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Modern Technology Adoptions and the Faculty Need in Nigeria Universities

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Abstract

Faculty members are interested in the impact of technology on education and are supported by regulatory bodies promoting technology standards, recruiters seeking teachers with technology skills, legislated technology in the curriculum, and a demand for a technology skilled workforce. In response to the interest in technology in education and faculty members incorporating technology in their research, this study was carried out to assess faculty needs concerning technology in the educational delivery system of Nigerian universities. The study adopted a qualitative approach to investigate the research needs of faculties concerning technology. This qualitative study randomly selected a convenience sample of 100 faculty and administrators in the faculty of education of 12 universities in Nigeria across several states. Using focus-group discussion sessions and interviews, the researchers met with 100 participants in groups of 10 to 15 each session. Data were transcribed and entered into a database for analysis. The use of technology in research such as searching (search engines), data gathering, analysis and publishing was discussed before explaining the needs and concerns of faculties with regards to technology. The study shows that there is a need for government and universities to adopt and institutionalize e-learning which will help to close the gap in technology

Key words: technology, research, faculty, skills

1. Introduction

As technologies converge with the field of education, it becomes increasingly apparent that faculty members carrying-out research in education need to become conversant with the application of modern technologies in their research to support both their discipline, and pre-service and in-service teachers. It is important for faculty members to investigate and learn how technological advances can be used in their research. In exploring the implications of technology in the academic profession, Zeynep & Jordan (2019); David & Fred (2020); Jin & David

(2020), reports the need for researchers to consider technology in their collaboration among colleagues, scholarly debates, publishing, and rewards for innovation. Educators need to learn how technologies can be accessed and used in their searching, gathering, analysis and display of data. To maximize the unique features of technologies in their research, educators need to investigate adapted and different approaches and strategies.

There is an increasing need for faculty to embrace new technology especially with the emergence of new normal in both teaching, learning and research. In a cursory look at universities faculty, only 30% of faculty of education are in tune with modern technology, 67% of faculty are not conversant with modern technology, while 3% seem to have no interest in any change from the old method of doing things as they claim to be conservatives.

There is, therefore, a need to carry out this research to better understand redesigning ways that faculty teach, and research using technology. As Jonatan et al. (2018); Muhaimin et al. (2020), contend that little research is available on how faculty want to participate in professional development opportunities regarding technologies, this study is 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 Research. 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.

The accelerated development of technologies and their application to the field of education prompted Olcott & Wright (1995) 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 research needs of faculty concerning technology. Through the following research question, the study investigated the research needs of faculty about technology:

What do faculty members need in other to integrate technology into all aspects of their research process including access to information, collection of data, analysis of data and dissemination of results?

1.1 Transition to Using Technology

1. To move from the traditional to using modern technologies, faculty members need the opportunity to learn from the experience of others, and to contribute to and draw from research that strengthens the body of knowledge (Teresa & Ray, 2019; Ching et al., 2020; Jesse, 2020). To make the transition to using technologies in their research, educators need a vision and opportunities to participate in professional development. Wilson & Berne, 1998; Aktekin, 2019; Ustuk & Çomoglu, 2019; Cheng & Li, 2020, concluded from their research that professional development activities can be more successful if educators drive the content and opportunities themselves.

As noted in Figure 1, faculty members participate in professional development regarding technology in other to incorporate technology in their research work. Professional development regarding technology is based on the expertise, experience and expectations of faculty members. The needs of faculty members are investigated, and when determined applicable, are merged with relevant technologies. To integrate technology, faculty members participate in professional development activities and initiatives, ideally driven by faculty members themselves. Throughout the professional development and incorporation of technology process, faculty members rely on an ongoing follow-up support system. Faculty members reflect on the experience and re-enter the process. Faculty members can be involved in this process for different technologies or applications at the same time.

