THE RELATIONSHIP OF TEACHER ATTITUDES TO LEVELS OF INTEGRATION IN TECHNOLOGY-RICH LEARNING ENVIRONMENTS

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This mixed methods study examined teacher attitudes towards technology and their relationship to the integration of technology in technology-rich learning environments.

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CHAPTER 1

INTRODUCTION

Introduction to the Problem

If John Dewey were to walk into a contemporary classroom, he might feel right at home because so little has changed in the time since he wrote *My Pedagogic Creed* in 1897 (Cuban, 2018; Mays, 2019; Sedivy-Benton & Leland, 2014). Cuban (2001) asserted that teachers of the early 21st century used roughly the same level of technology as teachers who came well before, quoting Louis Gerstner, Jr., then IBM'S Chief Executive Officer, who said, "Before we can get the education revolution rolling, we need to recognize that our public schools are low-tech institutions in a high-tech society" (p. 13). However, the skills and competencies students are expected to learn and demonstrate have changed dramatically in recent years (Dede, 2010; Erstad & Voogt, 2018; ISTE, 2016) and student expectations regarding how they are taught have evolved (Means, 2010). Personalized learning (Pane, Steiner, Baird, & Hamilton, 2015), the universal design for learning (UDL) framework (Topper, 2017), and social media (Dabbagh & Kitsantas, 2012; Kimmons & Belikov, 2018) all play important roles in the design and delivery of 21st century education.

Therefore, it is reasonable to ask, "what role does technology play in the delivery of education in the 21st century?" Reigeluth and Karnopp asserted, "appropriate learning tools are vital to implementing the Information Age paradigm of education in a feasible and cost-effective way" (2013, p. 37). They elaborated, writing "Technology can provide powerful instructional tools… to support learning during a project…" (p. 39). Excitement regarding the possibilities technology may offer must be tempered with the reality that

most studies on the subject show “no significant difference” when teaching methods employing technology are compared to traditional (non-technology based) methods (Lowe, 2001; Nguyen, 2015; Yaghmour, 2016). In the related area of comparing technology-based distance education to face-to-face education, Russell has compiled and curated a list of several hundred studies showing “no significant difference” in learning outcomes (2001). The majority of studies in the realm have, thus far, been conducted in post-secondary or adult-learning settings, with only a few investigating the role of technology in secondary school classrooms. The present study focused on teacher attitudes regarding the use of technology in face-to-face classrooms in a private, parochial, secondary school.

Problem Statement and Purpose

As K-12 schools across the country continue to invest funds in educational technology (Kahl, 2018), the research community has been called upon to investigate the effectiveness of the continued use of technology in the classroom (Chauhan, 2017). There are, of course, broad questions of policy, such as whether these investments are paying off in the manner policymakers envisioned. Nevertheless, essential questions best addressed by the research community remain. For example, despite over 30 years of research effort, dating back to Wilson and Reish’s work on the Comprehensive Unified Physics Learning Environment (C.U.P.L.E.) Studio Physics course at Rensselaer Polytechnic Institute (RPI), using IBM 486 computers (MacDonald, Redish, & Wilson, 1988; Wilson & Redish, 1989; Wilson & Redish, 1992), there remains little consensus regarding the operational definition of key terms such as “active learning,” “student engagement,” and “active learning classroom.” Additionally, nearly all such

research has been focused on the higher-education arena, and overwhelmingly the American higher-education arena (Talbert & Mor-Avi, 2018). Some investigators explicitly identified the need for rigorous scholarly research in secondary education (Talbert & Mor-Avi, 2018, p. 31) including focusing on the impact of instructor attitudes (Talbert & Mor-Avi, 2018, p. 4) regarding the successful implementation of these initiatives.

The problem of imprecise, universally accepted operational definitions of key terms was beyond the scope of this research effort. However, this study intended to add to the body of research that is attempting to codify and clarify terminology while expressly examining teacher attitudes towards technology in secondary education.

The purpose of this study was to examine how teacher attitudes towards technology, as measured by surveying tangible outcomes of their own Internet use, impact levels of integration of technology in a technology-rich learning environment at a private, parochial, co-educational, college-preparatory secondary school in a large, urban city in the southwest United States. Non-pedagogical outcomes, such as student and family enthusiasm, market factors, such as product differentiation, and the use of creative or novel lesson plans, were acknowledged but were not directly measured as part of the current study. This mixed-methods study incorporated elements of ethnography, survey, fidelity of implementation, and interview research paradigms. The philosophical framework was pragmatism, in the sense of William James and John Dewey (Talisse & Aikin, 2011), with additional perspective from grounded theory (Charmaz, 2006; Corbin & Strauss, 2008; Glaser & Strauss, 1967), to the extent that the researcher collected data in advance of the formation of a hypothesis or theory rather

than collecting data to test or refine an existing theory (Walliman, 2017). The vocabulary of Roger's diffusion of innovations model was used to illustrate the observations (Rogers, 2010). The observations were descriptive rather than prescriptive. Grounded theory is marked by "simultaneous involvement in data collection, its most important basic rule being: 'study your emerging data'" (Tracy, 2013, p. 184). The effort focused on the commonalities between quantitative and qualitative approaches, rather than their differences (Onwuegbuzie & Leech, 2005), and viewed the entire project through a practical and real world lens.

Significance

While a number of studies have been conducted regarding fidelity of implementation of other educational practices in higher education (Karam et al., 2017; Phillips, Ingrole, Burris, & Tabulda, 2017; Schechter, Kazakoff, Bundschuh, Prescott, & Macaruso, 2017), there remains a dearth of data regarding the relationship between teacher attitudes towards technology and degree of implementation in technology-rich classroom environments and, ultimately, student learning outcomes and, even more specifically, in the area of active learning spaces in the secondary education space (Talbert & Mor-Avi, 2018).

Implementation fidelity refers to the degree to which an intervention or program is developed as designed (Carroll et al., 2007). Consequently, this was not a traditional fidelity of implementation study, such as those often conducted in the medical field (Harn, Parisi, & Stoolmiller, 2013), because there was no set of stated goals and objectives of the effort against which to measure how the intervention is intended to be designed or delivered.

> Fidelity in this context refers to the degree to which the implementation or effort is consistent with and carefully aligned to the stated goals and objectives of the effort. A fidelity of implementation study is primarily descriptive in nature, describing what is happening or has happened as it pertains to the intended outcomes (Spector & Yuen, 2016).

Instead, the goal was to focus on gauging the levels of integration achieved by various practitioners within the school and consider how well the implementation stayed within, and was aligned with, the subjective goals of this specific implementation, which included exploring the novel tools within the classroom, establishing a point of differentiation from local competition, and sparking innovation and creativity by the teachers who use the room.

Fullan argued the status quo regarding the integration of technology in education, as he observed it, is not sustainable and the successful school of the future will necessarily "integrate the digital and the learning" (2015, p. 33) while acknowledging "(e)ducational change is technically simple and socially complex" (p. 67). Reigeluth and Karnopp concurred and acknowledged that an educational environment in which technology and pedagogy are seamlessly integrated does not yet exist (2013). Banathy characterized systemic change, such as the integration of technology in an educational organization, as being guided by the "principle that any change in a part of the system affects the whole system" (1991, p. 149). Therefore, a better understanding of teacher attitudes towards technology may help understand the level of success achieved by specific classroom technology initiatives (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017).

Implications

The extent to which teacher attitudes and perceptions impact their success with

various technological innovations in post-secondary education has been established in the literature (Ertmer, 2005; Ertmer & Ottenbreit-Leftwich, 2010; Irby, 2017). While the same volume of research does not exist at the elementary and secondary levels, teachers at those levels have demonstrated a willingness to adapt teaching methods to incorporate technology when the technology has been shown to provide incremental benefits. For example, it is rare for a teacher or school in 2021 to rely primarily on paper communication (e.g., Friday afternoon letters sent home with students) or to rely solely on wired telephonic communication (e.g., calling a landline during the day to reach a parent). Communication strategies between the school and the student and their families have evolved over time. Similarly, schools replaced the overhead projector, introduced in the 1930s, and slate chalkboard with whiteboards, smart boards, and a host of mobile technologies (Bekkering & Ward, 2020; Gysbers, Johnston, Hancock, & Denyer, 2011). The introduction of affordable, mass-market personal computers in the 1980s brought opportunities, as well as challenges, for educational technology. Nevertheless, timely, rigorous research studies concentrating on the effectiveness of these innovations, which are often influenced by teacher attitudes, must be replicated and conducted in concert with the introduction of new technologies (Buabeng-Andoh, 2012). This is especially true at the primary and secondary education levels as many past research efforts have concentrated on post-secondary education (Talbert & Mor-Avi, 2018).

Overview of the Research

The present study gathered data using a validated instrument developed by Helsper, van Deursen, and Eynon (2015). The purpose of their study was to “develop

theoretically informed measures that can be used to explain how people use the Internet and what the benefits might be" (p. 9). Though not directly related to the use of technology in the education setting, the instrument focused on tangible outcomes, which is the sort of real-world and pragmatic approach the present study endeavored to embrace.

The participant pool, chosen for convenience, examined for this study was 45 full time teachers at a private, Catholic, coeducational, college-preparatory high school in a large, urban city in the southwest United States. In 2016, the school implemented a novel classroom technology initiative with the introduction of five technology-rich, student-centric learning environments, referred to as "TEAL" (technology enhanced active learning*).

The results of the surveys, administered online to teachers at the school, were complemented by five semi-structured interviews selectively administered to a representative convenience sample of teachers who either self-identifed or were identified by the investigator as innovators, early adopters, early majority, late majority, and laggards (Rogers, 2010, pp. 263-268), to elicit specific examples and to potentially identify trends in attitudes. Interview responses and conclusions were coded by a lone ethnographer and validated with subjects using member checking (Saldaña, 2015, pp. 35-36). This case study approach was consistent with the methodology offered by Flyvbjerg (2001) and also with Charmaz's first rule of grounded theory, "study your emerging data" (2006, p. 80).

* The acronym TEAL was introduced at the Massachusetts Institute of Technology (MIT) in fall 2000, where they expressed it as "technology *enabled* active learning." However, because the secondary school which was the subject of this study uses "enhanced," this is the term used herein unless otherwise noted.

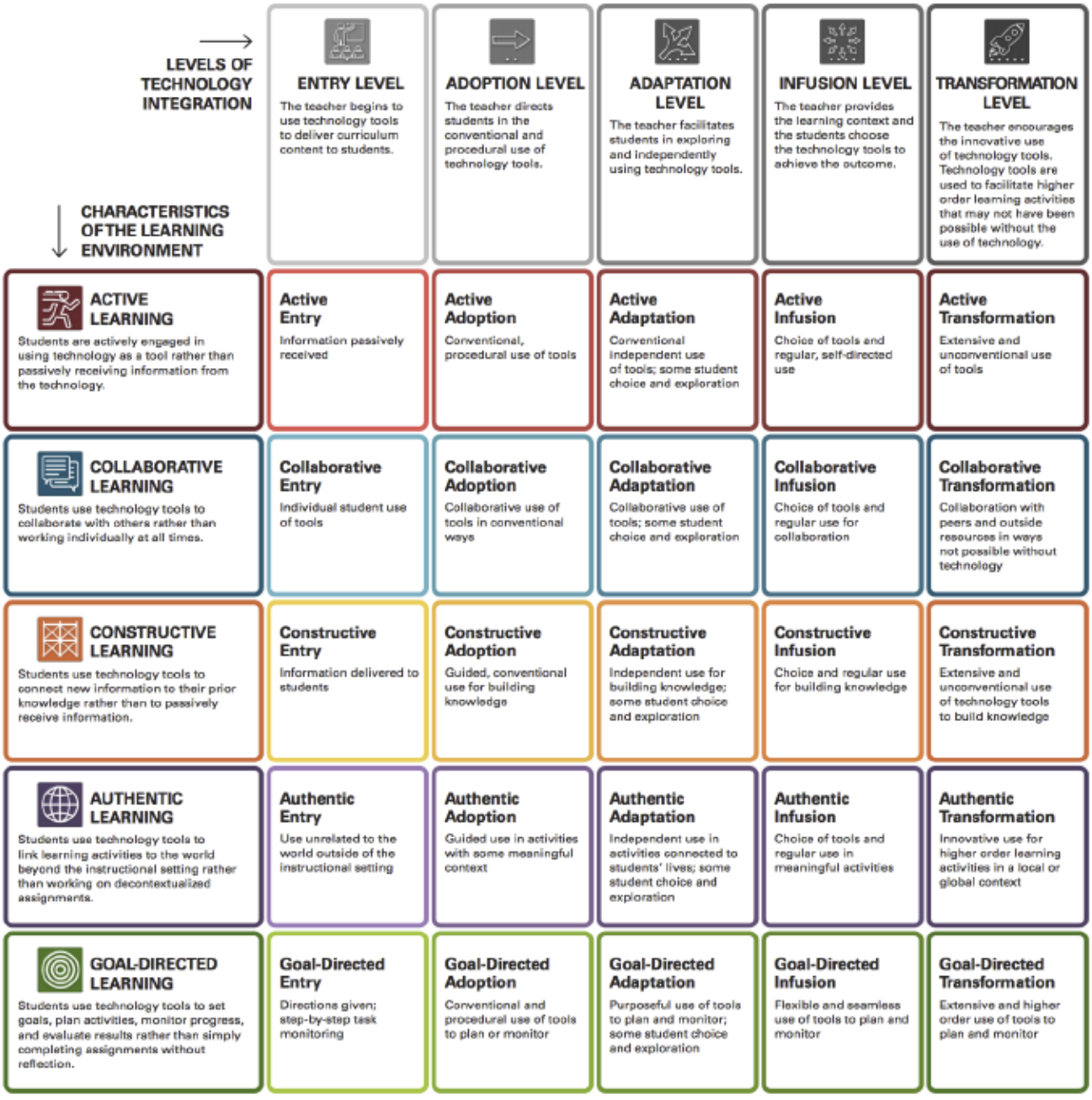
The resulting data were presented as an enhanced formative evaluation of the experience of the school as a whole with the implementation of these new classrooms. Survey results showed data concerning the attitudes of the teachers, as they related to their use of the Internet, and the interviews were presented as studies of individual experiences, providing the study with anecdotal and descriptive evidence. These are two of the four categories of evidence described by Cukurova and Luckin, the other two being correlational evidence and causal evidence (Cukurova & Luckin, 2018, pp. 10-11).

Level of technology integration was qualitatively evaluated using the Technology Integration Matrix developed at the Florida Center for Instructional Technology (FCIT) at the University of South Florida (Harmes, Welsh, & Winkelman, 2016). The verbiage and context of the matrix drove the nature and content of the semi-structured interview questions (see Appendix A).

The technology integration matrix (TIM) provided a framework for describing and targeting the use of technology to enhance learning (see Figure 1.1). The matrix identified five interdependent characteristics of meaningful learning environments: (1) active, (2) collaborative, (3) constructive, (4) authentic, and (5) goal-directed. The Harmes team associated these characteristics with five levels of technology integration: (a) entry, (b) adoption, (c) adaptation, (d) infusion, and (e) transformation. Together, the five characteristics of meaningful learning environments and five levels of technology integration create a matrix of 25 cells. The behavior descriptions presented in the matrix helped ensure all participants had a similar understanding of each concept.

Figure 1.1

The Technology Integration Matrix



Source: Harmes et al., 2016, p. 142). Used by permission of the Florida Center for Instructional Technology, fcit.usf.edu.

Definition of Terms

- *Active learning:* defined broadly to include "any pedagogical method that

involves students actively working on learning tasks and reflecting on their work, apart from watching, listening, and taking notes" (Talbert & Mor-Avi, 2018, p. 1).

- *Active learning classrooms (ALCs)*: "learning spaces specially designed to optimize the practice of active learning and amplify its positive effects in learners from young children through university-level learners" (Talbert & Mor-Avi, 2018).
- *Authentic*: a characteristic of meaningful learning within the TIM framework describing technology use for learning that includes experiences that have relevance to the world outside the classroom (Harmes et al., 2016).
- *Collaborative*: a characteristic of meaningful learning within the TIM framework that describes how technology is used to facilitate or support students in working together with peers and outside experts (Harmes et al., 2016).
- *Constructive*: a characteristic of meaningful learning within the TIM framework describing student-centered instruction that facilitates students connecting new information to their prior knowledge while allowing flexibility and choice of technology tools.
- *Design-based research:* a "systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings and leading to contextually-sensitive design principles and theories" (Wang & Hannafin, 2005, pp. 6-7).
- *Diffusion*: "the process by which an innovation makes its way through a social system" (Rogers, 2010, p. 19).
- *Education*: a deliberate "process of improving one's knowledge, performance,

and understanding through a systematic and sustained effort" (Spector, 2015, p. 7).

- *Educational technology*: any tool, equipment, or device—electronic or mechanical—that can help students accomplish specified learning goals. Educational technology includes both instructional and learning technologies (Davies & West, 2014).
- *Effectiveness*: "the ability of an intervention to produce the desired beneficial effect in actual use" (Dorland, 1994, p. 531 as cited in: O'Donnell, 2008, p. 41).
- *Efficacy*: "the ability of an intervention to produce the desired beneficial effect in expert hands and under ideal circumstances" (Dorland, 1994, p. 531 as cited in: O'Donnell, 2008, pp. 40-41).
- *Emerging technologies*: those that have (or, at the time of their introduction, had) the potential to change the current state of affairs in education. Emerging technologies currently include but are not limited to virtual reality implementations, augmented reality implementations, mobile learning devices, Internet of Things hardware with sensors, and technologies that allow collaborative learning at a great scale (Cukurova & Luckin, 2018, pp. 2-3).
- *Goal-directed*: a characteristic of meaningful learning within the TIM framework that describes technology use that supports meaningful reflection through activities such as setting goals, planning activities, monitoring progress, and evaluating results (Harmes et al., 2016, p. 162).
- *Implementation fidelity*: refers to the degree to which an intervention or program is developed as designed (Carroll et al., 2007). In other words, "how well an intervention is implemented in comparison with the original program design during an efficacy and/or effectiveness study" (O'Donnell, 2008, p. 33).

- *Innovation*: “an idea, practice, or object that is perceived as new by the individual” (Rogers, 2010, p. 12).
- *Instructional technology*: educational technologies teachers employ to provide instruction (Davies & West, 2014). A variation is found in Johnson: “the delivery of instruction with the aid of computer software and hardware as tools to enhance the teaching and learning process” (M. L. Johnson, 2011, p. 1).
- *Knowledge*: “occurs when an individual (or other decision-making unit) is exposed to the innovation’s existence and gains some understanding of how it functions” (Rogers, 2010, p. 20).
- *Learning*: “involves stable and persisting changes in what a person (or group of people) knows and can do.” (Spector, 2015, p. 31).
- *Learning technology*: educational technologies learners use to accomplish specific learning objectives and tasks (Davies & West, 2014).
- *Standard classroom*: the standard configuration of classrooms at the subject school. The configuration included 20-26 student desks and portable chairs as well as a teacher desk and movable lectern. All standard classrooms were equipped with smartboards and short-throw projectors. All classrooms had a desktop computer connected to the smartboard, with additional HDMI ports available. Many teachers also made use of personal technology to augment their in-class activities (laptops and iPads, for example). The school was a “bring your own device” (BYOD) school, and all students had their own Windows or Mac laptop. Most classrooms had auxiliary whiteboards and bulletin boards displaying teacher-selected content.
- *TEAL classroom*: the technology-rich student-centric learning environment

that was studied; images of the classroom are found in Appendix B. These five classrooms were installed in the school in 2016 and had 24-48 portable chairs, with desks on wheels to facilitate reconfiguration of the classroom. There were computer monitors spaced throughout the room with tables often arranged in “pods” in front of the distributed monitors. There was a Newline interactive touchscreen in each room, as well as an industry-standard (OPS, Open Pluggable Specification) onboard computer, with input/output ports to allow for usage of other devices (laptops, phones, or tablets, for example). The pod monitors could either project the image from the Newline or an alternate video feed in a Sharp TV (not an interactive monitor or touchscreen). Each pod monitor had a cable connected to it that has connectors for a variety of devices (iPad, iPhone, VGA, USB-C, and HDMI, for example). Additionally, the TEAL classrooms’ walls were IdeaPaint, which acted as a floor-to-ceiling whiteboard, allowing teachers and students to write on the walls, facilitating creativity and collaboration. There were no auxiliary whiteboards or bulletin boards in the TEAL classrooms.

- *Technology*: “involves the practical application of knowledge for a purpose” (Spector, 2015, p. 5).

- *Technology integration*: The use of technology to enhance, extend, or enrich learning (Harmes et al., 2016, p. 162). A related view offered by Davies & West: the effective implementation of educational technologies to accomplish intended learning outcomes (Davies & West, 2014).

- *Technology integration matrix* (TIM): a pedagogically-centered model for planning, describing, and evaluating technology integration (Harmes et al., 2016, p. 162).

Research Questions

1. To what extent do teacher attitudinal outcomes towards information technology impact level of technology integration in a technology-rich learning environment at the secondary school level?

2. To what extent do teacher perceptions regarding their own technical proficiency impact level of technology integration in a technology-rich, student-centric learning environment?

Limitations

Due to the specific nature of the environment being studied, this was not a generalizable study. However, it did provide valuable insight into the experience of the subject school with the implementation of this set of classroom innovations. It is not reasonable to expect the findings will in any way inform the future experience of public institutions, for example, or private elementary or middle schools. It is reasonable to expect the findings will illustrate successes, as well as opportunities for improvement, of the type of installation being investigated and that this information will be valuable to the administrators and other stakeholders at this and other similar schools. Furthermore, as educational institutions at all levels continue to invest substantial resources, financial and otherwise, novel and dynamic research protocols and conceptual frameworks will be needed to guide future studies. Studies such as the current study will add to the body of experience for future researchers, and while the specific study may not be widely applicable, the theoretical approach and methodology certainly will be.

One example of the limitation, even within the same organization, was that while the classrooms participating in this study had a great deal of flexibility, with movable work areas and chairs, for example, there were limitations to that flexibility, such as the

fixed installation of the view-only monitors and the interactive monitor at the front of the room.

Though the quantitative data gathering portion of the study was concluded prior to the COVID-19 pandemic in 2020, any future study would need to take into consideration the impact of the pandemic on students, teachers, and the learning environment.

One additional limitation of the approach that must be acknowledged was conscious or unconscious bias among the survey participants and the researcher. Some may provide obliging responses even under the protection of anonymity. The organization freely acknowledged the change management issues present when considering implementations of this sort. Some teachers were quite content to continue teaching their course material as they have in the past. At no time was any teacher required to use any of the facilities or to participate in this study.

CHAPTER 2

LITERATURE REVIEW

Historical Perspective

The educational community continually searches for the next great technology to solve problems at various levels of education (Berk, 2010; Suppes, 1968). From mandatory pre-K to problem-based learning (PBL) to 1:1 and bring your own device (BYOD) initiatives, the search for simple solutions appears to be ongoing and futile. There are a variety of problems with this approach, from funding to politics, and nothing in the present body of research suggests technology alone will ever solve problems faced by educators and students (Collins & Halverson, 2018; Ertmer & Ottenbreit-Leftwich, 2013; Skinner, 1965). Toyama (2015) offered one possible explanation, which he terms technology's law of amplification: "While technology helps education where it's already doing well, technology does little for mediocre educational systems; and in dysfunctional schools, it can cause outright harm."

The present study focused on a specific implementation of educational technology, dubbed TEAL (technology enhanced active learning). The TEAL concept originated with a project at the University of Maryland, the Maryland University Project on Physics and Education Technology (MUPPET), which began in the early 1980s as a way to introduce first-semester physics students "to the art of analyzing real physical systems" (MacDonald et al., 1988, p. 23). With the advent of inexpensive personal computers, the physics faculty at the University of Maryland who founded the MUPPET initiative, believed they could use personal computers to reorganize elements of the physics curriculum to emphasize fundamental concepts, use simulations to spark their

students' intuition, use projects to simulate research experiences, and modernize the course content which, they believed, had not appreciably changed in the prior 30 years.

North Carolina State University called their implementation of TEAL concepts Student-Centered Active Learning Environment with Upside-down Pedagogies or SCALE-UP. They promoted the success of their original implementation, indicating they had data comparing nearly 16,000 traditional and SCALE-UP students taking physics courses. They summarized the results in a seminal 1999 publication (Beichner et al.) with these five points:

1. Students' ability to solve problems is improved
2. Their conceptual understanding is increased
3. Their attitudes are better
4. Failure rates (especially for women and minorities) are drastically reduced
5. "At-risk" students do better in later courses

One of the challenges with this research, as noted above, was the lack of explicit operational definitions and pervasive ambiguity in terminology. Though SCALE-UP is one of the oldest terms, others are prevalent, including TEAL and ALC (active learning classroom). Beichner did his research in the 1990s, but research into the concepts continues, with contributions in the last few years from Schroff, Ting, and Lam (2019), Ewing (2018), and Soneral and Wyse (2017), among others.

Subsequent Efforts

It appears that either university physics faculty are more inclined to try TEAL methods or physics curricula are thought to be particularly well suited to this approach because several subsequent TEAL-related research efforts took place in physics

classrooms. These include Naron (2011), Shieh (2012), Breslow (2010), and the University of Massachusetts-Amherst (B. White, personal communication, June 24, 2015).

A particularly insightful example is that of Breslow (2010), wherein she describes the design and introduction of TEAL* in the initial physics classes at the Massachusetts Institute of Technology (MIT) in the late 1990s and in to the early 2000s. The initial effort met with considerable resistance from the student body. Breslow detailed the multi-year change management exercise that was needed before the TEAL methodology was firmly a part of the MIT physics curriculum.

