, but so perfect. The handwriting is more personal, yet so imperfect" (87). Although participants indicate that they use technology in assessment, the majority of participants limit their use of technology to the receipt of attachments from students and arguments prevail as to the advantages and disadvantages of marking online. Participants also share ideas on how they integrate technology into assessment and suggest that technology can also be used to help store responses to students and store feedback sheets (33, 19) to assist in instructional management.

Technology in Instructional Management

In the area of instructional management, 32% of the participants indicate they use technology. Some participants in the study are reluctant to use the technology and others are seeking ways to become familiar with its use. As noted in Table 21, of the 32% participants who use technology for management, 23 are using calculators, computer programs such as spreadsheets, databases, WEB CT, file storage and backup systems, and systems to record and retrieve advice and comments given to students.

Table 21. Management Concerns and Advantages

Concerns
Lack of Awareness - Does the calculator built into the computer count as using technology? (6). Don't know how to use a program to report grades and stuff, I don't even know how to use Excel-which is craziness. I would like to know how (28). Infrequent use, forget how to use them (33). I don't know how to do that (45). No, need more help (11). I didn't realize that they could send you an attachment from optical scoring with all of the listings of students-why didn't somebody tell me about this? (50). No but probably should start (60). That part I am going in reverse in technology (88). Deterrent - Sometimes I find it quicker because I am a slow type, to tabulate and add and do all those stuff mentally. 12 and 200 people - that is totally different (3).
Advantages
Software - Spreadsheets (3, 10, 16, 21, 25, 27, 35, 52, 55, 56, 65, 66, 68, 74, 80, 87, 93, 99). Data base (8). Web CT (86). File and keep backups (4, 48, 87).
Keep files on all my students electronically. Keep a record of what advice I have given, I do keep a record of my comments on student's papers (5).
Statistical calculator gives me flexibility to move around (23) and because you have to submit a hard copy to the department (23). Why-we have to submit on paper (24). Yes that's all that I use, and I would love if we could enter our marks on the computer (46). Computers make fewer mistakes than I do by hand (63).
Source of amusement - we have the most sophisticated spreadsheets to figure out marks, marks are still communicated manually. I want to get the class lists electronically - not been the norm. Need name, ID#, email address to cut and paste. Who can you ask for this, how can you get it? (65). Freedom of Information - so marks have to be submitted so students can access their own marks - that takes time (17).

Of the 32% participants using technology, 5 participants indicate a preference for marking and returning assessments online and obtaining class lists electronically, whereas others are amused that although they can record electronically, they cannot submit electronically to administration. Others from the group of 68% who prefer not to use technology comment that it is because of their typing skill, because of smaller class sizes, because it needs to be submitted manually anyway, because they simply do not want to, yet 6 participants comment that they are ready and willing to learn.

Discussion

The study was conducted to examine the teaching needs of faculty members with regard to technology. The study provided the basis for understanding the basic needs of faculty members and issues integral to the process of integrating technologies in their work. Currently, little research is available on how faculty wants to participate in professional development opportunities regarding technologies (Chiu et al., 2013; Jonatan et al., 2018). The limited research currently available regarding teaching needs of faculty members and technology further demonstrates that connecting the two is necessary and critical.

This study utilized a qualitative research design. The qualitative research design was selected as it was considered well suited to the problem or phenomenon under study, and the intended audience. The purpose of this study, to probe for deeper understanding of the professional development needs of educators using technologies, made use of the strengths of qualitative methods to seek illumination, understanding and extrapolation to similar situations (Hoepfl, 1997). Johnson (1995) supported the qualitative research method for educators to "probe for deeper understanding rather than examining surface features" (p. 2) of factors that support learning and teaching. Similarly, Armstrong (1998) selected a qualitative method including interviews to investigate and explore influences that motivate faculty to incorporate technology with their instruction. Armstrong indicated the qualitative method sought to gain a richer understanding of the experiences of faculty members, thus contributing to the body of literature weak in linkages between faculty members as adult learners and their professional development with regard to technology (Armstrong, 1998). The qualitative method was also recommended for technology related studies-to investigate the adoption or integration of technologies in education, case studies and shared stories to determine professional development needs (Martin & Christopher, 2020; Norum, 1997; Pedretti & Woodrow, 1999).

