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Exploration of the Adoption of Digital Technology among Indigenous People in Guyana

Volda Elliott

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ABSTRACT

In technology adoption in the educational field and school system, teacher training is imperative to increase success. In Guyana, indigenous Amerindian preservice teachers were found to lag in successful adoption. The study findings indicated that this demographic may need to prioritize acquiring the skills and overcome the technological barriers to better prepare learners beyond the classroom. Although internet access facilitates adoption, indigenous Amerindians in Guyana develop technology literacy skills and access educational resources, indigenous pre-service teachers have a low rate of technology adoption in the classroom. The purpose of this qualitative study is to discover the perceptions of indigenous Amerindian preservice teachers about the adoption of digital technology in the classroom. Rogers's diffusion of innovation theory and David and Venkatesh technology of acceptance model constituted the underlying theoretical grounding, which served to understand indigenous Amerindian preservice teachers' perceptions about the use of digital technology, perceived barriers, and the coping and adopting mechanism throughout their pedagogical practices. Ten indigenous Amerindian preservice teachers participated in this qualitative study. Semistructured, interviews were the primary data collection tool. Open coding was used to generate themes and analyze emergent coding. The findings showed that the rate of adoption of digital technology could accelerate if (a) training is strategic, (b) reduction of institutional barriers, and (c) professional practices are aligned for educational growth. This study may contribute knowledge to the advancement specific to the field of digital technology and pedagogical practices. The findings may have positive implications for the community at large in that professional development centers can improve skills that provide flexible learning for IAPT to integrate digital technology beyond the classroom. and serve as a catalyst to promote growth by capacity building.

Introduction and Background

Indigenous peoples in Guyana are descendants of the first inhabitants who occupied the country before the arrival of the Europeans (Menezes, 1988). They are referred to as the Amerindians and have settlements in Guyana's far-flung and remote interior areas. Educators in these areas are often indigenous Amerindian preservice teachers, who are expected to be exposed to similar services and use the same tools used by other teachers, who live close to Georgetown, the capital city. The educational teaching and technology competencies of indigenous Amerindian teachers are expected to be at the same level as those of their peers throughout the country. To enable the realization of these expectations, special provisions were made by the government, in light of the frequent cries of marginalization, especially in the field of education (Ramsey & Deana, 2018).

Khan (2018) opined that even after Guyana gained independence from Great Britain during the nineteen sixties, the indigenous Amerindians have continued to be marginalized. This, Khan claimed, was reflective of the policies and practices of the precolonial administrators. In order to inform decision-makers, administrators, and educators, about the challenges of indigenous Amerindian preservice teachers' adoption of digital technology in the classroom, it was therefore relevant that in-house training sessions be conducted to enhance the decision-making process. It may have the potential to eventually motivate the Amerindian teachers to integrate digital technology into their classrooms rapidly. Subsequently, it was hoped that each indigenous Amerindian group would have made make the necessary adjustments to embrace digital technology integration without eliminating their native perceptions. Several researchers have noted that integration of technology initiatives in rural areas had to be strategic and practical because of communities' remoteness and economic status, which might affect how individuals embrace change (Beaton & Carpenter, 2016; Gillan et al., 2017).

The ability to integrate digital technology has become an essential ingredient for the delivery of education in developing countries (Jawarneh, 2017). Since digital technology is changing globally, there was a need for the training institution to create a more robust training plan for indigenous Amerindian preservice teachers to integrate digital technology into their pedagogical discourse (Jeffery, 2019;

Tassel-Baska & Hubbard, 2016; Yeh & Wan, 2019). According to Bates (2017), teachers' training institutions must act expeditiously to provide adequate technological learning experiences for indigenous teachers to realize success in a rapidly changing modernized classroom environment.

A preservice teacher's role is to guide their students to become critical thinkers and problem-solvers in a modernized classroom (Castagno et al., 2016; Sellars, et al., 2018). All teachers are required to learn how to use digital technology in schools, yet training is inadequate in schools in remote areas (Tyler-Wood et al., 2018). Indigenous educators in hinterland, rural, and remote communities were way behind their counterparts in their technology needs, yet, they were required to use skills in digital technology to move the learners along the continuum. Policymakers and administrators often lack the skills necessary for systematic change and technological integration into long-term reorganization procedures of a teaching program (Neiterman & Zaza, 2019; Pincus et al., 2017; Townsend et al., 2017). The Ministry of Education endorse the need for technological integration throughout the education system to provide teachers and students with opportunities to become technological thinkers and planners. It is further stated that technological integration was met when the teaching environment utilized tools to encourage new methodologies and strategies for teachers to deliver the curriculum (Ossiannilsson, 2018; UNESCO, 2019b). Therefore, effective integration of digital technology by indigenous Amerindian preservice teachers may be hindered by teachers' perceptions, particularly if the populations were less likely to have access to the technologies (Litz & Scott, 2017; Parkman et al., 2018).

Focus of the Exploratory Study

The low adoption rate of digital technology in the classroom by indigenous Amerindian preservice teachers. Consequently, indigenous Amerindian preservice teachers had to undergo intensive training to acquire knowledge to become competent in instructional technology. It was further posited that intensive training could boost Amerindian teachers' confidence when teaching Amerindian students how to use digital technology (Min et al., 2019; Tyler-Wood, 2018). Hence, there was a need to understand indigenous Amerindian preservice teachers' perceptions about the use of digital technology by establishing baseline research.

The Professional Development Center in Guyana was the ideal setting to study the technology adoption. Since it was the principal Professional Development Center, leadership are tasked with the role to effectively prepare indigenous Amerindian preservice teachers with appropriate teaching methodologies so that they could function in the classroom. Although there are growing bodies of research on digital technology in preservice teachers' education programs in developed and developing countries (Jita, 2018; Sauers & McLeod, 2017), there is seemingly a gap in literature relating to indigenous Amerindian preservice teachers' acceptance-in implementing digital technology at their indigenous location. While the use of digital technology is dynamically changing the structure of teaching, there is a gap in the literature concerning the perceptions and attitudes of indigenous Amerindian preservice teachers and their plan to incorporate digital strategies in the classrooms of schools serving indigenous students. This study's outcome could provide knowledge and appropriate support, that may have potential positive social change for policymakers and stakeholders in Guyana toward the integration of a digital technological program.

