Use of Immersive Simulations to Enhance Graduate Student Learning: Implications for Educational Leadership Programs

Robert H. Voelkel
University of West Georgia
rvoelkel@westga.edu

Christie W. Johnson
University of West Georgia
cjohnson@westga.edu

Kristen A. Gilbert
University of West Georgia
rvoelkel@westga.edu

Abstract

The purpose of this article is to present how one university incorporates immersive simulations through platforms which employ avatars to enhance graduate student understanding and learning in educational leadership programs. While using simulations and immersive virtual environments continues to grow, the literature suggests limited evidence of avatar technology currently used at the university level, especially in educational leadership preparation and other graduate level programs. The authors identify a step-by-step process to effectively employ the use of immersive simulations as a practitioner tool at the university level. This article provides a process for incorporating immersive simulations into graduate educational leadership programs that can be successfully duplicated to best support professional preparation of current and future educational leaders in developing best practices for stakeholder engagement, human talent management, instructional leadership, and other areas relevant to transformational leadership. The authors argue that immersive simulations do indeed better support graduate students.

Introduction

The current education reform movement began when *A Nation at Risk: The Imperative for Educational Reform* was released by the National Commission on Excellence in Education in 1983. Its publication has led to the longest sustained period of reform in American educational history. This report called attention to the need to improve public education and resulted in Americans losing confidence in the public educational system. This outcry prompted legislators to address the issue of America's eroding public school system as presented in the report, which spawned multiple school reform models and sometimes unwieldy change efforts to improve the levels of education provided to America's students. The result has been a series of education reforms leading to a gradual implementation of greater accountability for excellence in teaching and leadership at school sites throughout America.

The passage of the federally mandated No Child Left Behind (NCLB) Act legislation of 2001 represented one more step in this reform trajectory and was in response to continued failure of American students to achieve on a par with other industrialized nations particularly in light of the gap in achievement of low-income and Latino and African American students (US Department of Education, 2001). With the inception of NCLB, there was increasing pressure for higher quality teachers and leaders, more scripted curriculum aligned to state adopted standards, and more systematic assessments and interventions for those students who have not met grade-level standards at the proficient level. More recently Common Core State Standards have been implemented adding additional pressure to teachers and leaders.

As public schools in the United States continue to face these unprecedented state and federal demands to raise student achievement and close racial and ethnic achievement gaps, the role of university preparatory programs becomes increasingly important. The recently passed federal Every Student Succeeds Act (2015) gives state and local authorities more flexibility and discretion on approaches and setting achievement benchmarks. Increasing flexibility with greater accountability for learning outcomes, however, suggests the importance of research on university programs and their methods for preparing current and future school leaders to meet these high demands in their own schools or districts. Collaborative learning technologies, arguably both efficient and cost-effective, are among the distance education strategies universities have adopted to meet increasing demands (Gaskell & Mills, 2014; Hartley, Ludlow, & Duff, 2015). One such collaborative learning practice showing promise is the use of immersive simulations (Bautista & Boone, 2015; Beckem & Watkins, 2012), which provides leaders with non-threatening hands-on simulations that can reinforce leadership characteristics necessary to succeed in K-12 settings in the 21st century. While access to, or experiences with, immersive simulations or other collaborative learning technologies do not guarantee participants will become proficient in a particular area, there distance learning strategies do advance essential knowledge, skills, dispositions, and practices for adult learners (Killion & Treacy, 2014). Accordingly, school and district leaders responsible for the supervision and administration of distance learning, including collaborative learning technologies, may find participation in immersive simulation experiences at the university level beneficial in building prior knowledge for application in their own schools or districts.

LITERATURE REVIEW

Principal Leadership Practices

School leadership matters for school success. There is ample research demonstrating links between high-quality leadership and positive school outcomes. In fact, few researchers would disagree that the principal's leadership is one of the most important factors underlying the success or failure of schools. Leithwood, Louis, Anderson, and Wahlstrom (2004) reviewed research on how leadership influences student learning and found that leadership is second only to classroom instruction among all school-related factors that contribute to what students learn at school. They found that the total direct and indirect effects of leadership on student learning account for about 25% of total school effects. This effect is primarily through creating a culture of high expectations and supportive learning environment for both teachers and students. This recognition of the important role of school leadership has led to an increased focus to recruitment and preparation of school leaders. Thus, we identify a step-by-step process of including immersive simulation technology that supports university graduate level educational leaders. We drew on two dimensions of principal leadership literature that appear most frequently: instructional leadership and transformational leadership. In particular, we identified principal practices that previous research has indicated are associated with successful school leadership and the potential uses of immersive simulations to further enhance current and future educational leaders in employing best leadership practices as identified by the literature. Table 1 summarizes the similarities and differences between instructional and transformational leadership characteristics found in two studies (Leithwood, Leonard & Sharratt, 1998; Robinson, Lloyd, & Rowe, 2008).

