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Meta-synthesis of Outcomes of Simulated Learning Among Speech-Language Pathology Graduate Students

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Abstract

Simulated learning is firmly established in health-related disciplines with a growing presence in the field of speech-language pathology. However, research on its efficacy and outcomes in this field is still emerging. A synthesis of simulated learning practices and associated student learning outcomes within the field of speech-language pathology is needed. As such, this study aims to explore perceived student learning experiences, perspectives, and the associated impact of simulated learning in speech-language pathology education. Guided by the research question of student attitudes and subjective outcomes that shape the simulated experience, the study employs criterion-based, purposeful sampling from empirical studies in peer-reviewed journals and dissertations. Using a thematic synthesis approach, the study synthesizes primary qualitative and mixed-method research findings into descriptive and analytical themes through coding and content analysis. Results revealed can help explain learning outcomes regarding simulated education within the field of speech-language pathology to increase understanding of educational methods and barriers that impact learning.

Keywords

simulated learning, speech-language pathology, graduate students, meta-synthesis, thematic synthesis, student learning experiences, communication sciences and disorders, student learning outcomes

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Academic and clinical knowledge within educational contexts can be attained and demonstrated through the use of simulated learning practices. Simulated learning has been implemented across health-related disciplines for decades with supportive evidence that speaks to the positive impact on learning (Bakhos et al., 2020; Bearman et al., 2019), performance and skill acquisition (Dudding & Nottingham, 2018), knowledge acquisition (Weller et al., 2012), critical thinking (Dalessio et al., 2021; Lapkin et al., 2010; Lee & Oh, 2015), and development of clinical skills (Alanazi & Nicholson, 2023; Andre et al., 2021). Simulated learning has been found to enable a more thorough understanding of academic and theoretical concepts, further inquiry, and strengthen clinical problem-solving skills (Chernikova et al., 2019; Hayden et al., 2014; Kelly et al., 2023) while increasing confidence (Alanazi & Nicholson, 2023; Howells et al., 2019) and clinical decision making (Macauley, 2018; Tivener & Gloe, 2015; Watson et al., 2012; Woda et al., 2017). Additional studies within health-related disciplines have revealed that simulated learning can provide a safe learning environment (Nestel et al., 2018; Wenger et al., 2012) and narrowed exposure to particular populations within the field or area of interest (Hewat et al., 2020).

Simulated learning, spanning various clinical professions in higher education, involves diverse tasks using standardized patients, manikins, computer-based simulations or software programs, and augmented reality or virtual reality (Henton & Vansant, 2024) with varying degrees of fidelity (Bakhos et al., 2020). Widely adopted in health and medical professions education, simulation is aimed at skill training or development, evaluating competencies, enhancing patient safety, and fostering interprofessional practice. In the last decade, speech-language pathology and audiology programs have witnessed increased use of simulated learning, driven by factors such as programmatic challenges, growing student enrollment, and institutional demands (Andre et al., 2021; Bakhos et al., 2020). Despite ongoing research supporting simulated learning, a comprehensive synthesis of perceptions and outcomes in simulation-based learning within the field of speech-language pathology is yet to be published.

Literature Review

Simulation in the field of communication sciences and disorders (CSD) encompasses various forms and fidelity levels, including task trainers, digitized manikins, standardized patients, virtual or augmented reality, and computer-based simulations (Battista & Nestel, 2019; Dudding & Nottingham, 2018; Nestel et al., 2018) providing diverse opportunities for experiential learning, allowing learners to practice and refine clinical skills in a risk-free, controlled environment (Nestel et al., 2018). Computer-based simulations and standardized patients are prevalent in CSD curricula (Dudding & Nottingham, 2018), offering immersive interactions where learners can adjust decisions and actions in a structured environment (Peker & Rosa-Lugo, 2021). However, research regarding the use of virtual or augmented reality for CSD, particularly in audiology, is emerging (Henton & Vansant, 2024).

Simulation Types.

Fidelity. Simulated learning experiences (SLEs) are differentiated by their level of fidelity, ranging from low to high. Low-fidelity simulations, such as standardized patients, replicate aspects of the experience to a lesser degree (Alanazi & Nicholson, 2023). Intermediate or medium fidelity simulations, including digitized manikin and computer-based simulations, offer a more

comprehensive immersive experience (Ntlokonkulu et al., 2018). Conversely, high-fidelity simulations, like virtual reality (VR), provide an immersive and interactive environment that closely mimics real-life scenarios (Kelly et al., 2023).

