



# An individualized Professional Development Approach for Training University Faculty in using a Technological Tool

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## Abstract

As university faculty must continually grow in their instructional skills and proficiencies with new tools to remain relevant to the educational needs of their students, effective models of professional learning and development are important areas of need and topics for research. However, many outdated professional development models do not create the desired results of technology integration into university teaching. More responsive and innovative models of faculty learning could be the answer. The purpose of the current research study was to explore the impact individualized professional development had on faculty's understanding, experience, and use of a technological tool. A qualitative research design was implemented to analyze data from interviews and surveys. The participants were a convenience sample of six faculty members across five different programs within one university located in the southeastern United States. Data were analyzed using a hybrid coding method and the results revealed that the procedures facilitated implementation of a technological tool within the specific contexts of their courses. Participating faculty appreciated the utility of the provided training and how closely the designed resources mirrored those they would encounter in their instruction of students. Based on study findings and other relevant research, a new model for individualized professional development using a technological tool is proposed which can help to guide future faculty learning.

**Keywords** Professional development · Faculty development · Higher education · Educational technology · Virtual simulation

## 1 Introduction

As institutions of higher learning seek to improve the quality of education provided by their faculty, opportunities for professional learning have been one of the primary avenues of continued development. While some institutions have moved to incorporate a greater variety of professional development delivery options, the primary way new knowledge, skills, and tools are presented to faculty remains face-to-face presentations or workshops (Beach et al., 2016; Belt & Lowenthal, 2020). However, group delivery often does not result in faculty incorporating new strategies, pedagogy, or tools into their courses with fidelity (Bickerstaff & Cormier, 2015). As course delivery modality has shifted to online or hybrid environments in response to the COVID-19 pandemic (Lederman, 2021; Turnbull et al., 2021), the incorporation of technological tools and resources has been especially important. Over the past several years, university faculty have been receiving great amounts of technology-centered professional development opportunities (Johnson et al., 2020), but how they are adopting the presented practices and tools and how these are impacting their practice with students is difficult to ascertain (Phuong et al., 2018; Uerz et al., 2018).

To ensure that new educational techniques and specifically technological tools are adopted by faculty and implemented with greater fidelity, individualized professional development that synthesizes new technological skills with existing knowledge of pedagogy and content could be employed. Previous research on the practice of tailoring professional development to the individual needs of faculty members has yielded encouraging results (Dysart & Weckerle, 2015). Importantly, Baran (2016) presented a professional development model featuring the mentoring of university faculty to facilitate implementation of instructional technology in their courses. In this key study, six critical strategies were identified – determining needs; exploring technologies’ affordances and limitations; scaffolding; sharing feedback; connecting technology, pedagogy, and content; and evaluating – that were foundational to the research presented here. By supporting faculty members with individualized avenues of professional development, positive outcomes can be obtained. This present study seeks to address the following research question: *What were higher education faculty experiences with individualized professional development designed to facilitate the implementation of a novel technological tool in their courses?*

### 1.1 Literature review

In the middle of the twentieth century, in response to pressure from students to improve their quality of instruction, universities began to invest in structures to support continued faculty growth and development (Lewis, 1996). Faculty development programs have continued to gain popularity over the past several decades as post-secondary enrollment has increased and competition among institutions has grown (Pifer et al., 2015). Additionally, the role higher education plays in society is ever evolving and keeping faculty apprised of new instructional methods and pedagogies is a task requiring constant attention from administrators (Lockhart & Stoop, 2018; Steinert et al., 2016). To best facilitate the creation and maintenance of a faculty that meets the needs of modern universities, professional development must be offered

using methods that effectively communicate the utility of the proposed improvements and facilitate the implementation of new practices and pedagogies.