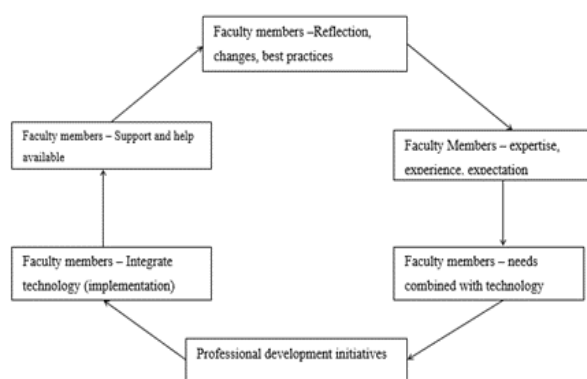


Figure 1: Professional development process

It is important to relate this work to existing models and theories. One of those theories is Adoption Theories/Models by Rogers. Explaining the theory further, we understand that an information systems theory that models how users come to accept and use technology can be adopted by researchers in universities and can be used to improve teaching and learning. The theory or model suggests that when users are presented with new technology, some factors influence their decision about how and when they will use it.

1.2 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 description of technology as a tool, technique or process was upheld.

1.3 Technology in Research

Academic members who are involved in research also need to consider professional development as the application of modern technology in their searching, data gathering, analysis and publication continue to evolve. In electronic searches, academic members need to continuously identify likely sources of information, learn how various search engines work and what they look for, be able to evaluate and filter out what they want, track their sources, share documents electronically, and print and store links or documents in databases (Chadwick, 2001; Ololube, 2006; Byrne et al., 2016). In their gathering, faculty members need to investigate possibilities for online surveys, electronic interviewing or focus groups, collection of data through email (Selwyn & Robson, 1998; Slutsky, 2016; Ogunkunle & Fomsi, 2010), collection of data from electronic sources such as medical imaging systems, digital cameras, or collection of data through tele/video-conferencing. Businesses are also beginning to offer services to academic members such as the development of electronic questionnaires, or electronic repositories to gather the data (Tothill et al., 2001; DeJong, 2018). In their analysis, faculty members can investigate the use of word processing, database, and spreadsheet programs, computational analysis programs and text analysis programs for both qualitative research and quantitative research (Peebles, 2000; Brown, 2002; Grillot, 2019). The Covid19 pandemic has indeed driven educational technology to the next higher level, especially in faculty teaching and research. For publishing, faculty members can investigate electronic tools to collaborate or co-author with others, and post to various online websites or journals, or department websites or their websites (McEldowney, 1995; Ed Cuff, 2014).

When considering using technology in research, academic members need to be aware of issues that arise. Searching using electronic tools and the internet can yield a broader range of information, the internet is typically more accessible than a library, and the internet can also provide documents immediately online or hard

copy for the price of printing. Searching online can be more tedious and less reliable and the skill of proper sieving, verification to filter out unauthentic sources must be understood by researchers. Searching for information always depends on how well the topic has been narrowed and how relevant the keywords are. The internet does not rely on the same keyword structure or systems as formal libraries or holdings. Academic members need to investigate information to see if the information is valid, is sponsored, or is sustainable (will it be available at a later date). Although searching can be quick, searching depends on the expertise of the user and the stability of the technology. When gathering, data can be analyzed easier if it arrives in electronic format. However, the auditing data, the sample you are trying to reach might not have access to a computer or electronic tools, the setup for data collection might be too technical and require the services of others to maintain, and anonymity and confidentiality issues arise. In analysis, results can be more accurate and faster because it does not have human error or speed as a factor in the process. However, some of the electronic analysis tools can be criticized as being too rigid without regard to details of the data. Publishing on the internet or in electronic media is typically cheaper, faster, and more convenient as you do not need a publishing company as a sponsor, and self-publishing can also reach a wider audience faster. Indeed, not all electronic journals are refereed and not all electronic publishing is located due to the amount of data on the internet, and intellectual property or copyright issues emerge. Given the advantage of using technology in their research, yet the need to be aware of the impact, academic members are encouraged to investigate and critically evaluate the use of technology in their research, and when appropriate, adopt and adapt their research skills to working with technology (Schmidt, 1997; Chadwick, 2001; Parsons et al., 2019).

1.4 Research - Support to Use Technology

The diversity among faculty members in the use of technology falls in line with the complexity that Bullock, (2019); Schwarzer, (2019); Greene &

Jones (2020); Pamela et al. (2020), suggested, and demonstrated how problematic this can be. It is therefore necessary that professional development planners seek out the needs of faculty members concerning technology when developing professional development initiatives for research, as the specific needs of faculty continue to change.