Standardized patients. Standardized patients are trained individuals who act as clinical patients in a standardized and repeatable portrayal purposely created to meet clinical objectives and student learning needs (Dudding & Nottingham, 2018; Hill et al., 2013). The effectiveness of standardized patients within the field of nursing research has been found to have a constructive impact on confidence, application of clinical skills, and motivation related to learning (Oh et al., 2015). Specific to CSD, simulated learning incorporating standardized patients focuses on student assessment of various communication and diagnostic skills (Baylor et al., 2017) and is particularly effective in developing diagnostic and communication skills in student learners (Dudding & Nottingham, 2018; Hill et al., 2013).

Digitized Manikins. Digitized manikins and task trainers are computerized models that mimic physiological and physical patient responses and are often used to train manual skills needed in complex clinical environments (Ward et al., 2014). Task trainers are further defined as devices representative of a specific body or region, while manikins are considered life-size simulators (Dudding & Nottingham, 2018) and classified as high and medium-fidelity simulation experiences (Hill et al., 2013). Manikins or task trainers have been incorporated into CSD clinical practice to provide training specific to tracheostomy, endoscopy, and speaking valve placement (Berkowitz, 2017; Dudding & Nottingham, 2018; Ward et al., 2014).

Computer-based Simulations. Computer-based simulations are interactive programs in which patients (pre-recorded patients or avatars) are portrayed or exhibit a diagnosis or disorder on a computer screen and are considered valuable for practicing skills and assessing knowledge in a structured, repeatable format (Dudding & Nottingham, 2018). In the CSD field, computer-based simulation allows for practicing skills through learning opportunities or the measurement of knowledge through assessment. As a component of computer-based simulation, task-part trainers allows for focus to be placed on a specific element to develop a particular skill. Specifically related to speech-language pathology student learning, research regarding computer-based simulation has been shown to improve graduate students' collaboration, assessment selection, and diagnostic skills (Carter, 2019).

Virtual or Augmented Reality. Although the use of virtual or augmented reality is expanding in healthcare and education (Kelly et al., 2023), it is more commonly employed in audiology programs than in speech-language pathology programs (Bakhos et al., 2020). These technologies are categorized as highly immersive computer-based simulations (Dudding & Nottingham, 2018), where three-dimensional environments are either overlaid or augmented to mimic the real world in a virtual context (Embøl et al., 2021). Immersive virtual reality and immersive simulations are subtypes of virtual or augmented reality where learners engage actively, utilizing wearable technology or fully enveloped in experiences involving perceptual, emotional, and physical responses (Henton & Vansant, 2024).

As immersive technologies continue to redefine educational learning opportunities by providing dynamic, real-world experiences, the design and structure of the simulations become crucial to

their success. Ensuring proper design within the virtual experiences confirms that they are not only engaging but also pedagogically effective.

Simulation Standard Design. Simulated learning employs specific methods to measure learner outcomes and achieve educational objectives through established design practices. Exhibiting diverse structures based on the field of practice, educational simulations typically adhere to specific standardized phases situated within the simulated activity: preparatory, briefing (briefing and debriefing), reflection, and assessment or evaluation (Battista & Nestel, 2019). These phases provide a structured framework for creating a conducive learning environment, outlining essential tasks, and fostering various learning opportunities.

Preparation. Preparation aims to prevent disadvantageous events within the simulation, including physical obstacles and psychological barriers (Nestel et al., 2018). This phase involves explaining the simulation, identifying goals and objectives, and clarifying the simulation process (Chamberlain, 2015; Page-Cutrara, 2015). Additionally, the phase allows for the identification of student learner needs, the design of the simulation, the selection and acquisition of hardware or software, and the overall organization of the simulation event (Battista & Nestel, 2019).

Briefing. In simulation activities, briefing is crucial, with facilitators providing essential information to learners, including instructors and team members. Although briefing is vital for setting goals and expectations in CSD, standardized practices remain unspecified (Elliott & Brumbaugh, 2021). Williams et al. (2013) suggest pre-briefing should define purposes, establish goals, reference past cases, and set expectations to boost student motivation. Conversely, debriefing, led by experienced professionals, plays a pivotal role in discussing performance and decision-making post-simulation and is a cornerstone of simulation-based education in healthcare (Gaba, 2004; Nestel et al., 2018; Parker & Myrick, 2010).