Findings from the study show that participants are using technologies to assist with the development of their courses and as a vehicle for the delivery of their courses. The study demonstrated that Several participants are using technology to supplement or deliver entire courses at a distance and several more are interested in future development. In their teaching, participants are also demonstrating technologies, referring students to websites for additional information, and integrating technology into their teaching and learning strategies. Participants expressed their concerns and recommendations regarding the teaching of core technical skills, the integration of technology, the need to include the impact of technology on education and society in their courses, need for critical thinking, and the need to teach the use of technology by modeling. Faculty members are using technology in their planning (86%) and in their teaching (74%). However, many faculty members are not

integrating technology in their courses to facilitate problem solving, critical thinking and collaboration. The responses also suggest that many faculty members are also not integrating technology as an assessment strategy or instructional management tool.

Findings on the study indicated that teachers are beginning to email and post information to communicate with students, and as teachers begin to integrate technology in their design and delivery, teachers also look at how technology can be of value in assessment. Finding from the study also show that Faculty members are interested in learning how to incorporate technology in their teaching and their comments suggest their need to combine technology with principles of pedagogy, andragogy, and constructivism. The findings of this study are consistent with prior studies (Alenezi, 2017; Blanchette et al., 1999; Hughes et al., 2020; Schwarzer, 2019) which established that technology has a great impact in teaching and this has progressively improved delivery of instruction, and facilitated development of knowledge, skills, abilities, including problem solving and critical thinking.

Conclusions

Almost all of the participants (86%) are using the internet and electronic data bases to search for information and ideas relevant to their courses and participants are using computer applications to organize and prepare for their course. Participants bring to our attention the need for extra time and planning when using technology in their courses, especially courses delivered partly or entirely from a distance. In the area of teaching, most participants (74%) indicate that they are using technologies to communicate with students, to develop and deliver courses and to integrate the technology with course content. However, when asked about integrating technologies with the course content, 47% participants indicate they are either integrating technology generally or specifically, 37% are using a technology such as WEB CT, 19% of the participants are involved with distance delivered courses, and 25% are teaching core technical skills. Several participants (6%) indicate that they are not using these technologies because they lack information about its use, and 25% state that they are interested in learning in the future. Of the 100 participants, 67% are interested in teaching and discussing the impact of technology on society in their classes.

With regard to assessment, more than two-thirds of the participants (68%) indicate they are using technology in assessment such as sending and receiving attachments, however, a low number of these participants (14%) give examples of integrating technology with their assessment strategies. In the area of instructional management, 32% of the participants are using technology. With regard to using technologies in planning, teaching and learning, assessment and instructional management, the faculty recognizes the need to support participants and help is made available. "Support for teaching, located down the basement is superb, very very helpful" (20) to learn about "instructional presentations, Mac, IBM, color printers and copiers, and transparencies" (62). Participants are using technology in their communications and in their teaching and learning.

Based on the findings of this study investigating what faculty members need to make technology an integral part of their teaching process to enhance delivery of instruction, and to facilitate development of knowledge, skills,

abilities, including problem solving and critical thinking, the following conclusions evolved:

1. Faculty members are using technology in their planning (86%) and in their teaching (74%). However, many faculty members are not integrating technology in their courses to facilitate problem solving, critical thinking and collaboration. Many faculty members are also not integrating technology as an assessment strategy or instructional management tool.

2. Faculty members are interested in learning how to incorporate technology in their teaching and their comments suggest their need to combine technology with principles of pedagogy, andragogy, and constructivism.

3. With a responsibility to support pre-service and service teachers with regard to technology, faculty need equitable access, release time and recognition to investigate, build, and deliver courses or parts of courses using technology.