One of the aspects of higher education most changed in recent years is the incorporation of, and often dependence upon, advanced instructional technology (Ng’ambi et al., 2016; Nilson & Goodson 2021). Societal changes, the COVID-19 pandemic, and technological improvements have all contributed to a need for university faculty to be proficient in utilizing instructional technology with their students (Arkorful & Abaidoo, 2015; Oliveira et al., 2021; Rapanta et al., 2020) such as online learning management systems, virtual meeting programs, and novel ways to engage with course content and stakeholders (Nilson & Goodson, 2021). How these new instructional technologies impact student learning and other outcomes has been a major topic of interest to researchers and university faculty. Findings on student engagement with online learning have been mixed (e.g., Dumford & Miller 2018; Henrie et al., 2015), but the utilization of tools and activities that encourage collaboration could be helpful in positively influencing this aspect commonly connected to learning in online environments (Henrie et al., 2015; Pascarella & Terenzini, 2005). More interactive tools, such as games and simulations, can be especially engaging for college students (Clark et al., 2016; Vlachopoulos & Makri, 2017). Interestingly, a review of relevant research studies found that, when choosing technological tools to implement, college instructors highly valued advice from their colleagues; even above researched findings and evidence (Price & Kirkwood, 2014). To facilitate the successful adoption of emerging educational technologies, faculty will need to be made aware of their potential utility to their teaching.

One emerging technology that has great potential for student instruction is virtual simulation (VS). Researchers have found that using VS can positively impact preservice teachers’ abilities to implement classroom management practices (Luke et al., 2021a; Hudson et al., 2019), science teaching methods (Straub et al., 2015) and high leverage practices (Luke et al., 2021b). VS has also been found to be realistic with targeted early field experience opportunities (Luke et al., 2021a), as well as influential in helping preservice teachers begin developing core practices prior to field experiences. For example, Piro and O’Callaghan (2019) examined a practice-based teacher education program that used VS prior to field experiences. They found that the integration of VS in courses prior to clinical experiences increased preservice teachers’ maturation of professional identities during clinical experiences. How VS can be integrated into higher education programs, particularly its use in courses as a pedagogical tool, is a timely question considering the recent popularity it has gained since the COVID-19 pandemic.

As the role of technology in higher education has become more central, faculty have been offered increasing numbers of professional development opportunities in using technological tools and associated strategies in their courses and research (Bates & Sangara, 2011; Johnson et al., 2020). However, the success of many technology-centered professional development programs has been limited by the mode of delivery. One-time workshops, despite being cost- and time-effective, often have limited impacts on faculty developing proficiencies in using the presented technological tools or methods (Bickerstaff & Cormier, 2015; Stes et al., 2010). Importantly, the simple adoption and use of a technological tool by university faculty is not the

ultimate outcome of most professional development initiatives, but their use to enrich the learning experiences of students. Recently, researchers have employed professional development approaches that incorporate new learning within a framework containing technological, pedagogical, and content knowledge (TPACK) (Mishra & Koehler, 2006). Connecting the mastery of using new technological tools and skills with existing faculty teaching practices and content knowledge is a strategy that has shown promising results in other professional learning endeavors (Lidolf & Pasco, 2020; Mourlam, 2017).

Despite many faculty professional development opportunities being offered in the form of short-term workshops, there exist alternative modes of learning that have demonstrated encouraging results with faculty such as tailoring activities to the individualized needs of the targeted faculty. Mentorship, and the one-on-one experiences it necessitates, has been shown to facilitate higher levels of integration of new technologies in educational settings (Huston & Weaver, 2008; Kopcha, 2010; Silva et al., 2010; Swan et al., 2002). To develop effective technological professional development programs, providing faculty members with close support, such as one-on-one mentoring, can help them both feel more confident in implementing these tools but also for customizing them to fit the specific needs of their content areas. In an examination of effective strategies for incorporating novel technological tools into higher education teaching, Baran (2016) proposed six critical strategies for success. Those strategies were determining needs; exploring technologies' affordances and limitations; scaffolding; sharing feedback; connecting technology, pedagogy, and content; and evaluating. Implementation of individualized professional learning experiences that incorporate activities centered on these six critical strategies could be a pathway to successful adoption of novel instructional methods.