Table 1. Similar and Different Characteristics of Transformational and Instructional Leadership

Transformational Leadership (Leithwood et al., 1998)	Instructional Leadership (Robinson et al., 2008)
• Vision • Group goals	• Communicating high academic standards
• Intellectual stimulation • High performance expectations	• Professional development enhancing student learning
• Individualized support	• Classroom observations
• Appropriate modeling	
• Productive school culture • Structure	• School environment conducive to learning

Instructional leadership

The study of instructional leadership has resurfaced as a form of leadership that is essential to improve student learning (Hattie, 2009; Katz, & Dack, 2013) and was driven in large part by the effective schools movement of the 1970s and 1980s (Horng & Loeb, 2010). Spillane, Hallett and Diamond (2003) defined instructional leadership as "an influential relationship that motivates, enables, and supports teachers' efforts to learn about and change their instructional practices" (p. 1). Liu (1984) asserted, "Instructional leadership consists of direct or indirect behaviors (by principals), that significantly affect teacher instruction and, as a result, student learning" (as cited in Daresh, 1989, p. 97). These behaviors include communicating high academic standards, professional development enhancing student learning, classroom observations, and a school environment conducive to learning (Robinson et al., 2008). In his meta-analysis of 50,000 studies covering more than 80 million students, Hattie (2009) asserted that instructional leadership, as evidenced by an effect size of .36, has a greater impact on student results than does transformational leadership. Katz and Dack (2013) found that both formal and informal instructional leadership played roles in positively impacting curriculum, teaching and learning.

Hargreaves and Fullan (2012), on the other hand, emphasized the necessity of viewing other leadership models beyond instructional leadership. They argued for the power of professional capital development through teacher collaboration and asserted there is not one way to collaborate. They viewed instructional leadership as "micromanaging mania." However, there is growing empirical evidence (i.e., Hattie, 2012; Marks & Printy, 2003) of the importance of an integrated leadership approach to include transformational and instructional leadership. The basis for including both stems from their different foci: instructional leadership attending to classroom pedagogy and the individual teacher development, and transformational leadership encompassing a broader schoolwide perspective, including the work of grade and department teams.

Transformational leadership.

To understand how leaders bring about change in districts and schools, one approach has been to identify the behaviors of leaders who have transformed their organization (Bass, 1985; Burns, 1978). We drew upon the characteristics identified in the pioneering study of educational leadership by Leithwood, Leonard and Sharratt (1998). The behaviors they identified are: (a) establishing a vision, (b) setting group goals, (c) providing intellectual stimulation, (d) setting high performance expectations, (e) providing individualized support, (f) offering appropriate modeling, (g) establishing a productive school culture, and (h) developing appropriate structures. Marks (2013) found that more than 80% of school leaders claim to be primarily transformational leaders.

Printy, Marks, and Bowers (2009) conducted a content analysis of a subset of extensive case studies that extended and supported their earlier quantitative research of 24 elementary and middle schools (see Marks & Printy, 2003). In the quantitative study, they found that when principals displayed transformational leadership practices, strong correlations were shown with pedagogical quality (r = .86) and actual achievement (r = .85). The qualitative phase (2009) showed that school success was enhanced when principals and teacher leaders incorporated a transformational leadership approach to establish an intellectual culture (i.e., having a leader who encouraged innovation and creativity as well as critical thinking and problem-solving). In addition, these leaders modeled what it meant to be a professional educator, inspired their staff to produce their best efforts, elevated staff contributions, and expressed personal concern for colleagues. Their work helped to establish a link between instructional leadership and transformational leadership, showing the importance of tending to relationships and instruction.