By the time the University of Minnesota conducted its pilot study in 2007, technology, design, student attitudes, and faculty approach to the concept had all evolved to yield overwhelmingly positive qualitative results (Alexander et al., 2008).

Other scholarly efforts in recent years included reflections on teaching non-science subjects in TEAL classrooms (Caraher & Stanley, 2018), combining TEAL classrooms with the flipped classroom concept (Long, Logan, Cummins, & Waugh, 2016), cross-disciplinary efforts (Chiu, 2016), and several studies focusing more broadly on active learning spaces (Chiu, 2016; Ge, Yang, Liao, & Wolfe, 2015; Hassan, Puteh, & Sanusi, 2018; McNeil & Borg, 2018), all at the post-secondary level.

Current State of the Use of Technology in the Classroom

As of this writing, many diverse organizations employ TEAL principles in universities and, to a lesser extent, secondary schools. Among these are statistics and

* Educators at MIT use the phrase “technology *enabled* active learning.” As mentioned above, the secondary school that was the subject of the present study uses “enhanced” so this is the term used herein, unless otherwise noted.

algebra classes at the Montana State University, multi-purpose TEAL classrooms at Bishop Moore Catholic High School in Orlando, FL, one of the few secondary schools to have implemented the concept (see http://www.BishopMoore.org/Technology), and physics at MIT (see http://web.mit.edu/edtech/casestudies/teal.html). The Thomas S. and Harvey D. Wilmeth Active Learning Center at Purdue University (West Lafayette, IN) opened in 2017 and has 27 active learning classrooms in a variety of configurations (Purdue University, 2017) and hosts courses in various subjects.

According to the members-only section of the SCALE-UP website (https://tinyurl.com/scaleupsite) administered by Robert Beichner at the North Carolina State University, as of July 2021 there are currently 337 institutions that have deployed these classroom and are listed on the registry: 9 elementary schools, 13 middle schools, 23 high schools, and 290 universities in 48 states and 23 countries. Some institutions indicated deployments at multiple levels (for example, elementary and middle school).

Measurement of Teacher Attitudes towards Technology

Measuring and attempting to correlate teacher attitudes towards technology in the classroom with positive learning outcomes has been a persistent challenge (Ertmer, 2005; Pajares, 1992). Research supports the notion that attitudes toward technology and its use in education are essential determinants of technology acceptance and integration in classrooms (Scherer, Tondeur, Siddiq, & Baran, 2018). The technology acceptance model (TAM), among other models (unified theory of acceptance and use of technology, and TAM 2, for example), have been used to frame the discussion regarding teacher attitudes and the use of technology in the classroom with varying

degrees of success (Scherer, Siddiq, & Tondeur, 2019). The technology acceptance model, as first proposed by Davis (1989), comprises core variables of user motivation (such as perceived usefulness, perceived ease of use, and attitudes toward technology) and outcome variables (such as technology use and behavioral intentions). The model then seeks to identify variables that directly or indirectly explain the observed outcomes. External factors often accompany these variables to explain variation in perceived usefulness and ease of use of technology.

Knezek and Christiansen (2008) found "simply placing technology in schools has not been sufficient to ensure educationally relevant use" (p. 322). This is a sentiment shared in more recent studies (Godhe, Lilja, & Selwyn, 2019; K. Johnson, 2018). These observations suggest additional research regarding the role of attitudes and their relationship to technology implementation, including mixed methodologies, such as those conducted in the present study, would be valuable. McKnight documented successful strategies for implementing technology in educational settings and identified several fundamental functions facilitated (or made more efficient) by technology. Examples include keeping content current and adding a depth or richness to the content that would not otherwise be possible, and would bring efficiencies to tasks such as grading. They also observed teacher beliefs regarding technology and their self-efficacy influenced their use of technology in the classroom.

Diffusion of Innovation

"Diffusion is the process by which an innovation is communicated through certain channels over time among the members of the social system" (M. L. Johnson, 2011, p. 9). Most of the research regarding diffusion of innovation has been conducted in the

medical field where novel treatments or protocols are developed and then adopted, or not adopted, subject to a variety of factors (Wainwright & Waring, 2007), explored business innovations (Katz, 1961), or were purely theoretical (Valente, 1996). There remains a dearth of evidenced-based research regarding diffusion of innovation in the social sciences.

Rogers observed an S-curve plotting time on the *x*-axis and number, or cumulative percentage, of adopters on the *y*-axis (Rogers, 2010, p. 262). Johnson (2011) applied Rogers' diffusion of innovation model, especially as it relates to students' acceptance of technology, and measured student attitudes, perceptions, and student expectations as part of her study. She found evidence indicating Rogers' theory helped explain observations at two different universities in Virginia and suggested a positive relationship among student attitudes, perceptions, and expectations towards instructional technology existed. Johnson's 2001 study focused on student attitudes, and the present study took a similar methodological approach but instead concentrated on teacher attitudes.

Fidelity of Implementation

O'Donnell observed that in the era of policymaker driven accountability, practitioners and researchers alike must find practical methods to measure the success (or failure) of interventions; this necessitates both efficacy studies and effectiveness studies whenever possible (2008). Resource constraints and other factors often influence the feasibility of such studies in practice, especially at the secondary school level and particularly in rural schools (Azano, Callahan, Missett, & Brunner, 2014).

Much of the education research regarding fidelity of implementation, as with the

body of work in diffusion of innovation theory, borrows from the medical field. In much the same manner that Flyvbjerg (2001) suggested comparisons between social science and natural sciences are at worst fundamentally flawed, or at best unproductive, Harn, Parisi, and Stoolmiller (2013) observed that the medical field, from which many fidelity of implementation concepts are borrowed, has primarily measured fidelity in terms of treatment adherence while education researchers often deal with subjects in a much more multidimensional environment and that education research is highly contextual and volatile in ways that would be unheard of in the natural sciences. Berliner captured this sentiment well in his 2002 essay, "Educational Research: The Hardest Science of All," in which he poignantly wrote:

> Hard-to-do science is what the social scientists do and, in particular, it is what we educational researchers do. In my estimation, we have the hardest-to-do science of them all! We do our science under conditions that physical scientists find intolerable. We face particular problems and must deal with local conditions that limit generalizations and theory building-problems that are different from those faced by the easier-to-do sciences (Berliner, 2002, p. 18)

The challenges alluded to by Berliner have, if anything, intensified in the years since his editorial, as technology and access to the Internet have become ubiquitous while the systems we are charged with studying have dramatically increased in complexity. Berliner made this observation five years before the release of Apple's iPhone, a seminal event in both technology and education.

Spector and Yuen stated, "it should be obvious that conducting fidelity of implementation studies is a complex and challenging enterprise" (2016, p. 118). They also encouraged using "validated and reliable instruments," such as the one used in the present study" (p. 112).

The challenges of conducting educational research and with affecting change in

the learning setting are perhaps best captured by Fullan (2015). He wrote “Educational change is technically simple and socially complex.” From the earliest efforts at introducing technology in to the learning environment to the present day challenges presented by seemingly ubiquitous technology and pervasive, if not universal, access to broadband Internet, the challenges remain technically simple and socially complex. One objective of this study is to capture and describe teacher attitudes towards technology in the classroom at a given point in time, at one particular school.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The present study was conducted from the perspective of a Mode 2 knowledge-producing practitioner-scholar as described by Nowotny, Scott, & Gibbons (2003) and Tenkasi & Hay (2004). "Practitioner-scholars are actors who have received traditional academic training and who apply their knowledge and theory to an organization's particular challenges to resolved business problems" (Mohrman & Lawler, 2011, p. 212). "Mode 2 knowledge producers are closely tied to applied contexts. They are charged with achieving concrete results by creating actionable knowledge that can advance organizational causes" (Mohrman & Lawler, 2011, p. 213). In Mode 2 environments, such as the focus environment in this present study, theoretical knowledge is tested in concrete, local circumstances, as opposed to a classical laboratory or true experimental setting. One example of such a researcher is a laboratory-trained clinical researcher employed by a pharmaceutical company and charged with developing an effective drug to combat a specific disease. It is through this practical, real-world lens that the present study was conducted.

The design of the present study was also influenced by the work of Wang and Hannafin (2005) and their perspectives on design-based research in the area of technology-enhanced learning systems. Their observation of the five basic characteristics of designed-based research (see Table 3.1) complement the philosophical approach advocated by Flyvberg regarding the necessity of a pragmatic approach to social science

Table 3.1

Characteristics of Design-Based Research

Characteristics	Explanations
Pragmatic	• Design-based research refines both theory and practice. • The value of theory is appraised by the extent to which principles inform and improve practice.
Grounded	• Design is theory-driven and grounded in relevant research, theory, and practice. • Design is conducted in real-world settings and the design process is embedded in, and studied through, design-based research.
Interactive, iterative, and flexible	• Designers are involved in the design process and work together with participants. • Processes are iterative cycles of analysis, design, implementation, and redesign. • Initial plan is usually insufficiently detailed, so the designers can make deliberate changes when necessary.
Integrative	• Mixed research methods are used to maximize the credibility of ongoing research. • Methods vary during different phases as new needs and issues emerge and the focus of the research evolves. • Rigor is purposefully maintained, and discipline is applied appropriate to the development phase.
Contextual	• The research process, research findings, and changes from the initial plan are documented. • Research results are connected with the design process and the setting. • The content and depth of generated design principles vary. • Guidance for applying generated principles is needed.

Source: Wang & Hannafin (2005).

Rogers' diffusion of innovations (2010) provided the theoretical framework for this study and addresses the spread and adoption of technology and ideas within organizations. This theory "provides a framework for describing how, why, and at what rate new technologies spread through social systems" (Dingfelder & Mandell, 2011, p. 597). This is consistent with modern theories of learning, such as social constructivism (Derry, 1999; Tsortanidou, Karagiannidis, & Koumpis, 2018) and the theories of Bruner

(1966) and Vygotsky (1980) as well as being consistent with both grounded theory and pragmatism, the philosophical frameworks that influenced the design of this research.

Rogers offered five stages of the individual innovation-decision process (pp. 168-169):

1. Knowledge
2. Persuasion
3. Decision
4. Implementation
5. Confirmation

He extrapolates these to five corollary states of the organizational innovation-adoption process (pp. 420-429):

1. Agenda-setting
2. Matching
3. Redefining/restructuring
4. Clarifying
5. Routinizing

Rogers also identified five adopter categories, referred to as ideal types (pp. 282-292):

1. Innovators
2. Early Adopters
3. Early Majority
4. Late Majority
5. Laggards

The participants in the semi-structured interviews were categorized into one of these five adopter categories and represented each of the five adopter categories.

Instrumentation

Survey data were gathered using the Internet Outcomes Survey developed by Helsper et al. (2015) as part of the DiSTO (Digital Skills to Tangible Outcomes) project and semi-structured interviews of individual teachers who either self-identified or were identified by the investigator as being in each of the broad categories coined by Rogers (Rogers, 2010, pp. 263-268). The Internet Outcomes Survey consisted of 48 statements using a 5-point Likert scale with additional options for "not applicable" and "don't know." Prior to the analysis of responses, all "not applicable" and "don't know" responses were removed.

The scale for the first 24 statements, measuring use, ranged from *strongly disagree* (1) to *strongly agree* (5). The scale for the final 24 statements, measuring satisfaction, ranged from *very dissatisfied* (1) to *very satisfied* (5). One novel innovation of this instrument was that it measured both use (did the respondent use the Internet for a particular purpose) and satisfaction (was the respondent satisfied with the outcome).

For the purpose of this study, the demographic categories measured included:

- Gender
    - Male
    - Female
- Subject taught (i.e. which academic department)
    - English
    - Fine Arts
    - Math
    - Performing Arts
    - Science

    - Social Studies
    - Theology
    - World Languages
- Age
    - 20-29 (Group 1)
    - 30-39 (Group 2)
    - 40-49 (Group 3)
    - 50-59 (Group 4)
    - 60-69 (Group 5)
- Experience (as measured by years taught)
    - 0-1 years (Group 1)
    - 2-4 (Group 2)
    - 5-9 (Group 3)
    - 10-19 (Group 4)
    - 20-29 (Group 5)
    - 30+ (Group 6)

The technology integration matrix offered an extended set of teacher descriptors for each cell of the matrix (see Appendix A). This verbiage informed the questions for the semi-structured interviews. The emphasis of the survey instrument on tangible outcomes as well as the behavior component of the technology integration matrix complemented the pragmatic approach of the research design.

Study Population

The convenience sample population examined for this study was full-time teachers at a private, Catholic, coeducational, college-preparatory high school in a

large, urban city in the southwest United States. Teachers participating in this study were limited to full-time faculty who teach credit-bearing, graded courses that factor into student grade point averages (GPA) and count towards graduation. This eliminated most physical education and athletics classes (the exception being dance, which is also in the Fine Arts department), non-academic courses, such as study hall, and a mandatory freshman seminar all 9th grade students must take.

The resulting sample population of teachers included individuals who ranged in experience from those in the first few years of their careers to those with over 40 years of experience at the school. They ranged from ages 24 to 74. The pool of 45 resulting participants was 55% female and 45% male, and was 80% Caucasian, 8% Hispanic, 9% Asian, and 3% African American. The gender and racial make-up of the faculty mirrored that of the student population within a few percentage points. The student population is 12% Hispanic and 6% each African American and Asian.

Methodology

This study was pre-approved by the administration of the school involved and the diocesan superintendent. Upon UNT IRB approval, the principal of the school included administration of this survey as an agenda item in a regularly scheduled monthly faculty meeting, attended by the researcher. The DiSTO instrument was estimated to take less than 15 minutes total to administer, including demographic questions. The survey instrument was built in Microsoft Forms, a platform with which the participants were already familiar. To ensure participant anonymity, initial data cleansing was facilitated by a system administrator not directly affiliated with the study.

With respect to the semi-structured interview portion of the study, a number of

colleagues had already indicated their willingness to participate so recruiting participants was not a challenge for this study. Formal selection of interviewees was finalized in order to gather a representative sample of departments (STEM, Humanities, Arts, and World Languages were represented) and Rogers categories (all five categories, innovator, early adopter, early majority adopter, late majority adopter, and laggard, were represented). The TEAL classrooms were deployed in 2016, most participating teachers had used the classrooms at least once. Three teachers were assigned a room for an entire academic year and the other two rooms were available to all teachers on a check out basis. Of the five teachers who participated in the semi-structured interviews, one taught in a TEAL classroom full time during the year of the study, one taught in a TEAL classroom over multiple summer sessions prior to the year of the study, one taught in a TEAL classroom for a full academic year previously but not during the year of the study, and one other had checked it out as needed. The remaining teacher (in the laggard category) had not used the TEAL classroom at all.

Demographic questions included the subject taught (academic department), age category, experience category, and gender. Two sets of similar semi-structured interview questions were initially crafted to be used, depending on whether the participants for the semi-structured interviews indicated they have previously utilized the TEAL classrooms or not (see Appendix A). Ultimately, the interview questions were not materially different based on this proposed differentiation. This adaptation is consistent with the inductive, iterative, grounded theory approach for this study.

> Grounded theorists evaluate the fit between their initial research interests and their emerging data. We do not force preconceived ideas and theories directly upon our data. Rather, we follow leads that we define in the data, or design

> another way of collecting data to pursue our initial interests (K Charmaz, 2014, p. 32).

Participants offered their thoughts on the TEAL classrooms in connection with questions common to both pools (those who had taught, or planned to teach, in the TEAL classrooms and those who had not/did not plan to teach) and the differentiating questions were simply not needed. Interviews were recorded and transcribed solely by the researcher. In accordance with the informed consent agreement that was electronically signed by participants and as required by the IRB, recordings of the semi-structured interviews were deleted when the transcriptions were completed. Participants were sent the text of the transcripts produced from the recordings and asked to confirm the contents to ensure the transcript was a faithful representation of the interview. No corrections were requested. All quotes, whether attributed directly or not, were confirmed with the participant prior to inclusion. The commercial software package MAXQDA® was procured to facilitate management of the results of the qualitative phase of the study. MAXQDA® is a software program designed for computer-assisted qualitative and mixed methods data, text, and multimedia analysis in academic, scientific, and business institutions.

While mixed methods research is generally viewed as a time consuming, labor-intensive, and an often costly endeavor, it is also generally the approach best suited to unearth valuable insights when neither an in-depth analysis of qualitative data or a multivariate analysis of quantitative data is justified (Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007).

CHAPTER 4

ANALYSIS

Introduction

Two sets of data were collected for this study: quantitative data from the survey instrument and qualitative data from the semi-structured interviews. These represented two distinct but complementary sources of information for the observations that constitute this study.

The online survey was administered at a regularly scheduled faculty meeting in February 2020. Results were tabulated in Microsoft Excel and descriptive statistics and visuals were generated. The initial design of the semi-structured, qualitative, portion of the study included the use of MAXQDA® as an analysis tool. Ultimately, the functionality and level of analysis sophistication afforded by the platform was not needed. The responses of the interviewees were straightforward and clearly identified where on the technology integration matrix continuum the interviewee felt best represented.

An important aspect of the instrument was that it not only asked about Internet use but also about the respondent's satisfaction with the experience. Other instruments tend to measure use but not necessarily satisfaction, a gap which the developers of the instrument sought to close (Helsper et al., 2015).

Survey Results by Individual Question

The scale for the first 24 statements, measuring use, ranged from *strongly disagree* (1) to *strongly agree* (5).

In the following tables, green highlighting in the "Average" column indicates a value greater than or equal to 4.0, salmon highlighting in the "Average" column indicates

a value lower than or equal to 2.0, and no highlighting indicates a value between 2.1 and 3.9.

The colored shading on the leftmost column shows the relative value of the average on a scale of 0 to 5. The higher the average, the more of the leftmost cell is shaded.

Statement 1: “I save money by buying products online.”

Table 4.1

Responses to Statement 1: “I save money by buying products online.”

Gender	**Count**	**Average**
Male	19	4.2
Female	23	4.4
Subject	**Count**	**Average**
English	5	4.6
Fine Arts	2	2.5
Math	8	4.5
Performing Arts	3	4.3
Science	6	4.0
Social Studies	6	4.3
Theology	9	4.4
World Languages	3	4.7
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	4	4.8
5-9 yrs	6	4.5
10-19 yrs	10	4.4
20-29 yrs	19	4.2
30+ yrs	2	3.5
Age	**Count**	**Average**
20-29 yrs	7	4.7
30-39 yrs	10	4.2
40-49 yrs	8	4.8
50-59 yrs	10	4.2
60+ yrs	7	3.7

The sample population across nearly all demographics used the Internet for the purpose of buying products. This included 19 of 20 males (95%) and 23 of 25 females (92%). The average for males was 4.2 and for females 4.4 (between 4, *somewhat agree* and 5, *strongly agree*). Two of the three responses from the Performing Arts department were 5 (*strongly agree*) and three additional departments (World Language, English, and Math) recorded averages of 4.5 or higher.

Similarly, each experience category averaged higher than 4.0 except for those with 30 years or more of teaching experience, where the average was 3.5 and each age category averaged higher than 4.0 (*somewhat agree*) except for those over 60 years old, which averaged 3.7.

Statement 2: “I sell goods I would not have otherwise sold.”

While much of the sample population (over 93%) made use of the Internet in buying products, the same cannot be said for the selling of products, with only 27 of 45 (60%) participants providing a response for this statement. The average was 3.3 for males (13 of 20, 65%) and 3.5 for females (14 of 25, 56%). These values fell between the neutral response of 3 and the *slightly agree* response of 4.

Two departments (Performing Arts and World Languages) averaged 4.0 while a sole respondent from Fine Arts indicated *strongly disagree* (1.0).

Similarly, only the category of teachers with 5-9 years of experience averaged a response of 4.0 (*slightly agree*) or higher while a single teacher with over 30 years of experience responded 2 (*slightly disagree*). No category of age was higher the 4.0 threshold.

Table 4.2

Responses to Statement 2: "I sell goods I would not have otherwise sold."

Gender	Count	Average
Male	13	3.3
Female	14	3.5
	Count	**Average**
English	3	3.7
Fine Arts	1	1.0
Math	6	3.2
Performing Arts	1	4.0
Science	4	3.5
Social Studies	4	3.5
Theology	5	3.4
World Languages	3	4.0
Years Teacher	**Count**	**Average**
-	0	-
2-4 yrs	2	3.5
5-9 yrs	5	4.0
10-19 yrs	6	3.7
20-29 yrs	13	3.2
30+ yrs	1	2.0
Age	**Count**	**Average**
20-29 yrs	4	3.5
30-39 yrs	6	3.8
40-49 yrs	5	3.2
50-59 yrs	7	3.7
60+ yrs	5	2.6

Statement 3: "The information and services I found online have improved my financial situation."

Many of the participants responded they had used the Internet to improve their financial situations (38 of 45, 84%), with 18 of 20 males (90%) and 20 of 25 females (80%) yielding an average of 3.9 for males and 3.7 for females. These responses fell between the neutral response of 3 and the *slightly agree* response of 4.

Teachers in World Languages had the highest average (4.3) and English and Performing Arts each averaged 4.0.

The experience category of teachers with 5-9 years of teaching experience had the highest average (4.2) while the age category of teachers in their 30s had the highest average of 4.1.

Table 4.3

Responses to Statement 3: "The information and services I found online have improved my financial situation."

Gender	Count	Average
Male	18	3.9
Female	20	3.7
	Count	**Average**
English	4	4.0
Fine Arts	2	3.0
Math	7	3.6
Performing Arts	2	4.0
Science	5	3.8
Social Studies	6	3.8
Theology	9	3.8
World Languages	3	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	4	3.5
5-9 yrs	5	4.2
10-19 yrs	10	3.8
20-29 yrs	16	3.8
30+ yrs	2	4.0
Age	**Count**	**Average**
20-29 yrs	6	3.3
30-39 yrs	10	4.1
40-49 yrs	7	3.9
50-59 yrs	8	3.9
60+ yrs	7	3.6

Statement 4: "I bought insurance online that I would not have bought off-line."

Though 84% of the participants overall indicated they used the Internet as a source of information for improving their financial situation (Statement 3), it does not appear they made *incremental* purchases of insurance products online, since only 29 of 45 participants (65%) responded to the question and the average of responses for the

12 males (60%) was 2.3, which fell between the neutral response of 3 and the "slightly disagree" response of 2 and the average of responses for 17 females (68%) was 1.4, which fell between the *slightly disagree* response of 2 and the *strongly disagree* response of 1.

Only the sole teacher in their first year of teaching responded with *slightly agree*, corresponding to a value of 4. The average for all levels of experience and age was lower than 2.4, with 6 of the 10 categories recording an average lower than 2.0 (*slightly disagree*).

Table 4.4

Responses to Statement 4: "I bought insurance online that I would not have bought off-line."

Male	12	2.4
Female	17	1.6
	Count	**Average**
English	3	2.0
Fine Arts	1	3.0
Math	8	2.3
Performing Arts	1	1.0
Science	3	2.0
Social Studies	3	1.3
Theology	7	1.6
World Languages	3	2.7
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	3	1.3
5-9 yrs	4	1.5
10-19 yrs	8	2.1
20-29 yrs	13	2.0
--	0	--
Age	**Count**	**Average**
20-29 yrs	6	1.7
30-39 yrs	6	2.2
40-49 yrs	6	2.0
50-59 yrs	6	1.7
60+ yrs	5	2.4

Statement 5: “The things I find online influence how I do my job.”

Every participant responded to this question with the 20 males averaging 3.8 and the 25 females averaging 4.2. The average of responses for all demographic categories fell on the agreement side of the scale, with both of the teachers in the Fine Arts department selecting a response of 5 (*strongly agree*) and all departments except Social Studies (3.8) and Theology (3.4) averaging 4.0 or higher.

There is a similarly strong positive response (higher than 3.8) when looking at Experience and Age (all categories averaging 3.7 or higher).

Table 4.5

Responses to Statement 5: “The things I find online influence how I do my job.”

Gender	Count	Average
Male	20	3.8
Female	25	4.2
	Count	**Average**
English	6	4.0
Fine Arts	2	5.0
Math	8	4.0
Performing Arts	3	4.3
Science	7	4.0
Social Studies	6	3.8
Theology	9	3.4
World Languages	4	4.8
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	3.8
5-9 yrs	6	4.7
10-19 yrs	11	3.9
20-29 yrs	19	3.9
30+ yrs	3	4.0
Age	**Count**	**Average**
20-29 yrs	7	3.9
30-39 yrs	11	4.5
40-49 yrs	8	3.8
50-59 yrs	10	3.7
60+ yrs	9	4.1

Statement 6: “I found a job online that I could not have found off-line.”

Similar to the pair of statements regarding financial information and insurance (Statements 3 and 4) the pair of statements about finding information that influences how a teacher does their job (Statement 5) and this statement, indicated that while they used the information in the course of their job, they didn’t necessarily find the job online. Only 11 of 20 males (57%) and 17 of 25 females (68%) responded to this statement with the average of responses being 3.6 for males and 2.9 for females. The three responses from World Languages averaged 4.7, the highest in any category.

Table 4.6

Responses to Statement 6: “I found a job online that I could not have found off-line.”

Male	11	3.6
Female	17	2.9
	Count	**Average**
English	3	3.7
Fine Arts	0	--
Math	8	3.1
Performing Arts	1	3.0
Science	3	2.7
Social Studies	2	2.5
Theology	8	2.9
World Languages	3	4.7
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	5	3.8
5-9 yrs	6	3.5
10-19 yrs	6	2.3
20-29 yrs	10	3.2
--	0	--
Age	**Count**	**Average**
20-29 yrs	7	3.1
30-39 yrs	8	3.9
40-49 yrs	5	3.2
50-59 yrs	5	2.8
60+ yrs	3	2.0

Statement 7: “I got a certificate (professional development or training) that I could not have gotten without the Internet.”