Faculty members also look for the support of the technology for their communication in their research. As noted in Figure 2, faculty members who are using or will be using technology in their qualitative, quantitative or other research need to be actively involved in their professional development, supported by the administration, with available resources such as application support and technology services. All of this support structure relies on the technology infrastructure for the development and maintenance of the technology systems.

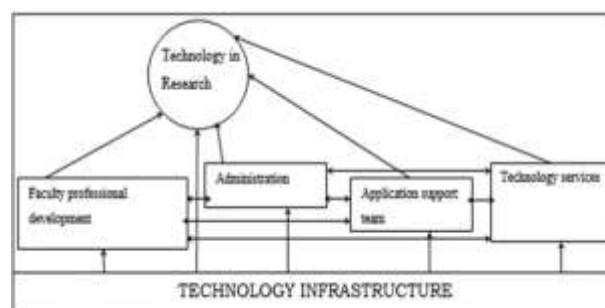


Figure 2: Technology in Research as proposed by researcher.

1.5 Professional Development Cycle

The concept of professional development communicated at the onset of this study indicates that faculty members begin with their expertise and experience, investigate how their needs and technology can be combined, participate in professional development initiatives, begin to implement the use of technologies with ongoing support, evaluate and reflect on the experience, and re-enter the process. Participants support this concept as they are using technologies in their research based on previous professional

development opportunities, and they are interested in learning more about using technologies in the future by participating in professional development initiatives with ongoing support. As noted in Figure 3, findings from the study expand the professional development cycle concept at the beginning of the study. The expanded view includes the need for leadership for policies, recognition and equitable access to technology and training, and communication within the interdependent system. The findings of this study are consistent with prior studies of Jones (2019); Coto & Dirckinck (2020); Hardesty et al. (2020); Bush, et al. (2020), which established that if professional development opportunities deliver the right content at the right time to the right people at the right place, then the content in the professional development initiatives will more likely be applied to their research.



Figure 3: Professional Development - Technology

1.6 Limitations

Limitations or restrictions in the study that were not imposed by the researcher were inherent in the implementation and analysis of the study: The

study relied on information gathered through interviews. The study used a convenience sample, thus, findings were context-specific. To remain a manageable process, delimitations or restrictions were deliberately imposed by the researcher: A convenience sample of one faculty of 100 participants was used for the researchers/interviewers to gain an understanding of the phenomenon under study. Faculty and administrative officers within 12 universities in Nigeria within the Faculty of Education, were selected for this study because their location and availability were convenient for the researcher/interviewers.

2 Research Organizations and Method

This study utilized a qualitative research design. The method is described in detail to demonstrate how the qualitative method was conducive to the search questions and the study, and to provide steps for conducting the research- of value to the reader to follow and for other researchers to use for replication. Thus, the study falls under the philosophy of constructivism in research. This qualitative study randomly selected a convenience sample of 100 faculty and administrators in the faculty of education of 12 universities in Nigeria. Using focus-group discussion sessions, interviews, the researcher met with 100 participants in groups of 10 to 15 each session. Data were transcribed and entered into a database for analysis. During the data collection process, the interviewer used examples and probing questions to communicate the need for participants to respond about the use of technologies in their work, not necessarily the use of computers. The technical vocabulary could be explained, examples could be given for clarification, and questions could be answered by the interviewer. The researcher could observe and perceive if the participants understood the technology questions or required clarification,

and the interviewer could ask for clarification of responses. The interviewer could strive to make the participants feel comfortable in responding to open questions to provide additional information and issues of value or concern to them.

Cognizant of the need for dependability or ability for others to replicate this study under similar conditions, the analysis process was documented. In preparation for analysis, the tapes of the interviews were transcribed and information from interview notes was added. A coding system was developed to organize the data by fields or categories, and important to confidentiality, the names of the participants were replaced with numbers. To promote the credibility of the analysis, the researcher developed an electronic database to record interview datum. The researchers met to review preliminary fields or categories, and revisions were made as necessary to the database structure. To prepare for analysis, each set of interview data was entered as a record into the database.

3. Findings

Findings reveal that 42 female and 58 male invitees participated from 12 universities randomly picked. About 16% of the selected participants did not fully participate because of conflict of interest and inaccessibility, making it 83% valid participation.