Leadership Preparation Programs

Numerous studies examining the effectiveness of preparation programs for educational leaders exist in the literature, including a growing body of empirically grounded research focusing on specific elements of professional learning deficits or needs (Dodson, 2014; Dunlap, Li, & Kladifko, 2015). Questions surrounding what constitutes the right balance between practical and theoretical preparation, however, remain a topic of discussion among scholars and practitioners alike (Davis, Leon, & Fulz, 2013). While the literature clearly supports a strong link between principal effectiveness and student achievement (Davis et al., 2013; Dodson, 2014; Lowrey, 2014), close examination of how education programs help principals prepare for their role has risen to importance only recently in the wake of a national focus on standards-based instruction. Such examinations, however, typically do not include university faculty and high level practitioners (Dunlap et al., 2015).

If there is a silver lining surrounding program redesign beyond mandated compliance, arguably, it may be found in the accelerated national focus on improving principal preparation and stronger vetting of the programs designed to prepare them. Traditional leadership preparation programs, once rooted heavily in the theoretical, are no longer the norm in most institutions of higher education (Dodson, 2014). According to Davis and his colleagues (2013) and Lynch (2012), among others, higher education programs have long debated best practices for designing principal preparation programs. Some areas of significant learning gaps for educational leaders in higher education preparation programs include working with special needs students (Lynch, 2012), budget, finance, and site-based decision making (Dodson, 2014), and pedagogical or human resource management (Radinger, 2014).

In the twenty-first century, leadership preparation programs are evolving toward an integrated approach that blends field-based experiences and practical strategies supported with a theoretical context and targeted to strengthen the leader's development in a specific area of need (Dodson, 2014). Attention to program evaluation by external reviewers, a best practice, has risen to the forefront as leadership preparation providers seek national accreditation, align programs more closely to national standards, or enact other measures of accountability (Parylo, 2013). The Interstate School Leaders Licensure Consortium (ISLLC) (2016) has identified seven primary standards that guide the work of educational program providers and review for effectiveness at the state and national levels, including program design, instruction, and implementation.

State and national policymakers, driven by decades of sociopolitical fallout associated with declining student achievement, have also contributed heavily to discussions with other colleges and universities as they collaborate to build more effective leadership preparation programs. In Georgia, for example, state rules governing requirements for educational leaders and the certification programs that prepare them have changed multiple times over the last twenty years. At times, colleges and universities must operate programs that meet multiple state certification rules in order to accommodate students enrolled for completion of an expiring program as well as those enrolling under an existing one (Georgia Professional Standards Commission, 2016). Additionally, attention to program evaluation by external reviewers, a best practice, has risen to the forefront as leadership preparation providers seek national accreditation, align programs more closely to national standards, or enact other measures of accountability (Parylo, 2013). We argue that incorporating immersive simulation technology as part of graduate preparation programs in educational leadership is a best practice that will not only enhance preparation programs but also better prepare current and future educational leaders in K-12 settings.

Historical Overview of Mursion/TeachLivE ™

One way in which higher education is further developing an integrated approach to blending theory and practice is through pedagogical tools of immersive simulation. This technology has the ability to target leaders' specific needs and create authentic and practical experiences in which to apply theory. The use of simulation has been prevalent as a teaching and learning tool in a number of fields for centuries. Simulation was defined by McGaghie (1999) "as a person, device, or set of conditions which attempts to present evaluation problems authentically [and where the] student or trainee is required to respond to the problems as he or she would under natural circumstances" (p. 9). As technology has become increasingly integrated into the fabric of our existence, simulations have transformed from simple role-playing to those which are immersive and technologically driven. Both the pace of disruptive innovations and the proliferation of a wide variety of technologies have increased the exposure of the general population to immersive simulation and interactions with avatars. This type of technology, widely used in fields such as medicine, aviation, and the military, has been posited to be a powerful pedagogical tool particularly in higher education (Johnson, Smith, Willis, Levine, Haywood, 2007). One platform using this technology at over 75 universities across the nation is Mursion, formerly known as TeachLivETM (www.teachlive.org, n.d.).