Overarching Research Question (RQ) of Study

What are the perceived barriers to the adoption of digital technology by indigenous Amerindian preservice teachers?

Conceptual Framework of the Study

The focus of this study was to discover indigenous Amerindian preservice teacher perceptions towards the low adoption of digital technology at the Professional Development Center in Guyana. In this qualitative study, Rogers' diffusion of innovations theory (DOI) and the technology acceptance model (TAM) served to underpin the study and constituted the conceptual framework.The underlying theoretical grounding aided in the interpretation of the digital technology adoption process among indigenous Amerindian preservice teachers. The theory and model provided the lens for a deeper and holistic interpretation of the data analyses. Rogers (2004b) proposed a categorization system for adopters. Huang and Liaw (2018) suggested that technology adoption in the classroom was highly linked to teachers' technological lifestyles. In this study, DOI theory helped to examine the perceived attributes among early adopters, adopters, likely adopters, and non-adopters of the innovation and the demographics of ethnic groups. The DOI theory is similar to the TAM model in that it focused on how individuals within specific groups accept and adopt some technologies.

To establish a framework about the phenomenon, the DOI and TAM were used to provide valuable information about potential adopters' perceptions regarding the low adoption of new technological ideas (Rogers, 1995a; Venkatesh & Davis, 1986). These theories provided additional insight into the continuous use of new technology and factors that impact indigenous Amerindian preservice teachers' digital technology adoption into their pedagogical practices (Sánchez-Prieto et al., 2019). Woodside, Augustine, and Giberson (2017) added that the Technology Adoption Life Cycle possesses elements that allowed potential adopters to embrace digital technology strategically. Drijvers et al. (2014) posited that new ideas take time to disperse throughout any social group. For this research study, DOI theory expanded the understanding of indigenous Amerindian preservice teachers at the Professional Development Center and considered their views about digital technology's integration process..

Rationale for in Opting for Qualitative Research

The purpose of this basic qualitative study was to discover the perceptions of indigenous Amerindian preservice teachers about digital technology integration in the classroom. Studies of Indigenous peoples' ability to access digital technology (Louise Starkey, 2020; Prayaga et al., 2017) to utilize technological strategies and maintain their identity (Norton, 2019; Walid et al., 2016), revealed, a range of barriers that affected the acceptance of digital technologies as instructional tools. Based on previous research (Norton, 2019), the question of how indigenous Amerindian teachers use digital technology for instruction has been answered. There is an apparent gap in the literature with inadequate information about indigenous Amerindian preservice teacherperceptions of digital technology as an instructional tool in Guyana. The findings of this study may therefore contribute to knowledge on indigenous Amerindian preservice teacher utilizing digital technology for student instruction and teaching.

Research Design and Rationale

Central Research Question (RQ) for the Study was:What are the perceived barriers to the adoption of digital technology by indigenous Amerindian preservice teachers? Since an understanding was being sought of indigenous Amerindian preservice teachers' perceptions of digital technology, a basic qualitative approach with interviews was used for this study. The qualitative method helped the researcher to be more intimate with participants to collect data, understand participants' experiences through their lenses, provide a comprehensive and detailed summary of the data with practical terms, and describe the experiences of participants with their words (Alvesson & Sköldberg, 2017; Brandt et al., 2018). Thus, the interview approach typically served to deepen understanding of the subject where participants re-encounter their personal experiences with the realities of being an indigenous Amerindian preservice teacher at the Professional Development Center. During the interview process, the recorded experiences of participants highlighted their perceptions.

Qualitative researchers seek to construct a sample of participants who had contributed to the study, remove potential influences, and ensure generalizability of research (Lindlof & Taylor, 2017; Ravitch & Carl, 2016). Qualitative research often entails endeavors in understanding human encounters concerning the distinction and opportunities of the explorations' outcomes that could represent the research participants (Daher et al., 2017). Based on this study's purpose, a basic qualitative method was used to understand what an individual's perception means in their context, as was used in qualitative studies by many influential researchers (Creswell & Poth, 2017; Mohajan, 2018b). Such experiences are often captured by answering the 'what' and 'how' types of research questions (Yin, 2017). For this study, participants were selected from the indigenous Amerindian preservice teachers attending the Professional Development Center. The indigenous Amerindian preservice teachers originated from the ten administrative regions of Guyana.

A combination of unstructured and semistructured questions to solicit information from the participants was used Appendix C. Each interview session lasted 45-60 minutes duration. Interviews were conducted at the Professional Development Center campus in the Bain Gray Hall at an appropriate time agreed upon by the participants. The interviewed questions were written, and the video of the session was recorded with permission from the interviewees, using smart video on the android cell phone and video editor from the Microsoft app store. Researchers are human, with tendencies to influence research. A reflective journal was used to ensure suggestions, comments, and personal interpretation was bracketed to minimize the influences of the data (Vicary et al., 2017).

After transcribing the data, participants were allowed to review the transcripts to verify their accuracy before highlighting the emergent themes regarding the integration of digital technology by indigenous Amerindian preservice teachers. The interview was divided into semistructured and unstructured questions to gain an in-depth understanding of the participants' experiences. A comprehensive plan with questions developed to evoke truthful responses was presented to each participant during the interview process (Mohajan, 2017a; Ravitch & Carl, 2016). Eight unstructured questions and five semistructured questions captured participants' experiences in natural settings concerning their digital technology integration Appendix A. Conducting the interview using the combination of unstructured and semistructured questions allowed the researcher to be flexible as the conversation progressed and redirection of questions as the need arises. The questions focused on participants' perceptions about the integration of digital technology into the classroom.

Data Analysis Plan, From Development to Implementation

Analysis and collection of data was an ongoing and inherent part of this qualitative study and undertaken per the derived review of experts from a review of literature as cited herein (Bloomberg & Volpe, 2017; Lindlof & Taylor, 2017). The planning provided critical strategies for identifying themes, trends within the data interview transcripts, and the construct of the theoretical framework. Researchers have explained that influencing the means of collection, organization, and storage of data are important considerations before one commences any data collection process (Merriam & Tisdell, 2016). It helped to save time during data management. A robust framework captured the usefulness of data collection. The implementation of this plan facilitated data organization and analysis, culminating in facilitating the derivation of emergent themes.