To provide important empirical research evidence to the ongoing discussion about best practices for faculty development and professional development, the present study examines the experiences of higher education faculty with individualized professional development activities. The featured professional development was designed to engage the three facets of knowledge as modeled by the TPACK framework (Mishra & Koehler, 2006) while also incorporating the six strategies of Baran's (2016) model for professional development in order to fully integrate an emerging technological tool (virtual simulation) into their college teaching.

## 2 Methodology

### 2.1 Research context and author subjectivity

At the time of this study, the research team was composed of three assistant professors and one associate professor from the same college of education at a large private university located in the southern United States. The authors were assistant professors in different disciplines (e.g., teacher education, education research, and special education) and have experience with different research approaches. The authors and participants involved are located across multiple campuses, including one in the largest urban center of the state and two regional academic centers that serve students

from more rural locales. As the participants of this study were all colleagues of the authors, complete objectivity is impossible to achieve and not an expected outcome of the study. Rather, transparently sharing details that reveal the authors' past experiences and potential motivations through a subjectivity statement increases the trustworthiness of the study (Patton, 2015).

The authors regularly use VS in their teaching and research and are familiar with the strengths and limitations of the technology. Seeing the added value the VS provided their students, the researchers struggled to understand why other faculty members were not implementing VS in their courses. The researchers hypothesized the lack of training in using VS may have played a role in the minimal use among other faculty members, which inspired the individualized professional development approach utilized in the current research study. In support of providing individualized professional development to other faculty members, the dean of the college provided funds to purchase the VS hours.

## 2.2 Technological tool: virtual simulation

The technological tool presented to this study's participants in the professional learning activities was a VS program called TeachLivE. VS can be categorized into (1) visual puppetry simulations, (2) multi-user virtual simulations, and (3) single user simulations (Bradley & Kendall, 2014). TeachLivE is classified as mixed reality virtual puppetry and was created in 2005 by researchers from the fields of computer science and education at University of Central Florida who partnered together to help special education preservice teachers improve their practices (Dieker et al., 2008). Since then, VS technology has evolved and become commercialized, making it accessible to various teacher preparation programs across the globe. Although TeachLivE was initially designed for use with preservice teachers, fields such as hospitality, leadership, counseling, nursing, and public speaking have adopted mixed reality VS to meet their training needs (Dieker et al., 2015).

Mixed reality VS combines the real world with the virtual world to create an immersive training experience. The preservice teachers interact with the virtual avatar students and adults in a virtual classroom setting designed to closely resemble a real educational environment. A human puppeteer controls the avatar students/adults and converses with the preservice teacher in natural conversation through the avatars. The avatars' appearance and mannerisms as well as the setting can differ depending upon the scenario that the user is running. Figure 1 is representative of a virtual Kindergarten classroom with the avatar students.

## 2.3 Sample

Following a presentation of the TeachLivE VS tool to the university's college of education instructors at an in-person faculty meeting, researchers recruited six faculty members to participate in individualized professional development. To create this study's sample, researchers employed convenience sampling and contacted faculty who they predicted might be receptive to learning about the use of VS within their courses across multiple programs in the college. Participating faculty members



**Fig. 1** A virtual Kindergarten Classroom in TeachLive

*Note.* Visual Graphic by Eric Imperiale (2020)

taught in the Bachelor of Science in Education (BSED), Education Leadership (EL), Early Learning and Development (ELAD), Master of Arts in Teaching (MAT), and Teacher Leadership (TL) programs. Please see Table 1 for a detailed description of the study's participants.