Acknowledging the challenges of adequately preparing pre-service teachers to face the demands of teaching in the 21st century, educational researchers sought to create an augmented reality platform, (heretofore referred to more generally as immersive simulation), capable of providing a risk-free environment in which to better prepare teachers (Dieker, Hynes, Stapleton, & Hughes, 2007). To that end, they created avatars to be used in immersive simulation that would not only provide a risk-free environment, but would also afford a cost-effective method for increased access to learning opportunities, enhanced benefits of non-technological simulation, and personalized learning. Initial research regarding the efficacy of this platform and software in uses in higher education across the country indicates significant positive effects across the variety of areas examined (Brown, 2015; Straub, 2014, 2015) with usage now expanding into the realm of training pre- and in-service educational leaders. Recognized as an efficacious tool particularly where transfer of skills is critical (Christensen, Horn, Caldera, & Soares, 2011; Johnson et al., 2007), some in higher education educational leadership programs are exploring immersive simulation as a means to better prepare educational leaders.

DEVELOPING AND IMPLEMENTING IMMERSIVE SIMULATION

Depending on the platform used, the process for developing and implementing an immersive simulation scenario varies. Mursion's software allows users to choose from a variety of avatars and to customize use through the design of a scenario planner, a tool much like a lesson plan that is used to guide the interaction between students and the avatar. Because this immersive simulation platform operates through both software and a human in the loop, the quality of the experience relies heavily on the design of the scenario planner. As with traditional pedagogical tools, experiences designed with specific objectives, opportunities for scaffolding, and targeted feedback combined with formative and summative assessments, increase the quality and efficacy of the interaction. Absent of intentional instructional design, immersive simulation has the potential to serve as a fun, but ineffective tool for promoting the development of necessary educational leadership skills. Thus we cannot overemphasize the importance of completing the scenario planner with a strong instructional design. We have found that doing so supports a learning experience that is transformational in an educational leader's ability to hone their skillset and apply them in their work life. Figure 1 outlines the steps we found most effective when employing immersive simulations with our educational leadership students.

Step one: collaboration.

Residency professors met over a series of months to explore the concept of using immersive simulation experiences with educational leadership candidates. Discussions centered primarily on determining potential outcomes for use of the simulation experience in meeting course goals and objectives, state and national standards for educational leaders, and state licensure requirements. The team also discussed possible simulation experiences, levels of student engagement, feedback protocols, ethical considerations, technology, and other factors. Reviewing potential outcomes for use of the immersive simulation software led residency professors to agree that experiences involving a broad range of interpersonal communication types, verbal and non-verbal, have the potential to lead to improved skills and greater self-efficacy for leadership candidates that they can, in turn, take back to their sites. While professional collaboration is ongoing, the initial phase completed with development of implementation strategies, assigned responsibilities, and planning next steps. An example of the Educational Leadership faculty collaborative planning framework is shown in Table 2.

Planning Item	Action Items	Deliverables
Learning Outcomes	Set goals and objectives	Scenario plan - draft
Scenario	Design/develop interactive scenario	Scenario plan - final
Scenario Summary	Develop scenario summary (2 pages)	scenario summary - final
TeachLivE™ Simulator	Schedule Mursion/TeachLivE™ Send scenario plan to TeachLivE™ Send summary to avatar/interactor	Schedule confirmed Scenario plan submitted Summary submitted
Meeting space	Reserve appropriate meeting space	Classroom/labs confirmed
Technology	Secure dedicated on-site technology Schedule on-site support	Technology scheduled Tech support scheduled
Candidate Protocols	Develop interaction schedule Design/develop observer procedures Design/develop pre/post activities Post candidate information/pre-work	Interaction/rotation plan Observer/feedback plan Pre/post learning activities Post to Course Den/LMS
Classroom/Lab Setup	Test internet connectivity Test audiovisual equipment Review scenario with avatar/interactor	Confirm on-site Confirm on-site Completed on-site
Implementation	Review participation procedures Address candidate questions/concerns Monitor candidate participation Debrief candidate experience	Printed copies Face to Face Face to Face Face to Face
Reflective Analysis	Faculty debrief Candidate reflection	Strengths/Improvements Reflective essay/alternative

Step two: goals and objectives.