Analyzing and organizing the data were done to conclude and provide an in-depth understanding of indigenous Amerindian preservice teachers' methods of integrating digital technology into the curriculum. This was concluded after all the codes for each transcribed transcript were entered in the NVivo software. NVivo provided an in-depth and insightful description of how indigenous Amerindian preservice teachers perceived the integration of digital technology into the curriculum. The overarching research question in this study served to understand how indigenous Amerindian preservice teachers perceived the integration of digital technology into their pedagogical practices in the classroom. During the interview process, indigenous Amerindian preservice teachers were asked to provide their perceptions of real situations and digital technology experiences. Indigenous Amerindian preservice teachers were given opportunities to verify the analysis of the transcriptions to eliminate any misrepresentations and clarify the given data.

Results

The purpose of this basic qualitative study was to discover the perceptions of indigenous Amerindians' preservice teachers about digital technology integration in the classroom. To accomplish this purpose, the principal research question (RQ) for this study was: *RQ:* What are the institutional conflicts or obstacles hindering the adoption of instructional technology by indigenous Amerindian preservice teachers

Interview Coding and Connecting Data

This qualitative study included 10 participants whose responses were coded in the order by which they were interviewed IAPT 1, IAPT 2, to IAPT 10. Participants were exposed to semistructured and unstructured interview questions that allowed them to provide in-depth responses to the questions. After face-to-face interview recordings were transcribed, they were examined for pertinent concepts, themes, and subthemes. By hand-coding, each transcript, several themes, and patterns were discovered. During the data analysis, personal embarkation on intensive reading and re-reading of data helped to identify respective themes. As the themes emerged, these were aligned to research questions.

Table 1. Emergent Themes and Subthemes for Research Question (a).

Digital technology	Insufficient exposure to technology	No previous knowledge	Quality of teaching
Setting up teaching tools -time-consuming -learning new language -have no starting point - technological intimidation	Demographic i. remote communities ii. lacks infrastructure	-ability to integrate digital technology - trial and error - stimulant for digital technology	- content delivery - traditional method - unilateral approach
	- Secondary education i. communication ii. unfamiliar content		

Note: What are the perceived barriers to the adoption of digital technology by Indigenous Amerindians preservice teachers?

Table 2. ***Emergent Themes and Subthemes for Research Question (b).***

Alignment of Content with the way of life	Basic Knowledge	Gigantic Barriers
- connecting to communities - enhanced learning - first-hand information - equal opportunities	- effective integration of tools - uploaded data - technology commands	Administration; - internal i. college focus ii. policies iii. poor communication infrastructure i. electricity ii. WiFi password iii. internet connectivity
		Peers -strengths -work ethics
		Ministry of Education -technological plan -absence of technological resources
		Individual -culture -age -level of education -experience

Note: This table indicates the elements of interview and research questions. What are the perceived barriers to the adoption of digital technology by indigenous Amerindians preservice teachers?

Table 3. ***Percentages of Codes by Individual Participants.***

Teacher Code	Previous Knowledge	Basic Knowledge	Individual Barriers	Quality of Teaching	Decisions to Adopt or Reject DT	Empowerment	Support for Training	Current State of DT	Community Barriers
IAPT1	1	2	3	1	1	1	2	1	2
IAPT2	3	1	1	0	1	1	3	1	2
IAPT 3	2	2	1	2	2	3	1	2	1
IAPT4	1	1	3	1	0	2	1	1	1
IAPT5	0	2	1	0	0	1	1	0	2
IAPT6	2	0	2	1	0	3	2	0	1
IAPT7	1	1	1	1	1	1	1	1	1
IAPT8	2	1	2	2	2	2	3	2	2
IAPT9	1	2	1	0	1	2	1	2	1
IAPT 10	2	0	1	1	2	3	2	1	2
Total	15	12	16	9	10	19	17	11	15
124	3(12.0%)	(9.6%)	(12.9%)	(7.2%)	(8.0%)	(15.3%)	(13.7%)	(8.8%)	(12.0%100%

Note: This table indicates the frequency of emergent codes for each indigenous Amerindian preservice teacher, which aligned to the diffusion of innovation theory for the Principal RQ and IQ nine.

This study on the exploration of the adoption of digital technology by indigenous Amerindian preservice teachers in classrooms was guided by the overarching research question: What are the perceived barriers to the adoption of digital technology by indigenous Amerindian preservice teachers?

Research Question

The overarching research question was: What are the perceived barriers to the adoption of digital technology by indigenous Amerindian preservice teachers? Participants were asked to reflect on perceived barriers to adopting digital technology. Nine themes emerged during the semistructured interview: previous knowledge, basic knowledge, individual barriers, quality of teaching, decision to adopt or reject digital technology, empowerment, support from training, the current state of digital technology, and community barriers—the frequency of responses for each emergent theme for this research question is shown in Table 2.

Principal Theme: Some factors that create barriers to Indigenous Amerindian preservice teachers' perception to adopt digital technology and helped understand individual indigenous Amerindian preservice teachers' perceptions of barriers to digital technology adoption. The figures in this section show the emergent code and sub-codes that were inductively generated from the interviews. All of the participants explained their barriers to adopt digital technology in response to interview question (IQ)-2

***Emergent Code 1: Previous Knowledge*.**

Fifteen text segments with code previous knowledge were coded. All of the segments that were coded aligned with the conceptual framework. The emergent code and sub-codes were found across all 10 participants (Figure 1).

The emergent pattern occurred within 12.0% (15/124) of the text segments, shared during IQ 2 that sought to find out participants' perceptions about the delivery of instruction with digital technology in their teaching practice. Eight of the 10 participants interviewed described the delivery of education concerning digital technology use. Teachers shared that the lack of previous knowledge of using digital technology affects their ability to understand the integration process of technology in daily activities. IAPT 4 indicated that digital technology could not practically help novice teachers make drastic changes when used in the classroom. This participant mentioned that it was not imaginable why some lecturers would use technology to present their work in PowerPoint mode, yet make demands for them to do the same when they have to make group presentations. This participant recalled the haphazard behavior of some adults when disposing of duties for trainees to follow. "I wish educators can stop seeing learners as high flyers, especially when it comes to technology. It is clear that instructors focus only on specific students to manipulate with technology because of 'assumption.'" This participant was of the view that assumptions cripple novice teachers who are in training, and these teachers will continue to be left behind. Such exposure would make it difficult for indigenous Amerindian preservice teachers to implement technology when returning to their village. An example the participant contended was, "I have no knowledge of setting up a projector and my colleagues would try to set it up without the help of a technician or lecturer. This is also prevalent among the other ethnic groups." IAPTs 8 and 9 shared how the level of instructions received seemed far from reality.