Reflection. The reflection phase, occurring within the debriefing phase and completed after the simulated activity, can be facilitated directly or indirectly by the simulation facilitator or clinical educator at various stages of the experience (Battista & Nestel, 2019). Research suggests that reflection fosters learning through the analysis of experiences, sharing thoughts and ideas, and engaging in collaborative discussions (Dreifuerst, 2009; Lederman, 1992; Wright & Lundy, 2012). In the reflection phase, student learners are asked to use past, current, and expected experiences to synthesize the simulation activity (Battista & Nestel, 2019).

Assessment. Assessment in simulated learning has taken the form of comprehensive, high-stakes, and authentic assessment (Buléon et al., 2022). However, evaluation at this level does not assess individual performance but rather simulated learning quality (Battista & Nestel, 2019). In relation to the stages, evaluation is a critical step in addressing the strengths and weaknesses of the simulated activity in meeting established objectives (Battista & Nestel, 2019).

Transitioning from a foundational understanding of the various structured designs and essential phases to an exploration of its perceived impacts within the field of speech-language pathology requires a comprehensive understanding of the impact of simulation on student learning. Moreover, outcomes obtained from the evaluation of simulated learning experiences can

objectively measure the success and effectiveness of the simulation and its ability to support student learning and associated outcomes (Clinard, 2020).

Student Outcomes. In Cook and colleagues' (2011) meta-analysis of 609 studies, significant positive effects were observed in simulation practices across health-related disciplines, impacting knowledge, behavior, and skill outcomes. Simulated exercises demonstrated notable benefits in student knowledge attainment, clinical skill development, and confidence in various health-related fields (Clinard, 2020; Hill et al., 2013; Miles et al., 2016; Oremerod & Mitchell, 2023). While research in CSD has traditionally focused on student experience and perception, recent studies have explored additional constructs such as self-efficacy, critical thinking, decision-making, and knowledge attainment (Clinard, 2020).

Perceived Changes. Research in speech-language pathology and simulated learning has examined student perceptions, anxiety, confidence, and perceived changes in clinical performance using methods such as focus groups and interviews (Alanazi & Nicholson, 2019; Clinard, 2020; Hill et al., 2013; Howells et al., 2019; Miles et al., 2016). While a link between student perceptions and motivation impacting outcomes was identified (Knowles et al., 2005), the measures of perception, attitude, confidence, or anxiety lack observability, precluding the assessment of tangible skill achievement (Howells et al., 2019). Penman et al. (2020b) conducted a qualitative study on speech-language pathology students and educators during a five-day simulated learning experience using simulated patients for adult-specific diagnoses. The simulation provided diverse learning opportunities, but students reported negative perceptions related to mode limitations and structural constraints, such as time limitations (Penman et al., 2020a, 2020b).

Confidence. Simulated learning in the field also extends investigating the confidence gained by students in health-related disciplines, where self-confidence is closely tied to clinical competency and self-efficacy (Crooks et al., 2005; Pike & O'Donnell, 2005). Confidence impacts clinical competencies and is associated with purpose, interest, and student performance (Bandura, 1986; Hill et al., 2013). Various studies have explored confidence within simulated learning experiences. Hill et al. (2013) found that using a standardized patient clinic model increased confidence in undergraduate and graduate students, though no significant improvement in interpersonal skills or professional interaction was observed. Similarly, Penman et al. (2020a) reported that speech-language pathology students experienced increased perceived confidence and decreased anxiety when using standardized patients for adult-specific diagnoses. Berkowitz (2017) demonstrated that graduate-level students using an endoscope reported increased perceived competence and confidence through both quantitative and qualitative measures, indicating positive learning experiences and the achievement of personal goals.

Knowledge. Simulated learning supplements traditional clinical education, enhancing knowledge synthesis, application, and hands-on practice (Morrison & Hammon, 2000; Ward et al., 2015). It boosts competence and confidence in speech-language pathology students (Lasater, 2007; Morgan et al., 2002; Nestel et al., 2018). Studies show positive effects on confidence, perception, and knowledge acquisition using human manikin simulators and standardized patients (Clinard, 2018; Rose et al., 2017). Enhanced comfort and learning outcomes were reported in stuttering and tele-practice courses (Penman et al., 2021; Howells et al., 2019). Despite some challenges, simulated training benefits long-term knowledge retention (Bartlett et al., 2021).