Much time and attention were dedicated toward planning a series of exercises to meet specific course objectives across a series of eight weeks in advance of the first residency seminar in which the immersive simulation software was introduced. Residency professors worked closely with the university's onsite TeachLivE™ Coordinator to ensure authenticity of the simulation scenarios and their strategic alignment with clearly defined instructional goals. These objectives work to ensure desired outcomes while targets help learners develop a keen sense of meta-cognition. Having a clear sense of each aid in the instructional design process. For example, immersive simulation can serve a variety of purposes such as an exercise simply to provide an opportunity for exposure to a situation, or as a tool to promote skill development. In the former, a candidate might have the learning target of conducting their first parent-teacher conference using data, while in the latter, the student is applying classroom management techniques to address an identified weakness. In the context of higher education, a professor might identify the need for a group of educational leaders to practice facilitating data-driven discussions and decision-making based on the outcome of the school's most recent state testing. The professor would set up a scenario with the objective of affording an opportunity for educational leaders to practice leading a data-driven discussion. The educational leader's learning target would include being able to effectively facilitate a data-driven discussion which leads to actionable next steps for those on the team. After identifying goals and objectives, the next task is to create a scenario for the immersive simulation (see Figure 2).

Step three: embedded events.

Simulation scenarios were targeted toward extended learning on communication skills that instructional and transformational leaders use regularly with various audiences; for example, teachers, professional learning communities (PLCs), parents, and other internal and external stakeholders. The simulation experiences we have used include a PLC meeting and a teacher post observation conference between the principal and teacher who was observed. In each scenario, there is one candidate who plays the role of principal (leader) while the avatar plays the teacher. During each simulation, the rest of the group is completing an observational and reflective feedback form.

Building relevant experiences with varying degrees of difficulty is a key component for effective use of the Mursion/TeachLivE™ simulation software. Scenarios involving educational leaders were constructed to direct the virtual presence, or avatar, in participating at degrees of intensity ranging from zero (none) to five (extremely high) for a period of approximately ten minutes. Prior to the simulation, educational leaders are provided materials that all participants will use during the simulation. They are also briefed in advance about the conditions of the scenario, but do not know the degree of difficulty they will meet until the simulation unfolds (Figure 2). In scenarios where the intensity level is high and the candidate engaging with the avatar feels overwhelmed,

the participant may pause the simulation to receive direction from an instructor, discuss a possible response, or withdraw from the activity altogether. When the simulation resumes, the avatar continues participation from the pause point until the scenario's scheduled end.

Ten minutes in immersive simulation is roughly equal to 45 – 60 minutes of a real-world experience (Dieker, Rodriquez, Lignugaris/Kraft, Hynes, & Hughes, 2014). Although a scenario may require participants to draw from a breadth of knowledge (e.g., knowledge of curricular standards, cut off scores for a particular test, and school law) and employ a variety of skills (e.g., diffusing an angry teacher, data analysis, and creating an action plan) all in the same interaction, it is short in duration. Because the immersive simulation is generally limited to this brief interaction, a back story is developed that is shared with both the students and those running the immersive simulation. In the example provided, this might include details such as the educational leader's explanation to her staff about why the school has organized into data teams, the purpose of the team, and how they will operate in these teams. Once this backstory has been developed, the professor then embeds events into the scenario. These events often include common patterns of thinking (both misconceptions and correct patterns) to ensure that the scenario mimics authentic experiences. In the scenario described here, the professor may highlight ways in which the data could be misinterpreted; astute observations regarding the data; suggestions for action steps which may or may not address the actual identified needs; ways in which the avatar, playing the part of a teacher, could push back on the data or the process; or questions that the avatar could ask. The more information provided in this realm, the richer the experience, particularly if the same scenario is being repeated with several watching prior to their participation.

Step four: implementation.

Immersive simulation has the advantage of simultaneously slowing and speeding the learning process. Using the pause simulation feature slows down the interaction and allows the student to regroup, seek advice, or even start over. It can also be used as a corrective measure if the professor observes the leader executing a skill improperly. In both cases, the professor can also provide coaching or chose to offer it after the interaction. Conversely, the fact that each interaction in the immersive simulation takes place over a brief time period speeds up the learning process by allowing participants to reflect on the correlation between their actions and outcomes. This experience of slowing and speeding the learning process can also serve to benefit those who are observing since students indeed learn from previous individuals' mistakes providing a scaffolded learning opportunity that increases levels of mastery attained.