Although indigenous Amerindian preservice teachers found support for using digital technology, other issues such as level of instructions and technical support, need urgent attention so indigenous Amerindian preservice teachers can understand the scope and magnitude of integrating digital technology. Additionally, IAPT 9 described that the lack of technical assistance has impinged on individual growth. IAPT 9 states, "the exposure I am getting in the technology course is not sufficient, so I have to engage in trial and error to get it right." The participant expressed confusion surrounding technological principles concerning the integration process of technology into the classroom.

Emergent Code 2: Basic Knowledge.

Twelve text segments with previous code knowledge were coded. All of the segments that were coded aligned with the conceptual framework. The emergent theme and sub-codes were found across eight of the ten participants (Figure 2).

The emergent pattern occurred within 9.6% (12/124) of text segments, shared during IQ 4 that sought to find out participants' experiences with integrating digital technologies. Participants shared information about the time they need to explore internet resources and set up cutting-edge technology to impart knowledge. While discussing their experiences with technology integration, IAPT 5 mentioned, "I felt like I needed to have more exposure to the actual application of technological strategies to change my perception of technology." IAPT 7 shared that her tutor always "sticks to a rubric" when assessing practice teaching. IAPT 8 described how the planning process for preparing the "study kit" is not connecting with technology. Although IAPT 8 appreciates the strategies the instructors used, sometimes she felt as if she was in the wrong place because of lack of knowledge and insufficient skills even to attempt to integrate technology into the classroom. IAPT 6 and IAPT 10 reflected on their little technology experience to integrate a new tool into the classroom. IAPT 6 described "working along with others when possible" and "tapping into their skills." Both participants gave credit to "trial and error" as the master teachers for integrating technology. IAPT 6 added, "I had just wanted to understand how effective the use [of] technological tools is to enhance learning. My 'trial and error' skills magnified after I was reluctant to seek assistance, I persevered to download videos even though I lost sleep." Additionally, IAPT 9 stated that this individual sought help from a colleague who resides in the capital city and who it was assumed, possessed a reservoir of technology knowledge. Our workload is remarkable; it is unattainable and makes it difficult for me to expand my 'trial and error' skills to use digital technology in my teaching practice."

IAPT 1, 3, and 4 acknowledged digital technology as a game-changer for Indigenous Amerindians. IAPT 1 believed "the integration of digital technology has increased knowledge retention, life skills and collaboration among learners. Once IAPTs master technological skills, it can change the educational landscape for Amerindian teachers. "I am feeling excited … but there is always 'buts' when it comes to technology in the community. IAPT 3 shared, "if opportunities should arise for technology to be widespread, then gaining such skills would become my golden ticket. I mean wonders with lesson planning and activities for my little learners. I just like the idea, but say no more". IAPT 4 reflected how digital technology could enhance the introduction, development, and conclusion of a lesson plan. This participant felt that "the opportunity is not there for indigenous Amerindian preservice teachers to showcase their full potential with technology."

Emergent Code 3: Individual Barriers.

Sixteen text segments with unique code barriers were coded. The emergent theme and sub-codes were found across all participants (Figure 3). The pattern occurred within 12.9% (16/124) of the text segments, shared during IQ 5 which sought to find out participants' barriers when integrating digital technology. All participants described the magnitude of barriers with which they are subjected when it comes to integrating technology.

Two participants, IAPT 4 and 7, described the depth of struggles when trying to integrate technology in the schools in their communities. IAPT 4 felt that limited technological experience might expose a personal weakness upon return to the community. He believes that his "culture plays a major role in keeping him from embracing technological tools." Similarly, IAPT 7 shared that as a [Tribe], "we were taught not to embrace things that are not connected to our way of life, and digital technology is just one of them. With this tribal barrier, children in our communities are not exposed to modernized technology, but only to' radio' education in the classroom, which is a distractor to many." Both teachers believe that placing digital technology as a new teaching tool would be chaotic.

IAPT 6 also felt that age, educational status, and time to get it done would establish individual and institutional barriers. Having no previous knowledge of technology, was believed, added pressure to his "aged brain." This participant was adamant that it was difficult to learn new things like 'digital technology at his age. Educational status in real-time creates a major disturbance, with having to remove from their community to the Professional Development Center. "We don't have the time to be behind digital technology all day just to learn digital technology and it would be "null and void" for the communities." IAPT 9 shared the importance of training for success. Training, it was expressed, was not an [one-shot] affair for indigenous Amerindian teachers, creating more profound individual and institutional barriers. The participant's words were, "I am expecting to have professional development or continuous training about the use of digital technology. I have no training in the use of digital technology [and] various learning software, and the lack creates difficulty for those who want to use such tools in the classroom."

Most participants felt that time was a crucial ingredient for Indigenous Amerindian preservice teachers to have integrated digital technology into the classroom. IAPT 5 shared, "It is difficult to master technological skill since I am working on English as my second language and simultaneously prepare teaching lessons, this is overwhelming, [and] currently time is the essence of understanding this thing called "technology." IAPT 5 felt that teachers needed to be committed to the process of integrating technology, and she was not prepared 'mentally, or physically' to use digital technology. IAPT 10 and 3 added that the "lack of technical support" emanating from the Ministry of Education (MoE) and the Ministry of Amerindian Affairs created barriers for indigenous Amerindian teachers in the Regions to attempt the use of digital technology for basic things. Both participants reiterated that the MoE would have sent computers and printers to several schools so teachers could have used them to prepare records, print worksheets, and engage the students. "Although the initiative is good for us, they are never used without the knowledge to operate this equipment." IAPT 3 was vocal about the type of support [that] was required from different stakeholders. "We are treated as though we have 'excellent knowledge of technology'…oh, boy…little do they know, all technological equipment is still in the boxes, we are not technicians." Participants lamented the lack of interest from the MoE. The MoE must do a follow-up to ensure that the equipment delivered for educational purposes was being used effectively. Technical support was insignificant, and that created additional problems for schools to integrate digital technology. When sharing about the impact of barriers, IAPT 2, 6, 10, and 3 shared that their socio-economic situation had significantly threatened digital technology adoption. They shared that when living in remote riverine communities, residents are subjected to a high living cost, which affected them significantly. IAPT 2 reiterated that "a dollar is a dollar in any part of the country [and] salaries don't address the true economic struggles of riverine communities." All participants indicated their gratitude towards the government for providing one laptop per family, but the "Great wall computer is a failing Wall" … all we can do is laugh [because] it is like a 'cow without a tail for fly season' as my grandparents would say… useless."

