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Original Paper

Using Simulations and Artificial Intelligence and Simulations to Impact Teacher Preparation and Beyond

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Abstract

Teacher effectiveness is directly connected to their sense of confidence in their personal ability to be effective. An important part of teacher effectiveness is communication and collaboration with parents, and family members of their students. Research has demonstrated the correlation between the relationships of families and schools. When these relationships are positive, there are improved outcomes for both parties. However, even the most comprehensive teacher preparation programs are limited to the amount of practice they can provide aspiring teachers because parent-teacher conferences are confidential meetings. The study determined if providing aspiring teachers an opportunity to practice conferencing in a simulated environment would improve their confidence and sense of self- efficacy. It placed teacher candidates within artificial environments to practice simulated parent-teacher conferences to determine if engaging in a simulation improved their sense of confidence in their ability to conduct these meetings effectively. The use of artificial environments had a positive impact on aspiring teachers' confidence and self-efficacy. This technology has far-reaching implications for various parts of teacher preparation programs and beyond.

Introduction

Overall teacher effectiveness is connected to the teacher's sense of confidence in their personal ability to be effective. An important part of teacher effectiveness is communication and collaboration with parents, and family members of their students. Research has demonstrated the positive impact strong relationships between families and school have on both parties.

However, even the most comprehensive teacher preparation programs are limited to the amount of practice they can provide aspiring teachers because parent-teacher conferences are confidential meetings. This study determined if providing aspiring teachers an opportunity to practice conferencing in a simulated environment would improve their confidence and sense of self- efficacy.

It provided teacher candidates with artificial environments to practice simulated parent-teacher conferences to determine if engaging in a simulation improved their sense of confidence in their ability to conduct these meetings effectively. The use of artificial environments had a positive impact on aspiring teachers' confidence and self-efficacy. This technology has far-reaching implications for various parts of teacher preparation programs and beyond.

Artificial Intelligence

The rise of artificial intelligence and its impact on society has created an understandable sense of alarm. As a stand-alone technology, artificial intelligence has more unknowns than what is known and its impact, both positive and negative, seems potentially far reaching. The speed of which it is developing, is also a cause for concern. However, there is a sound argument to be made in support for the use of artificial and virtual environments in the field of personnel development.

The U.S. Department of Education Office of Educational Technology has taken a position and developed policies on the use and implementation of artificial intelligence (AI) in the field of education. Not surprisingly, the U.S. Department of Education Office of Educational Technology (2023) appears to focus on the positives that AI can provide, and highlights ways educators can benefit from the technology. Key takeaways include adaptability, personalization, and most notably, the ability to customize direct

feedback.

This position of support can be parlayed into the use of simulations and virtual environments. In this use, pedagogical skills can be practiced repeatedly with or without direct coaching. With the use of artificial environments, aspiring teachers can obtain access to experiences that are otherwise inaccessible in even the most comprehensive teacher preparation programs. Lastly, artificial environments can provide aspiring teachers with the opportunity for repeated practice and immediate feedback loops.

A key argument for the use of artificial environments in teacher preparation is the ability to implement a continuous improvement cycle. While the simulation occurs in real-time and is live, the environment is artificial; therefore, it can be stopped and restarted at any time. This flexibility allows for immediate feedback and coaching, creating the ability for the aspiring teacher to immediately implement feedback and continue practice. The ability to safely and securely practice and implement the feedback that is given, increases the likelihood that aspiring teachers will build confidence in the necessary skills to become effective classroom teachers.

Artificial Intelligence will, no doubt, play a pivotal role in teacher preparation. According to Jamal, (2023) at some point, either currently or in the near future, artificial intelligence, and artificial environments used for practice will play a role in teacher development including, but not limited to enhancing skills, adaptations in learning, personalized and differentiated instruction, and access to high quality opportunities for practice.

Kolb's Theory of Experiential Learning

In the process of developing new skills, the repetition of practice is critical. Additionally, authentic learning can take place when the learner has the opportunity to receive feedback and reflect on their skill development. In 1984, David Kolb published the Theory of Experiential Learning which highlights the need for concrete experiences, reflection, abstract conceptualization, and active experimentation.

The theory also highlights the need for reflection and thinking about an experience in order to solidify learning. For this study, the use of the artificial environment and simulation for practice, provides aspiring teachers concrete experiences, with the opportunity for repetitive practice, and reflection. This is a critical piece for aspiring teachers who may need additional time to achieve mastery of a specific skill.

Artificial environments can provide even experienced teachers the opportunity to further refine already developed skills. With the use of immediate coaching and feedback, they can continue implementation and practice multiple times to increase effectiveness and efficiency. It allows for concrete experiences and reflective observation which are needed for continued learning. In this case, Kolb's Theory can be applied by using simulations for opportunities to practice.

Efficacy and Teacher Effectiveness

In order for teacher candidates to become effective educators, they must first believe in their own abilities to become effective. In 1977, Albert Bandura published the theory of self-efficacy in which Bandura theorized that an individual's belief in their abilities positively impacts their persistence and effort.