4. Although the 74% using technology in teaching opposed to the 47 who suggest the use of technology in their teaching indicates a gap in integration, it should not overshadow the fact that over 90% of the faculty are modeling technology by communicating electronically with students and graduates.

5. Although the 68% using technology in assessment opposed to the 24 comments that suggest the use of technology in their assessment strategies indicates a gap in integration, it does not consider that it might be a choice as many comments suggest a dislike for reading and marking online.

6. Although 32% of the participants indicate the use of technology in instructional management, many support the choice of non-technical because of class sizes, keyboarding skills, and because class lists and submission to administration are not fully electronic.

Recommendations

Recommendations for Practice

The following practical recommendations are offered for consideration:

1. Systems Theory - Faculty members and administrators seeking opportunities to learn or incorporate technologies in their teaching are advised to investigate systems theory that recognizes technologies are embedded in an interconnected system involving connections and reliance among individuals, teams and departments where collaboration with those involved is critical.

2. Androgogy, Constructivism - It is recommended that faculty members set a goal to explore how technologies can help foster interaction, problem solving and critical thinking in the courses they are responsible for teaching. Faculty members are also challenged to investigate how teachers are or could be integrating technology in their curriculum. It is recommended that faculty members explore their use of, and teachers' use of principles of andragogy and constructivism in their teaching. Andragogical and constructivist principles include learner centeredness, relevance of content, self-directedness, linking of resources to learners, reflection on experience and knowledge, collaboration and interaction between instructor and students and among students. Lane (1996) supports the investigation of how technology can be used to support critical thinking, interaction and independent learning that are integral to the theories of andragogy and constructivism.

Recommendations for Further Research

After analyzing the data and themes emerging, and after further readings and research, the following recommendations are offered for further research.

1. Replication of this study is recommended in other contexts such as with other faculties of education as other universities might serve a more geographically scattered population, or might be combined with a college with less focus on research, or a university that focuses on distance delivery. Replication of this study is also recommended for other disciplines to learn how others apply technology and develop professional development initiatives.

2. As many academic members are not using technology in their teaching or assessment strategies to support problem solving, critical thinking or collaboration by incorporating technology, and as faculty members are asking to be kept informed about new and emerging technologies and applications, it is recommended that further research is needed to investigate specific needs of faculty and to inform faculty members of technology possibilities.

3. Ongoing studies are suggested to reveal how technologies are being used by administrators, faculty members, students at the university, student teachers, teachers, and students. Ongoing studies to reveal how others are using technologies will help individuals realize how much they know and how much "they don't know what they don't know" (74).

References

Alenezi, A. (2017). Obstacles for teachers to integrate technology with instruction. *Education and Information Technologies, Vol. 22*, No. 4, pp. 1797-1816, available at: http://search.ebscohost.com/login.aspx?direct=true&AuthType=shib&db=eric&AN=EJ1145944&site=eds-live&scope=site Accessed on 24th May 2020

Anderson, T., & Garrison, D. R. (1995). Transactional issues in distance education: The impact of design in audio teleconferencing. *The American Journal of Distance Education, 9*(2) 27- 45

Armstrong, R. D. (1998). Faculty strategies for learning to teach at a distance. *(Un-published Doctoral dissertation). University of Wisconsin - Madison, Madison, WI.*

Banathy, B. (1995). Developing a systems view of education. *Educational Technology. Vol. 35*, No. 3, pp. 53-57.