## 2.4 Research design

To address the study's research question, the present study utilized a qualitative research design (Johnson & Christensen, 2019) in which a hybrid coding approach (Fereday & Muir-Cochrane, 2006; Patton, 2015) was employed to analyze data collected via interviews and open-response survey items that inquired about faculty experiences with individualized professional development designed around Baran's (2016) six critical strategies (determining needs; exploring technologies' affordances and limitations; scaffolding; sharing feedback; connecting technology, pedagogy, and content; and evaluating) to address learning across the three domains of TPACK (technological, pedagogical, and content knowledge) (Mishra & Koehler, 2006). The use of interviews and survey items allowed the researchers to explore the experiences of faculty from two angles and provided opportunities for clarification and a deeper understanding of their interactions with the personalized learning activities.

## 2.5 Procedures

The individualized professional development for using VS as a pedagogical tool was implemented in the following manner (Baran's (2016) critical strategy):

1. Researchers presented a live demonstration to college faculty (n=40) on VS during a faculty meeting. Showed faculty what the technology looked like, allowed

**Table 1** Description of Study Participants

Participant (Pseudonym)	Degree	Position	Years at University	Gender	Program/Course
Nancy	Ph.D.	Assistant Professor of Elementary Education	2	F	MAT/Elementary Teaching Methods
Barbara	Ph.D.	Assistant Professor of Literacy	1	F	BSED/Foundations of Education
Terri	M.Ed.	Director of ELAD/Clinical Faculty	4	F	ELAD/Classroom Management
Justin	Ph.D.	Director of TL/Assistant Professor	1	M	TL/Instructional Coaching
Wynona	Ph.D.	Clinical Faculty	7	F	EL/Teaching Leadership
Alexandra	Ed.D.	Clinical Faculty	15	F	BSED/Classroom Management

*Note.* Programs were Bachelor of Science in Education (BSED), Education Leadership (EL), Early Learning and Development (ELAD), Master of Arts in Teaching (MAT), and Teacher Leadership (TL).

- them to interact with it and provided examples of how it was used in courses. After the demonstration, several faculty members informed the researchers they found it interesting, while others stated they did not understand how the tool could be used in their courses (exploring technologies' affordances and limitations).
2. Researchers recruited individual faculty members ( $n=6$ ) to participate in an individualized professional development where one of the researchers worked with faculty individually.
  3. Faculty participants completed a pre-survey and brainstormed with researchers on how they might implement VS within their course (determining needs/exploring technologies' affordances and limitations).
  4. Researchers developed a personalized plan for each faculty participant for their VS implementation including scheduling, a coaching protocol, and materials needed for the simulation (connecting technology, pedagogy, and content).

5. Researchers attended faculty participant's class and facilitated a "meet and greet" between the avatars and the students in the class to help everyone become more comfortable with the technology and troubleshoot any difficulties or questions prior to the specific course scenario (scaffolding).
6. Researchers attended each faculty participant's class one evening and facilitated the implementation of the VS with the students while the faculty participant acted as an observer. The researcher modeled coaching protocols, explained their rationales for effective implementation, and provided examples for future uses within the course (scaffolding/connecting technology, pedagogy, and content).
7. Researchers followed up with faculty participants after their VS session where they discussed the outcomes of the VS in an interview and completed a post-survey (sharing feedback/evaluating).

## 2.6 Professional development materials

Researchers provided the faculty members with a simulation scenario that was aligned with course learning outcomes, as well as materials to support the simulation for both the faculty members and students in their classes. The materials included a scenario guide that provided information about what scenario was going to be much like a case study. The scenarios were different for each faculty member as they all taught different courses but included scenarios such as a school coach implementing a follow-up observation meeting, a preschool teacher introducing classroom management procedures to young students, and an elementary teacher gaining the attention of students in an online classroom setting. Other materials like scheduling forms and coaching protocols were shared with faculty to facilitate the delivery of the simulation and as examples of how to schedule or coach future simulation sessions on their own if they desired.