Participants self-identified themselves into qualitative, quantitative, both, other, neither or not applicable. Of the 100 participants interviewed, 49 selected qualitative research, 18 selected quantitative, 22 selected both, and 3 participants selected other such as historical, text

and creative. The two participants who selected neither and six participants who selected not applicable were respondents who also self-identified themselves as being involved in service, administration or management. Participants selected one category only, therefore the 49 who selected qualitative are primarily qualitative, the 18 who selected quantitative are primarily quantitative, but those who selected both could be included in qualitative and quantitative. Therefore, the overall number of participants involved in qualitative would increase to 71 and the number of participants involved in quantitative would increase to 40.

As noted in Table 1, all participants indicated they communicate with colleagues, both locally and globally by email. A high number of participants use technologies for searching (81%) and writing (88%), although not all participants are faculty researchers. Almost two-third of the participants' uses technology to gather (64%) and for analysis (62%) and most participants use technology to write (88%) and to publish (70%).

Table 1: Showing the Percentage of Faculty adopting different Technological Skills

S/n	Modern Technological Skill	Frequency	Percentage%
1	Email	100	100
2	Search engines	81	81
3	Write/collate	64	64
4	Analyze	62	62
5	Edit/plagiarism test	88	88
6	Publish	70	70

Source: Primary Data

3.1 Searching

Most participants are using technologies to assist them in their search for information for their area of research. There were 100 participants interviewed, 81% indicate that they are using technologies such as websites and search engines on the internet, databases, library data bases, visual databases, and electronic journals to seek information. Participants are using search engines on the internet that locate information from both typical and atypical sources. Participants are using technology as research tools in their literature search, search for current information and information about what others are also doing in their field. Some participants are completing their searches by alternate methods such as hard copy journals and trips to both their local library and university libraries. "Old ways because you can find something that is shelved right next to the thing you were looking for" (24). To increase their productivity, participants also ask others such as research assistants, graduates and library people to assist with searches. These participants seek assistance with electronic searches because they feel others are more efficient than they are, although one participant indicates an intention to learn. Most participants (81%) are using the technologies in their search for information, and one participant suggests we organize our searches electronically to better manage our gathering and analysis of data. "Build a computer file, make critical analysis and hot quotes, I might use at some time so I don't have to go back to the reading unless I want to check something for accuracy" (4).

3.2 Gathering

Almost two-thirds of the participants are using technology to assist them in their data gathering in their research. Of the 100 participants interviewed, 64% are using technology with equipment such as Tape recorders, Audio, video

recorder, Scanners, Cameras, Electronic surveys/questions, EEG, Computer to edit video, Computer, email and webpages. Participants are gathering data such as readings from electronic medical equipment, from downloading data onto their computer from internet sites from around the world, from information pulled from databases, census records, online tasks and surveys.

Participants are using data transcribed from audio and videotapes and scanned or digitized clips. Participants are looking at ways to gather data such as digitizing and speculating what it will bring to their research environment in gathering, analyzing and publishing. Participants are looking to the future for ways to gather data and for ways the data gathering could ease the preparation of data for analysis. "Helping get data into a usable form so people can analyze, we're just starting to use web sites for questionnaires where you can respond directly, possibly interactively" (61). "Interested in how technology can gather data direct" (11).

3.3 Analyzing

Almost two-thirds of the participants are using technology to assist them in their analysis in their research. To clarify the use of technology in analysis, examples such as SPSS and NUDIST software were mentioned. Out of 100 participants interviewed, 62% are using programs such as word processing, spreadsheets, voice, and quantitative and qualitative analysis programs as tools in their analysis. Although 26 comments support the use of quantitative statistical analysis programs, 2 participants attest to difficulty graphing and importing and gaining access to the program. Although seven comments support the use of qualitative statistics packages, several feel a qualitative statistics tool is not appropriate for their

qualitative analysis. "No, looking for key passages, not how often it occurs. However, we use find searches for fishing. Close reading is most important" (16). Comments also suggest that some participants seek help from graduate students and research assistants and specific university groups who have the skills and expertise to provide help with analysis programs. Participants are using technology (62%) in their analysis and participants are using word processing as a major tool for writing.