Bates, A. W. (2016). The 10 Fundamentals of Teaching Online for Faculty and Instructors. *https://teachonline.ca/* Accessed on 24th May 2020

Bates, A. W. (2019). Teaching in a Digital Age: Second Edition. *https://teachonline.ca/* Accessed on 24th May 2020

Bates, T. (2006). The Impact of Technological Change on Open and Distance Learning. *Presented at Queensland Open Learning Network, Brisbane, Queensland, Australia.* https://doi.org/10.1080/0158791970180108 Accessed on 24th May 2020

Bennis, W. (1997). An Interview with Warren Bennis. *https://www.strategy-business.com/article/18276?gko=0e7a4* Accessed on 4th February 2020

Blanchette, J., Collett, D., Goodale, C, & Kanuka, H. (1999). Learning Technologies in Distance Education. *Office of Learning Technologies: Human Resources Development Canada.*

Boettcher, J. (2007). Ten Core Principles for Designing Effective Learning Environments: Insights from Brain Research and Pedagogical Theory. *Innovate: Journal of Online Education: Vol. 3*: Iss. 3, Article 2. https://nsuworks.nova.edu/innovate/vol3/iss3/2

Broad, M.L., & Newstrom, J.W. (1992). Transfer of training. Reading. *MA. Addison-Wesley Publishing Company, Inc.*

Chizmar, J., & Williams, D. (2001). What do faculty want? *Educause Quarterly, 24*(1), 18-24.

Chiu, J. L., Malcolm, P. T., Hecht, D., DeJaegher, C. J., Pan, E. A., Bradley, M., & Burghardt, M. D. (2013). WISEngineering: Supporting precollege engineering design and mathematical understanding. *Computers & Education, 67*, 142-155.

Crawford, R. (1998). Teaching and learning IT in English state secondary schools - Towards a new pedagogy, http://eprints.hud.ac.uk/id/eprint/7540/2/Microsoft_Word_-_J_Ed_IT.pdf

Ellsworth, J. (1997). Technology and change for the information age. *Vision, 1997.* https://eric.ed.gov/?id=ED439702

Fales, A. & Burge, E. (1984). Self-direction by design: Self-directed learning in distance course design. *Canadian Journal of University Continuing Education*, *10*(1), 68-78.

Fidishun, D. (2000). Andragogy and technology: Integrating adult learning theory as we teach with technology. *Proceedings of the 2000 Mid-South Instructional Technology Conference. Murfreesboro, TN: Middle Tennessee State University*

Franklins, A. S. & Nelson, E. A. (2015). Nigeria education system and vision 20: 2020: A critical development planning perspective. *International Journal of Educational Administration and Policy Studies.*

Fulford, C. & Zhang, S. (1993). Perceptions of interaction: The critical predictor in distance education. *The American Journal of Distance Education, 7*(3) 8-20.

Garrels, M. (1997). Dynamic Relationships: Five Critical Elements for Teaching at a Distance Alternative Education. *Faculty Development Papers.* Available online at: Indiana Higher Education Telecommunication System (http://www. ihets. org/distance_ed/fdpapers/1997/garrels. htm l).

Gay, G. (1997). Using Research to Design Effective Distance Education. *Ontario Institute for Studies in Education (OISE)*.

Gehlauf, D., Shatz, M., & Frye, T. (1991). Faculty perceptions of interactive television instructional strategies: Implications for training. *The American Journal of Distance Education, 5*(3) 20-28.

Gibson, S., & Nocente, N. (1998). Addressing instructional technology needs in faculties of education. *Alberta Journal of Educational Research, 44*(3), 320-31.

Guzman, N. (2000). *Applications of Adult Learning Theories to Constructivist Learning Environments.* University of Colorado, Colorado Springs

Hardy, D. W. & Olcott, D., Jr. (1995). Audio teleconferencing and the adult learner: Strategies for effective practice. *American Journal of Distance Education, 9*(1), 44 - 60.

Hein, G. (1991). Constructivist learning theory. *Exploratorium: Institute of Inquiry*. Available at https://www.exploratorium.edu/education/ifi/constructivist-learning Accessed on 4th February 2020

Heinzen, T, & Alberico, S. (1990). Using a creativity paradigm to evaluate teleconferencing. *The American*

Journal of Distance Education, 4(3) 3-12.

Hillman, D., Willis, D., & Gunawardena, C. (1994). Learner - interface interaction in distance education: an extension of contemporary models and strategies for practitioners. *The American Journal of Distance Education, 8*(2), 30-42.