## 2.7 Data sources

Prior to beginning the individualized professional development sessions, each faculty member completed a pre-survey meant to establish a baseline of their experience with using the VS technological tool. This pre-survey consisted of three open-ended questions and one ten-point Likert-style item. Following the completion of the professional development activities, each faculty member completed a post-survey and a follow-up interview conducted using a scripted set of questions designed to gain greater depth of understanding regarding their experiences both with the VS and the targeted professional development activities. (Please see Appendix A for the surveys and interview questions.)

## 2.8 Analyses

Participants were teacher educators and had the required experiences to answer the research question. Data were collected from a small sample of six participants over a period of two years to allow for deeper exploration of faculty experiences. Additionally, a semi structured interview guide and surveys were given to all six par-



ticipants. Prior to data analyses, two members of the research team reviewed the interview transcripts for accuracy. All three researchers read the interview transcripts and responses on the pre- and post-surveys to familiarize themselves with the data. Then, each researcher individually inductively coded the open responses on both pre- and post-surveys. Next, the researchers came together and conducted consensus coding where they agreed upon the final codes that were then used to code the transcripts. Finally, the codes were collapsed into final themes and illustrative quotations were used to represent each theme. The researchers engaged in several collaborative efforts to explore interpretations and decisions throughout data collection and analysis (e.g., peer debriefing and consensus coding) to increase credibility of the results (Patton, 2015). The researchers chose consensus coding because it allowed them to use consistent procedures and agreement to develop and apply codes (Patton, 2015).

### 3 Results

To gain an understanding of faculty experiences with individualized professional development facilitating the implementation of a new virtual simulation tool in their courses, the research team collected responses from participating professors and employed appropriate qualitative analyses. The following six themes were identified (please see Table 2 below for a full list of themes and illustrative quotations):

- 1) Prior to the professional development, faculty recognized their own deficiencies in both knowledge and experience, but were excited by the prospect of gaining additional tools to engage their students (Potential for growth),
- 2) They viewed the VS as an opportunity to allow their students to practice important skills in an environment that more closely matched that in which they would be working (Practical student work),
- 3) The personalized professional development structure afforded them the opportunity to have expert trainers customize their experiences to best fit the situations within which they taught (Responsive development).
- 4) The VS and the targeted professional development were useful to faculty and students in the context of their course and represented an exciting innovation (Utility),
- 5) Faculty thought the VS and how it was presented in the targeted professional development represented a closer approximation of the working environments they were preparing students for than other class activities they had used in the past and was therefore a valuable addition (Authenticity),
- 6) The VS as utilized in the professional development activities allowed faculty to closely observe their students as they carried out tasks and practiced their skills and provide them with support and coaching to refine their actions (Coaching).

**Table 2** Study Themes

Theme Description (coding type)	Illustrative Quote (Participant)
Potential for growth (inductive)	While I'm not an expert on using virtual simulations to facilitate student learning, it is an increasingly powerful tool...even more so during a global pandemic. (Nancy)
Practical student work (inductive)	It's incredibly convenient and I think it replicates the interactions to a high degree. (Justin)
Responsive development (inductive)	The content is tailored to a particular concept or skill that the instructor would like for students to practice. The student avatars have diverse needs, interests, and personalities just as you would find in a typical classroom. The simulation can be paused to give the student time to debrief and reflect with their instructor and classmates. (Barbara)
Utility (deductive)	So, the primary benefit for me was to actually see my students in action trying out these various strategies that they've read about that we've discussed in class. (Barbara)
Authenticity (deductive)	I always love how much they inevitably feel like it's so real. When they go in thinking how real could this be, you know? I'm doing it on a computer with avatars, but they get sucked into it! (Nancy)
Coaching (deductive)	This type of support was very useful in building my professional knowledge and preparing my students for their virtual simulation experience. [Researcher] made me feel very comfortable and invited me to provide feedback to students during the debriefing sessions when I was ready. She did a phenomenal job of modeling and providing feedback. (Terri)

## 4 Discussion

In analyzing the faculty responses in interviews and surveys, it is clear that faculty appreciated both the VS as an innovative technological tool useful to their teaching as well as the individualized, targeted professional development activities they received from the research team. They believed that the individualized nature of the professional development activities allowed them to better grasp how the technological tool could be used to the benefit of their own students within the context of their courses; a level of specificity often missing from large-scale professional development initiatives given to higher education faculty (Bickerstaff & Cormier, 2015). In proposing a new model of professional development, it is hoped that universities will see the value in tailoring professional learning resources and activities to the needs of targeted faculty members. If the new instructional methods or technological tools being proposed are deemed to be worthwhile by university administrators, supporting their adoption and implementation with adequate measures should be a goal worth pursuing.