Clinical Skills. Research has demonstrated the effectiveness of simulated learning in teaching clinical skills before actual clinical placements, thus minimizing patient risk during skill acquisition (Michels et al., 2012; Miles et al., 2016). Studies, such as those by Quail et al. (2016) and Hill et al. (2020), reveal that using standardized patients, task-part trainers, and traditional patients enhances student skills, knowledge, and confidence. Quail et al. (2016) observed higher challenges and anxiety with task-part trainers and standardized patients, noting the empathy development with traditional patients. Furthermore, clinical educators are pivotal in offering crucial feedback and support. Findings from Hill et al. (2020) suggest no significant difference in clinical competency between students with or without simulated experiences, indicating that while beneficial, simulations alone do not outperform traditional clinical training.

Critical Thinking. Critical thinking is a learned skill essential in professional settings and everyday life (Finn, 2011). In education, it involves analytical processing, reflexive analysis, conceptual understanding, and problem-solving (Leite et al., 2020). Problem-based learning enhances critical thinking, enabling students to build, transfer, and apply knowledge as emerging clinicians (Mok et al., 2008). Carter (2019) found that students in the simulated experience showed greater improvement in assessment measures using the Critical Thinking Test for CSD (CTCSD) and the SimuCase Clinical Skills Inventory (SCSI), likely due to direct verbal feedback. This aligns with the positive perception and value placed on feedback in simulated learning environments (Quail et al., 2016).

Given the extensive benefits of simulated learning across health-related disciplines, it is essential to thoroughly examine the specific learning outcomes within the field of speech-language pathology. Despite the significant evidence supporting simulation's effectiveness, there remains a gap in the comprehensive synthesis of student perceptions and outcomes related to simulation-based learning in the field of speech-language pathology.

Methodology

One research question guided this thematic synthesis: What are student learning perceptions, subjective outcomes, and attitudes about simulated learning that shape the overall simulated experience within the field of speech-language pathology?

A thematic synthesis is an analytic approach to meta-synthesis suited for its design and application (Dixon-Woods et al., 2005). This method addresses intervention efficacy, appropriateness, and suitability in health-related fields, providing insights into factors influencing intervention application (Barnett-Page & Thomas, 2009; Thomas & Harden, 2008). The outcomes of a thematic synthesis offer practical recommendations for administrators, educators, and practitioners (Dixon-Woods et al., 2005), being flexible enough to incorporate qualitative and mixed-method studies (Barnett-Page & Thomas, 2009; Dixon-Woods et al., 2005; Thomas & Harden, 2008).

Primary Study Selection. Primary studies were selected using a systematic search strategy to identify relevant studies in speech-language pathology and simulated learning. Criterion-based, purposeful sampling ensured that included studies met specific parameters, allowing for conceptual saturation and a focused qualitative analysis (Palinkas et al., 2013).

The search strategy incorporated Boolean logic keywords informed by the adapted PICo framework, focusing on Population (P), Interest (I), and Context (Co), as delineated by Stern et al. (2014). Specifically, keywords related to specific populations (P) were "students" or "graduate students," the phenomenon of interest (I) was "simulation" or "simulated learning," and the context (Co) was "speech-language pathology," "communication sciences and disorders," or "speech therapy."

The body of primary research included peer-reviewed journal articles and dissertations sourced through an extensive search of electronic databases. The following search terms were used: simulation AND speech-language pathology, simulated learning AND speech-language pathology; simulated learning AND communication sciences and disorders; simulation AND communication sciences and disorders; simulated learning AND speech therapy; simulation AND speech therapy. In addition to Google Scholar, the databases utilized for this purpose, located at the Texas A&M University - Kingsville library, included *SAGE Journals, Taylor and Francis, Wiley, Academic Search Complete, Cambridge Core, Education Source, PubMed, and ProQuest.*

Inclusion and Exclusion Criterion. Inclusion criteria consisted of peer-reviewed journals using qualitative methodology or mixed methods design, reported in English. Included studies must have involved graduate students within the field of speech-language pathology, conducted in the United States of America or Australia. The intervention identified in the studies consisted of simulated learning including standardized patients, digitized manikin-based simulation, task trainers, computer-based simulation, and virtual reality. Additionally, the chosen and included articles must have had a publication date of January 2011 through April 2024. Exclusion criteria consisted of studies not completed in English, studies that included solely quantitative methodology, studies published outside of January 2011 through April 2024, and studies that did not provide a first-person experience, narrative, or perception.