The professor must consider specifically how he or she will prepare the students for this interaction; how the interaction will flow: Will students use the "pause simulation" feature?, Will the professor coach during or after the session?; and what types of assessments will be used. This is referred to in the scenario planner (and in research on immersive simulation) as the action-review cycle (ARC) (Badiee & Kauffman, 2015; Dieker, Rodriquez, et al. 2014). To develop an effective scenario, it is important to consider all aspects of the ARC–before action, during action, and after action. Apart from this process representing research-based pedagogical practices, outlining each of the aforementioned components in the scenario planner ensures a clear understanding of the intended use and outcomes of the immersive simulation. Finally, the professor outlines the logistics of the scenario. For example, will students present in pairs, or on their own? How long will each simulation last, and will students observe others in the simulator? (Figure 3)

Step five: debrief. Educational leadership candidates debrief with an instructor following each immersive simulation experience. Observers provide warm and cool feedback to participants on specific events that took place during the exercise, including what did or did not go well, the leader's areas of strength, possible improvement needs, and others. Participants are offered an opportunity to describe how they felt, explain their response technique, and ask questions about the scenario. We cannot overemphasize the importance of conducting a debriefing immediately following each simulation experience.

Step six: reflection. At the close of the simulation activity, educational leader candidates are assigned a reflective essay using a theory to practice model. They are required to use the written and verbal feedback provided from their peers during their simulation experience. Candidates are asked to reflect on their role, the role of others, shifts in focus throughout the simulation, conditions that could or could not be altered, and other factors connecting simulation conditions with real-world experiences and outcomes.

DISCUSSION

This article lays the groundwork through a step-by-step process that we have found to best support current and future leaders as they navigate the ever increasing demands of being site and district K-12 leaders. Implementing the use of immersive simulations as a resource of graduate level programs can enhance student learning and understanding of these ever increasing demands in K-12 settings. Our experiences, through the step-by-step process outlined in this article, have highlighted the practice of integrating immersive simulations into educational leadership preparation programs.

Educational leaders need opportunities to practice confronting the myriad of challenges they will face while in the field to be effective instructional and transformational leaders. Most universities have addressed this reality by adding a job-embedded performance-based learning component to their educational leadership training programs. However, these job-embedded experiences have proven difficult to regulate, in terms of quality and exposure, leaving many to continue to search for other pedagogical tools to enhance training programs. This need for more effective and consistent training tools for educational leaders has created a niche for the use and proliferation of immersive simulation in educational leadership training programs. Exposure to immersive simulation allows for individualized teaching and learning that effectively promotes skill acquisition and problem solving. When intentionally designed, it also serves as a tool by which to consistently and comprehensively expose educational leaders to authentic and complex decision-making opportunities. Although research is still in the nascent stages for using this type of pedagogical tool to prepare educational leaders for the complexities of leading schools in the 21st century, preliminary results are promising (Mann, Reardon, Becker, Shakeshaft, & Bacon, 2015; Storey & Cox, 2015).

Current and future educational leaders are afforded the ability to increase their problem solving, critical thinking, and reflective skills as they partake in real-world and meaningful immersive simulations in a risk-free yet authentic learning environment. These problem-based learning opportunities may very well be the future of graduate level preparation programs. Beckem and Watkins (2012) agree and state that "simulations empower learners to acquire new knowledge and build upon existing competencies…" (p. 62). They go on to claim that "incorporating simulations in education supports the shift towards a student-centered approach where students are more in control of how and when they learn" (p. 62). Allowing educational leaders simulation experiences enables them

to move beyond lower order processes such as remembering and understanding to higher order thinking of evaluating and synthesizing information leading to new knowledge that will better support their important work as site and district leaders of the 21st century.

FUTURE RESEARCH

Given the evidence that immersive simulations can be a powerful pedagogical tool in higher education (Johnson et al., 2007) and the fact that this technology is widely used in fields such as medicine, aviation, and the military (Johnson et al., 2007), an important next step is for researchers to conduct quantitative and qualitative studies exploring the effectiveness of incorporating immersive simulations into graduate educational leadership programs. Further research is needed to understand the specific ways in which immersive simulations could support current and future site and district leaders. Another area of future research is to explore the extent to which immersive simulations increase leaders' level of self-efficacy.

References

Badiee, F. & Kaufman, D. (2015). Design evaluation of a simulation for teacher education. Sage *Open,* 5(2), 1-10. doi:10.1177/2158244015592454

Bass, B.M. (1985). Leadership and performance beyond expectations. New York, NY: The Free Press.