Another barrier was staying connected as opined by IAPT 10, who felt that Amerindian teachers who had smartphones had these phones to receive and send calls. For them to stay connected on the internet, they must buy data, and that was not cheap. So, without economic support from officials, it would be difficult for schools in the Hinterland to attempt technology integration. Additionally, IAPT 4, 5, 6, 8, and 9 shared that "the Professional Development Centers should be our source supplier for digital technology, but that is far from reality." Participants described administrative shortcomings from poor communication, training, electricity, Wi-Fi accessibility to connectivity as pillars for them to integrate digital technology professionally. IAPT 4 shared that it was not effective because the administration released information in a 'piece-meal fashion." Even though the respondents originated from far remote Regions, they embraced simple lifestyles that spoke directly to effective communication across the communities, which they said was. lacking at the institution.

The "information about using the institution's Wi-Fi was not disseminated correctly [hence] unbearable had to be encountered red-tape to get access to the computer lab, and internet connectivity was a problem. Wi-Fi access is not free, [but] if you 'snitched,' the admin would quickly give access, and others will be left behind in this technological era." Additionally, the participants felt trapped, without knowing how to locate relevant materials, use the hardware to integrate new content and be plagued with unstable electricity supply. "My excitement to widen my knowledge dwindles based on the magnitude of institutional barrier," one had said.

Emergent Code 4: Quality of Teaching.

Nine text segments with code quality of teaching were coded. The emergent themes and sub-codes were found across eight of the participants (Figure 3).

The purpose of this qualitative study was to discover the perceptions of indigenous Amerindian preservice teachers about digital technology integration in the classroom. In order to achieve this purpose, the endeavor entailed understanding the perceptions of indigenous Amerindian preservice teachers on the integration of digital technology, as a pedagogical tool. This study was conducted to expand upon the adoption rate of digital technology among indigenous Amerindian preservice teachers, as well as to determine if and how the rate of digital technology could have been improved and whether this

innovation provided quality pedagogical strategies for indigenous Amerindian preservice teachers to integrate within the classroom.

Interpretation of the Findings

The qualitative data in the form of perceptions of indigenous Amerindian preservice teachers about the low adoption of digital technology into the classroom were viewed through the lens of Roger's diffusion of innovation theory, in tandem with the technology acceptance model of Venkatesh and Davis' (Venkatesh & Davis, 2000).

Perceived Barriers

Research Question. The principal research question elicited information and knowledge on the perceived barriers to the adoption of digital technology by indigenous Amerindian preservice teachers at three different levels. The teachers were challenged individually, at the institutional level, and the wider arm of the education sector as they explored and shared personal experiences associated with the integration process beyond the classroom. It may be due to the induction of digital technology by individual lecturers who may appear to have limited knowledge of the process, Also the unstructured delivery of the Educational Technology course's content With a lack of previous research on perceived barriers by the indigenous Amerindian preservice teachers, this study may study contributes to a deeper understanding of barriers faced by indigenous Amerindian preservice teachers in training and their willingness to be involved in the integration of technology in the classroom. One conclusion arrived at from the analysis of the data related to this research question was that indigenous Amerindian preservice teachers found that obstacles were authentic, and because they impinged on decisions for implementing digital technology, they were limited. Although researchers report that IAPTs using digital technology while in training encountered obstacles like insufficient technology, content, poor administrative structure, and lack of resources (Redmond & Lock, 2019), IAPTs created plans to overcome obstacles to enable the successful integration of digital technology.

Recommendations

Recommendations for further research are based on study results and the limitations of the study. As this study was perhaps one of the first which involved exploring indigenous Amerindian preservice teachers' perceptions about the integration of digital technology, it is recommended that additional studies with indigenous Amerindian preservice teachers be conducted to confirm and/or disconfirm the findings. In addition to further exploring indigenous Amerindian preservice teachers' viewpoints, a personal suggestion is that studies on this topic be conducted with indigenous Amerindian in-service teachers to gather viewpoints on the adoption of digital technology beyond the classroom. Further research is needed to understand the low adoption of digital technology and to build a deeper understanding of indigenous Amerindian preservice teachers' perceptions about the adoption of digital technology for pedagogical growth and professionalism within the education system.

Another recommendation is related to the research question and the research design utilized in this study. The use of a basic qualitative research design was to capture the perceptions of indigenous Amerindian preservice teachers on the low adoption of digital technology and not on the scrutiny of a "phenomenon in depth and within its real-world context" (Yin, 2017, p. 16) or to contribute an "elaborate and copious history concerning a body, system or program" (Patton, 2015, p. 259). A case study research design with the indigenous Amerindian preservice teachers' population at the training institution, may serve to gain practical insight into indigenous preservice teachers' perceptions. in gaining insight into the indigenous Amerindian preservice teachers' perceptions about the low adoption of digital technology for pedagogical practices.

A recommendation would also be in conducting this study with a larger sample and conducting a second round of interviews with participants from the Satellite Development Centers throughout the Coastal Plain of Guyana to gain a deeper understanding of the low adoption of digital technology as an academic tool.

Implications

This study may contribute to positive social change in several ways, including at the institutional, societal, and individual levels. Firstly, at the institutional level, the findings of my study may contribute to positive social change through improved pedagogical practices. The study indicates indigenous Amerindian preservice teachers found the adoption of digital technology tedious even though it is useful for professional growth and improvement of pedagogical practices beyond the institution. Synonymous with previous empirical research, my study determines the practicality of providing operative training for trainers and trainees. Through some degree of indigenous Amerindian preservice teachers' professional exposures and perceptions, the findings of my study also highlight the importance of providing access to digital technology and support with technological plans when instituting new pedagogical tools within the curriculum. Education stakeholders at regional levels who are looking to reduce the educational gap and improve learning in the school systems should seek continuous professional development, create support based on digital technology where indigenous Amerindian teachers are placed to provide learning.