The average of the responses from 16 of 20 males (80%) was 3.5 and the average of the responses from 21 of 25 females (84%) was 3.9. The departmental averages of responses to this statement ranged from 2.5 in World Languages (2 responses) to 4.6 in the English department (5 responses). The sole response from the teacher with 0-1 years of experience was 4. The only age category where the average was higher than 4.0 (*slightly agree*) was 50-59 years where the 7 respondents averaged 4.3, though the average for all age categories exceeded 3.3 which was above the neutral value of 3.

Table 4.7

Responses to Statement 7: “I got a certificate (professional development or training) that I could not have gotten without the Internet.”

Gender	**Count**	**Average**
Male	16	3.5
Female	21	3.9
Subject	**Count**	**Average**
English	5	4.6
Fine Arts	2	4.5
Math	8	4.3
Performing Arts	2	3.0
Science	6	4.2
Social Studies	4	3.0
Theology	8	2.9
World Languages	2	2.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	4	3.8
5-9 yrs	6	3.3
10-19 yrs	9	3.9
20-29 yrs	14	3.8
30+ yrs	3	3.3
Age	**Count**	**Average**
20-29 yrs	7	3.6
30-39 yrs	9	3.9
40-49 yrs	5	3.4
50-59 yrs	7	4.3
60+ yrs	9	3.3

Statement 8: “I find educational material online that I could not have found off-line.”

Nearly all participants (43 of 45, 93%) responded to this statement with 19 of 20 males (95%) giving an average response of 4.0 (*slightly agree*) and 24 of 25 females (96%) giving an average response of 4.7 (between *slightly agree* and *strongly agree*). All departments save one (Performing Arts, 3.3) averaged higher than 4.0 with Fine Arts and World Languages averaging 5.0 (*strongly agree*). All Experience categories, except 30+ (3.3) average higher than 4.0 and all age categories except 20-29 years (3.7) averaged higher than 4.0.

Table 4.8

Responses to Statement 8: “I find educational material online that I could not have found off-line.”

Male	19	4.0
Female	24	4.7
Subject	**Count**	**Average**
English	6	4.3
Fine Arts	2	5.0
Math	7	4.3
Performing Arts	3	3.3
Science	7	4.4
Social Studies	6	4.5
Theology	8	4.3
World Languages	4	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	4.4
5-9 yrs	6	4.0
10-19 yrs	10	4.9
20-29 yrs	18	4.4
30+ yrs	3	3.3
Age	**Count**	**Average**
20-29 yrs	7	3.7
30-39 yrs	10	4.9
40-49 yrs	8	4.1
50-59 yrs	10	4.6
60+ yrs	8	4.3

Statement 9: “The things I come across on the Internet make me think about the differences between men and women.”

Of the participants, 89% responded to this question (40 of 45), the average ranged from 3.0 for males (19 of 20, 95%) to 3.6 for females (21 of 25, 84%). Within departments, the average ranged from 2.5 (*slightly disagree* for Science (with 6 responses) to 5.0 (*strongly agree*) for Fine Arts (with 2 responses). There was a similar spread in Experience where the 10 teachers with 10-19 years of experience averaged the neutral value of 3.0 and teachers with 0-1 or 2-4 years average 5.0 and 4.0, respectively. The spread was somewhat muted in the other observed demographics with no single category averaging lower than 2.6 or higher than 3.9.

Table 4.9

Responses to Statement 9: “The things I come across on the Internet make me think about the differences between men and women.”

Gender	Count	Average
Male	19	3.0
Female	21	3.6
Subject	**Count**	**Average**
English	5	3.8
Fine Arts	2	5.0
Math	6	3.3
Performing Arts	2	3.0
Science	6	2.5
Social Studies	6	2.8
Theology	9	3.1
World Languages	4	4.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	5.0
2-4 yrs	5	4.0
5-9 yrs	5	3.2
10-19 yrs	10	3.0
20-29 yrs	17	3.2
30+ yrs	2	4.0
Age	**Count**	**Average**
20-29 yrs	6	3.5
30-39 yrs	10	3.9
40-49 yrs	7	2.7
50-59 yrs	9	3.0
60+ yrs	8	3.4

Statement 10: “Through the Internet I learned new things about my ethnic group.”

The averages of responses to this statement for all demographic groups were near the neutral value of 3.0. For example, 38 of 45 participants responded (85%) with the average for males being 3.2 (17 of 20, 85%) and for females 3.4 (21 of 25, 84%). The single response from Fine Arts, and the pair of responses for the Performing Arts department were all 5 (*strongly agree*). The two extremes of the Experience demographic, 0-1 and 30+ both averaged 4.0 and all other categories were between 2.9 and 3.8. No category in any of the other demographics was higher than 4.0 or was lower than 2.0.

Table 4.10

Responses to Statement 10: “Through the Internet I learned new things about my ethnic group.”

Male	17	3.2
Female	21	3.4
Subject	**Count**	**Average**
English	5	3.6
Fine Arts	1	5.0
Math	8	2.8
Performing Arts	2	5.0
Science	5	2.8
Social Studies	5	3.4
Theology	9	3.1
World Languages	3	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	3.8
5-9 yrs	5	3.0
10-19 yrs	8	2.9
20-29 yrs	17	3.4
30+ yrs	2	4.0
Age	**Count**	**Average**
20-29 yrs	7	3.4
30-39 yrs	9	3.3
40-49 yrs	7	3.6
50-59 yrs	8	3.1
60+ yrs	7	3.3

Statement 11: “Through the Internet I found people of a similar age that share my interests.”

The overall average of responses to this statement fell between the neutral value of 3 and the *slightly agree* value of 4, with 17 of 20 males (85%) averaging 3.6 and 20 of 25 (80%) of females averaging 3.8. All the departments averaged higher than 3.2 with English, Fine Arts, and Performing Arts averaging higher than 4.0. The only Experience category to average 2.0 was the single response from 30+ while 0-1 and 5-9 both averaged higher than 4.0. The average of the 19 responses from Age category 30-39 and 40-49 was 4.1. No other age category was higher than 4.0 or lower than 2.0.

Table 4.11

Responses to Statement 11: Through the Internet I found people of a similar age that share my interests.”

Gender	Count	Average
Male	17	3.6
Female	20	3.8
Subject	**Count**	**Average**
English	5	4.4
Fine Arts	2	4.5
Math	8	3.8
Performing Arts	1	4.0
Science	5	3.2
Social Studies	6	3.7
Theology	6	3.3
World Languages	4	3.8
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	3	3.7
5-9 yrs	6	4.2
10-19 yrs	9	3.7
20-29 yrs	17	3.7
30+ yrs	1	2.0
Age	**Count**	**Average**
20-29 yrs	5	3.6
30-39 yrs	11	4.1
40-49 yrs	8	4.1
50-59 yrs	9	3.7
60+ yrs	4	2.3

Statement 12: “Due to the information I found and people I have met online I feel more connected with religion or spiritual beliefs.”

Overall, 76% of the participants responded to this statement with the 14 males (70%) averaging 2.2 (nearing the 2 value for *slightly disagree*) and the 20 females (80%) averaging 3.6 (between the neutral value of 3 and *slightly agree* of 4). Only the 2 participants from the English department responded with higher than average agreement (4.5) to this statement. The Theology department, with 8 participants responding, recorded the lowest average (2.4). Both teachers with more than 30 years of experience averaged 4.0 (*slightly agree*) and no other category averaged higher than 4.0 or lower than 2.0.

Table 4.12

Responses to Statement 12: “Due to the information I found and people I have met online I feel more connected with religion or spiritual beliefs.”

Gender	**Count**	**Average**
Male	14	2.2
Female	20	3.6
Subject	**Count**	**Average**
English	2	4.5
Fine Arts	2	2.5
Math	8	3.1
Performing Arts	2	3.0
Science	3	3.0
Social Studies	5	3.0
Theology	8	2.4
World Languages	4	3.8
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	4	3.0
5-9 yrs	5	2.6
10-19 yrs	8	3.8
20-29 yrs	14	2.6
30+ yrs	2	4.0
Age	**Count**	**Average**
20-29 yrs	6	2.7
30-39 yrs	9	3.2
40-49 yrs	6	3.0
50-59 yrs	7	3.1
60+ yrs	6	3.0

Statement 13: “I am more in touch with my close friends because I use the Internet.”

More than 90% of participants responded to this statement with the four from World Languages recording the highest response (5, *strongly agree*), as well as all four responses from teachers with 2-4 years of experience (these may be the same four individuals). Additionally, the English, Performing Arts, and Theology departments all averaged higher than 4.0. The two youngest categories of age (20-29 and 30-39) averaged higher than 4.0 and the oldest teachers, 60+ years, averaged the lowest at 2.9.

Table 4.13

Responses to Statement 13: “I am more in touch with my close friends because I use the Internet.”

Male	18	3.1
Female	24	4.0
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	2	2.5
Math	8	3.4
Performing Arts	2	4.5
Science	7	2.6
Social Studies	6	3.0
Theology	8	4.1
World Languages	4	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	4	5.0
5-9 yrs	6	3.5
10-19 yrs	11	3.9
20-29 yrs	18	3.1
30+ yrs	2	3.5
Age	**Count**	**Average**
20-29 yrs	6	4.2
30-39 yrs	11	4.0
40-49 yrs	8	3.9
50-59 yrs	9	3.0
60+ yrs	8	2.9

Statement 14: “People I meet online are more interesting than the people I meet off-line.”

There was near unanimous disagreement with this statement, as more than 78% of participants responded to the statement with the average for all responses being under 2.0 (*slightly disagree*). All departments, save English (3.0 with 4 responses), averaged 2.0 (*slightly disagree*) or lower. All age groups averaged 2.0 or lower as did all Experience categories except 0-1, 10-19, and 30+.

Table 4.14

Responses to Statement 14: “People I meet online are more interesting than the people I meet off-line.”

Gender	Count	Average
Male	16	1.8
Female	19	1.9
Subject	**Count**	**Average**
English	4	3.0
Fine Arts	2	2.0
Math	8	2.0
Performing Arts	2	2.0
Science	4	2.0
Social Studies	5	1.2
Theology	7	1.3
World Languages	3	2.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	3	1.3
5-9 yrs	6	1.5
10-19 yrs	9	2.2
20-29 yrs	14	1.6
30+ yrs	2	3.0
Age	**Count**	**Average**
20-29 yrs	6	1.5
30-39 yrs	10	2.0
40-49 yrs	7	2.0
50-59 yrs	7	1.7
60+ yrs	5	2.0

Statement 15: “I became a member of a hobby or leisure club or organization I otherwise would not have found”

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Just over half of the participants responded to this statement with 11 males (55%, average 3.4) and 16 females (64%, average 2.4). The English department, with 4 responses averaged 4.5 (between *slightly agree* and *strongly agree*) and the sole respondent from Performing Arts responded with 4 (*slightly agree*). This contrasts the sole response from the Fine Arts department, which was 1 (*strongly disagree*). The sole response from the teacher with 0-1 years of experience was 4, while all other Experience categories ranged from 2.4 to 3.5. The oldest category of teachers, 60+ years, averaged 2.0 (“slightly disagree”).

Table 4.15

Responses to Statement 15: “I became a member of a hobby or leisure club or organization I otherwise would not have found.”

Gender	**Count**	**Average**
Male	11	3.4
Female	16	2.4
Subject	**Count**	**Average**
English	4	4.5
Fine Arts	1	1.0
Math	8	2.1
Performing Arts	1	4.0
Science	3	2.3
Social Studies	3	3.3
Theology	4	2.3
World Languages	3	3.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	2	2.5
5-9 yrs	4	3.5
10-19 yrs	6	3.2
20-29 yrs	14	2.4
--	0	--
Age	**Count**	**Average**
20-29 yrs	5	3.2
30-39 yrs	6	2.7
40-49 yrs	7	3.3
50-59 yrs	5	2.6
60+ yrs	4	2.0

Statement 16: “I became a member or donor of a civic organization I would not have become a member of otherwise.”

Responses to this statement were generally below average, with 10 of 20 males (50%) averaging 2.4 and 16 of 25 females (64%) averaging 2.8. Notably, the responses from the Science and Theology departments (a total of 5 responses) were all 1 (*strongly disagree*). However, the sole respondent with over 30 years of experience responded 5 (*strongly agree*), while the two groups with the least experience that responded (2-4 and 5-9 years) averaged 1.0 and 2.0, respectively. The two extremes of the age category, 20-29 and 60+ averaged lower than 2.0 (1.7 and 2.0, respectively).

Table 4.16

Responses to Statement 16: “I became a member or donor of a civic organization I would not have become a member of otherwise.”

Gender	Count	Average
Male	10	2.4
Female	16	2.8
Subject	**Count**	**Average**
English	3	4.0
Fine Arts	2	2.5
Math	7	2.7
Performing Arts	2	4.0
Science	2	1.0
Social Studies	4	2.3
Theology	3	1.0
World Languages	3	3.7
Years Teacher	**Count**	**Average**
0-1 yrs	0	--
2-4 yrs	1	1.0
5-9 yrs	4	2.0
10-19 yrs	7	3.6
20-29 yrs	13	2.3
30+ yrs	1	5.0
Age	**Count**	**Average**
20-29 yrs	3	1.7
30-39 yrs	7	3.3
40-49 yrs	6	3.3
50-59 yrs	6	2.2
60+ yrs	4	2.0

Statement 17: “I have discovered online that I am entitled to a particular benefit, subsidy, or tax advantage which I would not have found off-line.”

There was a large gap in the responses to this statement by gender, with 12 of 20 males (60%) and 12 of 25 females (48%) averaging 3.3 (slightly higher than the neutral value of 3) and 1.8 (slightly lower than the value of 2, indicating *slightly agree*).

The sole response from the Performing Arts department was the highest response (5, *strongly agree*), but no other department averaged higher than 3.5 and the sole response from Fine Arts was the lowest response (1, *strongly disagree*). The 11 responses from the group of teachers with 20-29 years of experience, as well as the group with 2-4 years of experience, averaged 2.0 (*slightly disagree*) while the four responses from the oldest age group (60+) averaged 1.8.

Table 4.17

Responses to Statement 17: “I have discovered online that I am entitled to a particular benefit, subsidy, or tax advantage which I would not have found off-line.”

Male	12	3.3
Female	12	1.8
Subject	**Count**	**Average**
English	3	2.3
Fine Arts	1	1.0
Math	6	2.2
Performing Arts	1	5.0
Science	2	3.5
Social Studies	2	3.5
Theology	7	2.3
World Languages	2	3.0
Years Teacher	**Count**	**Average**
0-1 yrs	0	--
2-4 yrs	3	2.0
5-9 yrs	5	3.6
10-19 yrs	5	3.2
20-29 yrs	11	2.0
30+ yrs	0	--
Age	**Count**	**Average**
20-29 yrs	4	2.8
30-39 yrs	6	3.0
40-49 yrs	5	2.2
50-59 yrs	5	3.0
60+ yrs	4	1.8

Statement 18: “Online, I have better contact with my political representatives (local, state, or national), or political party.”

When considering gender, both categories averaged higher than the neutral value of 3, with 14 of 20 males (70%) and 16 of 25 females (64%) averaging 3.2 and 3.4, respectively. The sole response from the Performing Arts department was the highest response (5, *strongly agree*), and one other, the English department, with 5 responses, averaged 4.0 (*slightly agree*). No other department averaged higher than 3.5. Notably, Subject taught (department) is the only area with averages higher than 4.0. When averaged together, gender, age, and years taught all indicated averages between 2.5 and 3.5 (essentially clustered around the neutral 3.0 value).

Table 4.18

Responses to Statement 18: “Online, I have better contact with my political representatives (local, state, or national), or political party.”

Gender	**Count**	**Average**
Male	14	3.2
Female	16	3.4
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	1	3.0
Math	7	2.6
Performing Arts	1	5.0
Science	3	3.3
Social Studies	4	3.5
Theology	6	3.3
World Languages	3	3.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	2	3.5
5-9 yrs	5	3.6
10-19 yrs	8	3.5
20-29 yrs	13	3.2
30+ yrs	1	3.0
Age	**Count**	**Average**
20-29 yrs	5	3.6
30-39 yrs	9	3.2
40-49 yrs	6	3.3
50-59 yrs	7	3.6
60+ yrs	3	2.7

Statement 19: “I have made better decisions about my health or medical care as a result of information or advice I found online.”

Responses averaged close to 4.0 (*slightly agree*) in nearly all measured categories with 16 of 21 males (80%) averaging 4.1 and 22 females (88%) averaging 3.9. Similarly, all subjects averaged higher than 4.0 except Science (3.4), Theology (3.8), and World Languages (3.3). Also, all Experience categories averaged higher than 3.5 and all Age categories averaged higher than 3.6.

Table 4.19

Responses to Statement 19: “I have made better decisions about my health or medical care as a result of information or advice I found online.”

Gender	Count	Average
Male	16	4.1
Female	22	3.9
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	2	4.5
Math	8	4.1
Performing Arts	3	4.7
Science	5	3.4
Social Studies	6	4.2
Theology	6	3.8
World Languages	3	3.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	1	4.0
5-9 yrs	5	4.0
10-19 yrs	10	3.8
20-29 yrs	19	4.1
30+ yrs	2	3.5
Age	**Count**	**Average**
20-29 yrs	4	4.3
30-39 yrs	9	3.6
40-49 yrs	8	4.3
50-59 yrs	10	4.0
60+ yrs	7	4.0

Statement 20: “Information I found online gives me more confidence in my lifestyle choices.”

The responses to this statement were more closely grouped towards the neutral value of 3 but all were 3 or higher. No responses disagreed with this statement in any way (meaning a response of 1 or 2) with 18 of 21 (90%) of males averaging 3.5 and 22 of 25 (88%) of females averaging 3.7. The English, World Languages, and Fine Arts departments averaged 4.2, 4.0, and 4.5, respectively, while all other departments averaged 3.3 or higher. All Experience categories averaged 3.0 or higher with the sole response from the first-year teacher being 4.0. The Age category averages ranged from 3.1 to 3.9.

Table 4.20

Responses to Statement 20: “Information I found online gives me more confidence in my lifestyle choices.”

Gender	Count	Average
Male	18	3.5
Female	22	3.7
Subject	**Count**	**Average**
English	5	4.2
Fine Arts	2	4.5
Math	8	3.5
Performing Arts	2	3.5
Science	7	3.3
Social Studies	6	3.7
Theology	7	3.3
World Languages	3	4.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	3	3.7
5-9 yrs	6	3.5
10-19 yrs	10	3.8
20-29 yrs	18	3.6
30+ yrs	2	3.0
Age	**Count**	**Average**
20-29 yrs	5	3.6
30-39 yrs	10	3.8
40-49 yrs	8	3.9
50-59 yrs	9	3.7
60+ yrs	8	3.1

Statement 21: “My knowledge is increased because of the Internet (for example, looking up information or communicating with others).”

This is the first of five statements where the responses across the board were 4 or higher. Notably, this statement was also one of three that had a 100% response rate, with the 21 males averaging 4.6 and the 25 females averaging 4.8. All four from World Languages were 5 (*strongly agree*), but all departments averaged 4.5 or higher. All the Years Taught and the Age groups averaged 4.6 or higher.

Table 4.21

Responses to Statement 21: “My knowledge is increased because of the Internet (for example, looking up information or communicating with others).”

Gender	Count	Average
Male	20	4.6
Female	25	4.8
Subject	**Count**	**Average**
English	6	4.7
Fine Arts	2	4.5
Math	8	4.9
Performing Arts	3	4.7
Science	7	4.7
Social Studies	6	4.7
Theology	9	4.7
World Languages	4	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	5.0
2-4 yrs	5	4.8
5-9 yrs	6	5.0
10-19 yrs	11	4.6
20-29 yrs	19	4.7
30+ yrs	3	4.7
Age	**Count**	**Average**
20-29 yrs	7	4.9
30-39 yrs	11	4.8
40-49 yrs	8	4.8
50-59 yrs	10	4.6
60+ yrs	9	4.7

Statement 22: “Using the Internet helps me form opinions about complex social issues I would not fully understand otherwise.”

While not as dramatic as the previous statement (Statement 21), this statement also had a 100% response rate with every response to this statement being 3 or higher. Of the 8 departments, 5 averaged 4.0 or higher (the exceptions being Science, Social Studies, and Theology, which averaged 3.1, 3.8, and 3.4, respectively)

This statement also showed some weighting towards younger teachers and those with fewer years of teaching experience. These two measures do not necessarily correlate because several current teachers commenced teaching as a second career.

Table 4.22

Responses to Statement 22: “Using the Internet helps me form opinions about complex social issues I would not fully understand otherwise.”

Gender	Count	Average
Male	20	3.8
Female	25	4.0
Subject	**Count**	**Average**
English	6	4.8
Fine Arts	2	4.5
Math	8	4.1
Performing Arts	3	4.5
Science	7	3.1
Social Studies	6	3.8
Theology	9	3.4
World Languages	4	4.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	5.0
2-4 yrs	5	4.2
5-9 yrs	6	4.0
10-19 yrs	11	4.0
20-29 yrs	19	3.7
30+ yrs	3	4.0
Age	**Count**	**Average**
20-29 yrs	7	4.1
30-39 yrs	11	4.3
40-49 yrs	8	3.6
50-59 yrs	10	3.7
60+ yrs	9	3.9

Statement 23: “Online entertainment (games, listening to music, reading jokes) make me feel happier.”

This is another statement to which all participants responded, and all the responses were 3.0 or higher, on average, with both males and females averaging higher than 4.0 and all departments averaging higher than 3.7. All Experience categories were 4.0 except 5-9 years which was 3.2 (6 responses). All age categories were 4.0 or higher except 50-59 which was 3.8 (10 responses).

Table 4.23

Responses to Statement 23: “Online entertainment (games, listening to music, reading jokes) make me feel happier.”

Gender	Count	Average
Male	20	4.1
Female	25	4.1
Subject	**Count**	**Average**
English	6	4.6
Fine Arts	2	5.0
Math	8	4.4
Performing Arts	3	4.0
Science	7	3.9
Social Studies	6	4.0
Theology	9	3.7
World Languages	4	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	5.0
2-4 yrs	5	4.6
5-9 yrs	6	3.2
10-19 yrs	11	4.4
20-29 yrs	19	4.0
30+ yrs	3	5.0
Age	**Count**	**Average**
20-29 yrs	7	4.1
30-39 yrs	11	4.0
40-49 yrs	8	4.3
50-59 yrs	10	3.8
60+ yrs	9	4.5

Statement 24: “I go to events and concerts I would never have otherwise considered.”

This statement was also met with a 100% response rate and nearly universal strong agreement, with one department being a notable exception. All 3 responses from the Performing Arts department strongly disagreed (response was 1) with this statement. Both genders averaged approximately 4.0, with males averaging 4.1 and females averaging 3.9. All Experience groups averaged 3.7 or higher with 30+ years (3 responses) averaging 5.0 (*strongly agree*) and all Age groups average 3.4 or higher, with those over 60 years averaging 4.8.

Table 4.24

Responses to Statement 24: “I go to events and concerts I would never have otherwise considered.”

Male	20	4.1
Female	25	3.9
Subject	**Count**	**Average**
English	6	4.2
Fine Arts	2	4.5
Math	8	4.4
Performing Arts	3	1.0
Science	7	3.0
Social Studies	6	4.0
Theology	9	3.4
World Languages	4	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	4.3
5-9 yrs	6	3.7
10-19 yrs	11	4.5
20-29 yrs	19	3.7
30+ yrs	3	5.0
Age	**Count**	**Average**
20-29 yrs	7	3.4
30-39 yrs	11	4.5
40-49 yrs	8	3.7
50-59 yrs	10	3.6
60+ yrs	9	4.8

The scale for the final 24 statements, measuring satisfaction, ranged from *very dissatisfied* (1) to *very satisfied* (5). As with Tables 1-24, green highlighting in the "Average" column indicates a value greater than or equal to 4.0, salmon highlighting in the "Average" column indicates a value lower than or equal to 2.0, and no highlighting indicates a value between 2.1 and 3.9.

The colored shading on the leftmost column shows the relative value of the average on a scale of 0 to 5. The higher the average, the more of the leftmost cell is shaded.

Statement 25: "The quality of the last product I bought online."

This statement was also met with nearly universally strong agreement with one department being a notable exception. The three responses from the Performing Arts department showed less agreement (averaging 3.3) with this statement, but every other department average was 4.0 or higher, with males (100%) and females (24 of 25, 96%) averaging 4.2 or higher. Similarly, all Experience categories (except 0-1 and 5-9) averaged higher than 4.0, as did all Age categories, without exception.

Table 4.25

Responses to Statement 25: "The quality of the last product I bought online."

Gender	Count	Average
Male	20	4.2
Female	24	4.3
Subject	**Count**	**Average**
English	5	4.8
Fine Arts	2	4.5
Math	8	4.4
Performing Arts	3	3.3
Science	7	4.1
Social Studies	6	4.7
Theology	9	4.0
World Languages	4	4.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	5	5.0
5-9 yrs	6	3.8
10-19 yrs	11	4.1
20-29 yrs	19	4.3
30+ yrs	2	5.0
Age	**Count**	**Average**
20-29 yrs	7	4.6
30-39 yrs	11	4.1
40-49 yrs	8	4.1
50-59 yrs	10	4.3
60+ yrs	8	4.3

Statement 26: “The price I got for products I sell online.”

Recalling the results for Statement 2 and that relatively few respondents (8 of 20 males, 43%, 11 of 25 females, 44%) made use of the Internet to sell goods, those that did sell had a much higher than average satisfaction with the price they got for products they sold online, with the average being 4.5 for both males and females. The average scores were higher than 3 for all measured categories (Department, Experience, and Age).