Quality Appraisal. In addition to inclusion and exclusion criteria, a critical appraisal tool was employed to evaluate study quality for inclusion or exclusion and address transparency and credibility. This study utilized the appraisal checklist developed, outlined, and provided by Caskurlu and colleagues (2021) in a thematic synthesis study (see Appendix A). The checklist comprised eight critical criteria specifically tailored to the reporting practices of primary studies. These criteria covered identifying the study purpose, research design, sampling methods, data collection techniques, data analysis procedures, findings, value of the research, and trustworthiness or reliability.

Each criterion included questions that targeted specific items, with particular questions marked as *red flag* items. Studies that were missing or inadequately addressed any red flag items were deemed low quality and were subsequently excluded from the analysis (Caskurlu et al., 2021). The red flag items included issues related to the purpose of the study, research design, and sampling. Specifically, flagged items included studies lacking a clear research question or a strong purpose statement, inappropriate research designs for the qualitative or qualitative components of mixed-methods studies, insufficient descriptions of the setting or context for data collection, and inadequate descriptions of the population being studied (see Appendix A).

Findings. The initial database search yielded 4,992 documents. Upon removing duplicates, 957 full-text articles were selected for screening by title and abstract for inclusion criteria. Subsequent full-text evaluations were conducted on 29 articles (Figure 1). After this detailed review, eight articles met the inclusion criteria and quality appraisal utilizing the checklist from Caskurlu and colleagues (2021) and were retained for the meta-synthesis (Table 1).

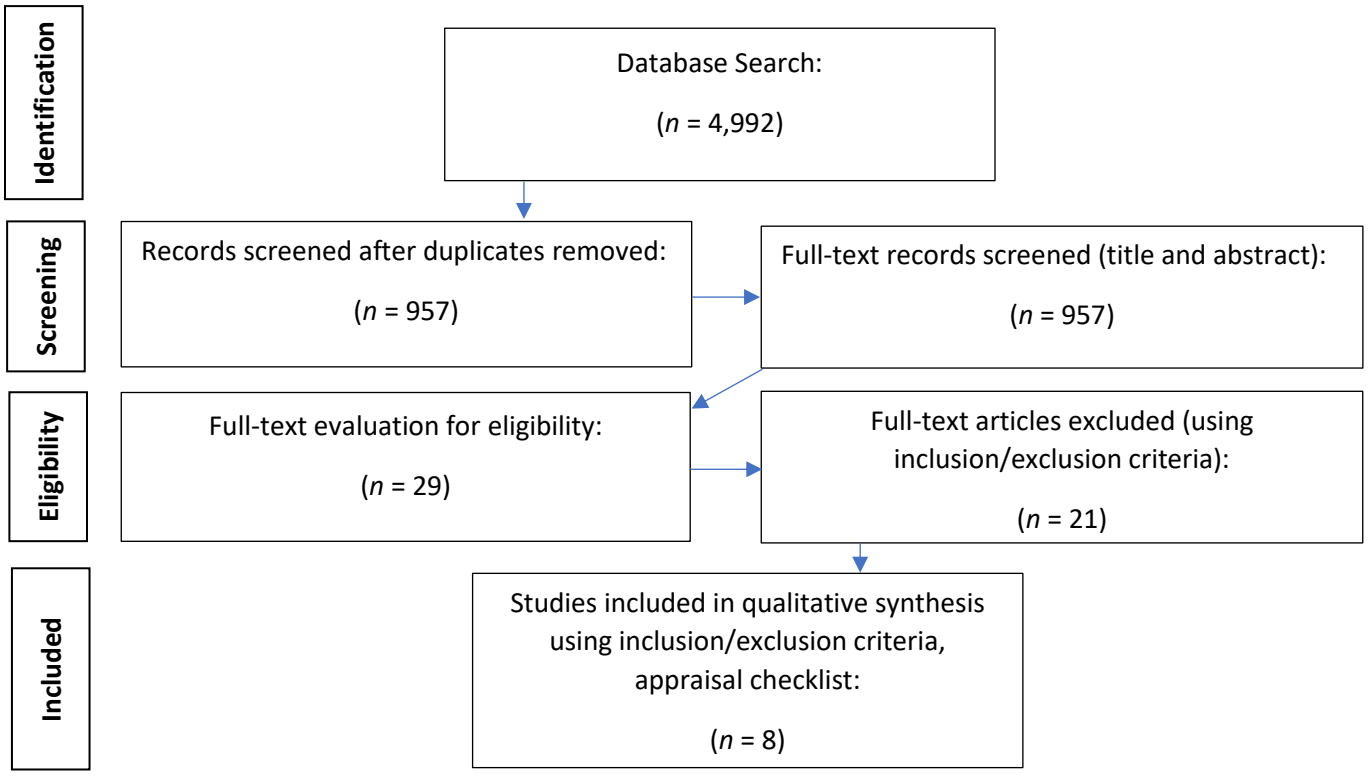
Trustworthiness and Confirmability. To enhance credibility and dependability, a second coder was employed to confirm categories across the coding framework (Creswell & Poth, 2018). Each article included in the study was reviewed by two reviewers and classified according to the coding framework, which explored learner outcomes of perceived changes, confidence, knowledge, clinical skills, and critical thinking. The second coder independently reviewed and coded at least one article within each classification to ensure intercoder agreement. Additionally, as the synthesis unfolded, the second coder further reviewed established themes for accuracy and consistency.