When asked about their experiences with the individualized professional learning experiences, participating faculty remarked that being able to work one-on-one with a mentor through the process of incorporating the new technological tool into their course was invaluable. According to Justin, “This was an incredibly helpful experience. I didn’t know exactly how useful the VS could be but now I am planning ways to further incorporate it into our courses.” As the technological tool was introduced to faculty and they in-turn worked collaboratively with the trainer to use it with their students, they were able to design experiences they thought would be of benefit to their learners. As Terri stated, “I’ve never had the opportunity to see my students teach anyone outside of their peers, so I’m very thrilled about the possibilities that virtual simulation opens up.” Furthermore, faculty were able to pause the simulation in order to provide coaching to their students as they engaged in the activities. This in-the-flow coaching is a unique opportunity provided faculty as most similarly practical experiences are not able to be interrupted. The video of the VS also afforded the opportunity to have students rewatch and reflect on their choices. “Students can react to the situations and then reflect upon their actions” (Alexandra). These opportunities for expert coaching and reflection are exciting as both represent research-based approaches that have shown positive impacts on pedagogical practices (Huston & Weaver, 2008).

When discussing the VS itself, the participating faculty repeatedly remarked upon the utility of the tool – how it could easily be used within the context of their course to improve student readiness. As stated by Nancy, “Practicing skills in the virtual space can really help build confidence in teaching approaches that do not actually harm or put children at risk in any way. Virtual simulation provides a safety net for trying new things, not just for [student name], but for students at all levels of their educational careers.” Being able to create opportunities for students to practice their interpersonal relations skills in the safety of the simulation was an extremely useful aspect of the tool. Relatedly, the way in which the VS experience could be designed to authentically resemble the workplace environment that the students would be immersed in was invaluable to faculty teaching across multiple programs. As Barbara described it, “The student avatars have diverse needs, interests, and personalities just as you would find in a typical classroom.” Finally, the VS represented a novel way in which students were able to practice the skills they were learning in their coursework. As summarized by Nancy:

Virtual simulations are a great way to practice all sorts of skills. Right now I work with Elementary Education MAT students and C&I PhD students. Teacher candidates can use virtual simulations to practice classroom management techniques, to try culturally and linguistically responsive or inclusive teaching strategies, to practice a specific instructional strategy, etc. In other settings, they might be able to practice job interviews and parent-teacher conferences. PhD students can practice giving poster or research presentations, can practice collecting data or recruiting participants, etc. I think there is application value in lots of directions, including for classes in programs I do not teach.

As many of the courses offered in this educational context are offered in a primarily online delivery format, having authentic opportunities to practice their skills in a safe environment was especially novel and appreciated.

In one of the interviews conducted at the conclusion of the professional development activities, one of the participating faculty members recommended using the individualized practices with another group of faculty members in order to get them to adopt the tool into their own practices. “I think some of the ideas we generated would be very helpful to support other faculty who are unfamiliar and/or uncomfortable with the idea of using virtual simulations in their classrooms” (Nancy). As each of the participating faculty members indicated their willingness to use the VS tool with their students again, clearly the individualized professional development approach utilized in this study is a promising approach worthy of continued investigation. The evidence gathered from this study prompts the following proposal of a novel model of professional development.

#### 4.1 Proposed individualized professional development for technological tools model

In response to the findings of this present study and informed by the research of Baran (2016) and Mishra and Koehler (2006), we propose the following model for individualized professional development for technological tools (IPD TT) model (Fig. 2).