Table 4.26

Responses to Statement 26: “The price I got for products I sell online.”

Gender	Count	Average
Male	8	4.5
Female	11	4.5
Subject	**Count**	**Average**
English	1	4.0
--	0	--
Math	4	4.3
Performing Arts	2	5.0
Science	3	4.7
Social Studies	3	5.0
Theology	3	4.3
World Languages	3	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	1	5.0
5-9 yrs	4	4.3
10-19 yrs	4	4.5
20-29 yrs	7	4.7
30+ yrs	2	5.0
Age	**Count**	**Average**
20-29 yrs	4	4.5
30-39 yrs	4	3.8
40-49 yrs	4	5.0
50-59 yrs	4	4.5
60+ yrs	3	5.0

Statement 27: “The last financial service I used (for example: banking).”

This is the second of five statements where the average of responses across the board, in every measured category, was 4.0 or higher. All 21 male participants responded and 22 of 25 females (88%) with averages of 4.6 or higher for both. All departments averaged 4.0 or higher, with Science averaging 4.9 and World Languages averaging 5.0. Similarly, all Experience groups average 4.0 or higher, with 2-4 years (5 responses) all being 5 (*strongly agree*). All Age groups averaged 4.4 or higher.

Table 4.27

Responses to Statement 27: “The last financial service I used (for example: banking).”

Gender	Count	Average
Male	20	4.7
Female	22	4.6
Subject	**Count**	**Average**
English	4	4.3
Fine Arts	2	4.5
Math	8	4.5
Performing Arts	3	4.0
Science	7	4.9
Social Studies	5	4.8
Theology	9	4.7
World Languages	4	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	5.0
5-9 yrs	6	4.3
10-19 yrs	10	4.6
20-29 yrs	18	4.7
30+ yrs	2	4.0
Age	**Count**	**Average**
20-29 yrs	7	4.4
30-39 yrs	11	4.6
40-49 yrs	8	4.8
50-59 yrs	8	4.6
60+ yrs	8	4.6

Statement 28: “The insurance or other financial product I bought online.”

This is the third of five statements where the responses were all 4 or higher, however far fewer response were received than for most statements (9 of 20 males, 45% and 7 of 25 females, 28%). Similar to the pair of statements about selling products online (Statements 2 and 26), this statement paired with Statement 4 and indicated that while few respondents purchased insurance through the Internet, those that did were satisfied with the purchase. All departments with responses (2 had none, Fine Arts and Performing Arts), averaged 4.0 or higher with World Languages (2 responses) recording an average of 5.0 (strongly agree). All Experience groups with responses (all but 30+) and all Age groups averaged 4.0 or higher.

Table 4.28

Responses to Statement 28: “The insurance or other financial product I bought online.”

Gender	Count	Average
Male	9	4.3
Female	7	4.9
Subject	**Count**	**Average**
English	3	4.7
Fine Arts	0	--
Math	4	4.8
Performing Arts	0	--
Science	2	4.5
Social Studies	1	4.0
Theology	4	4.3
World Languages	2	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	2	4.5
5-9 yrs	2	4.5
10-19 yrs	4	4.5
20-29 yrs	7	4.7
30+ yrs	0	--
Age	**Count**	**Average**
20-29 yrs	3	4.3
30-39 yrs	4	4.5
40-49 yrs	4	5.0
50-59 yrs	3	4.3
60+ yrs	2	4.5

Statement 29: “The job I got online.”

This is another statement regarding satisfaction that pairs with a statement about use (Statement 6), and, again, though few respondents found jobs via the Internet (6 males, 30% and 7 females, 28%), those that did were universally satisfied, with the average for males being 4.7 and for females 4.9. All Departments recording responses (all but Fine Arts) averaged 4.0 or higher, with Social Studies, Performing Arts, and World Languages all returning values of 5. The pattern held for both the Experience and the Age categories where all averages were higher than 4.0.

Table 4.29

Responses to Statement 29: “The job I got online.”

Gender	Count	Average
Male	6	4.7
Female	7	4.9
Subject	**Count**	**Average**
English	1	4.0
Fine Arts	0	--
Math	3	4.7
Performing Arts	1	5.0
Science	1	5.0
Social Studies	1	5.0
Theology	4	4.8
World Languages	2	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	0	--
2-4 yrs	3	5.0
5-9 yrs	5	4.8
10-19 yrs	1	4.0
20-29 yrs	4	4.8
--	0	--
Age	**Count**	**Average**
20-29 yrs	4	5.0
30-39 yrs	5	4.6
40-49 yrs	2	5.0
50-59 yrs	2	4.5
60+ yrs	0	--

Statement 30: “The way the Internet has influenced how I do my job.”

Nearly all participants responded to this statement (44 of 45, 98%). All departments save one (Theology, 3.9, 8 responses) averaged 4 or higher on this statement. Similarly, all Age and Experience categories averaged 4 or higher.

Table 4.30

Responses to Statement 30: “The way the Internet has influenced how I do my job.”

Gender	Count	Average
Male	19	3.9
Female	25	4.5
Subject	**Count**	**Average**
English	6	4.3
Fine Arts	2	4.5
Math	8	4.4
Performing Arts	3	4.0
Science	7	4.1
Social Studies	6	4.2
Theology	8	3.9
World Languages	4	5.0
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	4	4.8
5-9 yrs	6	4.3
10-19 yrs	11	4.1
20-29 yrs	19	4.2
30+ yrs	3	4.3
Age	**Count**	**Average**
20-29 yrs	6	4.3
30-39 yrs	11	4.4
40-49 yrs	8	4.0
50-59 yrs	10	4.3
60+ yrs	9	4.2

Statement 31: “The quality of an educational course I completed online.”

Overall satisfaction with the quality of online educational courses was above the

neutral value of 3 with the exception of one department (Social Studies) where the 3 respondents averaged 2.7. The response rate was 70% (13 of 20 males averaging 3.7 and 18 of 25 females averaging 4.1). All Experience categories averaged higher than 3.0 with 0-1, 10-19, and 30+ averaging higher than 4.0 and all Age categories averaging higher than 3.0 with 30-39 and 60+ averaging higher than 4.0. The 4.5 average for the 8 teachers over age 60+ and the 4.7 average for the 3 teachers with over 30 years of experience suggested some overlap and indicated strong satisfaction with online educational courses for these teachers.

Table 4.31

Responses to Statement 31: "The quality of an educational course I completed online."

Gender	Count	Average
Male	13	3.7
Female	18	4.1
Subject	**Count**	**Average**
English	5	4.4
Fine Arts	2	4.5
Math	7	4.3
Performing Arts	2	4.5
Science	5	3.8
Social Studies	3	2.7
Theology	5	3.4
World Languages	2	3.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	2	3.5
5-9 yrs	4	3.0
10-19 yrs	9	4.4
20-29 yrs	12	3.7
30+ yrs	3	4.7
Age	**Count**	**Average**
20-29 yrs	4	3.8
30-39 yrs	8	4.0
40-49 yrs	5	3.2
50-59 yrs	6	3.7
60+ yrs	8	4.5

Statement 32: “The quality of educational materials I found online.”

This is the fourth of five statements in which all averages (but not necessarily all responses) were 4.0 or higher, indicating both high utilization (see Statement 8) and high satisfaction (this statement). This is the only pairing of high utilization **and** high satisfaction **and** greater than 90% responses for both statements. Overall, 96% of participants (18 of 20 males, 90% and all 25 females) responded to this statement. Similarly, responses for all Age categories and all Experience categories averaged 4 or higher.

Table 4.32

Responses to Statement 32: “The quality of educational materials I found online.”

Gender	Count	Average
Male	18	4.1
Female	25	4.6
Subject	**Count**	**Average**
English	6	4.5
Fine Arts	2	4.5
Math	8	4.4
Performing Arts	3	4.3
Science	7	4.4
Social Studies	6	4.2
Theology	7	4.4
World Languages	4	4.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	4	4.8
5-9 yrs	6	4.0
10-19 yrs	10	4.7
20-29 yrs	19	4.3
30+ yrs	3	4.7
Age	**Count**	**Average**
20-29 yrs	6	4.3
30-39 yrs	10	4.5
40-49 yrs	8	4.4
50-59 yrs	10	4.2
60+ yrs	9	4.6

Statement 33: “Information I come across about religion and religious people.”

The responses to this statement were less varied than for most other statements, with the lowest average of responses coming from the Theology department (2.8 for 8 responses) while all other departments averaged higher than 3.0 with 4 departments averaging higher than 4.0. Overall, 34 of 45 (76%) participants responded with the average for 17 males (85%) being 3.2 and the average for 17 females (68%) being 4.1. All Experience categories averaged between 3.0 and 3.8 except 30+ (2 responses) where the average was 4.5 (midway between *slightly agree* and *strongly agree*). This pattern held for the Age category where all age groups averaged between 3.3 and 3.7 except 60+ where the average for 7 responses was 4.0.

Table 4.33

Responses to Statement 33: “Information I come across about religion and religious people.”

Gender	Count	Average
Male	17	3.2
Female	17	4.1
Subject	**Count**	**Average**
English	3	4.0
Fine Arts	2	4.0
Math	7	3.9
Performing Arts	2	3.0
Science	3	4.0
Social Studies	5	3.6
Theology	8	2.8
World Languages	4	4.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	5	3.8
5-9 yrs	5	3.2
10-19 yrs	9	3.8
20-29 yrs	12	3.5
30+ yrs	2	4.5
Age	**Count**	**Average**
20-29 yrs	7	3.3
30-39 yrs	9	3.7
40-49 yrs	5	3.6
50-59 yrs	6	3.5
60+ yrs	7	4.0

Statement 34: “The information I come across about my ethnic group.”

This statement was one to which fewer than 60% of the participants responded, with 13 of 20 males (65%) averaging 2.6 and 13 of 25 females (52%) averaging 3.9, just below the 4 level *slightly agree*. The sole response from the Fine Arts department was 5 (*strongly agree*) and the 2 responses from the Science department averaged 4.0 while all other departments averaged between 2.9 and 3.5. In the Experience category, the sole responses from the teacher with the least experience (0-1 years) was 4 while the average of the 4 responses from teachers with 5-9 years was 1.8. There was similar disparity in the Age category with a range from 2.8 to 4.0.

Table 4.34

Responses to Statement 34: “The information I come across about my ethnic group.”

Gender	Count	Average
Male	13	2.6
Female	13	3.9
Subject	**Count**	**Average**
English	2	3.0
Fine Arts	1	5.0
Math	6	3.3
Performing Arts	2	3.0
Science	2	4.0
Social Studies	2	3.0
Theology	7	2.9
World Languages	4	3.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	4	3.8
5-9 yrs	4	1.8
10-19 yrs	5	2.8
20-29 yrs	10	3.6
30+ yrs	2	4.5
Age	**Count**	**Average**
20-29 yrs	5	3.0
30-39 yrs	9	2.8
40-49 yrs	3	4.0
50-59 yrs	3	3.0
60+ yrs	6	4.0

Statement 35: “My interactions with people of my age online.”

As with the previous statement, fewer than 75% of the participants responded to this statement with 15 of 20 (75%) males averaging 3.3 and 18 of 25 females (72%) averaging 3.8. Three departments, World Languages, Fine Arts, and English averaged 4.0 or higher with all the others between 3.0 and 3.5. The only Experience category with an average of 4.0 or higher was 10-19 years (averaging 4.0) and the others all between 3.0 and 3.6. The Age category was similar with the only group averaging higher than 4.0 being 40-49 years, averaging 4.2 and all the others between 3.3 and 3.8.

Table 4.35

Responses to Statement 35: “My interactions with people of my age online.”

Gender	Count	Average
Male	15	3.3
Female	18	3.8
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	2	5.0
Math	7	3.3
Performing Arts	2	3.5
Science	3	3.0
Social Studies	5	3.4
Theology	6	3.2
World Languages	3	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	3	3.3
5-9 yrs	5	3.2
10-19 yrs	8	4.0
20-29 yrs	14	3.6
30+ yrs	2	3.0
Age	**Count**	**Average**
20-29 yrs	6	3.3
30-39 yrs	8	3.8
40-49 yrs	6	4.2
50-59 yrs	7	3.3
60+ yrs	6	3.3

Statement 36: “My online interactions with people and organizations that share my religious beliefs.”

The satisfaction responses to this statement were especially varied, with the average by department ranging from 2 (Performing Arts, 2 responses) to 5 (Fine Arts, also 2 responses). The 15 of 20 males (75%) averaged 2.8, near but below the neutral value of 3 while the 17 females (68%) averaged 3.9, which is nearly the 4 level *slightly agree*. None of the Experience categories averaged lower than 3.0 or higher than 3.7 and only one of the Age categories averaged higher than 4.0 (4.2, category 40-49, with 5 responses).

Table 4.36

Responses to Statement 36: “My online interactions with people and organizations that share my religious beliefs.”

Gender	Count	Average
Male	15	2.8
Female	17	3.9
Subject	**Count**	**Average**
English	4	3.5
Fine Arts	2	5.0
Math	6	3.2
Performing Arts	2	2.0
Science	2	3.0
Social Studies	6	3.5
Theology	7	3.0
World Languages	3	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	2	3.0
5-9 yrs	5	3.2
10-19 yrs	9	3.7
20-29 yrs	13	3.4
30+ yrs	2	3.0
Age	**Count**	**Average**
20-29 yrs	5	3.0
30-39 yrs	8	3.4
40-49 yrs	5	4.2
50-59 yrs	8	3.1
60+ yrs	6	3.3

Statement 37: “My online communication with friends or family.”

All departments, ages, genders, and experience levels averaged higher than 3.0 on this statement with older teachers (age 40 or higher) averaging higher than 4.0 and 60+ averaging 4.1. Overall, 41 of 45 participants replied to this statement with 17 of 20 males (85%) averaging 3.4 and 24 of 25 females (96%) averaging 4.0. All Departments averaged higher than 3.0, with half of them (English, Fine Arts, Social Studies, and World Languages) averaging higher than 4.0. The only Years Taught group to average higher than 4.0 was 30+ (5.0). The only Age groups to average higher than 4.0 were 40-49 and 60+.

Table 4.37

Responses to Statement 37: “My online communication with friends or family.”

Gender	Count	Average
Male	17	3.4
Female	24	4.0
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	2	5.0
Math	8	3.4
Performing Arts	2	3.5
Science	7	3.9
Social Studies	5	4.0
Theology	8	3.0
World Languages	4	4.8
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	4	3.8
5-9 yrs	6	3.0
10-19 yrs	11	3.8
20-29 yrs	17	3.9
30+ yrs	2	5.0
Age	**Count**	**Average**
20-29 yrs	6	3.0
30-39 yrs	11	3.6
40-49 yrs	8	4.0
50-59 yrs	8	3.9
60+ yrs	8	4.1

Statement 38: “My online communication with people online who are not close friends.”

Overall, 82% of participants responded to this question with 16 males (80%) averaging 3.5 and 21 females (84%) averaging 4.1.

Consistent with the observations for the previous statement, all departments, save one (Theology, 2.8 with 6 responses), averaged higher than 3.2 on this statement, with the teachers with the most experience, in terms of years taught (19 responses for groups 20-29 and 30+), averaging higher than 4.0 (“slightly agree”).

Table 4.38

Responses to Statement 38: “My online communication with people online who are not close friends.”

Gender	Count	Average
Male	16	3.5
Female	21	4.1
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	2	4.5
Math	8	3.8
Performing Arts	2	4.5
Science	5	3.6
Social Studies	5	4.2
Theology	6	2.8
World Languages	4	4.5
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	2	3.5
5-9 yrs	5	3.2
10-19 yrs	10	3.7
20-29 yrs	17	4.1
30+ yrs	2	4.0
Age	**Count**	**Average**
20-29 yrs	4	3.3
30-39 yrs	10	3.6
40-49 yrs	8	4.3
50-59 yrs	8	4.1
60+ yrs	7	3.7

Statement 39: “The last club organization I became a member of online.”

This statement had one of the lowest response rates with only 33% of the participants responding. Those who responded had a generally favorable response. For the 9 of 20 males (45%) the average was 3.9, and for the 8 of 25 females (32%) the average was 4.3, both near or above the value of 4 “slightly agree.” All departments averaged higher than 4.0 except the five responses from the Math department (3.6) and Theology (0 responses). The only Experience categories with responses were 5-9, 10-19, and 20-29 and all three averaged higher than 3.8. All Age categories had responses and averaged higher than 4.0 except 60+ which averaged 3.5.

Table 4.39

Responses to Statement 39: “The last club organization I became a member of online.”

Gender	Count	Average
Male	9	3.9
Female	8	4.3
Subject	**Count**	**Average**
English	4	4.3
Fine Arts	1	4.0
Math	5	3.6
Performing Arts	1	4.0
Science	1	5.0
Social Studies	2	4.0
Theology	0	--
World Languages	3	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	0	--
2-4 yrs	0	--
5-9 yrs	3	4.3
10-19 yrs	6	4.3
20-29 yrs	8	3.8
--	0	--
Age	**Count**	**Average**
20-29 yrs	2	4.5
30-39 yrs	5	4.2
40-49 yrs	5	4.0
50-59 yrs	3	4.0
60+ yrs	2	3.5

Statement 40: “My online involvement with the last organization I joined or donated to.”

Though fewer than half of the participants responded to this statement (20 of 45, 44%), the average response was above the neutral value of 3 with the responses from 11 of 20 males (55%) averaging 3.6 and the responses from 9 of 25 females (36%) averaging 3.9. Half of the departments averaged higher than 4.0 (English, Science, Theology, and World Languages). The only Experience category with responses that averaged 4.0 or higher was 10-19 years (7 responses) and the only Age group with an average higher than 4.0 was 40-49 years (4.3).

Table 4.40

Responses to Statement 40: “My online involvement with the last organization I joined or donated to.”

Gender	Count	Average
Male	11	3.6
Female	9	3.9
Subject	**Count**	**Average**
English	3	4.3
Fine Arts	1	3.0
Math	5	3.2
Performing Arts	1	3.0
Science	2	4.5
Social Studies	4	3.8
Theology	1	4.0
World Languages	3	4.0
Years Teacher	**Count**	**Average**
0-1 yrs	0	--
2-4 yrs	0	--
5-9 yrs	4	3.3
10-19 yrs	7	4.0
20-29 yrs	9	3.8
30" yrs	0	--
Age	**Count**	**Average**
20-29 yrs	2	3.0
30-39 yrs	6	3.7
40-49 yrs	4	4.3
50-59 yrs	6	3.8
60+ yrs	2	3.5

Statement 41: “The last online government service I accessed.”

The responses to this statement averaged 3.5 for 14 of 20 males (70%) and 3.6 for 17 of 25 females (68%). The two responses from Performing Arts averaged 2.0 (*slightly disagree*) while the five responses from Science averaged 4.4. All Age categories averaged between 3.2 and 3.9. The only Experience category to average higher than 4.0 was the sole response from 2-4 years.

Table 4.41

Responses to Statement 41: “The last online government service I accessed.”

Gender	Count	Average
Male	14	3.5
Female	17	3.6
Subject	**Count**	**Average**
English	6	3.7
Fine Arts	0	--
Math	6	2.8
Performing Arts	2	2.0
Science	5	4.4
Social Studies	4	3.8
Theology	5	3.8
World Languages	3	3.7
Years Teacher	**Count**	**Average**
0-1 yrs	1	3.0
2-4 yrs	1	5.0
5-9 yrs	5	3.6
10-19 yrs	8	3.5
20-29 yrs	13	3.6
30+ yrs	3	3.0
Age	**Count**	**Average**
20-29 yrs	4	3.5
30-39 yrs	7	3.6
40-49 yrs	7	3.6
50-59 yrs	7	3.9
60+ yrs	6	3.2

Statement 42: “My last interaction with my political representatives, local, state, or national, or political party.”

This statement also had a low response rate at 40% overall, with 9 of 20 males (45%) averaging 3.3 and 9 of 25 females (36%) averaging 3.1, both near the neutral value of 3. Single responses from Performing Arts and Social Studies averaged 4.0 or higher (at 5 and 4, respectively), as did the sole response from the 2-4 years of experience category (4). The sole response from the oldest age category (60+ years) was 2, (*slightly disagree*).

Table 4.42

Responses to Statement 42: “My last interaction with my political representatives, local, state, or national, or political party.”

Gender	**Count**	**Average**
Male	9	3.3
Female	9	3.1
Subject	**Count**	**Average**
English	4	3.5
Fine Arts	0	--
Math	5	2.4
Performing Arts	1	5.0
Science	1	3.0
Social Studies	1	4.0
Theology	3	3.3
World Languages	3	3.3
Years Teacher	**Count**	**Average**
0-1 yrs	0	--
2-4 yrs	1	4.0
5-9 yrs	4	3.8
10-19 yrs	6	3.5
20-29 yrs	7	2.6
30+ yrs	0	--
Age	**Count**	**Average**
20-29 yrs	3	4.0
30-39 yrs	6	3.3
40-49 yrs	5	2.8
50-59 yrs	3	3.3
60+ yrs	1	2.0

Statement 43: The way in which the last bit of advice… level of fitness.

More than 70% of participants responded to this statement with 14 of 20 males (70%) averaging 3.1 and 18 of 25 females (72%) averaging 4.3, just over the value 4 (*slightly agree*). Half of the departments (English, Fine Arts, Science, and World Languages) averaged higher than 4.0 (4.3, 5.0, 4.0, and 4.3, respectively), as did nearly all the Experience categories (all but 5-9 years, at 2.8, and 20-29 years, at 3.7). The only age category to average higher than 4.0 was 30-39, at 4.1, with the highest number of responses (10).

Table 4.43

Responses to Statement 43: "The way in which the last bit of advice… level of fitness."

Gender	Count	Average
Male	14	3.1
Female	18	4.3
Subject	**Count**	**Average**
English	5	4.2
Fine Arts	1	5.0
Math	6	3.7
Performing Arts	2	2.5
Science	2	4.0
Social Studies	6	3.8
Theology	6	3.5
World Languages	4	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	3	4.7
5-9 yrs	4	2.8
10-19 yrs	11	4.1
20-29 yrs	12	3.7
30+ yrs	1	4.0
Age	**Count**	**Average**
20-29 yrs	4	3.5
30-39 yrs	10	4.1
40-49 yrs	7	3.9
50-59 yrs	7	3.7
60+ yrs	4	3.5

Statement 44: “The way I change my lifestyle as a result of information I found online.”

Nearly 80% (36 of 45, 78%) of participants responded to this statement with 16 of 20 males (80%) averaging 3.3 and 19 of 25 females (76%) averaging 3.9, nearing the value of 4 (*slightly agree*). The English (4.0), Fine Arts (5.0), and World Languages (4.3) departments averaged 4.0 or higher, as did the extremes of the Experience category, both 0-1 years and 30+ years had single responses of 4. The only Age category to average 4.0 or higher was 30-39 years with 11 responses and an average of 4.0.

Table 4.44

Responses to Statement 44: “The way I change my lifestyle as a result of information I found online.”

Gender	Count	Average
Male	16	3.3
Female	19	3.9
Subject	**Count**	**Average**
English	5	4.0
Fine Arts	1	5.0
Math	7	3.4
Performing Arts	2	2.5
Science	4	3.8
Social Studies	6	3.8
Theology	6	3.2
World Languages	4	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	3	3.7
5-9 yrs	6	3.3
10-19 yrs	11	3.6
20-29 yrs	13	3.8
30+ yrs	1	4.0
Age	**Count**	**Average**
20-29 yrs	5	2.8
30-39 yrs	11	4.0
40-49 yrs	7	3.7
50-59 yrs	8	3.9
60+ yrs	4	3.3

Statement 45: “In general, the information I find online about topics that interest me.”

This is the fourth of five statements for which there was nearly universal agreement/satisfaction in every measured category (gender, subject taught, age, and years taught). Overall, 44 of 45 participants (98%) responded, with the average for 19 of 20 males (95%) being 4.4 and for 25 of 25 females being 4.6.

Table 4.45

Responses to Statement 45: “In general, the information I find online about topics that interest me.”

Gender	Count	Average
Male	19	4.4
Female	25	4.6
Subject	**Count**	**Average**
English	6	4.5
Fine Arts	2	5.0
Math	8	4.4
Performing Arts	2	4.5
Science	7	4.3
Social Studies	6	4.7
Theology	9	4.4
World Languages	4	4.8
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	4.8
5-9 yrs	6	4.2
10-19 yrs	11	4.5
20-29 yrs	18	4.5
30+ yrs	3	4.7
Age	**Count**	**Average**
20-29 yrs	7	4.4
30-39 yrs	11	4.5
40-49 yrs	8	4.6
50-59 yrs	9	4.4
60+ yrs	9	4.4

Statement 46: “The way which the Internet helps me think about social issues.”

Nearly 90% (40 of 45, 89%) of participants responded to this statement with 17 of 20 males (85%) averaging 3.5 and 23 of 25 females (92%) averaging 4.3, above the value of 4 (*slightly agree*). All departments averaged 3.5 or higher, with 2 responses from Fine Arts being 5. All Experience categories except the 5 responses from 5-9 years (2.8) were 4 or higher. All Age categories averaged higher than 4.0 except 30-39 years (10 responses averaging 3.7) and 50-59 years (8 responses averaging 3.9)

Table 4.46

Responses to Statement 46: “The way which the Internet helps me think about social issues.”