For this study, Bandura's theory was used to demonstrate the link between positive experiences of aspiring teachers during their preparation program and the positive impact that will have on their long-term feelings of self-efficacy.

Aspiring teachers may be understandably less prepared for experiences that they do not have the ability to practice; specifically, parent-teacher conferences. While family-school communication is a foundational experience for teachers, most preparation programs cannot provide aspiring teachers the opportunity to practice. While this skill is critical, it is difficult to provide access to these meetings, even for observations, because they are confidential.

As self-efficacy improves, and the aspiring teacher believes in their ability to do something well, the more likely they are to be successful. Without access to observe or engage in parent-teacher conferences, it makes it less likely that an aspiring teacher would feel confident in their ability to conduct this kind of meeting effectively.

By providing aspiring teachers the ability to engage in real-time parent-teacher conferences, they would gain confidence in their skills which then increases their own positive beliefs about their abilities. Considering that most meetings, including parent-teacher conferences and Individualized Education Plan meetings are confidential and restricted for observations, it is understood why aspiring teachers feel less prepared to engage in these meetings after graduation. However, with the utilization of artificial environments and simulations, it can be done.

Family-School Partnerships

Research has clearly established that effective communication and strong family-school partnerships are a key component for positive student outcomes. According to ASCD, students learn best when caregivers and school personnel can communicate with each other effectively (Hoerr, 2022).

For families and caregivers of children with disabilities, this relationship is especially important for overall student success. Henderson and Mapp (2002) found that when schools and families collaborate effectively together, students generally have improved educational outcomes.

Research consistently shows that positive school-family relationships have a beneficial impact on several important educational indicators including attainment of IEP goals, consistent attendance rates, more frequent access to a wide array of support services, and lower drop-out rates. Essentially, when families and schools work together, students have better outcomes.

However, in the most comprehensive teacher preparation programs, the parent-teacher conference is the one experience that aspiring teachers do not have access to practice. Meetings between families or caregivers and teachers are confidential, therefore teacher candidates typically do not have the opportunity to practice or even observe the process to see effective conferencing in action.

Southeastern Louisiana University (SLU) took bold steps to change this. Since 2014, the Department of Teaching and Learning at SLU, has utilized a mixed-reality platform to support the development of teacher candidates. SLU utilizes the Mursion, Inc. virtual reality training platform for the development of pedagogical skills, classroom management, instruction delivery, and most notably, parent-teacher conferences.

Special Education (SPED) majors at SLU have the unique opportunity to graduate as dually certified teachers. SPED majors graduate with both general education and special education licensure in their identified area of content. Throughout the teacher preparation program, teacher candidates have the opportunity to access Mursion's platform to practice skills in a safe and supported environment with coaching from instructional staff.

The Special Education curriculum includes coursework that focuses on family-school partnerships and how to develop effective communication strategies with families and caregivers. Throughout the coursework, teacher candidates are initially provided with content and best practice, then gradually released into demonstration and practice by implementing a virtual parent-teacher conference.

Over the course of the curriculum, students are introduced to best practices, including how to support families of students with disabilities. Importantly, students are introduced to the long history of family and school engagement and partnerships along with historical struggles, and key successes.

The Mursion platform offers a one-to-one forward-facing interaction with a family member. 'Ms. Stacy Atkins' is a parent with whom teacher candidates engage with using a specific scenario to guide their interactions and discussion. Those behind the scenes, the course instructor and the Mursion interactor, determine what scenario each teacher candidate will discuss, the level of intensity of the interaction, and whether or not the interaction will end with a positive resolution or needs further discussion.

Artificial Environments

The rise of artificial intelligence and its impact on society has created an understandable sense of alarm among many in the field of education. As a stand-alone technology, artificial intelligence has more unknown than known and its impact, both positive and negative, seems potentially far reaching. However, there is good argument in support for the use of artificial and virtual environments in the field of personnel development.

However, artificial and simulated environments can be the key to flexible, customized, and meaningful teacher preparation programs. As referenced by the U.S. Department of Education Office of Educational Technology, virtual, or artificial environments can be the answer for several needs in teacher preparation programs including distance learning. Additionally, with virtual environments, pedagogical skills can be practiced repeatedly with or without direct coaching.

With the use of artificial environments, aspiring teachers can obtain access to experiences that are otherwise inaccessible in even the most comprehensive teacher preparation programs. Lastly, artificial environments can provide aspiring teachers with the opportunity for repeated practice, immediate feedback loops, and the opportunity for reflection.

Mixed-Reality and Simulated Experiences

The use of simulated environments for clinical practice has been widely used in various professions. Simulated learning environments are often a standard of practice in business, medical and nursing fields, and in the military. In teacher preparation, the use of artificial environments and simulated practice allows for the learner to practice pedagogical skills in a highly personalized, safe, yet realistic environment (Dieker et al., 2014).

The focus of this study was the use of simulations to better prepare teacher candidates to conduct effective parent-teacher conferences. In most cases, parent-teacher conferences are confidential meetings; therefore, teacher candidates do not have the ability to observe them or interact within an actual meeting. Artificial environments provide inexperienced aspiring teachers a safe place to practice a new skill or implement a new technique. "If novice teachers make mistakes or if experienced teachers want to experiment with a new teaching idea, it poses no danger to the learning of any real student." (Dieker et al., 2017) Additionally, artificial environments provide a safe opportunity for repetitive practice.