Another contribution and implication of this study is that it may provide a more in-depth understanding of the low adoption of digital technology at the societal level. Research in indigenous education has indicated the growing need for digital technology to support sustainable educational development (Gumbo, 2020); however, before embarking on this study, little was known about the low adoption of digital technology for pedagogical practices concerning indigenous Amerindian preservice teachers in training. Although this particular study focuses primarily on the perceptions of indigenous Amerindian's low adoption of digital technology and how it can be integrated as a form of pedagogical practices, a technological network may serve as a conduit for providing indigenous Amerindian preservice teachers' support to integrate digital technology in teaching across the regions. An increasing number of regional education officers, school leaders, and community leaders may help to provide training for the integration of digital technology in classrooms throughout Guyana.

At the individual level, the findings of this study may contribute to positive social changes by addressing the adoption of digital technology as teaching tools for learning integration for indigenous Amerindian preservice teachers. The findings specify that digital technology may be beneficial support for engaging indigenous Amerindian preservice teachers in the context of learning beyond the classroom. In earlier empirical research on different types of digital technology, little information is given on the perceptions of indigenous Amerindian preservice teachers' adoption of digital technology concerning the training. The viewpoints

shared by indigenous Amerindian preservice teachers in this study indicate that adequate professional development and support may serve as a valuable education tool to transform learning beyond 'one-size-fits-all' training for the integration of digital technology in the curriculum. These discoveries may have organizational as well as societal impacts.

Conclusion

The problem studied was that the low adoption of digital technology in the pedagogical practice among indigenous Amerindian preservice teachers was not understood. In this basic qualitative study, a variety of factors and interventions were explored to obtain a deeper understanding of the complex process of preparing indigenous Amerindian preservice teachers increasing the rate of adoption of digital technology in the field of teacher training. The results of data collected for this study yielded themes related to the conditions necessary to impact the adoption rate of digital technology at the (training) institutional, individual and societal levels. The key finding for this qualitative study was that indigenous Amerindian preservice teachers could be budding adopters of the educational transformation that is needed to fully integrate digital technology into pedagogical practices and beyond the classrooms.

As Scherer et al. (2018) indicated, preservice teachers must be trained to acquire 21st-century skills and strategies for integrating digital technology. This study has supported the theory that digital technology can no longer be simply viewed as a personal communication tool, or browsing the web, but must be viewed as useful for indigenous Amerindian preservice teachers to attain professional guidance and support for integrating instructional tools and strategies for meaningful training practices, of closing the educational gap. The evidence further revealed that the intensive training, which was posited as a boost to teachers' confidence when teaching preservice indigenous Amerindian learners, provided a platform for positive social change from which policymakers and stakeholders can formulate a much-needed plan of integration. Hence, the growing concern surrounding learning among indigenous populations which existed as the conception of the study and which still exist today in Guyana is a very fertile ground for the exploration to conduct similar justifiable endeavors in the field of educational research.

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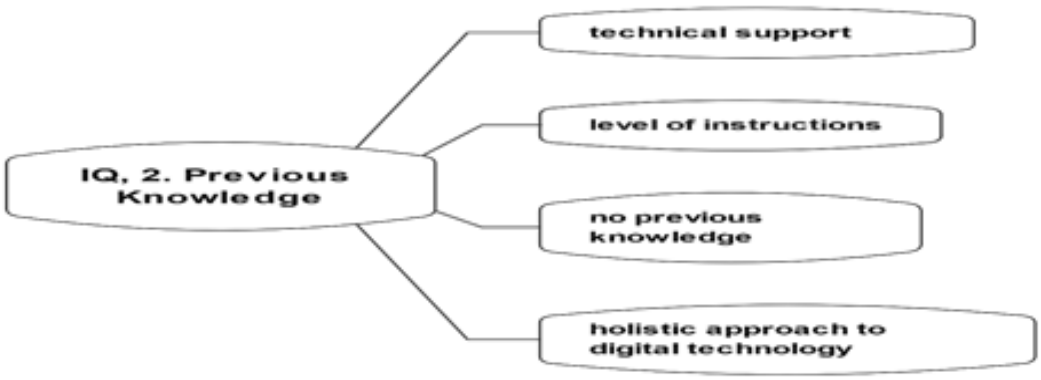

Figure 1. Emergent Theme and Sub-Codes Aligned to the Principal RQ and IQ 2.

Note: The figure indicates the elements associated with previous knowledge: RQ-What are the institutional conflicts or obstacles hindering the adoption of instructional technology by indigenous Amerindian preservice teachers?

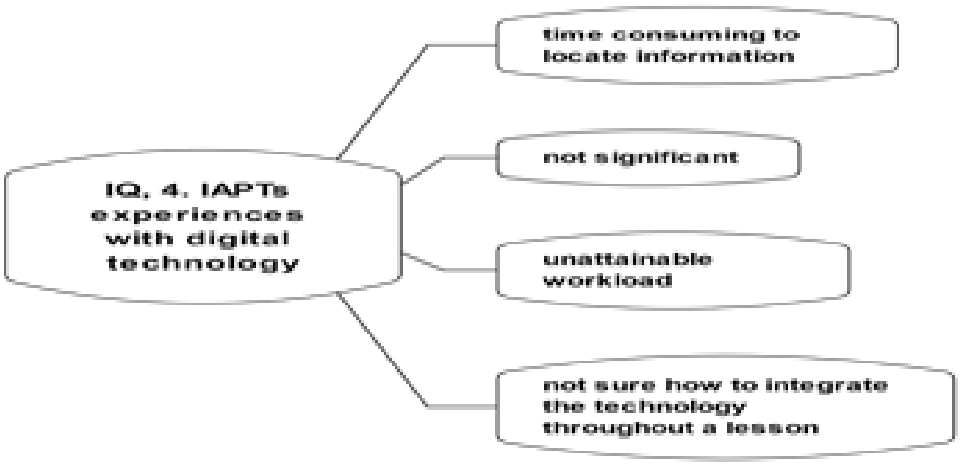

Figure 2. Emergent Theme and Sub-Codes Aligned to RQ and IQ 4.

Note: This figure indicates the elements associated with IAPT's experiences with digital technology and the overarching RQ-What are the institutional conflicts or obstacles hindering the adoption of instructional technology by indigenous Amerindian preservice teachers?