Gender	Count	Average
Male	17	3.5
Female	23	4.3
Subject	**Count**	**Average**
English	5	4.4
Fine Arts	2	5.0
Math	8	4.3
Performing Arts	2	3.5
Science	5	3.6
Social Studies	5	4.0
Theology	9	3.6
World Languages	4	4.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	4.4
5-9 yrs	5	2.8
10-19 yrs	10	4.2
20-29 yrs	17	4.1
30+ yrs	2	4.5
Age	**Count**	**Average**
20-29 yrs	7	4.0
30-39 yrs	10	3.7
40-49 yrs	8	4.3
50-59 yrs	8	3.9
60+ yrs	7	4.3

Statement 47: “The last concert event I went to after finding information online.”

Though fewer than 70% of the participants responded to this statement. Fourteen of 20 males (70%) averaged 4.4 and 17 of 25 females (68%) averaged 4.7, well above the level of 4 (*slightly agree*) and nearing the value of 5 (*strongly agree*). This is the fifth of five statements in which all measured categories averaged 4 or higher.

Table 4.47

Responses to Statement 47: “The last concert event I went to after finding information online.”

Gender	Count	Average
Male	14	4.4
Female	17	4.7
Subject	**Count**	**Average**
English	3	4.3
Fine Arts	2	5.0
Math	8	4.5
Performing Arts	2	4.0
Science	2	5.0
Social Studies	5	4.6
Theology	6	4.5
World Languages	3	4.7
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	3	5.0
5-9 yrs	5	4.0
10-19 yrs	9	4.6
20-29 yrs	11	4.6
30+ yrs	2	5.0
Age	**Count**	**Average**
20-29 yrs	6	4.5
30-39 yrs	8	4.6
40-49 yrs	5	4.4
50-59 yrs	6	4.5
60+ yrs	6	4.7

Statement 48: “In general, how do you feel about spending time online.”

Over 95% of participants responded to this statement with 19 of 20 males (95%) averaging 3.9 and 24 of 25 females (96%) averaging 4.0. All departments averaged higher than 3.8 except World Languages, with 4 responses averaging 3.3. Similarly, all Years Taught categories averaged higher than 3.8 and all Age categories averaged higher than 3.5.

Table 4.48

Responses to Statement 48: “In general, how do you feel about spending time online.”

Gender	Count	Average
Male	19	3.9
Female	24	4.0
Subject	**Count**	**Average**
English	5	3.8
Fine Arts	2	4.5
Math	8	4.4
Performing Arts	2	4.5
Science	7	3.9
Social Studies	6	4.3
Theology	9	3.8
World Languages	4	3.3
Years Teacher	**Count**	**Average**
0-1 yrs	1	4.0
2-4 yrs	5	3.8
5-9 yrs	6	3.7
10-19 yrs	11	4.1
20-29 yrs	17	4.1
30+ yrs	3	4.3
Age	**Count**	**Average**
20-29 yrs	7	4.4
30-39 yrs	11	3.5
40-49 yrs	8	4.3
50-59 yrs	8	3.8
60+ yrs	9	4.2

Semi-Structured Interviews

Semi-structured interviews were conducted during the spring and summer sessions of the 2019-2020 academic year with 5 volunteer participants. The identity of the participants of these discussions were not correlated in any way to the wholly anonymous submissions of the online survey previously addressed. Participants were known to the investigator and volunteered to be interviewed for this study, but their identities remain confidential. There was no compensation of any form.

Participants

Participant A was male, with over 30 years of teaching experience, all at the high school level. He taught in the performing arts department primarily teaching speech and theatre arts and made regular use of the TEAL classroom (assigned to one during the summer sessions). He taught one-semester classes, to students in all four grades, and was an early adopter of technology.

Participant B was female, with 15 years of teaching experience, 13 at the high school level. She taught in the World Languages department (German). She was an internal advocate for users of technology at the school and had used TEAL classrooms regularly (having been assigned to one full time during a previous academic year). She taught students in all four grades and was an innovator with respect to classroom and educational technology.

Participant C was a male mathematics teacher who was assigned full time to a TEAL classroom. He had over 30 years of teaching experience at the high school level. He taught only freshmen and was a late majority adopter of classroom technology.

Participant D was a male Social Studies teacher with over 25 years of teaching

experience at the secondary and post-secondary levels. He taught juniors and had chosen to not use a TEAL classroom at any time. He was a laggard when it comes to the adoption of technology in the classroom, pointing out during the interview that he was comfortable using nothing more than a blackboard or whiteboard for presentations.

Participant E was a male English teacher with over 20 years of teaching experience at the high school level teaching juniors and seniors. He had made occasional use of the TEAL classroom. On the Rogers scale of diffusion, he was in the early majority category.

Of the five teachers who participated in the semi-structured interviews, one taught in a TEAL classroom full time the year of the study, one taught in a TEAL classroom over multiple summer sessions prior to the year of the study, one taught in a TEAL classroom for a full academic year previously but not in the year of the study, and the one other have checked it out as needed. The remaining teacher (in the laggard category) had not used the TEAL classroom at all.

Participants' Self-Assessment Results regarding Level of Technology Integration

The technology integration matrix (see Figure 1.1) identified five interdependent characteristics of meaningful learning environments: (1) active, (2) collaborative, (3) constructive, (4) authentic, and (5) goal-directed, associated with five levels of technology integration: (a) entry, (b) adoption, (c) adaptation, (d) infusion, and (e) transformation. Each subject was presented with the same overview of the matrix (see Appendix A), then asked to rate themselves on their level of technology integration. Results for all 5 participants are found in Table 4.49. Full transcripts, each validated by the participant, are found in Appendix C.

Table 4.49

Summary of Responses

Participant ID: Subject Taught	Rogers Classification	Learning Environments				
		Active Learning	Collaboration	Constructive	Authentic	Goal Directed
A: Speech/Theatre	Early adopter	Mostly Adaptation and Infusion but touching on Transformation	Infusion	Adaptation	Adaptation	Infusion
B: German	Innovator	First 2 years adoptions; later years more towards infusion	Adaptation	Levels 1 and 2: entry and adoption; Levels 3 and 4: Adaptation	Adoption at the lower levels up through Transformation at the highest level	Levels 1 and 2: entry and adoption; Levels 3 and 4: Adaptation
C: Mathematics	Late majority	Primarily adoption with a goal of adaptation	Adaptation, moving towards infusion	Adaptation	Adaptation	Adoption
D: Social Studies	Laggard	Adaptation	Adaptation	Adaptation	Adaptation	Adoption
E: English	Early majority	Adoption	Adaptation, moving towards infusion with some elements of transformation	Infusion bordering on transformation	Infusion bordering on transformation	“it depends”

Excerpts of Responses to Final Open-Ended Question

Is there anything in your experience with technology in the classroom that I didn't ask about but that would you like to share?

Participant A (Speech/Theatre):

So, a traditional classroom with rows and desks and this small bit of space for me to move in, and students can barely move in, and it's very regulated. That's like a crowded black box theatre where actors can't move, and things can't be done. There's no level to operate on.

The TEAL classroom, even the four smaller TEAL classrooms, provide me a place that reflects more of how my imagination works. It's like the inside of a theater reflects how my imagination works. I think it's like almost a Jungian reflection of the human imagination. That's where theater comes from and even where a good classroom comes from me. For me, the TEAL classrooms... my favorite one is the big one upstairs.

Participant B (German):

For me it was, I mean, having that year in the TEAL classroom for a combo class, it was… it sounds weird to say it like this, but it truly transformed how I taught too. It brought me back to my earliest teaching days when I was in an elementary and middle school classroom and being able to have centers and stations and do jigsaw collaborative work with students.

And I know part of that is just the space itself but the added tech of having students with their laptops and being able to project and to do gallery walks with students in that space, was wonderful. I don't get in there as often as I'd like. I do love

using it for training with teachers, but for my own German students I tend to use it at least once a year for every class. German 2 usually get in there twice. And it tends to be where I'll check it out for a specific unit or project, and it tends to be that collaborative piece. So, I think that's part of it."

Participant C (Mathematics):

First thing is that I allow the kids, the first day of school, to say that math is not their favorite subject and that it's okay not to like math. And that hopefully by the end of the year we might turn that just a little bit. The nice thing about the TEAL room is that it allows you to be expressive, stand up, you know, collaborate with your friends in a math situation, and before you know it, the conversations are going to be math oriented. It kind of breaks that fear of "I'm going to have sit here and listen to this teacher teach and I'm going to have to do a hundred times what they say to do." It's a whole different twist on the learning curve which allows the medium that you choose, as a teacher, to influence their attitude about math. And then once you get that tweaked a little bit you can almost teach them something.

Participant D (Social Studies):

That's pretty much it. Sometimes in our annual summer professional development, I take the module on TEAL classrooms, because I need the hours to add up. (But) I've never seen that "Wow! That's going to make a huge difference for what we're doing."

I like technology and I use it. For example, as soon as I got a smartboard, I use it. But if it's not functioning, I go back to doing other ways of teaching. The TEAL, I

mean, those specific classrooms are not the best ones to have renovated, I don't think. And I don't ever have a big enough group to go to the large one.

Subject E (English):

I think my issue with technology in the classroom is I feel like often, I feel we are encouraged to use the technology because technology is supposed to be good, but it doesn't necessarily achieve the learning goals. So, if I'm supposed to teach, you know, critical reading skills, I don't need technology for that.

I feel like 20 years in the classroom, in a Catholic school… I mean, when I started teaching, I thought that my job was to teach them to write, to teach them to read, but the older I get, the more I feel like my job is formation of students and if they're interacting with a computer that is not human formation and I want… I want… to build my relationship with them to help them grow as people, not as cyborgs.

CHAPTER 5

DISCUSSION

Introduction

This study was designed and executed as descriptive, not prescriptive and sought to deliver its findings as a formative evaluation. As such, it draws no direct conclusions from the data but rather documents observations and raises questions for further study.

John Dewey would be pleased with the classrooms these teachers described. They have effectively used digital technology as a tool to further learning outcomes for their students. Louis Gerstner could see these technology-enhanced classrooms as a material step towards moving schools to being high-tech institutions, in this evolving, higher-tech world.

Chapter 1 posed the question "what role does technology play in the delivery of education in the 21st century?" The responses to the survey indicated that technology in general, and the Internet in particular, have become necessary but not sufficient for the performance of personal and professional business. The ubiquitous nature of digital technology has made it virtually impossible to function in modern society without an increasing level of digital literacy for both students and teachers (List, 2019).

Talbert and Mor-Avi (2018) identified that much of the research regarding the use of technology in the classroom and of teacher attitudes towards technology had been done at the higher education level. This study was conducted at the secondary education level and set a foundation for replication studies and other similar efforts at the secondary level. Though not a traditional fidelity of implementation study, the

present study sought to establish a baseline for future efforts at the institution being studied.

One of the more interesting observations is the few statements where 100% of the respondents chose to respond. This observation merits additional study but for the present study, we can take the robust response to indicate that all respondents had an opinion on the statement and took the opportunity to express it. In the case of Statement 21: “My knowledge is increased because of the Internet (for example, looking up information or communicating with others),” given the fact that all responses, across all measured categories, was higher than 4 (*slightly agree*) with multiple responses of 5 (*strongly agree*), this community of teachers used the Internet as a source of knowledge.

One of the key strengths of the Internet Outcomes Survey developed by Helsper et al. (2015) as part of the DiSTO (Digital Skills to Tangible Outcomes) project was that it not only measured use (whether the Internet was used for a specific purpose) but also satisfaction (how satisfied the individual was with the experience). As such, the Internet use features were presented first as a group and later there were corresponding satisfaction statements.

For example, Statement 1: “I save money by buying products online” and Statement 24: “The quality of the last product I bought online” are a pair. The first statement is about use (whether or not the task was performed) and the second is about satisfaction (how satisfied the individual was with the experience). Table 5.1 shows the relationship between all 24 sets of use and satisfaction statements. Key words or phrases illustrating the relationship are bolded in Table 5.1 but no such visual cue was

present in the instrument that was completed by the participants.

The first eight statement pairs (shaded in the table) tended to be pragmatic or job-related. These are followed by statement pairs that were more abstract in nature, delving into topics such as religion, politics, and social organizations. It is interesting to note that there was a drop-off in both response rate and average of responses as the statement pairs trended away from the pragmatic or job-related topics.

Table 5.1

Paring of Use and Satisfaction Statements

Use Type Question	Satisfaction Type Question
Statement 1: I save money by buying **products** online	Statement 25: The quality of the last **product** I bought online.
Statement 2: I **sell** goods I would not have otherwise sold.	Statement 26: The price I get for products I **sell** online.
Statement 3: The information and services I found online have improved my **financial** situation.	Statement 27: The last **financial** service I used (for example: banking).
Statement 4: I bought **insurance** online that I would not have bought off-line.	Statement 28: The **insurance** or other financial product I bought online.
Statement 5: The things I find online influence how I do my **job**.	Statement 30: The way the Internet has influenced how I do my **job**.
Statement 6: I found a **job** online that I could not have found off-line.	Statement 29: The **job** I got online.
Statement 7: I got a certificate (**professional development or training**) that I could not have gotten without the Internet.	Statement 31: The quality of an **educational course** I completed online.
Statement 8: I find **educational material** online that I could not have found off-line.	Statement 32: The quality of **educational materials** I found online.
Statement 9: The things I come across on the Internet make me **think** about the differences between men and women.	Statement 33: **Information** I come across about religion and religious people.
Statement 10: Through the Internet I learned new things about my **ethnic** group.	Statement 34: The information I come across about my **ethnic** group.
Statement 11: Through the Internet I found people of a similar **age** that share my interests	Statement 35: My interactions with people of my **age** online

(table continues)

Use Type Question	Satisfaction Type Question
Statement 12: Due to the information I found online I feel more **connected**.	Statement 36: My online **interactions** with people …beliefs
Statement 13: I am **in touch with my close friends** more because I use the Internet.	Statement 37: My online **communication with friends** and family.
Statement 14: **People** I meet online are more interesting than the people I meet off-line.	Statement 38: My online communication with **people** online who are not close friends.
Statement 15: I became a member of a **club** or organization	Statement 39: The last **club** organization I became a member of online.
Statement 16: I became a member or donor of a civic **organization** I would not have become a member of otherwise.	Statement 40: My online involvement with the last **organization** I joined or donated to.
Statement 17: I have discovered online that I am entitled to a particular **benefit, subsidy, or tax advantage** which I would not have found off-line.	Statement 41: The last online **government service** I accessed.
Statement 18: Online, I have better contact with my **political** representatives (local, state, or national), or political party.	Statement 42: My last interaction with my **political** representatives.
Statement 19: I have made better decisions about my **health**	Statement 43: The way in which the last bit of advice… level of **fitness**.
Statement 20: Information I found online gives me more confidence in **lifestyle** choices	Statement 44: The way I change my **lifestyle** as a result of information I found online.
Statement 21: My knowledge is increased because of the Internet (for example, looking up **information** or communicating with others).	Statement 45: In general, the **information** I find online about topics that interest me.
Statement 22: Using the Internet helps me form opinions about complex social issues I would not fully understand otherwise.	Statement 46 The way which the Internet helps me think about social issues.
Statement 23: Online entertainment (games, listening to music, reading jokes) make me feel happier.	Statement 47: The last concert event I went to after finding information online.
Statement 24: I go to events and concerts I would never have otherwise considered.	Statement 48: In general, how do you feel about spending time online

Approach to Presenting Observations from Select Paired Survey Responses

The first 8 pairs of statements are commercial, vocational, or educational in nature, the next 8 pairs of statements are more social or relationship focused, and the

final 8 pairs are informational and of a more broad nature (health, politics, and lifestyle, for example).

The next section focuses primarily on the first 8 pairs of statements as they are most relevant to the topic of this study. Just as not all pairs of statements are explored in depth here, not all categories initially identified merited additional exploration. For example, in the demographic section of the survey participants were asked whether they taught in the school's TEAL classrooms the previous year or planned to in the upcoming year. This category ended up not adding any meaningful insight to the results and thus was not discussed further, even though the data appeared in the initial data set. Similarly, the methodology outlined in Chapter 3 indicated plans to use MAXQDA® in anticipation of the participants in the semi-structured interviews possibly giving free-form or potentially ambiguous responses which would have necessitated the use of a tool like MAXQDA®. Ultimately, the responses to the semi-structured interviews were remarkably clear and concise and the analytical tools of MAXQDA® were not needed.

Observations from Select Paired Survey Responses

"Product" Statement Pair

[1] "I save money by buying **products** online"
[25] "The quality of the last **product** I bought online."

The sample population, across nearly all measured categories, used the Internet for the purpose of buying products and generally with a higher than neutral level of satisfaction. This included 20 of 21 males (95%) and 23 of 25 females (92%). The average of the use score for males was 4.15 and for females 4.43 (between 4,

“somewhat agree” and 5, “strongly agree”). Regarding satisfaction, both males (100%) and females (24 of 25, 96%) averaging higher than 4.1.

It would be interesting to follow up to see how the specific wording of Statement 25 (The quality of the ***last*** product I bought online) influenced the scores and whether the word “last” had a material impact. For those with a negative experience, it would also be interesting to learn what they bought and why they were not happy with it.

This high level of use and satisfaction indicates that the sample population is generally comfortable and seems to have a favorable attitude towards using the Internet for buying products. An opportunity for future study exists in determining whether this propensity for using technology as shown by Statement 1, and the demonstrated satisfaction, shown by Statement 25, has a direct influence on the teacher’s propensity for using technology in the classroom.

“Financial” Statement Pair

> [3] “The information and services I found online have improved my **financial** situation”
>
> [27] “The last **financial** service I used (for example: banking)”

The results for these two statements indicate that while not all respondents used the Internet for financial and information, as shown by use averages lower than 4.0 for both males and females, those that did were generally satisfied, as shown by satisfaction scores of higher than 4.6 for both males and females. This seems to indicate that the sample population used and trusted the Internet for financial transactions. The notion of trust in the Internet, especially for financial transactions, is important. Noviyarto (2019) expanded on Ba and Pavlou’s (2002) definition of trust “…. an assessment of one’s relationship with others who will do certain transactions in line

with expectations in an environment of uncertainty" and found that trust (together with security) significantly affected interest in using the Internet for banking.

"Job" Process Statement Pair

[5] "The things I find online influence how I do my **job**"
[30] "The way the Internet has influenced how I do my **job**"

Nearly every participant responded to these two statements with the overall averages being higher than 3.8 for both males and females on both statements. This indicates both high utilization and high satisfaction, especially among women where the response rate to the satisfaction was 100% and the overall average was 4.5. These results shows that the Internet is used, and trusted, as a source of job-related information and that respondents are satisfied with the information they obtain.

"Job" Search Statement Pair

[6] "I found a **job** online that I could not have found off-line"
[29] "The **job** I got online."

While the previous pair of statements explored high utilization and largely satisfaction with the Internet as a source of job-related information, the same cannot be said for the job search process. Few respondents used the Internet for their job search and fewer still actually found their job online. Given the tenure of many of the teachers at this school, it is unlikely that those who had been on the faculty for more than, for example, 20 years, found the job online.

The three responses from the World Languages department averaged 4.7, the highest in any category, and may be driven by the number of teachers hired by that department in recent years, when most new teacher recruiting has been done online.

This notion merits additional research.

“Training” Statement Pair

> [7] “I got a certificate **(professional development or training)** that I could not have gotten without the Internet”
>
> [31] “The quality of an **educational course** I completed online.”

The teachers in the sample population used the Internet for their own learning and professional development though the wording of the statement (including the word “certificate”) may have skewed the results. Some respondents may have taken online training courses that didn’t result in certification (the focus of Statement 7) but they were satisfied with the quality of the course (the focus of Statement 31). This may explain why the averages for Statement 31 (satisfaction) were higher than those from Statement 7 (use).

“Educational Material” Statement Pair

> [8] “I find **educational material** online that I could not have found off-line”
>
> [32] “The quality of **educational materials** I found online.”

The use and trust demonstrated by the sample population, by the previous two pairs of statements, extended to their use of the Internet as a source of information in their professional lives as the responses to these three pairs of statements demonstrated.

Statement 24

- *“I go to events and concerts I would never have otherwise considered.”*

This statement is not directly paired with another statement but was met with nearly universally strong agreement, with one department being a notable exception.

The responses from the Performing Arts department strongly disagreed (response was = 1) with this statement and, in future research. It would be interesting to ask open-ended follow-up questions to learn which element of the question triggered the *strongly disagree* (1) response. Was it the "go" to an event part of the statement or the "not otherwise" part of the statement?

Observations from the Semi-Structured Interviews

One of the main goals of the semi-structured interviews was to capture the experiences of teachers in the organization and relate those experiences to the theoretical framework for the study, Rogers' diffusion of innovations. This theory "provides a framework for describing how, why, and at what rate new technologies spread through social systems" (Dingfelder & Mandell, 2011, p. 597) and posits a principal factor influencing the spread of an innovation throughout an organization is largely "dependent on social context...." (Dingfelder & Mandell, 2011, p. 598). The results of the qualitative portion of the study show that the participants identified as innovators, early adopters, and early majority adopters each included at least one characteristic from the technology integration matrix in which they described their level of integration at the transformation level, while the participants identified as late majority or laggards did not. But the late majority and laggard participants identified at least one characteristic at the adoption level, while among the other three, only those who taught freshmen selected adoption for any characteristic. This may indicate that the age and technological sophistication of the students may play a more important role in level of technology integration in the classroom than the teacher's category in Rogers' continuum (innovators, early adopters, early majority, late majority, laggards).

Active Learning Environment

Since the school is a bring your own device (BYOD) school, where individual laptops are required, nearly all students arrive with some level of computer proficiency and thus would be beyond entry level from the onset of their secondary school experience.

However, many students lack the experience, confidence, and maturity to make productive, independent use of their devices, and one role of the teacher in this environment is to introduce students to the capabilities of their devices and demonstrate how they can be used in instruction. All teachers at this school engage in annual professional development and are at least familiar with the SAMR model and they are cognizant of where their lessons fall along the substitution, augmentation, modification, and redefinition continuum (Puentedura, 2014). This means that they have shown that they are at least minimally comfortable with demonstrating technology to their students and as the students' ability to use technology grows, they can increase their use of technology in the classroom.

Table 5.2

Participants' Self-Assessment of Technology Integration in an Active Learning Environment

Participant ID: Subject Taught	Level
A: Speech/Theatre	Mostly adaptation and infusion but touching on transformation
B: German	First 2 yea adoptions; later years more towards infusion
C: Mathematics	Primarily adoption with a goal of adaptation
D: Social Studies	Adaptation
E: English	Adoption

Collaborative Learning Environment

The trend, across all subjects, seemed to favor experience *of the students*. Meaning teachers of juniors and seniors tended to describe behaviors more consistent with the right side of the spectrum (infusion with an ultimate goal of transformation), while teachers who taught mostly freshman and sophomores tended to describe behaviors closer to adoption and adaptation with elements of Infusion towards the end of year-long courses. The German teacher who taught students for all four years described this most clearly.

It was interesting to note the German teacher (Participant B) was also a member of the school's 3-person Instructional Technology Team ("ITeam") and was tasked with introducing and supporting educational technology to the faculty. Since she often had her students for 2, 3, or even 4 years, she didn't have to spend much time at the beginning of each academic year building rapport and could instead spend that time introducing additional technology tools.

Table 5.3

Participants' Self-Assessment of Technology Integration in a Collaborative Learning Environment

Participant ID: Subject Taught	Level
A: Speech/Theatre	Infusion
B: German	Adaptation
C: Mathematics	Adaptation, moving towards infusion
D: Social Studies	Adaptation
E: English	Adaptation, moving towards infusion with some elements of transformation

Constructive Learning Environment

Responses to this topic tended towards the central value of adaptation. The one outlier is the English teacher who focused on the aspect of the described behavior of student autonomy in selection and use of technology. The teacher indicated that they gave students access to technology tools and then assisted them in exploring and choosing appropriate resources. The teachers indicated that the limited autonomy they gave students, with respect to technology choice, drew them to adaptation rather than infusion or transformation.

Table 5.4

Participants' Self-Assessment of Technology Integration in a Constructive Learning Environment

Participant ID: Subject Taught	Level
A: Speech/Theatre	Adaptation
B: German	Levels 1 and 2: entry and adoption; Levels 3 and 4: Adaptation
C: Mathematics	Adaptation
D: Social Studies	Adaptation
E: English	Infusion bordering on transformation

Authentic Learning Environment

Again, teachers were comfortable with the response of adaptation since they often limited the choices of technology available to the students. Also, continuing a trend previously observed, as the teachers taught students at higher levels (juniors and seniors), responses trended to the higher levels (infusion and transformation). This was particularly true of Participant B who often taught the same group of students for three or four years as well as Participant E, who taught primarily juniors and seniors.

Table 5.5

Participants' Self-Assessment of Technology Integration in an Authentic Learning Environment

Participant ID: Subject Taught	Level
A: Speech/Theatre	Adaptation
B: German	Adoption at the lower levels up through Transformation at the highest level
C: Mathematics	Adaptation
D: Social Studies	Adaptation
E: English	Infusion bordering on transformation

Goal Directed Learning Environment

This aspect of the technology integration matrix had the greatest spread in responses, ranging all the way from entry to infusion, and is the only one where a participant felt compelled to respond, "it depends," though no responses were transformation. There is no clear underlying reason for this and it may have to do with the relatively new use of goal-directed or project-based learning at the institution.