By providing teacher candidates with simulations, they have the opportunity to practice real-life situations in a safe and controlled environment. This study uses Kolb's theory for skill acquisition and Badura's theory of self-efficacy to enhance the overall effectiveness of aspiring teachers.

Study Methodology

Prior to the simulated experience, teacher candidates are assigned a specific scenario or vignette. They are directed to read through the vignette and plan for discussion topics. They are also required to draft questions and possible resolutions for the scenario they are assigned. The critical part to this experience is that while the teacher candidates know what they are coming to the meeting to discuss, they do not know how the parent will respond, nor do they know the outcome of the meeting.

Pre-Simulation

Prior to engaging in the simulation, aspiring teachers were asked to rate their confidence in their ability to conduct an effective parent-teacher confidence. The survey specifically asked, 'On a scale of 1-5, rate your efficacy, or confidence level in conducting an effective parent-teacher conference.' The response scale ranged from 1 = Not at all Confident to 5 = Extremely Confident.

The pre-simulation self-assessment of the aspiring teachers (n=21) ranged from a low score of 2, to the highest self-assessment score of 4. The average score was 2.0.

Informal discussions and survey responses from participants indicate that the lack of confidence stemmed from the feeling of the unknown, or the unpredictability of how the meeting would progress. However, this is generally seen as a good thing. The fact that the aspiring teachers are nervous about a simulated event, indicates that they are suspending disbelief; which has been established as a critical component for the simulation within the artificial environment to be successful.

Post-Simulation

After engaging in the simulation within the artificial environment, aspiring teachers were asked to again, rate their confidence in their ability to conduct an effective parent-teacher conference. The post-simulation survey specifically asked, 'Now that you have experienced the simulation, on a scale of 1-5, rate your efficacy, or confidence level in conducting an effective parent-teacher conference.' The

response scale ranged from 1 = Not at all Confident to 5 = Extremely Confident.

After experiencing the simulation in the artificial environment, the confidence level of aspiring teachers improved. Their confidence in their ability to conduct an effective parent-teacher conference generally went up. In contrast to their feelings of confidence prior to the experiences, aspiring teachers' scores on their self-assessment after the simulation (n=21) ranged from the lowest score of a 3 and the highest score of a 5. The average score after the simulation was a 4.0.

This improvement in scores indicates a significant increase in aspiring teachers' confidence in their ability to conduct an effective parent-teacher confidence. Both the range of scores (lowest to highest) as well as the average score showed an increase in aspiring teachers' confidence in their ability to conduct a conference. Aspiring teachers felt more confident in their ability after the simulation in the artificial environment than they did before the experience.

Aligning with Kolb's theory, after the simulation aspiring teachers had specific steps to take to further their reflection. First, aspiring teachers had to watch their simulation in its entirety and self-reflect on their interaction. They were provided a rubric that included guided questions to prompt their thinking and critique how they engaged with the parent. It is important for them to focus primarily on what they did well and connect those actions back to their coursework and understanding of best practices.

Aspiring teachers were also asked to highlight the areas that needed improvement and reflect on the specific actions or behavior. After the aspiring teachers identified the areas of improvement, they developed a plan of action outlining a plan for continuous improvement. This may include an improved method of communication, responses, or even the use of simple, non-verbal communication.

In the event a simulation did not go well, for example, if an aspiring teacher did not successfully engage in the simulation or had an incomplete experience, they would still develop an action plan for improvement. The benefit of using the artificial environment and simulation, is that this aspiring teacher could easily take the action plan and try again and engage in the simulation again. Because the platform environment is artificial, the aspiring teacher could essentially start from scratch.

Summary

The results of the study reinforced Kolb's Theory of Learning. In this instance, the implementation of concrete experience, active experimentation, conceptualization, and reflection, resulted in an overall increase in aspiring teachers' confidence and sense of self-efficacy. Providing aspiring teachers the opportunity to practice new skills in a safe and controlled, simulated environment, improved their confidence in their ability to conduct a parent-teacher conference.

Implications for Future Research

Research will continue in the use of simulations for parent-teacher conferences. Initial outcomes indicate that there should be a continuation of the research. However, there are additional areas that should be researched using artificial environments and simulations in a similar way.

The parallel exists in how the use of artificial environments could be used to bolster even the most comprehensive Educational Diagnostician preparation programs. Similar to aspiring teachers, aspiring educational diagnosticians also face uncertainty surrounding the evaluation dissemination meeting. Without the actual clinical experience of leading or observing a dissemination meeting, aspiring diagnosticians can be unclear on how the dissemination meeting will or should progress.

The use of artificial environments can provide the aspiring diagnostician with the necessary practice to successfully complete this vital role and responsibility of an Educational Diagnostician. After multiple sessions in the artificial environment, aspiring diagnosticians can improve their confidence and skills in conducting effective evaluation dissemination meetings.

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