Bautista, N.U., & Boone, W.J. (2015). Exploring the impact of TeachMETM lab virtual classroom teaching simulation on early childhood education majors' self-efficacy beliefs. Journal of Science Teacher Education, 26, 237-262. Retrieved from http://www.springer.com/

Beckem, J.M., & Watkins, M. (2012). Bringing life to learning: Immersive experiential learning simulations for online and blended courses. Journal of Asynchronous Learning Networks, 16(5), 61-71. Retrieved from http://olc.onlinelearningconsortium.org/publications/olj_main

Brown, B. (2015). University of Central Florida signs exclusive license agreement with Mursion to commercialize TeachLivE virtual simulation technology [Press Release]. Retrieved from http://www.streetinsider.com/Press+Releases/University+of+Central+Florida+Signs+Exclusive+License+Agreement+with+Mursion+to+Commercialize+TeachLivE+

Burns, J. M. (1978). Leadership. New York, NY: Harper & Row.

Christensen, C. M., Horn, M. B., Caldera, L., & Soares, L. (2011, February). Disrupting college: How disruptive innovation can deliver quality and affordability to postsecondary education. Retrieved from http://www.innosightinstitute.org/innosight/wp-content/uploads/2011/02/future_of_higher_ed-2.3.pdf

Daresh, J.C. (1989). Supervision as a proactive process. White Plains, NY: Longman.

Davis, S., Leon, R., & Fultz, M. (2013). How principals learn to lead: The comparative influence of on-the-job experiences, administrative credential programs, and the ISLLC Standards in the development of leadership expertise among urban public school principals. International Journal of Educational Leadership Preparation, 8(1), 1-33. Retrieved from http://www.tandfonline.com/

Dieker, L., Hynes, M., Stapleton, C., & Hughes, C. (2007). Virtual classrooms: STAR simulator building virtual environments for teacher training in effective classroom management.

New Learning Technology SALT, 4, 1-22. Retrieved from http://www.salt.org/salt.asp?ss=l&pn=jobListAll

Dieker, L. A., Rodriguez, J., Lingnugaris-Kraft, B., Hynes, M., & Hughes, C. (2014). The future of simulated environments in teacher education: Current potential and future possibilities. Teacher Education and Special Education, 37(1), 21-33. doi: 10.1177/0888406413512683 tese.sagepub.com

Dodson, R. L. (2014). Which field experiences best prepare future leaders? An analysis of Kentucky's principal preparation program. Educational Research Quarterly, 37(4), 41-56. Retrieved from http://erquarterly.org/

Dunlap, J., Li, J., & Kladifko, R. (2015). Competencies for effective school leadership: To what extent are they included in Ed.D. leadership programs? Educational Leadership and Administration: Teaching and Program Development, 26, 14-26. Retrieved from https://www.questia.com

Gaskill, A., & Mills, R. (2014). The quality and reputation of open, distance, and e-learning: what are the challenges? Open Learning, 29(3), 190-205. Retrieved http://eds.a.ebscohost.com/eds/pdfviewer/

Georgia Professional Standards Commission (2016). Resources for program providers. Retrieved March 21, 2016, http://www.gapsc.com/EducatorPreparation/Resources/.

Hargreaves, A., & Fullan, M. (2012). Professional capital: Transforming teaching in every school. Toronto, ON: Ontario Principals Council.

Hartley, M., Ludlow, B., & Duff, M. (2015). Second Life ®: A 3D virtual immersive environment for teacher preparation courses in a distance education program. Rural Special Education Quarterly, 34(3), 21-25. Retrieved http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer

Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. New York, NY: Routledge.

Hattie, J. (2012). Visible learning for teacher. New York, NY: Routledge.

Horng, E. & Loeb, S. (2010). New thinking about instructional leadership. Kappan, 92(3), 66-69. Retrieved from http://pdk.sagepub.com/login

Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K., (2011). The 2011 Horizon

Report. Austin, TX: The New Media Consortium. Retrieved from http://www.nmc.org/pdf/2011-Horizon-Report.pdf

Katz, S., & Dack, L. A. (2013). Intentional interruption: Breaking down learning barriers to transform professional practice. Thousand Oaks, CA: Corwin.