3.4 Writing / Editing

Most participants are using technology to assist them in their writing and editing in their research. Out of 100 participants interviewed, 88% are using word processing in their writing and editing. Other programs were also identified such as Procite, PowerPoint, FrontPage, Finale for Music, EndNote and Digital Photography.

Comments from participants suggest that they are finding word processing "incredibly valuable" (27) and "liberating" (91). Participants are using software programs for applications such as writing, publishing, sending attachments, developing websites, writing grant applications, charting and graphing, scheduling, and writing or working collaboratively. When writing collaboratively or editing, some participants prefer to write and edit online but many do not. Many participants suggested that they prefer difficult writing or conceptual work by paper and pen and editing in hard copy. Many prefer hard copy because ideas flow better and because it is easier to flip pages and cut and paste than to do the same task online. For example, one participant comments, "I'll print, much more confidence inability to read more carefully a printed document" (15). Also, typing skills can be a deterrent, thus the suggestion to use dictating

equipment and ask a specialist to return typed and formatted documents.

The majorities of participants (88%) write and edit using technologies, with specific emphasis on word processing. To write collaboratively, participants are sending and receiving attachments and they are also sending their writing as attachments for publication.

3.5 Publishing/Disseminating

Most participants are using technologies to assist them in publishing and disseminating their research information. Out of 100 participants interviewed, 70% indicate that they are using technologies such as attachments, file transfer process, transporting by CD, posting to websites, and development of multimedia materials. Participants indicate that they are submitting articles to reviewers and receiving their articles back from the reviewers for editing, linking their bibliographic references, submitting papers to online and offline journals. Concerning dissemination, participants note that they are beginning to use technology to provide handouts via email attachments, prepare work for publishing, use presentation software in their presentations, produce posters and overheads and build and post to their website and other websites, and provide links to and from relative websites.

3.6 Research Interests

Participants are interested in a wide range of research areas. For example, researchers are investigating the needs and experiences of the deaf or hard of hearing (2), family violence (2), research methodology (5), teaching (7,9), subtle teaching or the personal ways teachers use their voice, their walk, or how they relate to students (13), reading intervention (20), second language acquisition (24), interconnections of children with

disabilities who are abused, children who become disabled because of abuse (25), government financing of education (27), roles of deans and chairs (34), Active learning (35), equity and physical education (36), beginning teacher support (36), cognitive processes of learning - higher education (42), Physically challenged mainstreaming (68), mentorship (68), standards for band programs (75). Participants are interested in or involved in a variety of areas of research and some of the research involves the topic of technology, and some of the research uses technology to search for, gather, analyze and publish.

Of the 100 participants interviewed, 45% indicate that they are using technology either researching in the topic area of technology or using technology as part of their research method. Participants indicate in their comments that part of their research is on technology such as responses to essays about technology, library use of technology, world wide web, satellite technology, doing proposals and annual reports online, video conferencing, google meet classrooms, the role of visuals in research, technology in the classroom, integrating technology, and social implications. Using technologies in their method, participants identified scanners, zoom classes, search engines, online surveys, digital editing, electronic submissions, statistical analysis, simulations, electronic modules and speech recognition. As noted in table 2 are participants' comments on the use of technology in their research interest.

Table 2: Research Technology

Research Topic	Research Method
Searching for history (4). Response to essay about technology (8). Dewey Decimal Classification analysis for gender bias. Women's thesaurus linked to Dewey numbers, evaluated for link or fit (16). Satellite map technology (23). Proposals (29). Annual report (31). The role visuals play in research (39, 63). What practices in classroom they find are helpful and supportive (45). Vicariously through students (5). Technology and math (46, 60, 74). Virtual schooling (47). Technology integration in the humanities, teacher stories (48). How does the mandated technology outcome affect teachers (48). Virtual high schools compared with traditional schools (48) Internet in schools and teacher learning (49) Learning disabilities (53) Social implications of technology in terms of society (58). School architecture (63) Internet use in schools (64). Adolescent writing - ways in which they use programs (71). Meta-ethics in technology (87). Integration (91).	Using technology in virtually everything we do (3). Scanning devices such as magnetic imaging (3). Searching (4). Science of attracting and looking after students electronically. The art of attracting students is the other side where we actually talk to people and take care of them in person (7). Nigerian feminist thesaurus bilingual, online survey (16). Digital video editing (19). Submit electronically (38). Statistical analysis (55, 66). Computer systems (56). Simulation (79). Electronic modules on the web (80). WEB CT (86, 92). Dragon speech (99).