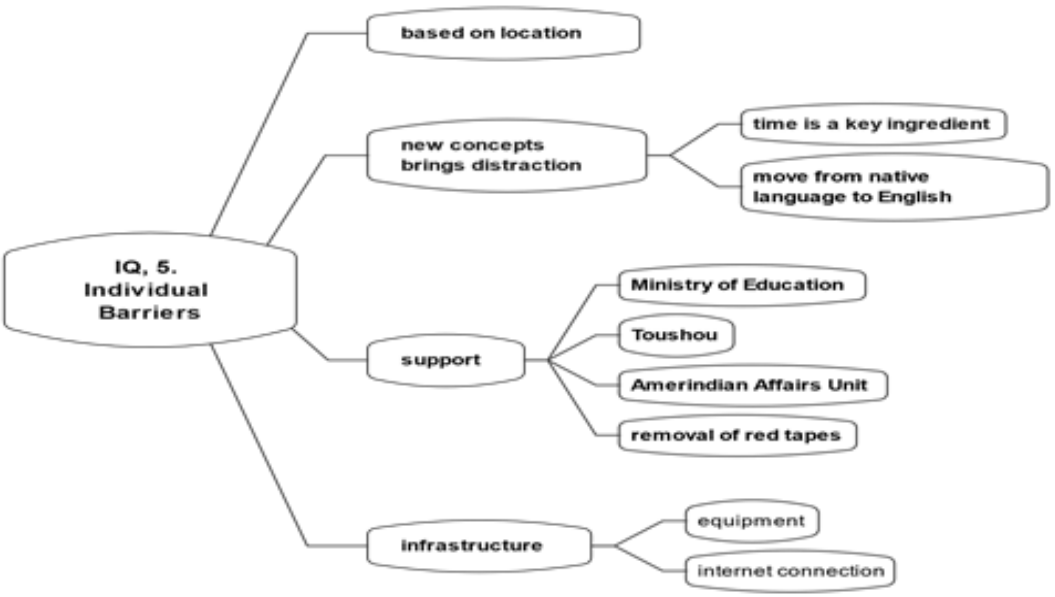

Figure 3. Emergent Code and Sub Codes Aligned to RQ and IQ 5.

Note: This figure indicates the depth of individual barriers associated with IAPT's position on IQ5 and the overarching RQ- What are the institutional conflicts or obstacles hindering the adoption of instructional technology by indigenous Amerindian preservice teachers?

References

Beaton,B., & Carpenter, P. (2016).Digital technology innovations in education in remote first nations.IN Education, 22(1), 42-60. https://www.ineducation.ca/ineducation/article/view/266/847

Bloomberg,L.D.,&Volpe,M.(2017).Completing your qualitative dissertation: A roadmap from beginning to end, (4th edition). Sage.

Brandt, C. J., Clemensen, J., Nielsen, J. B., & Søndergaard, J. (2018). Drivers for successful long-term lifestyle change, the role of e-health: A qualitative interview study. BMJ Open, 8(3), 1-7. doi:10.1136/bmjopen-2017-017466

Castagno, A. E., Garcia, D. R., & Blalock, N. (2016). Rethinking school choice:Educational options, control, and sovereignty in Indian country.Journal of School Choice, 10(2), 227-248.doi: 10.1080/15582159.2016.1153379

Creswell, J. W., & Poth, C. N. (2017). Qualitative inquiry and research design: Choosing among five approaches. Sage.

Daher, M., Olivares, H., Carré, D., Jaramillo, A., & Tomicic, A. (2017). Experience and meaning in qualitative research: A conceptual review and a methodological device proposal. In ForumQualitativeSocialResearch,18(3),125.doi:10.17169/fqs-18.3.2696.

Drijvers, P.,Monaghan, J., Thomas, M., & Trouche, L. (2014).Use of Technology in Secondary Mathematics (Doctoral dissertation), International Baccalaureate. https://hal.archives-ouvertes.fr/hal-01546747/document

Gillan, K., Mellor, S., & Krakouer, J. (2017). The case for urgency: Advocating for Indigenous voice in education. Australian Council for Educational Research, 62. https://www.acer.org/au/aer

Gumbo, M. T. (2020).Teaching food technology in a secondary technology education classroom: Exploring Ideas in Indigenous Contexts. Food Education and Food Technology in School Curricula (283-295). doi:10.1007/978-3-39339-7_19

Huang, H. M., & Liaw, S. S. (2018). An analysis of learners' intentions toward virtual reality learning based on constructivist and technology acceptance approaches. International Review of Research in Open and Distributed Learning, 19(1),1-25. Doi:10.19173/irrodl.v19i1.2503

Jawarneh, A. Y. (2017).Improving effectiveness of mobile learning technology for use in higher education: A comparative study of the UK and Jordan. [Doctoral dissertation]Cardiff Metropolitan University. https://repository.cardiffmet.ac.uk/handle/10369/9214

Jeffery, L. (2019).Preservice Teachers' Perceptions of Readiness for Teaching in a 1:1 Classroom. [Doctoral dissertation] University of New Mexico. https://digitalrepository.unm.edu/educ_teelp_etds/291

Jita, T. (2018).Exploring pre-service teachers' opportunities to learn to teach science with ICTs during teaching practice. Journal of Education, 71. doi:10.17159/2520-9868/i71a05

Khan, A. (2018). Protest and Punishment: Indo-Guyanese Women and Organized Labour. Caribbean Review of Gender Studies, 12(3) 269-98 https://www.sta.uwi.edu/crgs/index.asp

Lindlof, T. R., & Taylor, B. C. (2017). Qualitative communication research methods. Sage.

Litz, D., & Scott, S. (2017).Transformational leadership in the educational system of the United Arab Emirates. Educational Management Administration & Leadership, 45(4), 566–587. doi:10.1177/1741143216636112

Louise, S. (2020).A review of research exploring teacher preparation for the digital age. Cambridge Journal of Education, 50(1), 37-56. doi:10.1080/0305764X.2019.1625867

Menezes, M. N. (1988). The Amerindians of Guyana: original lords of the soil. América Indígena, 28(2), 353-375.

Merriam, S. B., & Tisdell, E. J. (2016). Qualitative research: A guide to design and implementation (4th ed.). Jossey-Bass.

Min, S., So, K. K. F., & Jeong, M. (2019). Consumer adoption of the Uber mobile application: Insights from diffusion of innovation theory and technology acceptance model. Journal of Travel & Tourism Marketing, 36(7), 770-783.doi:10.1080/10548408.2018.1507866.