In the proposed IPD TT model, the trainer has their effort gradually decrease throughout the process as the instructor assumes more responsibility and exerts more energy towards utilizing the technological tool being learned. The change in effort

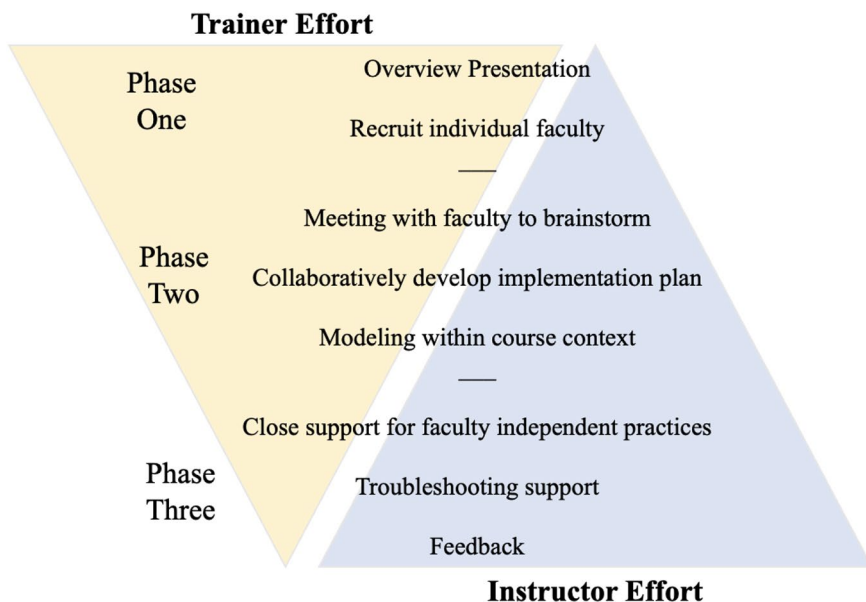


Fig. 2 Proposed IPD TT Model

could also correlate to a change in time spent by the trainer and instructor, but a continued need for oversight and support could keep time commitments static.

In phase one of the model, energy is focused on casting a wide net to gather individual faculty members who might be more receptive towards implementing the technological tool in their teaching. This is done by presenting an overview of the tool and its general capabilities to a larger audience than can be supported by the team of trainers. This can include some examples of the tool in use in similar settings drawing from familiar pedagogical or content knowledge, but it might not specifically match all the contexts of the included individuals. As a part of this event, trainers should ask faculty who are interested in utilizing the tool or learning more about it to set up individual meetings with the training team. The activities in this phase of the model are focused on building familiarity with the tool and identifying potential trainees. By focusing on creating a smaller pool of interested faculty with a baseline of knowledge about the tool, trainers will be able to devote more time and resources to the creation of meaningful and appropriate individualized materials.

In phase two of the model, a transition of ownership begins as the trainer solicits input from the faculty member regarding the context of their course and their existing pedagogical and content knowledge. Working collaboratively, the trainer and faculty member create a plan for implementation. The tool can then be introduced to students initially by the trainer who can model how to utilize it in a class setting for the instructor. The activities in this phase of the model are closely associated with the critical strategies of determining needs, exploring technologies' affordances and limitations, and scaffolding as discussed by Baran (2016). Additional research has shown the importance of aligning professional development resources and activities with the specific contexts of the subjects (Dysart & Weckerle, 2015; Mourlam, 2017). Modeling and mentorship are research-based practices (Kopcha, 2010; Silva et al., 2010) that allow the trainer to scaffold knowledge of how to use the tool for the instructor within the context of the course with their own students. By allowing the trainer and instructor to work together to determine how best the proposed tool can be incorporated into the educational context to achieve the outcomes desired by both parties, a more collaborative space is created, and that collaboration among colleagues could help to facilitate fruitful implementation (Price & Kirkwood, 2014).