Sources: Primary data

To sum up, participants identified the type of research they are mostly involved with, and how they use technology in their searching, gathering and analysis. Almost one-half of the participants (49%) are involved with qualitative, 18% are involved with quantitative, 22% are in both qualitative and quantitative, and 3% of the participants are involved in specialised research. The remaining 8% of participants did not select a research type because of their involvement with management, administration or support. Most participants (81%) are using technology such as the internet and library databases to search for information and ideas relevant to their field. Participants provided tips to increase productivity when searching using technologies, and conversely, participants gave reasons why non-technology searches are most effective. Although almost two-thirds (64%) of the participants are gathering data for their research through the use of technologies, many are asking for new, better, and faster ways to capture data electronically. Almost two-thirds (62%) of the participants are using technologies to analyze their research data. However, only 26 participants support the use of technology for analysis. Several participants give reasons why it is not technically user friendly, and why it does not fit with their philosophy of close reading for

meaning and insights. Although 88% of the participants are using the computer for writing and editing, several participants explain why conceptual thinking and editing in hard copy is preferred. For publishing and disseminating, 70% of the participants are using technology. Participants identified a wide range of research interests including topics related to technology and the use of technology in their research projects.

3.7 Participants suggestion of ways to improve on the use of modern technology for research

Participants suggested ways to improve the use of technology for research. The majority of the participants 69% suggested access to technology equipment, tools, and supplies, 61% suggested communication of new technology to faculty, 58% suggested provision of training on technology to faculty members, 59% suggested provision of specialist and support on technology to faculty, 49% suggested learning from colleagues and early adapters, 67% suggested learning from conference and media, 58% suggested release time to learn and 38% suggested need for recognition as shown in table 3 below.

Table 3: Showing the Percentage of Faculty suggestions of ways to improve on the use of

S/n	Ways to improve on the use of modern technology for research	Frequency	Percentage%
1	Access to technology	69	69
2	Communication of new technology	61	61
3	Provision of training	58	58
4	Provision of specialist and support	59	59
5	Learning from colleagues and early adapters	49	49
6	Learning from conferences and media	67	67
7	Release time to learn	58	58
8	Recognition	38	38

3.8 Demographics

Of the 100 participants involved in the study, 49 self-identified their area of research as mostly qualitative, 18 quantitative, and 22 as both. Eleven participants were involved in other research, or did not respond, or were not involved in research directly. Of the 49 in qualitative, 23 (47%) were female and 26 (53%) were male. Of the 18 in quantitative, 6 (33%) were female and 12 (67%) were male. Of the 22 in both, 9 (41%) were female and 13 (59%) were male. More male researchers were involved in quantitative, and a combination of qualitative and quantitative research than female researchers, but there are more male researchers (58) involved in the study than female researchers (42). The number of male and female researchers involved in qualitative are almost equal.

4 Discussions

Of the 100 participants in the study, 81% responded that they are using technology to search through the internet and library databases, 64% to gather, 62% in analysis, 88% in their writing and editing and 70% in their publishing and dissemination. From previous professional development opportunities, most faculty members have learned to use the technologies in their research. To proceed to learn more about technologies, participants identify barriers and enablers applicable to their work.

Participants want to learn about technologies. When asked about becoming aware of technologies in the future, most (79%) participants indicated an interest. However, to learn about the technologies, faculty members need to hear about or see the technologies. If the technologies can be communicated to the Faculty, then faculty members can investigate the relevance in their research work or investigate

how the technology can make their research work more effective or productive. To participants, there is a plethora of technology on the market, but they have limited time to get to it. When asked about drawbacks or deterrents to professional development regarding technologies, almost all participants (85%) identified time as both their most important issue and their most valued resource. This is consistent with prior studies (Mireille et al., 2020; Iginedo et al., 2020; Lillge, 2019; Serafini, 2018), that outlined some barriers to professional development to include release time. As participants are busy keeping up with their discipline and field of studies and learning from colleagues worldwide, they do learn about technologies but rely heavily on members of technology groups or colleagues. More than 20 comments suggest that in addition to the media and conferences, they rely on early adopters of technologies to talk about and demonstrate what is new and how it can be applied, and rely on others who have integrated technologies to share their best practices. If faculty members see a fit between the technology and their work, or if someone such as an early adapter or support person can see the fit and recommend it to faculty members, the faculty member is then ready to proceed, to learn, and to apply their learning.