Neiterman, E., & Zaza, C. (2019).A mixed blessing: Students' and Instructors' perspectives about off-task technology use in the academic classroom. Canadian Journal for the Scholarship

of Teaching and Learning, 10(1), n1.doi:10.5206/cjsotl-rcacea.2019.1.8002

Norton, S. (2019).Middle school mathematics pre-service teachers' content knowledge, confidence, and self-efficacy. TeacherDevelopment,23(5),529548.doi:10.1080/13664530.2019.1668840

Ossiannilsson, E. (2018). Ecologies of openness: Reformations through open pedagogy. Asian Journal of Distance Education, 13(2),103119.https://www.AsianJDE.org

Parkman, S., Litz, D., & Gromik, N. (2018). Examining pre-service teachers' acceptance of technology rich learning environments: A UAE case study. Education and Information Technologies 23(3) 1253-1275. doi:10.1007/s10671-018-9228-4

Patton, M. Q. (2015). Qualitative research and methods: Integrating theory and practice. Sage.

Pincus, K. V., Stout, D. E., Sorensen, J. E., Stocks, K. D., & Lawson, R. A. (2017).Forces for change in higher education and implications for the accounting academy. Science Direct 40, 1-18. doi:10.1016/j.jaccedu.2017.06.001

Prayaga, P., Rennie, E., Pechenkina, E., & Hunter, A. (2017). Digital literacy and other factors influencing the success of online courses in remote Indigenous communities.In Indigenous Pathways, Transitions and Participation in Higher Education, Chap.12, (189-210).doi:10.1007/978-981-10-4062-7_12

Ramsey, E., & Deana, B. (2018). Feeling like a fraud: Helping students renegotiate their academic identities. College&UndergraduateLibraries25(1),8690.doi:10.1080/10691316.2017.1364080

Ravitch, S. M., & Carl, N. M. (2016). Qualitative research: Bridging the conceptual, theoretical, and methodological. Sage.

Redmond, P., & Lock, J. (2019).Secondary pre-service teachers' perceptions of technological pedagogical content knowledge (TPACK): What do they really think? Australasian Journal of Educational Technology, 35(3), 45-54. doi:10.14742/ajet.4214

Rogers, E. M. (1995a).Diffusion of Innovations. Free Press.

Rogers, E. M. (2004b). Diffusion of innovations (5th ed.). Free Press.

Rogers, S. E. (2016).Bridging the 21st century digital divide. Association for educational communications and technology. Tech Trends, 60(3), 197–199. doi:10.1007/s11528-016-0057-0

Sánchez-Prieto, J.C., Huang, F.,Olmos-Migueláñez, S., García-Peñalvo, F.J., & Teo, T. (2019).Exploring the unknown: The effect of resistance to change and attachment on mobile adoption among secondary pre-service teachers. British Journal of Educational Technology, 50(5),2433-2449. doi:10.1111/bjet.12822

Sauers, N. J., & McLeod, S. (2017).Teachers' technology competency and technology integration in 1:1 schools. Journal of Educational Computing Research, 56(6), 892-910. doi:10.1177/0735633117713021

Scherer, R., Tondeur, J., Siddiq, F., & Baran, E. (2018). The importance of attitudes toward technology for pre-service teachers' technological, pedagogical, and content knowledge: Comparing structural equation modeling approaches. Computers in Human Behavior, 80, 67-80. doi:10.1016/j.chb.2017.11.003

Sellars, M., Fakirmohammad, R., Bui, L., Fishetti, J., Niyozov, S., Reynolds, R., Thapliyal, N., Smith, Y., & Ali, N. (2018). Conversations on critical thinking: Can critical thinking find its way forward as the skill set and mindset of the century? Education Sciences, 8(4), 2-29. doi:10.3390/educsci8040205

Serdyukov, P. (2017). Innovation in education: What works, what doesn't, and what to do about it? Journal of Research in Innovative Teaching & Learning, 10(1), 4-33. doi:10.1108/JRIT-10-2016-0007

Tassel-Baska, J. V., & Hubbard, G. F. (2016).Classroom based strategies for advanced learners in rural settings. JournalofAdvancedAcademics.27(4),285310. doi:10.1177/1932202X16657645.

Townsend, L., Wallace, C., Fairhurst, G., & Anderson, A. (2017). Broadband and the creative industries in rural Scotland.JournalofRuralStudies,54,451-458. doi:10.1016/j.jrurstud.2016.09.001

Tyler-Wood, T. (2019).Historical invention kits: A comparison of the achievement gains of high and low performing 7th grade students in rural Texas. In E-Learn: World Conference on E-Learning in Corporate Government, Healthcare, and Higher Education, 981-988. Association of the Advancement of Computing in Education Tyler-Wood, T. L., Cockerham, D.,& Johnson, K. R. (2018). Smart Learn. Environ, 5(22). 2-16. doi:10.1186/s40561-018-0073-y

United Nations Educational, Scientific and Cultural Organization.(2014). Information and communication technology (ICT) in education in Asia: A comparative analysis of ICT integration and e-readiness in schools across Asia.

United Nations Educational, Scientific and Cultural Organization.(2019b).ICT competency framework for teachers harnessing open educational resources. https://www.unesco.org/new/en/communication-and-information/access-to-knowledge/unesco-ict-competency-framework-for-teachers/

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46, 186–204. doi:10.1287/mnsc.46.2.186.11926

Vicary, S., Young, A., & Hicks, S. (2017).A reflective journal as learning process and contribution to quality and validity in interpretativephenomenologicalanalysis.QualitativeSocialWork,16(4),550565.doi:10.1177/1473325016635244

Walid, N., Noor, N. L. M., Ibrahim, E. N. M., & Ang, C. S. (2016).Potential motivational factors of technology usage for indigenous people in Peninsular Malaysia.In 2016 4th International Conference on User Science and Engineering (i-USEr), 259-264.

Woodside,J. M., Augustine, F. K., Jr., & Giberson, W. (2017).Blockchain Technology Adoption Status and Strategies. Journal of International Technology and InformationManagement,26(2)130.https://scholarworks.lib.csusb.edu/jitim/vol26/iss2/4

Yeh, E., & Wan, G. (2019).Media literacy education and 21st century teacher education.The International Encyclopedia of Media Literacy, 1-18. doi:10.1002/9781118978238.ieml0230

Yin, R. K. (2017).Case study research and applications: Design and methods. Sage.