Hoepfl, M. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education, 9*(1) 1-17.

Huff, M.T. (1998). A comparison of critical thinking in an interactive television social work course. *Ph.D. thesis, University of South Carolina.* Retrieved June 14, 2020 from https://www.learntechlib.org/p/120696/.

Hughes, JE. et al. (2020). Preservice and inservice teachers' pedagogical reasoning underlying their most-valued technology-supported instructional activities. *Journal of Computer Assisted Learning, 36*(4), 549-568.

Isa, J. & Julia, L. (2020). Three types of integrated course designs for using mobile technologies to support creativity in higher education. *Computers & Education, 146*. DOI: 10.1016/j.compedu.2019.103782

Johnson, D. (1995). Will our research hold up under scrutiny? *Journal of Industrial Teacher Education, 32*(3), 3-6.

Jonatan, C, Marco, K, Karel, K, & Yves P. (2018). Who is taking MOOCs for teachers' professional development on the use of ICT? A cross-sectional study from Spain. https://doi.org/10.1080/1475939X.2018.1528997 Accessed on 24th May 2020

Kanuka, H, & Anderson, T. (1999). Using Constructivism in Technology- Mediated Learning: Constructing Order out of the Chaos in the Literature. *Radical Pedagogy*. Available at http://auspace.athabascau.ca/handle/2149/728

Karen, M. D., Catherine, C. & Susan, A. (2007). Improving Classroom Instruction: Understanding the Developmental Nature of Analyzing Primary Sources *RMLE Online, 30*(6), 1-20, DOI: 10.1080/19404476.2007.11462039

Kearsley, G. (1997). A guide to online education. http://gustavolarriera.tripod.com/doc/tech/online.htm Accessed on 4th February 2020

Kelly, M. (1990). Course creation issues in distance education. In R. Garrison & D. Shale (Eds.), *Education at a distance: From issues to practice* (pp. 77-100). Malabar, FL: Peter E. Krieger.

King, K. (2000). Educational technology that transforms: Educators' transformational learning experiences in professional development. *AERC Proceedings.*

Knowlton, D. & Nelson, W. (2002). Faculty development by design. *Society for Information Technology and Teacher Education International Conference 2002(1),* 666-668.

Kochery, T. (1997). Distance Education: A Delivery System in Need of Cooperative Learning. *ED 409847*

Kruh, J., & Murphy, K. (1990). Interaction and Teleconferencing: The Key to Quality Instruction. Paper presented at the Annual Rural and Small Schools Conference. Manhattan, KS. *Eric Document Reproduction Service*, ED 329418

Lane, C. (1996). The role of technology in the systemic reform of education and training. *Ed Journal, 8*(6) 1-22.

Lee, C. (1998). The adult learner: Neglected no more. https://eric.ed.gov/?id=EJ560475 Accessed on 4th February 2020

Maloy, W., & Perry, N. (1991) A navy video teletraining project: Lessons learned. *The American Journal of*

Distance Education, 5(3) 40-49.

Mandefrot, K. (2001). An embarrassment of technology: Why is learning still difficult*? Journal of Research on Computing in Education, 33*(5).

Marquardt, M., & Kearsley, G. (1999). Technology - Based Learning: Maximizing Human Performance and Corporate Success. St. Lucie: New York

Martin, K. & Christopher, B. (2020). The professional development needs of beginning and experienced teachers in four municipalities in Sweden, Professional Development in Education. DOI: 10.1080/19415257.2020.1712451

Martin, R. (1997). Constructivism and transformative learning theories. Construction and Adult Education.

Models of Distance Education: A conceptual planning tool developed by University of Maryland University College for the University System of Maryland Institute for Distance Education. (1997). *Institute for Distance Education*. http://www.umuc.edu/ide/mod/menu.html

Moore, M. (1993). Is teaching like flying? A total systems view of distance education. *The American Journal of Distance Education, 7*(1) 1-10.