When using technologies, faculty members have barriers, needs and suggested solutions. Faculty members experience barriers such as shortage of time to work with technologies, lack of funding for new technologies and upgrades of existing technologies, need to learn, need for access to specialists and a support system, and need for recognition. This is consistent with prior studies (Jouparinejad, et al., 2020; Jiao et al., 2020; Christie, et al., 2020; Tahani et al., 2020), that outlined some barriers in advancing to using

technology to include lack of funding for new technologies and upgrades of existing technologies, need to learn new technologies, need for specialists.

Although participants recognize that funding and support are limited, participants look to their academic and administrative leaders as enablers to help provide for their needs. Of the 100 participants interviewed, 69% request the need for equitable funding and access to technology equipment, tools, and supplies. The support participants are requesting needs to be the right training or help at the right time in the right place. Participants also identify recognition as a priority and key to equitable access to technologies and time to learn. Faculty members are looking for leaders to enable access to technology, training, specialists and support, and recognition.

As Smith (2015); Anne et al. (2019); Onuora & Umeojiaka (2020); Kelly & Lord (2020), found, researches are improved by the use of technology but researches are not completely altered by the use of technology, which is demonstrated through the participants' comments. Faculty members are using technology. Participants' comments suggest they need professional development to improve their use of technology in their research. These connections between research and professional development are significant in that they are demonstrating that faculty members are not experiencing a fundamental shift in their professional development in technology, like Smith (2015) and Abhipriya (2019) have suggested. Rather, faculty members' professional development on technology is an advancement in the use of technology. Ideas about professional development also dispute

some of the findings of Rahimi et al. (2019); Bozkuş & Bayrak (2019); Yang & Rao (2020); Canyon et al. (2020), study. While the Faculty in their study need professional development to develop and improve their skills to better meet the continuously increasing requirements from federal and state mandates, faculty members in this study need professional development to increase the number of their skills and literacies needed to complete research, and also to increase the efficiency of each step and effectiveness of their research using technologies.

5 Conclusions

Based on the findings of this study investigating what faculty need to integrate technology into all aspects of their research process including access to information, collection of data, analysis of data and dissemination of results, the following statements were drawn.

1. Most faculty members are involved in qualitative research (49%) followed by a blend of quantitative/qualitative (22%), and quantitative (18%) research.
2. Most faculty members use technology in their searching (81%), writing/editing (88%), and dissemination (70%), however not as many faculty members are using technology in their gathering (64%) and analysis (62%).
3. Faculty members are interested in learning more about technology to enhance all of the components of their research process including areas such as bibliography, searching the library and internet, and analysis.
4. As technology continues to evolve, faculty members need to continuously investigate and evaluate the possibilities of incorporating technology with their research work in their

searching, data gathering, analysis, and publishing.

6. Recommendations

6.1 Recommendations for Practice

The study shows that there is a need for coordination and cooperation between Faculty and the university in regards to technology. There is also a need for Government and universities to put a plan in place to support faculty members in regards to technology. Faculty members must have access to digital literacy programs and e-books. There should be the provision of enhanced digital and connectivity services by expanding Wi-Fi capabilities, offering faculty members digital literacy training and enhancing online library programs. Finally, there is a need for government and universities to adopt and institutionalize e-learning which will help to close the gap in technology.

After analyzing the data and themes emerging, and after further readings and research, the following recommendations are offered for further research and beyond this diagnosis. Replication of this study is recommended for other disciplines to learn how others apply technology in their research and develop professional development initiatives.

As faculty members are asking to be kept informed about new and emerging technologies and applications, it is recommended that faculty administrators need to investigate specific needs of faculty and inform faculty members of technology possibilities from time to time. Further research is suggested to reveal how technologies are being used by administrators, faculty members, students at the university, student teachers, teachers, and students. Research 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).

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