Table 5.6

Participants' Self-Assessment of Technology Integration in a Goal-Directed Learning Environment

Participant ID: Subject Taught	Level
A: Speech/Theatre	Infusion
B: German	Levels 1 and 2: entry and adoption; Levels 3 and 4: Adaptation
C: Mathematics	Adoption
D: Social Studies	Adoption
E: English	"it depends"

Overall Observations and Generalizations

A key observation from the interviews is that the propensity of a teacher to use more complex or sophisticated technology innovations in their classroom has a great deal to do with the perception of the teacher regarding their students' level of comfort with technology as well as the rapport the students have with the teacher. The teachers who had younger students (freshman or sophomores) or who taught one-semester classes, tended to have greater challenges implementing technology than, for example, the German teacher who had largely the same group of students for three or four years. The school requires two consecutive years of the same foreign language for graduation and because there was only one German teacher on the campus, coupled with the fact that she was on the ITeam, increased the likelihood of successful implementation of technology in that teacher's classroom (regardless of whether it was a TEAL classroom). Examples of challenges faced by teachers of freshman or sophomores included taking time from lesson plans to introduce new technology platforms and introducing technology platforms for students with different types of laptops (Windows or Apple Mac, for example).

As student expectations regarding the use of technology in the classroom rise, as they become increasingly comfortable with technology in their own daily lives, teachers will likely continue to adapt and increase their use of technology in the classroom (regardless of whether the classroom has the features and affordances of the TEAL classrooms described at the school that was the subject of this study).

Limitations and Hindsight

Some of the questions in the DiSTO (Digital Skills to Tangible Outcomes) survey

are actually binary questions (yes/no) and it does not seem appropriate to have a Likert-style scale as a response. For example, Statement 4: “I bought insurance online that I would not have bought off-line.” Either the respondent made the purchase or did not make the purchase; it is not a Likert-style scale question. Another example of a binary statement is Statement 6: “I found a job online that I could not have found off-line.”

Statement 2 reads “I sell goods that I would not have otherwise sold” and given the nature of the survey it may be understood that the question means “… on the Internet” but the question would be clearer if it included the word “online” as that word is included on so many other statements.

Statement 3 reads “I bought insurance online that I would not have bought off-line” and an interesting corollary question might be something to address the question of whether it could be that they bought insurance online that they would have bought off-line, but it was easier or just as easy to buy it online? In other words, was this an incremental purchase or one that they would have made in any case.

If a participant disagreed with Statement 11 “Through the Internet I found people of a similar age that share my interests” it would be useful to understand which part of the statement they disagreed with (was it the similar age that affected the answer, or was it that the people they found didn’t share their interests).

Statement 14 reads “People I meet online are more interesting than the people I meet off-line” which leaves open to interpretation the meaning of the word “interesting,” a word that can mean very different things to different people.

Opportunities for Future Research

As noted above, some of the questions did not always lend themselves well to a

Likert-style scale because they were binary questions. One opportunity for future research would be to reword those questions to either fit a Likert-style scale is appropriate or rework and re-validate the instrument to include a section for binary questions.

Additionally, some of the questions inspire follow-up questions. For example, an opportunity for future study exists in determining whether the propensity for using technology (and the demonstrated satisfaction) as shown in Statements 1 and 25 has a measurable influence on the teacher's propensity for using technology in the classroom.

Statement 6: "I found a job online that I could not have found off-line" and Statement 29 "The job I got online" are paired and showed relatively few responses to the utilization statement and even fewer responses for the satisfaction statement. This may be because many of the teachers at the participating institution had been in their positions for many years and did not rely on the Internet for their job search. As more and more human resource functions transition to mostly, or solely, online channels, it would be interesting to revisit this topic in 5 or 10 years and see how the responses evolve. While it is likely some open positions will be filled by word-of-mouth or traditional offline networking, it's more likely that both the responses to both the utilization and satisfaction statements will rise over time.

Statement 24: "I go to events and concerts I would never have otherwise considered." It would be interesting to ask follow-up questions as to which aspect of the statement caused them to strongly disagree (the "going" part or the "never have otherwise considered" part). Also, Statement 7: "I got a certificate (professional development or training) that I could not have gotten without the Internet." It would be

interesting to learn which specific certifications were earned and what motivated the teacher to pursue those certifications.

Another aspect of the survey structure that may warrant examination was that all responses were optional. One of the more interesting observations is the few (5 of 48) statements where 100% of the respondents chose to respond. This observation merits additional study and perhaps follow up questions with participants to ascertain why they elected to respond to or not respond to, specific questions. The “think aloud” approach, coupled with reflective interviews, as championed by Reeder (2018), may shed light on the thought processes used by respondents to this survey much as they did in her study. Reeder observed “The reflection interviews after the think-aloud sessions sought to add context with respect to navigation, satisfaction, and motivation.” (p. 80). It is precisely this context, primarily with respect to motivation, that is missing from the current study.

Teacher attitudes evolve and the composition of the faculty changes from year to year. As technological innovations enter the marketplace, they are evaluated for their possible educational value, and are subsequently either implemented or not, the results of this study may assist administrators and practitioners by highlighting, in general terms, potential risks or opportunities. Replication of this study, at this institution and others, will add to the body of data available and may help reduce barriers to adoption of future implementations.

Similarly, replicating this study from the perspective of the student will be beneficial and will yield valuable data to the sponsoring institution. A student-centric replication of this study, with the same instrument and with interview questions

reworded to query from the student experience will begin at the conclusion of this study. The results of the semi-structured interviews inspired the notion that the level of technological sophistication of the students may have a more important influence on the level of technology integration in the classroom than the category of the teacher on Rogers' diffusion of innovation continuum (innovators, early adopters, early majority, late majority, laggards).

Differences in responses to various questions in the survey from teachers in different departments begs the question of whether it is more conducive to teach some subjects in TEAL classrooms as opposed to traditional classrooms. Similarly, it will be interesting to study whether pre-service teachers who have been students in a TEAL classroom are more likely to use them in their own teaching.

It would be useful to explore why the responses in the semi-structured interviews to the goal directed aspect of the technology integration matrix had the greatest spread in responses, ranging from Adoption to Infusion.

One limitation of this study was that non-pedagogical outcomes, such as student and family enthusiasm, market factors, such as product differentiation, and the use of creative or novel lesson plans, were not directly measured as part of the current study but present opportunities for future research.

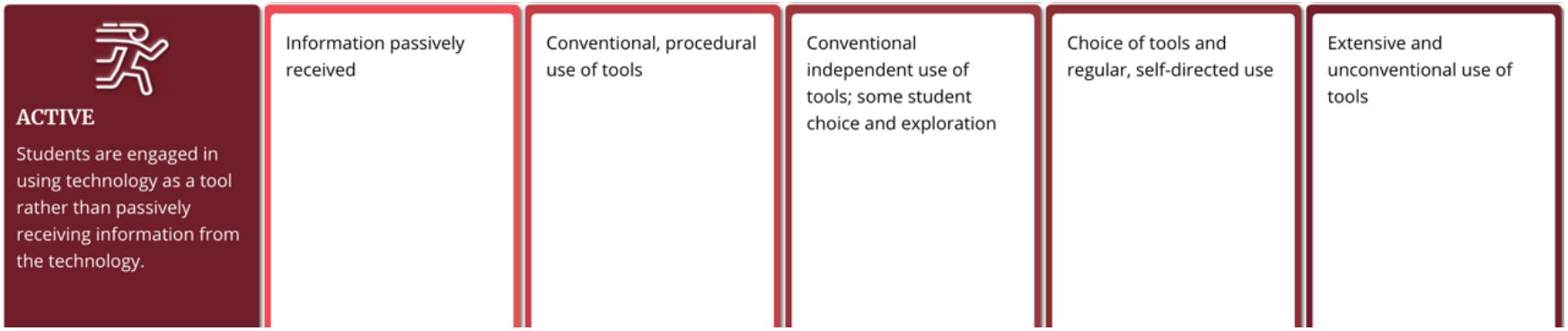
After the initial rollout of the TEAL classrooms in 2016, the school was concerned about developing a consistent professional development opportunity for new faculty. This was accomplished in the subject school by crafting a module in the learning management system. However, research is needed to ascertain the optimal approach to maintaining consistency as both technology and teacher experiences evolve.

The introduction of novel pedagogical approaches, whether technology-based or not, but particularly with emerging technologies, undoubtedly places cognitive load on the instructor. Measurement of the additional cognitive load on the instructor and an analysis of the potential impact on students is an area of concern that merits rigorous study.

APPENDIX A

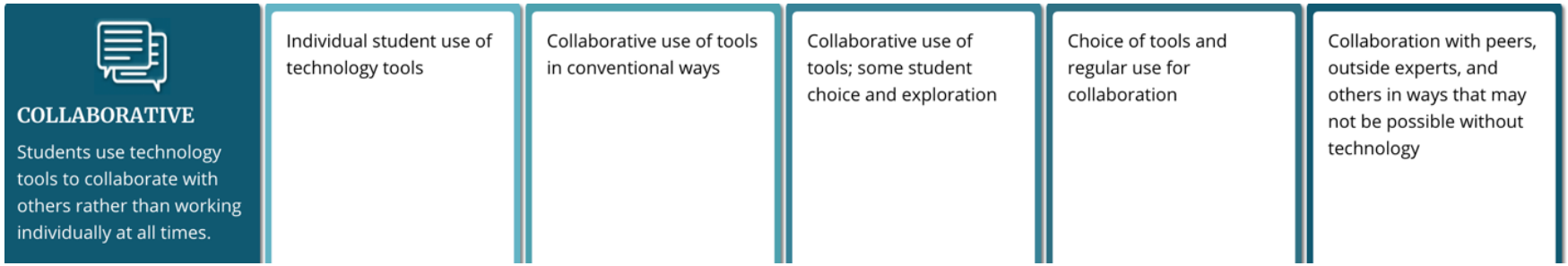
SEMI-STRUCTURED QUESTIONS

1. Where would you say you were on the continuum/spectrum with respect to use of **active** learning in the classroom? Here are some descriptions of specific behaviors to help you frame your response.



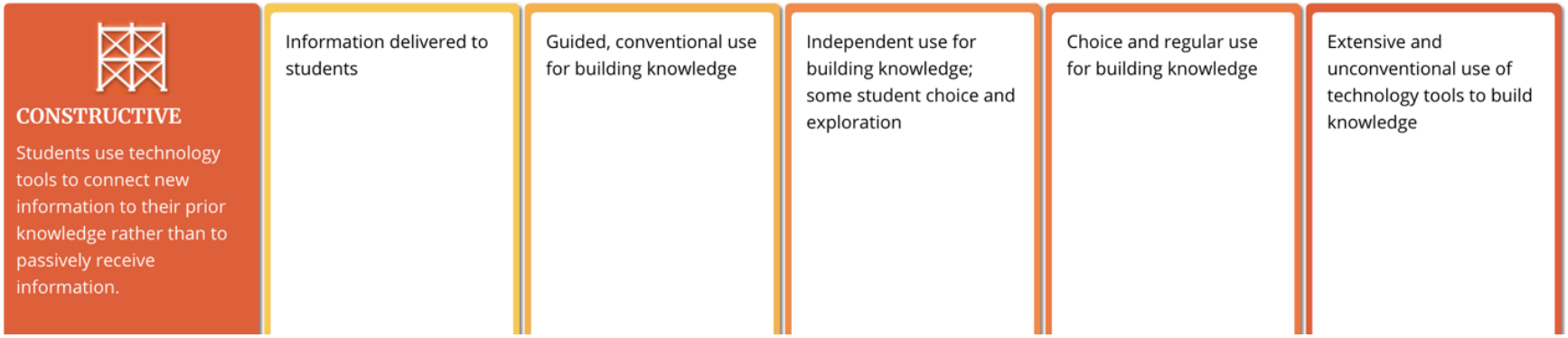
Entry	Adoption	Adaptation	Infusion	Transformation
The teacher may be the only one actively using technology. This may include using presentation software to support delivery of a lecture. The teacher may also have the students complete "drill and practice" activities on computers to practice basic skills, such as typing.	The teacher controls the type of technology and how it is used. The teacher may be pacing the students through a project, making sure that they each complete every step in the same sequence with the same tool. Although the students are more active than students at the Entry level in their use of technology, the teacher still strongly regulates activities.	The teacher allows for some student choice and exploration of technology tools. Because the students are developing a conceptual and procedural knowledge of the technology tools, the teacher does not need to guide students step-by-step through activities. Instead, the teacher acts as a facilitator toward learning, allowing for greater student engagement with technology tools.	The teacher guides, informs, and contextualizes student choices of technology tools and is flexible and open to student ideas. Lessons are structured so that student use of technology is self-directed.	The teacher serves as a guide, mentor, and model in the use of technology. The teacher encourages and supports the active engagement of students with technology resources. The teacher facilitates lessons in which students are engaged in higher order learning activities that may not have been possible without the use of technology tools. The teacher helps students locate appropriate resources to support student choices.

2. Where would you say you were on the continuum/spectrum with respect to how much **collaboration** takes place in the classroom? Here are some descriptions of specific behaviors to help you frame your response.



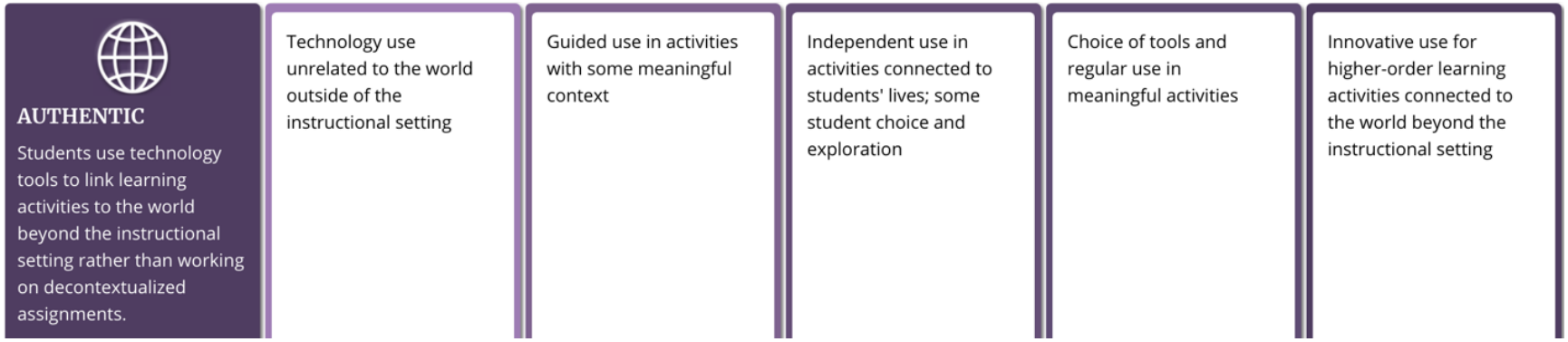
Entry	Adoption	Adaptation	Infusion	Transformation
The teacher directs students to work alone on tasks involving technology.	The teacher directs students in the conventional use of technology tools for working with others.	The teacher provides opportunities for students to use technology to work with others. The teacher selects and provides technology tools for students to use in collaborative ways and encourages students to begin exploring the use of these tools.	The teacher fosters a collaborative learning environment and supports students' meaningful choices in their selection of technology tools for collaboration.	The teacher seeks partnerships outside of the setting to allow students to access experts and peers in other locations and encourages students to extend the use of collaborative technology tools in higher order learning activities that may not have been possible without the use of technology tools.

3. Where would you say you were on the continuum/spectrum with respect to how **constructive** the learning was? Here are some descriptions of specific behaviors to help you frame your response.



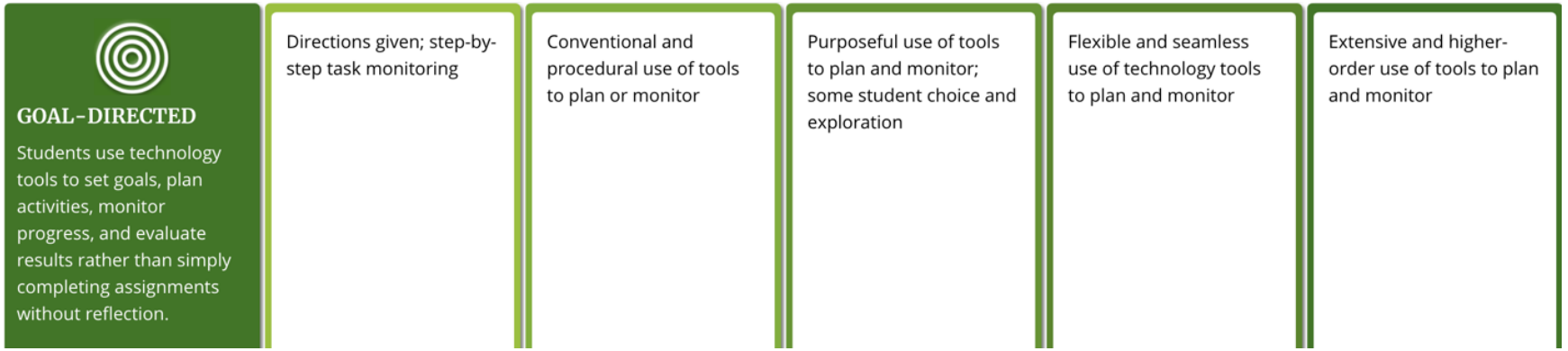
Entry	Adoption	Adaptation	Infusion	Transformation
The teacher uses technology to deliver information to students.	The teacher provides some opportunities for students to use technology in conventional ways to build knowledge and experience. The students are constructing meaning about the relationships between prior knowledge and new learning, but the teacher is making the choices regarding technology use.	The teacher creates instruction in which students' use of technology tools is integral to building an understanding of a concept. The teacher gives the students access to technology tools and guides them in exploring and choosing appropriate resources.	The teacher consistently allows students to select technology tools to use in building an understanding of a concept. The teacher provides a context in which technology tools are seamlessly integrated into a lesson and is supportive of student autonomy in choosing the tools and when they can best be used to accomplish the desired outcomes	The teacher facilitates higher-order learning opportunities in which students regularly engage in activities that may be impossible to achieve without the use of technology tools. The teacher encourages students to explore the use of technology in unconventional ways and to use the full capacity of multiple tools in order to build knowledge.

4. Where would you say you were on the continuum/spectrum with respect to how **authentic** the learning was? Here are some descriptions of specific behaviors to help you frame your response.



Entry	Adoption	Adaptation	Infusion	Transformation
The teacher assigns work based on a predetermined curriculum unrelated to the students or issues beyond the instructional setting.	The teacher directs students in the conventional use of technology tools for learning activities that are sometimes related to the students or issues beyond the instructional setting.	The teacher creates instruction that purposefully integrates technology tools and provides access to information on community and world issues. The teacher directs the choice of technology tools, but students use the tools on their own and may begin to explore other capabilities of the tools.	The teacher encourages students to use technology tools to make connections to the world outside of the instructional setting and to their lives and interests. The teacher provides a learning context in which students regularly use technology tools and have the freedom to choose the tools that, for each student, best match the task.	The teacher encourages innovative use of technology tools in higher-order learning activities that support connections to the lives of the students and the world beyond the instructional setting.

5. Where would you say you were on the continuum/spectrum with respect to how **goal directed** the learning was? Here are some descriptions of specific behaviors to help you frame your response.



Entry	Adoption	Adaptation	Infusion	Transformation
The teacher gives students directions and monitors step-by-step completion of tasks. The teacher sets goals for students and monitors their progress.	The teacher directs students step by step in the conventional use of technology tools to set goals, plan, monitor, evaluate an activity, or reflect upon learning activities.	The teacher selects the technology tools and clearly integrates them into the lesson. The teacher facilitates students' independent use of the technology tools to set goals, plan, monitor progress, evaluate outcomes, and reflect upon learning activities. The teacher may provide guidance in breaking down tasks.	The teacher creates a learning context in which students regularly use technology tools to set goals, plan, monitor, evaluate, and reflect upon learning activities. The teacher facilitates the student's choice and independent use of technology tools to accomplish these tasks.	The teacher creates a rich learning environment in which students regularly engage in higher-order planning, monitoring, evaluative, and reflective activities that may be impossible to achieve without technology. The teacher sets a context in which students are encouraged to use technology tools in innovative ways to direct and reflect on their own learning.

APPENDIX B

IMAGES OF TEAL CLASSROOMS

Teamwork
Organization
Greatness
Enthusiasm
Trustworthiness
Helpful

Formula:
Slope Formula:
m = y2 - y1/x2 - x1
Place in the values:
m = -2-4/-1-3
m = -6/-4
m = -3/-2
m = 3/2

PAPAL HISTORY

APPENDIX C

INTERVIEW TRANSCRIPTS

Introduction to the Interview

This part was substantively the same for all participants and is not reproduced for each participant)

I appreciate you taking time to speak with me. As you know, the subject of my dissertation is “teacher attitudes towards technology” and how it relates to teaching in the TEAL classroom. And I’m aware that you teach [subject].

I’m going to give you an overview here of our conversation and then when we’re done, I’m going to send you a transcript, it might take me a couple of days for me to transcribe it all, I’m going to send you a transcript to make sure that I have correctly captured your intent and we can make any corrections.

The dissertation is a public document so your identity is not anonymous because I know who you are but it will be kept confidential. Your name won’t be used in the document. You’ll just be referred to as “an English teacher.”

This is an overview of discussion. It’s a bit overwhelming all on one screen but I’m going to break it down for you.

This is a Technology Integration Matrix developed at the University of South Florida and it speaks of using technology across five different levels, from an entry level through adoption, adaptation, infusion, and finally, transformation. And we will talk a little bit about what each of those mean. I do that not because you don’t know what these words mean but because I want to read the definitions to each of my participants so that we are all speaking about the same thing in the same way.

We’re going to talk about those five levels of technology integration across five different characteristics in the learning environment. And, again, we’re going to explain what each of these are as well.

The five characteristics of the learning environment are Active Learning, Collaborative Learning, Constructive Learning, Authentic Learning, and Goal Directed Learning. And again, we’ll break these down a little bit each time.

So, moving across the levels, Entry level is where the teacher uses technology primarily to deliver content. It doesn’t take a lot of interaction on the part of the student. As you move across to Adoption, the teacher directs students in the use of technology but it’s very much of a procedural level of instruction. Then the next level is Adaptation, where the teacher facilitates the student’s exploration and independent use of technology. Moving to Infusion, the teacher provides the context but the students choose the technology. And lastly, Transformation, where the teacher sets the stage but the students can do different things that the teacher may not have intended and they’re doing lesson objectives/activities that you couldn’t do without technology.

At a school like ours, with a BYOD program, we practically start at the Adoption level because the students already have the digital technology. The primary difference between Adaption and Infusion is student choice in the use of technology and the primary difference between Infusion and Transformation is that the student in Transformation may be using technology that you were unaware of or using features of technology that you introduced them to in ways you were not familiar with.

So, to give an example here, in the Active Learning area, "students are actively engaged in using technology as a tool rather than passively receiving information from technology." So as you see those red boxes moving across, how would you rate your experience in the classroom in the characteristic of Active Learning across these levels that I just read to you. There's a little blurb about behaviors associated with each box.

Participant A

R: Can you see them okay?

A: yes

R: Great. So, on the continuum from Entry to Transformation, in the characteristic of active learning, given these definitions, where would you rate yourself?

A: I teach speech in the TEAL classrooms in the summer but I'm rather a guerrilla when it comes to TEAL rooms. If it's open, I'll move a class into it. <laughter> I've gotten in trouble with our administration several times for not signing the room out properly. One semester I signed out one of the rooms for every one of my class periods and we were like 5 weeks into it before they realized what I had done. They told me I could finish out the semester, but I couldn't do it again.

R: As I recall, there are a lot of aspects of the TEAL classroom that are present in your regular classroom, the Blackbox Theatre. You brought in the big Newline on wheels, for example.

A: yeah

R: you actually brought in some of that. You don't have the walls, of course, and that would be a primary difference.

A: The walls and the individual stations. I find that the students sitting in groups of 5 at a station is a pre—sort of a pre-selected arrangement that I really like. Because after a unit, I'll just say, "change stations" and they have to move around, and I'll let them change groups. They'll automatically re-order in a different configuration. And I can do that 3 or 4 times in a semester, which is really helpful.

R: I see.

A: I'm going to give you an answer, but I want to give you a little background on the answer. I would say that at this point in my teaching, especially now having gone to largely online, I am on the three tiles to the right. I move up and down those pretty regularly. Because when it comes to Adaptive level, or Infusion, where the students are choosing technology tools, for example, I used to have to get them off of Google Docs and on to our school-provided platform, Microsoft Office 365, for example. And a lot of that is built in, again, is built in by having the grouping because I'm using FlipGrid and I'm using the school account. I use Word Online, the school account, same with PowerPoint, so I'm having to encourage them to use organizational tools rather than the free tools that they're used to using and of course what they find is it makes cross-sharing and storage much better, because they don't have a miscellany of things. They just have all their school stuff in one place. So that being said, let me see, do I need to choose just one of these ten tiles?

R: no… you're choosing among the five red squares, but you can choose more than one.

A: I get it now. I think I'm going have to take the highest which is Transformation, because that's where I'm always moving. I provide, I show them the tools that we're using, and I show them how to use them. Especially in the speech class, then I turn them loose. And what I find is that my level is expanded by what they bring back. Sometimes a student will do something and I'll have to ask "how did you do that," because I thought I knew how to use the tool but then they'll do something I didn't know and then I'll incorporate that into the way that I will then going forward will teach it. There's a lot of that kind of thing going on.

R: and that's an aspect, interestingly that you pointed out, that the students are sometimes teaching you things. Another teacher that I spoke to said that he found it a little bit uncomfortable sometimes, you know, because we're used to being the "sage on the stage," with all of the knowledge coming from us and to control the room and classroom management and all those traditional concepts, and now, with this, you kind of have to cede some of that control to the students and allow them to know things you don't.