In phase three of the model, the instructor now takes the lead in using the technological tool with their students. The trainer attends class meetings for a short time to observe the instructor and provide close support as needed. Following implementation by the instructor, the trainer can meet to provide feedback and additional resources if higher levels of support are needed. This part of the cycle can be repeated multiple times to facilitate more complex usage of the technological tool as the instructor gains skill and comfort using the technological tool. The activities of this stage of the model are focused on the strategies of sharing feedback; connecting technology, pedagogy, and content; and evaluating (Baran, 2016). As the instructor continues to implement the tool with their students, they remain in contact with their trainer who can provide close support, additional modeling, or resources as needed. Close connection between technological tools, pedagogical practices, and learner supports is aimed at adoption and implementation with fidelity and longevity (Lidolf & Pasco, 2020; Mourlam, 2017). Through this proposed IPDTP model, we believe that faculty

can be engaged in supported learning and will enable them to grow in technological pedagogical content knowledge (Mishra & Koehler, 2006); or the intersection of being able to use technological tools along with existing teaching skills and content knowledge to enhance the learning of students within the context of their courses.

## 4.2 Limitations

This present study was conducted within the context of a single college of education of a private university located in the southeastern United States and the findings should not be attempted to be used prescriptively outside of this context. Additionally, the six participating faculty members volunteered for the study and were therefore possibly predisposed to utilizing the technology with their students. Data utilized in this study was gathered from higher education faculty only and their perspectives on the utility and impact of the professional development activities and the VS tool was self-reported and does not address any student outcomes. This study was conducted during the early years of the COVID-19 pandemic and the impacts of this phenomenon are far-reaching and important and could have influenced the subjects in ways that are difficult to measure.

## 4.3 Future research

Based on the findings of this study and other relevant research, a model for individualized professional development was proposed. Further testing of this model in a variety of settings across a more diverse set of academic programs with a wider audience would help to test its feasibility. Additionally, utilizing a more robust mix of data collection procedures and sources would provide alternative avenues of assessing the impacts of these types of professional development activities. In the current study, only faculty experiences were cataloged but seeking student experiences as well could prove to be a valuable source of information.

## 5 Conclusion

In examining the experiences of higher education faculty with individualized professional development designed to help them incorporate a technological tool (virtual simulation) into their teaching practices, the researchers discovered that faculty felt excited and encouraged to use the VS tool in their classes due to the collaborative nature of the activities. Faculty were initially hopeful about the usefulness of the VS for their teaching but were receptive to working with a trainer to design applications of this new technological tool that best fit the educational context of their courses and provide their students with opportunities to practice the skills they were learning in an environment that approximated the working conditions within which they would soon find themselves.

As implemented in this study, individualized professional development for the implementation of a technological tool (virtual simulations) benefited faculty and their students in the following ways:

- Faculty did not need to develop course materials, trainers provided them.
- Faculty did not need to worry about organizing the VS; trainers did the planning, scheduling, technology check, etc.
- Provided faculty an opportunity to see VS in the context of their specific course.
- Created opportunities for collaboration among faculty and trainers.
- Faculty gained new technological knowledge that is meshed with their existing pedagogical and content knowledge.
- Using the VS, students engaged in approximations of practice (Grossman et al., 2009) that are designed to closely align with their practice.
- Students experienced authentic and repeated practice in a safe environment where they could receive coaching and practice reflection.
- Students actively engaged in learning rather than just passively read about it.
- Students will overall be better prepared for their future workplace interactions.

The proposed IPDTT model is a framework created to facilitate the implementation of faculty learning experiences that are targeted to the specific needs of individuals as they grow in familiarity and competence in using a new technological tool in their courses. By supporting professors with coaching and other tailored supports as they adopt a new instructional tool, they may feel more confident in using them with their students, which will make their instruction more relevant to the changing needs of today's learners.

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**Data Availability** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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