Moore, M., & Kearsley, G. (1997). Study Guide for Distance Education: A Systems View. *Wadsworth Cengage Learning*.

Morales, M. (1999). Teacher professional development. *University of La Verne*.

Norum, K. (1997). Lights, camera, action! The trials and triumphs of using technology in the classroom. *Journal of Technology and Teacher Education 5*(1), 3-18.

Olcott, D., Jr. & Wright, S. J. (1995). An institutional support framework for increasing faculty participation in postsecondary distance education. *The American Journal of Distance Education, 9*(3), 5-17.

Pearson, W. (2004) Supporting Adult Student Persistence to the Baccalaureate Degree. *The Journal of Continuing Higher Education , 52*(2), 23-36. DOI: 10.1080/07377366.2004.10400282

Pedretti & Woodrow. (1999). Teaming technology enhanced instruction in the science classroom and teacher professional development. *Journal of Technology and Teacher Education, 7*(2), 1131-143.

Ramakrishna (1999). Management of distance teaching institutions: The staff development perspective. *World Bank Global Distance Educationet.*

Rob, K. (2012). Selecting Online Learning Technologies: An Interview with Tony Bates. https://www.facultyfocus.com Accessed on 4th February 2020

Rockwell, S. K. (1998). Research and Evaluation Priorities for Distance Education in Nebraska: A Delphi Study. [White paper Distance Education Action Team.] Nebraska Network.

Rogers, P. (2001). Traditions to transformations: The forced evolution of higher education. *Educational Technology Review, 9*(1)1-15.

Rogers, D. (2000). A paradigm shift: Technology integration for higher education in the new millennium. *Educational Technology Review, Spring/Summer,* 19-33.

Russell, T. (1997). The "No significant difference" phenomenon as reported in 248 research reports, summaries & papers. *North Carolina State University. 4th Edition.*

Schwarzer, SR. (2019). Support or Self-Efficacy: Which One Has the Most Effect on Teachers' Abilities to Reach Outcome Expectations with Integrating Technology in the Classroom? Available at *search.proquest.com*

Sherry, L. (1996). Issues in distance learning. *International Journal of Educational Telecommunications, 1*(4), 337-365.

Siantz, J., & Pugh, R. (1997). Using interactive video for instruction. *Indiana University*.

Snart, F., Carbonaro, M., & Goodale, C. (2001). Technology needs of university teachers, classroom teachers, and pre-service teachers: How do we begin? Finding the Courage to Teach in a Changing World. Western Canadian Association for Student Teaching Conference. University of Calgary. 2001.

Taylor, S. (1997). Cooperative Learning in Distance Education. *Ivy Tech State College, South Bend, IN*.

Teaching for Understanding: Educating Students for Performance (1996). *Wisconsin Education Association Council*.

Thach, L. & Murphy, K. L. (1994). Collaboration in distance education: From local to international perspectives. *The American Journal of Distance Education, 8*(3), 5-21.

Thach, E., & Murphy, K. L. (1995). Competencies for distance education professionals. *ETR&D 43*, 57-79. https://doi.org/10.1007/BF02300482 Accessed on 4th February 2020

Turugare, M. & Rudhumbu, N. (2020) Integrating technology in teaching and learning in universities in Lesotho: opportunities and challenges. *Education and Information Technologies*, 1-20. https://doi.org/10.1007/s10639-019-10093-3 Accessed on 24th May 2020

University of Missouri-Columbia. (2020). Technology in higher education: learning with it instead of from it. *ScienceDaily*. www.sciencedaily.com/releases/2020/02/200224131123.htm

Willis, B. (1995). *Distance education at a glance*. Engineering Outreach at College of Engineering, University of Idaho.

Wolcott, L. (1993). Faculty planning for distance teaching. *The American Journal of Distance Education, 7*(1), 26-36.

Yarkin-Levin, K. (1983). Anticipated interaction, attribution, and social interaction. *Social Psychology Quarterly, 46*(4), 302-311.

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