A: I kind of track those on different levels. Especially teaching speech and in teaching theatre, I teach a lot of, I teach basically like courtesy and tact and, because on the speech level, that's a communication skill that you need too, regardless of what we're doing, we need to treat each other a certain way, so, you know, so if it's technology, man, I'm wide open. I will even say to my students, this is what I think we're going to do, this is what I know about it, as we go along, you just give me feedback if something is not working or if you need, or if you see something that I didn't see. I keep that flow open because I'll admit that technology is not, has not, this kind of leaning and teaching would not have been an area of my strength, even 10 years ago. But by degrees, especially with the culture we have there at our school, and man, as soon as I see a tool that facilitates what I'm trying to get done, I will learn everything about it. So, I'm always open to that, especially recently, since we went remote in March. So, I'm going to put Transformation on that one.

R: Okay, the next one would be in the area collaborative learning and you already kind of pre-told this when you talked about how you like the setup in the room with the pods.

A: So, in this TEAL context

R: and that's really what we're talking about. I realize that in the second semester of this year we had a paradigm shift but that's out of scope for me. I'm really interested in the TEAL classroom experience.

A: I would put it at Infusion.

R: where the students choose but you could have accomplished the learning objective without technology (keeping it out of transformative) but you've instead elected to use technology and give the students a choice.

P Right. What I do is say "this is what needs to be done and I leave it up to you on how you're going to do it."

R: okay, got it. Thank you for that. Constructive learning, students use technology to connect new information to prior knowledge rather than passively receiving information. Again, this whole concept puts a lot of the onus for the learning on the students. The students have to be active; they can't just be passive.

A: I'm going to say Adaptation.

R: Okay... in the middle, that they use the tools to build knowledge and there is some choice but it's not as wide open as some of the other areas we've discussed

A: yeah, I think in some ways what this matrix is allowing me to accurately represent is that it depends on what level we're working on. In a classroom there's a diversity and for some students I give them an idea and they come back with something that blows my mind and others I have to lead them all the way through even with some of the simplest tools. And they will make some choices along the way but predominantly they're looking to me to make most of the decisions, outside of content, for them.

R: Thank you. A couple more. Authentic learning. Students use technology tools to link learning activities to the world beyond the instructional setting. And this is where I think where some of your real-world acting experience must be tremendous for your students.

A: I'm going to say Adaptation here… independent use and some student choice and exploration. There's a lot of discovery that, again, it just has to do with the student. I have freshmen and I have seniors in my classes. Here's an irony, really, usually the freshmen are more open minded and they're more integrated when it comes to like this stuff, I'm showing them because they're like "wow! That's great" and some of the upper classmen who have been able to get by over the last several years with maybe one or two tools or one or two skills, they don't see any need to expand their use of tools.

R: They will in 2 years when they're in college!

A: I try to make that clear to them. And usually by the end of the course or maybe in the middle, they give up that stoic attitude that they come in with and become a little more flexible and adaptive.

R: Your courses, like mine, are typically one semester, so we don't have as much time to build rapport and trust with the students before we get into the content. You and I have to kind of move it along.

A: I'm not sure that's the truth for me because one of the first things I really do is I make it clear that we're in a relationship and that at the beginning of the class, I used to shake their hands and say their names and call on them and model friendliness, model courtesy, and say "we're going to spend 3 months in the room together, you can't just, you know… it's important that you learn that teachers are human beings and if you don't acknowledge that and treat them with some type of respect, later on if you have some issue or you need to ask a question or you're upset about something there's no grease on those gears to help get through a difficult time, you know, to be tactful." So, I do spend time and because it's a communications class, I'm going to say "look, I'm going to be talking about, on the stage, how you look, sound, move, and you need to understand that I'm not criticizing you, I'm talking about the performance of skills and I try to keep those clearly distinguished. Maturity has a big influence on whether or not a student can do that, but I'd say 95% of the students, most of the time, are able to get that and understand the 2 levels that we're working at.

R: Right. I see that. And the last area is the area of Goal Directed Learning, where students use technology tools to set goals, plan activities, monitor progress, and evaluate results, rather than simply completing assignments without reflection. So I think of that last, completing assignment without reflection, as a worksheet. Here: fill in the blanks and give us *the* answer, without reflection. I don't know how much of that is present in your content area.

A: I think I touch on that with… I have what I call "reading quizzes," where students read chapters and then do true/false questions, because that forms the fundamental basis that is the vocabulary I'm going to be using, this is how I'm thinking about it and framing it and if you don't understand that, you're going to get lost if you don't understand the terms that I'm using. I think this one, in terms of goal-directed, Infusion is going to be my choice because by the end of this course, I've introduced lots of tools, lots of techniques. Different speeches have different goals. Different plays require different approaches to the content whether the genre is tragedy or comedy or melodrama or farce or whatever, so we look at whatever. And we look at what is this thing and how do we get there. And I sort of outline what the things we have to use in order to get there and then allow them to make those choices because otherwise the creativity and, especially, and in all my classes, creativity ranks very high, so how things are put together and whether it be a performance or a presentation or something, the more that you just take the ideas guiding what it is towards this goal and do whatever you do with that, is the… I get more and more hands-off as things go on. I start with a bit hands-on

and get more and more hands-off. I lay down the framework or the matrix if you will and then I let that guide everything and by the last quarter of the second quarter of a course, it's mostly now just dealing with those things and in whatever creative way that the student wants to

R: You're right. Yours is a more creative class than many. So, let me ask you this, is there something about your experience in the TEAL classrooms that you would like to share with me, just moving forward. This dissertation is not scientific experiment *per se* in the traditional sense. It's almost like an ethnography, I'm describing our experiences as a community with the TEAL classrooms more than doing a traditional study with an experimental group and a control group. So is there something about your experiences that you'd like to share with me.

A: It's very hard for me as a teacher, even before I went into the theatre, imagination for me is a black box, in my head. So, a traditional classroom with rows and desks and this small bit of space for me to move in, and students can barely move in, and it's very regulated. That's like a crowded black box theatre where actors can't move, and things can't be done. There's no level to operate on. The TEAL classroom, even the four smaller TEAL classrooms, provide me a place that reflects more of how my imagination works. It's like the inside of a theater reflects how my imagination works. I think it's like almost a Jungian reflection of the human imagination. That's where theater comes from and even where a good classroom comes from for me, the TEAL classrooms... my favorite one is the big one upstairs. And even if I only use half of it and I put my students on one half, I have a lot of space behind me and space around me and I can move them around. I can have them set up as an audience when someone goes up to present. I can reconfigure that space and have them reconfigure that space. Any way you want to set this up is fine with me. Everything here is on wheels. Construct it any way you see fit. Use your imagination. What will best facilitate what you want? And sometimes they don't know what to do and I'll pay attention to what they're trying to do, and I'll make a suggestion and say "hey, may I suggest you do this." And they're like "wow! That's a great idea" and that's been enough of a catalyst to get them over the hump. For me, this type of a learning context really is reflective of how my imagination works which is in turn reflective of how some of the other conventional things that I participate in. The convention of theatre where there is a place where imagination is projected for a group of people to experience.

R: I love it that you use the word "imagination" in an educational context. I wish we had more of that.

A: Well, that's the crux of the matter for me. I live there… in imagination. And I didn't come to education as a first choice, but it was a good third choice for me, after being a musician and an actor. And I'm still those things but in the context of teaching, where I wanted to help people and to give back but I also found it to be a great place to allow my imagination to help inform other people's imaginations and especially, I found, over the last 10 or 15 years, with technology taking the place of many students' active imagination, that to get into the mechanics of how one's imagination works and how to pay attention to it and how to let it be a source of, you know, inspiration, and joy and

fascination. Not that someone else occupies that space, but you've allowed them to do it, but you yourself get into the actual construct of that inner space in the mind and paying attention to those things may not, you know, sometimes I'm finding it kind of interesting that I have to teach how to do that. Something that would have seen quite natural in some ways it's being supplanted by the quick and immediate ability of someone to, you know, just watch someone else's construct. Of course, that's okay but let's look at how you can do it. For me, anyhow, I want to encourage students to do that on their own. For themselves.

R: I sincerely appreciate you taking time to speak with me. I'll send you a transcript so you can confirm that what I got is what you meant and, again, thank you.

Participant B

R: Can you see them okay?

B: Yes.

R: Now, your teaching situation is different from most because you have your German students for 1, 2, or 3, or even 4 years as they go through the various levels of German. So, it will be interesting to see how your experiences contrast with another teacher who most of their experiences is with one-semester classes.

Now, what I'm going to do is give you time to read this and look through the various descriptions along the continuum in the red boxes here as they relate to Active Learning. I'm reading these to you because I want to be consistent with all interviews. In Active Learning, students are actively engaged with the technology rather than passively receiving information from the technology.

B: So, as you mentioned earlier, because I'm in a unique situation, I teach students for an entire year, 2 semesters, but I also teach 4 different levels of the class, I'm going give you my responses, probably dividing up German 1 and German 2, which tend to be more underclassmen, versus my upper classmen that at this point have had me enough as a teacher that I think their levels will likely be different than an underclassmen.

R: Right, and as those courses begin, you're not going through the whole rapport building process and trust building each time. But they already know you and you have a relationship.

B: And because I'm a big proponent, kind of, the first days of school, especially those first couple of weeks, we spend so much time on the tech part of the class, before we even delve in to the content, I'm not having to do that every time because they know me. At a certain point, most of the tools that we're using are going to be different at the upper levels. So I'll try to elaborate on that. I scaffold it more in the lower levels that I would in the upper levels.

So, I would say German 1 and German 2, we're definitely at a minimum at the Adoption phase.

R: To me the key word here is "procedural." They're figuring out how to do the thing.

B: Right. So that's the minimum. And then by the end of the year, maybe even by the end of first semester, they've probably moved into the Adaptation phase. Some student choice is key and independent use is key, definitely. But I think I tend to not give them as much choice at the lower levels. I'm more like "this is the tool and here's how we're going to use it" versus the upper levels of German, would kind of straddle between Adaptation early on and move toward Infusion where they, you know, get a choice and certainly as it says, "self-directed use." So that's where I would see myself, in the middle 3, Adoption to Adaptation is the trajectory for levels 1 and 2 and then Adaptation towards Infusion would be levels 3 and 4.

R: Now, in the area of Collaborative learning, students use technology to collaborate with others. I don't know how much you do that. In some of the classes, collaboration is almost built in to the curriculum. I don't know how it is in your language class.

B: It is… not all of it is tech related, though, especially at the lower levels, because of the nature of the content. So, I would still say, based off of the descriptions that I'm reading, that the lower levels would be Adoption

R: Using technology in conventional ways

B: Right, in conventional ways, for the collaborative approach. I'm trying to think now back on the year as a whole, I would say possibly by level 2 or even the end of year is when we tend to do more collaborative work anyway. Some Adaptation, and then… Similarly, much like the Active Learning section, the upper levels, levels 3 and 4, would be Adaptation and Infusion.

R: It's almost like most of our lessons would be possible without technology (keeping us off of Transformation). Here were talking about peers and outside experts and it's really out there. Now, this integration matrix is using higher-ed as well and some parts make more sense there.

B: And that's not to say that we don't... I mean… I've had "experts" in German language, meaning native speakers, Skype in to us… yes, I've done that. But that's not something that's ongoing… they tend to be random and one-offs. But I've also brought in live speakers (not using technology).

R: Part of what I think the TEAL classroom affords us is that when you have an opportunity for a one-off, it's not a big deal. The room is flexible, and everything is on wheels, so it's like "okay, everyone get in a semi-circle and we're going to have this webcam going." And we can accomplish that quickly because the room is flexible.

B: Right. And maybe this is helpful because we're on the collaborative learning part, too, I was afforded the opportunity early to teach an entire year of a combination class

where I taught German 3 and 4 during the same class period and I got to teach that class for the entire year in a TEAL room and that was certainly, like , transformative for me personally, as a teacher. And I think because of the collaborative learning approach, because I was able to have the 3's in one section and the 4's in another section and I could have various teaching walls and I could easily transition between the different groups. That's specific to the TEAL room and that was certainly benefitial I would say for them and for me.

As someone who floats from classroom to classroom, I didn't have a set room at that time, it was nice to have that space that worked perfectly for a combo class. They were immediately in a collaborative setting.

R: More than in a standard room

B: right… which is not to say we don't move desks in a standard room but it was so easy. I could just plug in my laptop and turn on and off different screens.

R: and the white board is everything, everywhere

B: that was great! We could divide and conquer and use all four corners of the room.

R: moving on to Constructive Learning, students use technology to connect new information to their prior knowledge, rather than passively receiving technology. This is constructivist in the learning theory sense of the word.

B: I think this has to do probably more, thinking about cirriculum and scope & sequence and maybe how it's delivered with the use of technology tools, I know it's, well "no," because even in entry level it says that teacher uses technology to deliver content. I definately think that in levels 1 and 2, I'm definately dumping information.

R: well with language you have to build up vocabulary. You have to start somewhere. You have to give them vocabulary and then general rules on grammar.

B: so I always say that for levels 1 and 2 I'm teaching the language whereas for levels 3 and 4 I'm using the language to teach. I definitely, I would say, probably more so on this one, it's more Entry and Adoption, moving it to the left, for levels 1 and 2, and to some degree… let me double-check and read to make sure I'm not missing anything… think part of that is just thinking holisticly, thinking of an entire course and an entire level, certainly some of the Adaptation will come into play maybe more as that ocassional one-off, whereas I think that's heavy in levels 3 and 4. And I would probably stick with Adaptation because of the verbiage of some student choice, because I do tend to, and maybe it's the nature of high school, I still try to guide them more. Which are the reputable sites? Which are the problems that I know are going to work? Or that I know are user-friendly and will require less training.

R: There are other factors to consider also. For example, I was teaching something and I wanted to use a resource but you had to be 16 years old to use it and I had a student

who was 15 and wouldn't be 16 until April. So there are somethings we just cannot do. At higher-ed that's generally less of a concern.

In the area of Authentic Learning, and here's where I'm particularly interested in yur opinion, because the language class is not just the language, but it's also the culture of the country. So here were talking about students using technology to link learning activities to the world beyond the instructional setting. Rather than working solely on decontextualized assignments. Again, using your phrase, the first 2 years you teach the language, the second 2 years you use the language to teach, I imagine as you get to the higher level you're talking more about German culture and literature and maybe even poetry as opposed to just conjugating a verb, for example.

B: looking at how this is worded on the matrix, let me double-check. I teach something of a cycle cirriculum, and I see that for levels 3 and 4 it would depend on the subject.

R: can you please elaborate on cycle cirriculum? I'm not familiar with that term.

in the past, well I guess it's been about a year and a half, having a combo class, having levels 3 and 4 always taught during the same period, I was trying to work on differentiating between 3 and 4 when it comes to writing and grammar because those tend to be built on prior knowledge and what do you remember and learn but in terms of the content, so what is the topic of discussion? And maybe what are the poems, songs, or readings, or graphs that we're analysing for a particular content, I wanted the content of the cirruculum to be cyclical, so having a cycle A and a cycle B, meaning that if you came in on a rotation I guess, this coming school year will now be cycle A so 3 and 4 will have the same content of topics... the 8 topics that we'll cover throughout the course of the year will be same for 3 and 4, just different in terms of the writing and the grammar. That's integrated so if you come in next year as the German 3 you're in cycle A and then when you take German 4 that will be cycle B.

R: this will be 8 things but B will be 8 different things and that will be the starting point for the German 3

B: 8 different things and 8 of the topics have… I teach with a thematic approach, so it's still maybe the same broad topic but 2 very different things. So if the broad topic is history, for instance, this year we focused on the fall of the Berlin Wall and reunification. So that was a very timely topic because it was the 30th anniversary of the reunification.

This year, the students themselves in the upper levels probably had more authentic transformation in how they were being able to connect, to connecting and using some of those higher order thinking skills to go beyond even what we were just talking about in class because it was so timely in what was going on in the world. From a tech standpoint, probably more so. I mean were they following German news on Twitter or, you know, looking at Deutsche Welle website, whereas now, this coming year we'll go back to cycle A and the history focus is on resistance during the Nazi era, so now the kids have a different perspective. I also do a unit on multiculturalism, and immigration and refugees so it kind of ebbs and flows, they're going to be continually making bigger

connections to things on the outside. But maybe not so much on a topic like cell phone addiction… teens and their cell phones. I don't forsee them using tech as much for that. But on this one I think for lower levels, I mean, everything is always tied together. We have to go beyond ourselves, so sometimes… here I'm looking at certain words, definately minimum Adoption for the lower levels and some Adaptation because I do encourage them to, you know, connect as much as they can using authentic German resources, that can only be done through technology, not being in a German speaking portion of the United States. So, that I think's important. And then, I don't know, maybe the upper levels does span Adaptation through possible Transformation. I mean I tend to see that as definitely higher or beyond .

R: German 4 is an AP class?

B: It is an AP class, and that's what we're doing and even in their writing and their research, they're using higher order thinking skills but it's still very guided.

R: It's guided because it's still high school but at the same time they're reaching those stretch goals, they're reaching for that next level.

B: Right. So I would say this one, of all of them, this is the one where Transformation comes into play in the upper levels

R: Got it.

B: That was a lot of words

R: It was great! The last one is in the area of Goal Directed Learning, where students use technology to …. I don't know how many multi-session, multi-week projects you do. I suspect it's fewer at the lower levels and more as you get into the AP level.

B: Correct. It tends to be like just a 1 day thing with the lower levels whereas with the 3s and 4s they tend to get maybe a 3 to 4 class period assignment or project.

R: And I imagine that might be also an opportunity when you're in the TEAL room and you've got the combo class and you give a project to the 4's and you turn your back, literally, and deal with the 3s, and then come back and check on the 4s.

B: And to be able to differentiate the different type of lessons and to give them more freeedom. I would definately say it's more, looking at Infusion, it's more flexible for those upper classmen, just even, it's, like, I don't handhold but I taught middle school for years too. Especially those first semester freshmen, and I'm thinking of lower levels, we're going to start at Entry with the modeling and the scaffolding.

R: It's for their protection too, they need it.

B: And to make sure that, and maybe that's just me not letting go enough, I tell them I want it done and I want it done right. So for consistency's sake, you know, I train them and them start to let them go. So Entry to Adoption.

R: Because you wear multiple hats at school, you have that instructional technology hat too, and I ask this of others also, have any students used a tool that you weren't previously unfamiliar with? Because as you get in to the higher levels, they get more choice and they may use something that you're not only not an expert in but that you literally have not heard of before.

B: The only thing that I can think of, and I think part of it is just because it's not my forte of tech, is there are certain kids who are just stellar videographers…. They can edit and make amazing videos. Those kids with Macbooks, where it's so easy, trying to find some of the programs that I used to use, I don't have any more. I mean those are the kids that tend to go above and beyond. A few random kids have done a Sway, but that's something I kind of knew about, so that wasn't new to me. Or some kids, if I show them something that I've used, a tool, then they'll take it and try it.

R: But then they may exend it and go beyond what you demonstrated in class

B: Right or use it another class and then I don't always know about that. I do know that has happened sometimes.

R: And my last question is kind of open ended. Is there anything in your experience with the TEAL classrooms that I didn't ask about but that you would like to share. My dissertation is not a traditional, you know, treatment group and control group, it's more of an almost an ethnolgraphy, it's a description of what we're doing here.

B: The Trobriand Islanders and studying them.

For me it was, I mean, having that year in the TEAL classroom for a combo class, it was… it sounds weird to say it like this, but it truly transformed how I taught too. It brought me back to my earliest teaching days when I was in an elementary and middle school classroom and being able to have centers and stations and do jigsaw collaborative work with students. And I know part of that is just the space itself but the added tech of having students with their laptops and being able to project and to do gallery walks with students in that space, was wonderful. I don't get in there as often as I'd like. I do love using it for training with teachers, but for my own German students I tend to use it at least once a year for every class. German 2 usually get in there twice. And it tends to be where I'll check it out for a specific unit or project and it tends to be that collaborative piece. So I think that's part of it.

R: Plus it's fun to write on the walls

B: Oh, there's definiately that element! Because not all the classrooms that I teach in have that. And that's a great brainstorm space.

And I think some students may watch movies like the Internship or Office Space and they see a real corporate setting and the classroom is kind of like that. They just get excited to be in there too. Sometimes the enthusiasm is a nice change of pace for the kiddos.

R: I remember doing an 8th grade tour and one of the kids said “what class do I have to take to get in here!?”

You don’t usually hear 8th and 9th grade student talk about a classroom like that. That is part of the fun. That’s kind of the marketing aspect of it. From a business standpoint, you can’t disregard the marketing aspect.

B: That’s true.

R: We gotta get students into the seats

B: And we got to sell students on the idea of learning.

Participant C

R: Can you see them okay?

C: I can see them okay… I’m re-reading their definition of Active Learning. And I think you’re right, I think everybody comes in with a knowledge base and their computer or technology is accessible 24/7. And so that’s a baseline for our class. Does that answer your question, or do you want me to go on?

R: Okay, so that’s the baseline but where do you see your experiences? In other words, when you use the technology in the classroom is just procedural or something more? Now, you teach primarily freshmen, is that right?

C: All freshmen

R: ALL freshmen… okay so they may not have some of the experience or higher order thinking skills already at that level... .they’re 13 or 14 years old, so you’re saying that it’s pretty much Adoption and you’re focusing on procedural use of the tool. They’re not using tools you’re not aware of and they’re not using tools without your direction

C: Initially that’s where we start. We start on a baseline where my presumption is that I need to teach them how to use the tools that have in their pocket.

R: And by the end of the year do you think they get past that? To independent use and novel use?

C: My goal is to get them through the class and learn how to use what they have on an independent level so that I’m providing them tools throughout the year that they can store in their pocket and pull out any time. So, as we get into the later chapters, you’ll see a kid pull something that we did in the first chapter out and it just surprises me to no end that the have that resource. That’s why we have index cards that send them back to previous classroom experiences and they have these tools. I don’t what them to learn them for 6 weeks and then drop them. I want them to have them and continue them. And we always go back and bring back old information. But yeah, they all start

at the same level, for me, and that is teach them how to use the computer, teach them how to use the calculator, teach them how to work in groups in the teal room and Then go from there.

R: Got it. So primarily Adoption with a goal of Adaptation.

C: That'd be a good paraphrase.

R: In the area of Collaborative Learning, where students use technology tools to collaborate with others rather than working individually.

C: I think is one of the beauties of the TEAL room is that you have such an arsenal. You can have them use their own computer and collaborate. Or you can have the group use one computer and hook it up to the device on the wall and now they're all engaged with one computer. Or I can supply the problem and have them look on their computer, within their groups, just the way they're grouped, we have the ability to have them work collaboratively in so many different ways. And I think in math, for me, verbalization is huge, okay, to be able to explain how to work through a process, to solve a problem, to me that's the ultimate goal. All right, so when they're working in groups and I can walk around and hear them discussing what that word problem is, how they have to set it up, how they have to, you know, come in with different tangible things to solve that problem, to me, that's a goal of mine. It's not just to solve a simple equation, it's to solve a problem that we encounter.

R: So, in this context they're at Adaption in the sense that they're using the tools collaboratively. Do you think you hit Infusion where they have a choice of tools?

C: I would say towards the end (of the year) when we get into multi-level problems. Especially word problems, which I love, it is (Infusion) because I try not to give them the tools to work the problem. I try to give them a set of tools, for that lesson, but it surprises me because some of them have such recall that they see it (the problem) in a different way, so I joke and say "it's my way…. or it can be your way… not the highway." I love it! Because I like to be quiet sometimes and just listen to how they solve a problem.

R: It's interesting that you say that because we so often are used to being, as teachers, the "sage on the stage" where all knowledge comes from us. One of the things that I think the TEAL classroom lends itself to is to this ability, as you said, to step back and let conversation happen with you maybe providing some guidance and correction but you're letting them run it.

C: Correct and a second part is when I project a problem on the five stations, one person as to read it, one person has to be the scribe, which means they go to the wall and write down all of the thought processes. So I can see what they're thinking. I don't have to be at their table, I can see what they're thinking, and I can either choose to let them fight through an issue or I can go over there and redirect. All I have to do is have a chair that rolls and I'm perfect! But as I hear conversation, I don't just interject immediately. I let them struggle a little bit. Which is tough for me because, you know, I

want to fix things. I think there's a lot to be learned from making mistakes so I can hear them talking, I can see their work, and they discuss their work that's being put on the board and then I get to evaluate as to whether I want to inject or not

R: And because they're writing on the IdeaPaint wall, you can see this for all the two, three, four, or five groups, without literally standing over their shoulder. You can sit back and still see their thought process.

C: Absolutely. Then I have the choice to jump in or sit back and watch if they'll fight through it. If I see a mistake, you know, it's my choice and so that's what I love about it because, you know, I think you learn through failure. It's kind of a neat deal. I see a bunch of it. I see the writing, I hear what they're saying, and does is parallel, does it correlate, and then is there a mathematical error on the board

R: Thank you, thank you.

In the area of Constructive Learning, where students use technology to connect new information to prior knowledge, rather than just passively receiving information.

C: Okay, that's where we have an idea. I make them keep a notebook, a journal, that keeps all their notes in there. Not their work, but their notes, and we always reference back to previous chapters and see how this correlates to prior knowledge. And because it is so connected (in math). You do functions, for example, and you do functions all year long. You're solving equations, you're solving equations all year long. So their toolbox is getting bigger and bigger every day.

R: That would hit in the area of Adaption because they're using the tools. They don't really have a choice as to which tools to use. You're giving them the structure of a notebook

C: Right, they keep a [paper] notebook, so they see prior information, prior lessons. I don't want their homework to be in there. I want just their own notes. Because those are tools to solve problems. So, we might be in a lesson in Chapter 8, but they might be using stuff from chapter 6 and chapter 4 and it's their job to go back and reference that. For me to say "you remember what we did in chapter 4, remember, how we combined like terms?" I want them to recall that. So I can reference that. I can say "go back to chapter 4 and see what we did." So I have to be on my toes as to where things are.