Killion, J., & Treacy, B. (2014). Myths about technology-supported professional learning. Journal of Staff Development, 35(2), 12-18. Retrieved from http://eds.a.ebscohost.com/eds/

Leithwood, K., Leonard, L., & Sharratt, L. (1998). Conditions fostering organizational learning in schools. Educational Administration Quarterly, 34, 243-276. Retrieved from http://www.erquarterly.org

Leithwood, K., Louis, K.S., Anderson, S., & Wahlstrom, K. (2004). How leadership influences student learning. New York, NY: The Wallace Foundation. Retrieved from www.wallacefoundation.org

Lowrey, S. (2014). A mixed-methods study of principal efficacy and transformational leadership in Canada. Journal of International Studies in Educational Administration, 42(3), 35-54.

Lynch, J. (2012). Responsibilities of today's principal: Implications for principal preparation programs and principal certification policies. Rural Special Education Quarterly, 31(2), 40-47. Retrieved from https://www.acres-sped.org

Mann, D., Reardon, R. M., Becker, J. D., Shakeshaft, C., Bacon, N. (2015). Immersive, interactive, web-enabled computer simulation as a trigger for learning: The next generation of problem-based learning in educational leadership. Journal of Research on Leadership Education, 6(5), 272-287. Retrieved from jrl.sagepub.com

Marks, W. (2013). The late-career and transition to retirement phases for school leaders in the 21st century: The aspirations, expectations and reflections of late-career and recently retired principals in New South Wales (2008-2012). Unpublished doctoral dissertation, University of Wollongong, New South Wales.

Marks, H. M., & Printy, S. M. (2003). Principal leadership and school performance: An integration of transformational and instructional leadership. Educational Administration Quarterly, 39(3), 370-397. Retrieved from http://www.erquarterly.org

McGaghie, W. C. (1999). Simulation in professional competence assessment: Basic

considerations. In A. Tekian, C. H. McGuire, & W. C. McGaghie (Eds.), Innovative simulations for assessing professional competence: From paper-and-pencil to virtual reality (pp. 7-22). Chicago, IL: Department of Medical Education, University of Illinois at Chicago.

National Commission on Excellence in Education (1983). A nation at risk: The imperative for educational reform: A report to the nation and the secretary of education, United States Department of Education. Washington, DC, U.S. Department of Education.

Parylo, O. (2013). Collaborative principal preparation programs: A systematic review and synthesis of qualitative research. International Journal of Educational Leadership Preparation. 8(2), 177-191. Retrieved from http://www.tandfonline.com/

Printy, S. M., Marks, H. M., & Bowers, A. J. (2009). Integrated leadership. Journal of School Leadership, 19(5), 504-532. Retrieved from https://rowman.com/page/JSL

Robinson, V.M., Lloyd, C.A., & Rowe, K.J. (2008). The impact of leadership on student outcomes: An analysis of the differential effects of leadership types. Educational Administration Quarterly, 44(5): 635–674. Retrieved from http://www.erquarterly.org

Spillane, J.P., Hallett, T., & Diamond, J.B. (2003). Forms of capital and the construction of leadership: Instructional leadership in urban elementary schools. Sociology of Education, 76(1), 1-17. Retrieved from http://soe.sagepub.com/

Storey, V. J. & Cox, T. D. (2015). Utilizing TeachLivETM to build educational leadership capacity: The development and application of virtual simulations. American Research Institute for Policy Development, 4(2), 41-49. doi:10.15640/jehd.v4n2a5

Straub, C., Dieker, L., Hynes, M., & Hughes, C. (2014, June). Year 1 findings: Using virtual rehearsal in TLE TeachLivETM mixed reality classroom simulator to determine the effects on the performance of mathematics teachers. Paper presented at the 2014 TeachLivE

National Research Project, Orlando, Florida. Retrieved from http://teachlive.org/wp-content/uploads/2014/12/2014-Teachlive-Conference-Proceedings.pdf

Straub, C., Dieker, L., Hynes, M., & Hughes, C. (2015, June). Year 2 findings: Using virtual rehearsal in TLE TeachLivE™ mixed reality classroom simulator to determine the effects on the performance of mathematics teachers. Paper presented at 3rd National TeachLivE™ Conference, Orlando, FL. Retrieved from http://teachlive.org/publications/

U.S. Department of Education. Every Student Succeeds Act (2015). Retrieved February 4, 2016, from http://www.ed.gov/ESSA.

U.S. Department of Education. No Child Left Behind Act (2001). Retrieved November 2, 2013, from http://www.nclb.gov.