R: You're kind of providing that guidance, it's not that they're discovering it on their own, at least not at the beginning of the year.

C: yeah, it's a learning skill… especially for freshmen, it's a learned skill. Because they like to be told what to do and how many times to do it. And for them to be successful in math down the road, and I tell them about standardized tests, I can't tell them what problems will be on there. All I can do is give them the skills. If I knew what the problem was, I could teach them, but I don't know. It changes all the time. And so you try get them in a mindset where you have to discover, on your own, how to solve that problem.

R: right. Okay. Thank you. A couple more. In the area of Authentic Learning, this is where students use technology to link their learning activities to the world outside of the classroom. And you mentioned story problems, so I imagine that's kind of a vehicle for doing this.

C: We do as many word problems as we can just for that [reason]. Because the old question of "when will we ever use this?" comes up about twice a day. So when you can show them, and our textbook lends itself really well to doing a lot of word problems, so I don't have to go out and support it very heavily from outside experience. But the word problems that we do are very pertinent to what they see in real life. And when they can see a parabolic curve based on data and we put in a calculator and we reinforce it by being able to enter that data, see the data, understand when there's a positive curve or negative curve, or a trend line, or whatever it is. It all fits together. That's not until second semester when we start doing really heavy word problems. So, it's a learned process of what they can do. I think the calculator enhances it because that's a palpable tool, you know, and so we try to do a ton on the calculator as far as entering data, representing data on a graph, changing the grid to where we can see the graph differently. I mean we were getting into the data that was coming out regarding the corona virus prior to us leaving [campus for the semester]. We can put that data in there and show what Judge Jenkins was doing. So we were able to take data we got out of the tv and put in the calculator, see the graph, and explain why the beds were needed in the hospital and that's relevant. Although they don't know it's a parabolic curve and they don't know that it's exponential growth and that there's a line of best fit but they're learning all that because it matters. And to me it's exciting. To them it could be exciting.

R: I agree and that again would put us in the Adaption box, not so much the Infusion, because they don't have a lot of choice. Am I correct that [our school], they use the same calculator all four years in math.

C: Oh my gosh, it's been such a change. From the first year I got here, they said "no calculator the first semester," to now I personally show them as much as I can. I show them how to do it on paper and then I show them how the calculator can enhance that. You know, everybody loves doing the calculator because it feels kind of like cheating. Their ears perk up and their eyes open wide.

R: Teacher sanctioned cheating!

C: Absolutely. And so it's insane not to use the calculator to enhance whatever we can do. Although I don't shortchange them on teaching them how to do it on paper. You can't do that. You have to show them because the calculator can't be smarter than you. Computers aren't smart unless you know how to use them.

R: And the last one here is Goal Directed Learning where students use technology to set goals, plan activities, and monitor progress. I don't know how much project work or multi-class, or multi-week you do in you freshmen math class.

C: We don't do a lot. There is one thing we do, outside of the curriculum, where we do a project. When [the English Teacher] taught next door to me, we would bring in the English department in and talk about doing a paper. Very goal directed, this is what we want, this is how we want you to do it. There were two. One was over a mathematician and another was a career choice or a job. But we brought the English department in because he was right next doo and he would talk to them so we would have the 2 departments working together to learn a goal-oriented project. Which was outside of the curriculum so that wasn't something that we did in class every day, that was something they had to do outside of class but it was very goal-oriented because I wanted the paper and I wanted a PowerPoint presentation and I wanted done the way the English Department wants their papers written (MLA style) so we worked collaboratively. So they [students] were able to see the two of us [teachers] working collaboratively and we really gave them all high 5s when they turned in stuff that was really high-quality work

But I don't think that's the goal-oriented that you're asking about.

R: Right, your content and the level you teach doesn't really lend itself to this

C: No, it really is a beginning class. I think if I went back to teaching algebra 2, I would really stress those kids out because I'd make a lot more things goal oriented.

R: My last question is an open ended one… is there anything else in the context of the TEAL classroom that you'd like to share with me?

C: Sure. A couple of things. First thing is that I allow the kids, the first day of school, to say that math is not their favorite subject and that it's okay not to like math. And that hopefully by the end of the year we might turn that just a little bit. The nice thing about the TEAL room is that it allows you to be expressive, stand up, you know, collaborate with your friends in a math situation, and before you know it, the conversations are going to be math oriented. It kind of breaks that fear of "I'm going to have sit here and listen to this teacher teach and I'm going to have to do a hundred times what they say to do." It's a whole different twist on the learning curve which allows the medium that you chose, as a teacher, to influence their attitude about math. And then once you get that tweaked a little bit you can *almost* teach them something.

It's amazing! And so I think the paradigm is that they come into my classroom thinking Math is going to be ugly and bad and through the TEAL room, you're able to experience math at a different level. And by the end of the year…. I tell you… every kid likes to draw on the wall. I don't care who they are. Every kid likes to draw on the wall, sign their name to their worked problem. So it allows them to do something to them in an uncomfortable situation. And so I really, really think it enhances my kids learning and appreciating math. Because if they don't like math after their freshman year, it's a bad day because they have 3 more years of it.

R: How much do you think that the unconventional or different nature of the room disarms their canned objections. That is going to more of 5 students sitting in 5 rows,

25 students, 1 teacher, we're going to do worksheets, I'm going to hate it, and they walk into your room and Whoa… this is… not that.

C: Yeah, it's hilarious how it changes over the year. And I've even had kids say they like my class… it's kind of scary.

R: Oh no!

C: It just changes because I've taught that way, [researcher], for so many years, you know where you have 40 kids in a classroom… how are you even going to sit them. Here, it's not that. You change that paradigm because you're putting a problem in front of them and they have to discuss it.

When they're talking math and I'm walking around listening to them, then maybe you put in a little competition or something, as a teacher, it's nice. You have them video their homework. Video that problem, bring it in, put it on the board and let's see YOU teach it. I'm not teaching, you're teaching it. And that's so easy to do with smartphones now. I'm going send you home with a problem and you bring it back and teach it.

It really, really changes their attitude over the course of a year.

R: I sincerely appreciate you taking time to speak with me. I'll send you a transcript so you can confirm that what I got is what you meant and, again, thank you.

Participant D

R: Can you see them okay?

D: Yes

R: So, I'm going to let you go ahead and read the words in the five boxes (for Active Learning) and ask where you think you fall along this continuum. And if you have different classes, where some classes are mostly sophomores and others are mostly seniors, you can break that out however you want… subject matter or grade, or whatever else.

D: I would have to say, Adaptation.

R: So, there's some student choice and exploration but it's still pretty heavily scaffolded and heavily guided by you.

D: And that happens in different levels. In the Government class, for example, when they do their political view project, I give them the quiz that we all use, I give the links to the party platforms, but then they get to choose what article to go read. So, there is some choice, because they have to do some research on issues. And, like with the sophomores, one thing I did at the end of this year, I assigned an article through a database that we have, for each student, and they had to use it. When they work on the

national history day project, they get some choice, but it is directed because the sophomores still don't necessarily make good decisions about what valid online tools are.

R: And that's part of what we're trying to teach them. I get ya. Then on this matrix, when they talk about higher order skills, we may talk about some external resources. Keep in mind, the matrix applies also at higher ed where some of this more appropriate.

In the area of Collaborative Learning, students use technology tools to collaborate with others, rather than working individually.

D: I guess I would have to say Adaptation again. But I don't do a whole lot of collaborative stuff. But like, when they're working on projects, they can do that. With collaborative use of tools, for example, in my Holocaust class, they get to choose what precisely to research and what presentation tools to use so there is some student choice and exploration. And I do things like, with the sophomores, when we make sure we know how to write a good thesis paragraph, I'll use Google Forms, and everyone will anonymously put in their work, and that seems a bit more convenient.

R: Just so that I have a better understanding for when I'm writing this up and coding what, what class do you teach for sophomores

D: AP World History primarily.

R: And then juniors and seniors take the Holocaust class.

D: Actually, occasionally a sophomore will too, but it's mostly seniors with some juniors sprinkled in and this past year there was one sophomore.

R: And then government is all seniors, and it's AP also.

D: Only seniors can take government because we want them to have the junior year of US history before they take government and then they year that they are seniors they're usually turning 18 or approaching the age of 18 so they're much more interested in the participation of citizens.

R: Okay... government, world history, and Holocaust.... what else do you teach?

D: Anything and everything

R: I recall you had a history of science class

D: That was a few years ago, I taught the history of Russia, I used to teach AP European History, this past year I taught an early-modern Europe and a modern-Europe. I've done regular World History. I've taught both regular and AP US History but that's been several years.

R: And teach in a standard classroom, but have you ever made use of the TEAL classroom.

D: I do not.

R: That's okay.... that's fine.,

D: So, some of what I do sounds more like Adoption on that one but some of it sounds like Adaptation also.

R: That's fair. It's a continuum. There are boxes but it really is a continuum.

In the area of Constructive Learning, students use technology to connect new information to their prior knowledge rather than passively receiving information

D: It looks like I'm never going to go higher than Adaptation

R: That's okay! That's okay!

D: Because Infusion keeps saying "regular use" and this is stuff that I just don't do that often. And transformation says "unconventional" and god knows, I'm not that! [laughter]

So that one sounded more like Adaptation also.

R: Your PhD is in history, right?

D: It's in modern European history. Both my graduate degrees are in history.

R: I just wanted to get that for my notes.

Okay, on the subject of Authentic Learning students use technology tools to link learning activities to the world beyond the instructional setting. So again, I would see that for AP Government, with 18-year olds, they might have a different answer than sophomore AP World History students.

D: Well, like in Government, we sometimes use political cartoons. We connect to current events. And we use, like this fall, we're going to use the current election cycle as our examples, and they can look up stuff. I don't know…. Ummm... I guess I'm an old fashioned teacher in the sense that, to me, I do rely on students to learn, and that's primarily the reading, but they still require some explanation in a group context, where they're able to ask questions, and so, a lot of what is coming up here is independent use of technology and they can do it but I don't rely on technology for student learning.

R: That's an interesting sentence…. that's a valuable sentence.

D: Look, one community college where I taught, it was in a shopping center. I had no maps, no overhead, no nothing. It was just me and a chalkboard, right, and I can do that. And I use the smartboard (in the standard classroom) and I get students to do some things, right, and sometimes I'll say "that's a good question and I don't know so

you go look and share with us what you find out" and a couple of minutes later in class I'll come around to that. But to me, I require enough reading that that's taking up a lot of the students' independent study time. As opposed to them finding resources, so when we get together, we do an assessment and give some feedback but then we kind of explain it where people can ask questions and they get clear explanations and can then put it all together.

R: A lot of what informs your approach to the teaching has to do with the subject matter, where you have with these AP classes, for example, a set curriculum that you need to get through and that drives a lot, it sounds like it drives a lot of how you approach the material.

D: Right, because in like AP World History we have to move quickly and they're getting 2 semesters of college credit for it (at our partner school, anyway). But it's long been my experience I can't just rely on the students to do something on their own and have adequate learning. They need the pieces put together. They need the story telling to gather their interest. Which they can't really do on their own at this level. And they can't really get that online. The other AP World History teacher encourages students to go online and watch YouTube videos. But again, I'm old fashioned, because I believe that the teacher in the classroom, with the students, day-to-day, makes a big difference.

R: Now you also taught in higher-ed before you taught here at the high school level

D: Correct. Several stops

R: Do you think that influenced your approach also?

D: Possibly. Well, I mean, even when I started here, there was a smart board, but it was badly placed, and it didn't work well. So even the technology here has become much more consistent and stable since I've been here. But Universities, again, I don't have to be in a room with load of technology, right. Because to me it's the discussion, the conversation, where the learning happens. And even when students are going online and researching, right, I'm going around to see what they're finding. Show me what you're looking at… yes that's a good one…. What are you concluding from that?

R: And there's a difference between going on to YouTube and here's a set of curated videos and I want you to pick three to watch. There's a difference there.

D: Ummm... no, I think the classroom interaction is worthwhile. You know, I had somebody suggest a few years ago "just find someone who lectures well" online and you can just play the videos and the teacher is done. That's like assigning the reading and you're expecting the students to learn it, without context, without connections, without discussion, and I just don't think that works… I don't see that [has] happened.

R: And connections is one of the words here in the constructive learning characteristic. Making those connections.

So, in Authentic learning we talked about that you find yourself pretty well in the Adaptation phase primarily because of the word choice

D: The words “regular use” and “innovative” or “unconventional” kind of eliminate me from those two.

R: Okay… the last one here, and I have one open ended question after this, is on the Goal Directed Learning. Now, I don’t know how many multi-day or multi-week projects you have in your class. Here students use technology to set their goals, plan activities, monitor progress, and evaluate results. So, this would be either individual or group work but they’re doing project work over the course of days or weeks.

D: I basically have one or two a year in each class. Well, government gets one a semester, a political views project. Sophomores get the national history day project where they have to do research, put it together, and create an artifact, like an exhibit, or a video, or a website, or whatever. And then they have to do a research paper or read an article in a scholarly journal at the end. Some of the assessment and evaluation, one thing I do in the holocaust class, it’s really the only class I use the journal feature of Blackboard regularly. Because that’s a different kind of class. And that kind of reflection is what we need to do. And most of the other classes, I mean, they’re doing it kind of as we go and having discussions. But like, in Government, when they assess their learning and reflecting, I have them lined up in a political spectrum from right tot left on a particular issue and we have the discussion. Technology would add nothing to that experience… nothing to facilitate that. To me, that’s just learning, just good teaching.

R: One of the mantras in our department at UNT, and I got this from one of my professors, if the digital technology you’re contemplating using isn’t demonstrably better than pencil and paper, don’t use it. We don’t want to use technology for the sake of technology

D: And I don’t !

R: And you don’t…

D: But you know, right, even though I stopped using Kahoot! because so many teachers started using it. The google form is something I can use, and it actually replaced some convoluted thing I used to do, and so, I mean, I don’t know, they use tools because they have to go look at things online. It’s like when we moved online (during the COVID19 pandemic) they had to do a lot more assessing and reflecting on their own. They had to respond to discussions and respond to the posts of other students. Right, but that’s just because online learning is different.

R: And that’s actually out of scope for my dissertation because when all of this research was planned and approved, that hadn’t happened yet.

D: And some of that I like. But to me, a lot of those conversations should happen in class.

R: So, my last question is an open ended one... .is there some aspect of your experience with technology in the classroom that I haven't asked about that you would like to share with me. And I'm particularly interested if you have any reason for not using the TEAL classroom, other than you don't need it to accomplish your learning goals, which is a perfectly valid reason.

D: That's pretty much it. Sometimes in our annual summer professional development because I need the hours to add up. I've never seen that "wow! That's going to make a huge difference for what we're doing."

R: That's a fair assessment and I'm talking to people with a wide variety of experience, subjects taught, and opinions of technology, so what you're saying is valuable to me.

D: And I like technology and I use it. For example, as soon as I got a smartboard, I use it. But if it's not functioning, I go back to doing other ways of teaching. The TEAL, I mean, those specific classrooms are not the best ones to have renovated, I don't think. And I don't ever have a big enough group to go to the large one. And I'm just not interested. Across the hall from me, there's one teacher who reserves the TEAL room occasionally, because it makes a big difference occasionally, for his lessons. For me, students appreciate a lot of the routine and a lot of the collaboration that we can do take place and I haven't seen the need to not use my current classroom.

R: right. And I point out in my document that standard classroom at our school already has a lot more technology than most classrooms in high school, in the country. So, we're not talking chalkboard and 45 students in a room.

D: and students know how to use it, they can make their presentations, and have photos and videos, and we can do all sorts of things with the Smartboard. We don't need the rest of what's in a TEAL room.

R: I sincerely appreciate you taking time to speak with me. I'll send you a transcript so you can confirm that what I got is what you meant and, again, thank you.

Participant E

R: … I just need to remind you of the informed consent document that we presented at that time and also [for] to you to acknowledge that you're being recorded.

E: I acknowledge that I'm being recorded.

R: Okay. Thank you xxx and your responses will be transcribed by me,will be visible only to me and the principal investigator,my major professor,and I will show you a copy the transcription so you can validate that what I transcribed is what you indeed said if not meant and if you have any corrections or clarifications,we can do so at that time. You won'tbe identified in any publication whatsoever... you'll be described as an English teacher in a large Metropolitan Southhigh school in Southwest. We are talking today about TEALclassrooms, Technology Enhanced Active Learning classrooms and you are

teacher who has identified that you do not use the TEALclassroomsand you did not during the last academic year,you have not,nor do you plan to,in the current academic year. So I'm going to ask you the same questions that we're asking everybody here and that is on the continuum that goes from the scale of Entry through Adoption, Adaptation, Infusion, and Transformation,when you look at this chart here of behaviors and the topic is active learning in the classroom,where would you put your experience,your behaviors,on this continuum. And here are the specifics,if you need to take a look at some of them,as relate to Active Learning

E: I would say I'm probably in the active Adoption phase where I am controlling the technology that my students use.

R: And for the purpose of this description we are a BYOB school --every student has a laptop and what you're saying is a teacher may be pacing students through a project or using technology so that's the Adoption level, is that what you said?

E: Yes.

R: So higher than Entry where you're the only one using technology and not quite where the students have choice regarding technology and not quite in the Infusion...in the Transformation area where technology is considerably more pervasive. So,can you please give an example of a way you use technology that you feel is in the Adoption portion of the continuum.

E: I trust you will correct me if I'm wrong about what I'm doing, so when I'm using technology in my classroom,I am either using it myself, where I'm posting materials on the SmartBoard at the front room forward to my students and discussing it on a SmartBoard or in some way,like,if I put a sample paragraph on the board,I will invite my students to come to to the SmartBoard to make comments on that document for the purposes of a common understanding.

But they're not bringing up their technology and and plugging it in and presenting something from there...they're not deciding which technology platform to use for their next project.

Sometimes I will give them a choice like if you're going to do a presentation would you want to use a Google slide, a PowerPoint, SlideRocket, whatever else might be out there, and they can have their own presentation to display on the board but that's about as advanced as I get with letting them choose.

R: Okay,so now thinking about the same continuum, we're talking about Collaboration in the classroom. So once again here's a chart of the behaviors we're using where the Entry level of Collaboration is totally student teacher driven and Transformative would be that students are working with organizations or entities outside of the classroom to bring in collaborative ideas.

E: No... they're not doing that. Maybe Adaptation, if they use something like a OneDrive word document where students can work together on a writing sample.

R: So,the teacher selects and provides the tools and the students use it in collaborative ways. That's the middle, Adaptation, differentiated from Infusion where again, students make their own choices or Transformation where students go outside the classroom.

E: Right.

R: Okay, so Collaboration is… you're using the tools and there's some student choice and exploration but it's still pretty corralled. Okay, the next one would be Constructive, students use technology tools to connect new information to their prior knowledge, rather than just regurgitating or passively reciting past information. So, we were talking the other day about the vocab. You gave them a list of vocabulary words, I imagine, and they learn them.

E: They have the exercises that are on Blackboard and work from Blackboard.

R: Did you ask them to use the word in a new context?

E: I ask them that on their exams. I mean the exam is also on Blackboard. They have to write sentences for each word.

R: Okay.

E: Where's that put me?

R: I don't know. Let's take a look and see. So, again, this is with a technology focus, so, but, there, it's, the idea of constructivism is that they're connecting ideas differently, not just giving to back to you, even if it's a different form. So, it would be, here's a vocabulary word, go find pictures that illustrate this, or music, or lyrics.

E: I mean, stuff like that I have done. I mean, but I'm not sure if I'm necessary using technology to do it. So, we'll talk about, you know, here's an idea about America or the American Dream, what music can you find that illustrates the concept of the American Dream.

R: So, teacher consistently allow students use technology tools to build an understanding of the concept...teacher provides context and is supportive of student autonomy in choosing the tools. So that's in the Infusion part of the spectrum as contrasted to Adaptation where their using technology but it's really just giving you back what they gave them. So,it sounds like almost, thaton the continuum you're between these two. I don't want to put words in your mouth.

E: Now, in a setting where, like, we're about to make a film.

R: Okay! and, I mean... these are individuals, groups, or one for the class?

E: Individuals or groups. However,many students they want.

R: Oh, really?!

E: Yes, there is,a,the requirement is that for every kid that is in a group the film has to be a certain length.

R: So, 2 minutes per kid or something like that.

E: Something like that. And, so they get to choose whatever format they want as long as they can show me.

R: That's definitely Infusion, if not Transformation.....because there, they're talking about unconventional use of technology to build knowledge. What's the film about?

E: Caesar.

R: Okay. So, not autobiographical, they gotta go out and get....

E: We're going to read the play, and then they have to create a current, updated version.

R: Okay, so that's definitely Infusion, bordering on transformation... okay... excellent. What's interestingf rom where I sit, is that none of the uses of technology we described or discussed involve a TEAL classroom because you're doing all this in a standard <school> classroom and in the paper I already talk about what goes into a standard <school> classroom here, as opposed to classrooms that are significantly less technology rich. But what I'm hearing is that all the things that youa re trying to accomplish,you're able to do in the regular <school> classroom...you don't need the affordances of the TEAL classroom. There is nothing there..a write-on/wipe off board, the separate screens...wouldn't add anything to your lesson.... In fact,might even be a distraction. What grade levels are you're talking about?

E: 10th and 11th .

R: Right,so not freshman so they're not still wide-eyed and overwhelmed and not seniors where they're more or less checked out...they're right in the sweet spot there.

Okay two more topics. One is Authentic Learning… students use technology tools to link learning activities to the world beyond the instructional setting, whether they're working on decontextualizing assignments within the classroom, we want them to make connections between what we learn in the class and the real world.

E: Am I using technology for that?

R: I saw you! [off-topic digression not transcribed] I saw you project, on the smartboard,an excerpt of the Christchurch, New Zealand shooter's manifesto on the SmartBoard for students to discuss and analyze.

E: I mean, yeah, I'll put up news articles

R: And then it's on the whiteboard ando n the SmartBoard and everyone can see it and discuss it so that's using technology in the classroom when you're talking about topics that are clearly outside of the classroom and outside of the play that your reading, o rthe book that you're reading...

E: Where that connects the classroom, is it's what motivates like my Juniors, the classic s AP Rhetoric, the AP English Composition, it's the study of rhetorical strategy. So,we look at stuff outside the class to look at the rhetoric of it and typically when we do our own rhetorical essays I'm trying to give them some insights; what other people saying on these topics,out in the world.

R: Got it. So, teacher encourages innovative use of technology and higher order learning activities, or connection to the lives of the students and the world beyond the

instructional setting. That's on the Transformative side of the continuum, to the extent that you're using technology...YouTube videos, podcasts, articles that you see on the Internet, access to newspapers that we wouldn't have access to here otherwise, that is using technology, bringing in the outside world in to the confines of the classroom, so I would definitely say that's on the Transformative side. The last one here is goal-directed and I realize I didn't read the definition of the first couple but I'm making up for it...goal-directed would be where students use technology tools to set goals, plan activities, monitor progress,a nd evaluate results rather than simply comparing assignments completing assignments without reflection. So, Blackboard for example, has discussion posts where you can prompt students to reflect on a given assignment. That's just one example and here's the behaviors described in the continuum.

E: I'm having a hard time thinking of places where I expect my students to set their own goals.

R: Well, this film project, it's a project it will last more than one class session and to divide up the work,they have to hold each other accountable

E: They set their date, they (decide) who gets to edit, who's gonna film...

R: Now is that is that done on a note card? Do you ask them to put it on a Google sheet? it it shared on an Excel OneDrive file or use a project management tool? That's probably overkill but,you know,how do they keep track of and prioritize their work in that project?

E: Really and truly, I mean,I'll give them some time in class to plan, together,but then I just set them free and I tell them it's is due on this date.

R: And some of them may use an index card to keep track of things and some of them may use a shared Google sheet...

E: That's true.

R: Have you observed either or both of these?

E: I know I've observed the written parts...the stuff that's on the computer, I don't really (get into).

R: Okay that's reasonable. So the answer to this will be "it depends."And I'm surprised that it took us to the fifth question before we got one where "it depends"is the answer. I have one more broad category questions and that's is there any other question as it relates to TEAL in the classrooms or technology in classrooms that I haven't asked you that you would like o rwish I would've asked.

E: A question about technology in classroom.... Ummm... I'm not thinking of a particular question. I think my issue with technology in the classroom is I feel like often, I feel we are encouraged to use the technology because technology is supposed to be good,but it doesn't necessarily achieve the learning goals. So, if I'm supposed to teach, you know, critical reading skills, I don't need technology for that.

R: And it may in fact be a hindrance.

E: If I'm trying to teach creative thinking, I mean,there are lots of places where the technology gets in the way and so I feel like in the last year or two, like, I've made it a priorityt o figure out what is really important to me;what I'm really tryingt o achieve and anyplace I think technology is in the way I try to remove it.

R: That's fair.One of my professors is fond of saying "if the technology is not demonstrably better than pen and paper, don't use it" so even though I'm in the technology department (here) and at UNT in the department of Learning Technologies, I'll be the first one to say if technology doesn't improve the learning outcome, don't use it

E: So I thinkwe're in agreement on that.

And I would say, too, and I don't know how this fits in to what you're trying to say, I feel like 20 years in the classroom, in a Catholic school...I mean, when I started teaching, I thought that my job was to them to write, to teach them to read, but the older I get, the more I feel like my job is formation of students and if they're interacting with a computer that is not human formation and I want...I want...to build my relationship with them...to help them grow as people not as cyborgs.

R: Thank you

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