Data Analysis. This thematic synthesis followed the framework outlined by Thomas and Harden (2008), which consisted of three distinct phases: line-by-line coding, the development of descriptive themes using primary studies, and the development of analytical themes derived from descriptive themes (Barnett-Page & Thomas, 2009). Furthermore, as the phases that outline a thematic synthesis can be abstract, this study included Attride-Stirling's (2001) six-step systematic tool for creating thematic networks to assist in the completion of the three stages presented by Thomas and Harden (2008). These six steps included coding the material, theme identification, network creation, exploration of the thematic networks, summarization of the network, and pattern interpretation (Attride-Stirling, 2001).

The process involved coding material from eight primary studies related to learner outcomes, ensuring intercoder agreement for credibility. Qualitative quotes were extracted and analyzed, resulting in 380 lines of data. A coding framework aligned with measured learner outcomes in speech-language pathology guided the line-by-line coding. Codes were then examined, refined, and categorized into 299 codes related to the study's framework. A thematic network was established, revealing 13 basic themes, which were further condensed into six organizational or descriptive themes. Further analysis revealed three analytical themes, representing enhanced experience, learning influencers, and learning roadblocks. The final steps included exploring the text to identify fundamental patterns and summarizing thematic networks (Attride-Stirling, 2001; Thomas & Harden, 2008). The established themes were reviewed for accuracy and consistency with a second coder.

Figure 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram Depicting the Study Selection Process for a Meta-Synthesis on Simulated Learning in Speech-Language Pathology.



Note. Adapted from Alanazi and Nicholson (2023).

Table 1

Study Characteristics and Outcomes in Simulated Learning for Speech-Language Pathology

Reference	Study Location	Design	Study Sample	Study Purpose	Simulation Type	Study Outcome
Bartlett et al. (2021)	USA	Mixed-method; nonrandomized with repeated measures	*n* = 50	Determine whether adding simulation to training enhances short and long-term knowledge, preparedness, and anxiety levels compared to traditional teaching methods.	Manikin	Higher long-term quiz accuracy; no difference in short-term scores, student ratings of preparedness, or anxiety.
Clinard & Dudding (2019)	USA	Mixed-method; Convergent-parallel	*n* = 29	Examine student perceptions of simulation and identify valued components of the experience.	Computer-based	Four primary themes were found concerning the strengths and weaknesses of computer-based simulation diagnostic evaluations (i.e., communication, technology, skill practice, independent learning).
Clinard (2018)	USA	Mixed-method; Embedded; Pretest, Posttest	*n* = 52	Investigate high-fidelity human patient simulation impacts on student understanding and confidence with medically complex infants.	Manikin	No significant difference in knowledge between groups at posttest; experimental group showed higher perceived confidence in hands-on skills.
Elliott & Brumbaugh (2021)	USA	Qualitative	*n* = 10	Identify particular factors students considered most and least effective in the simulated experience.	Computer-based	Mixed perceptions of the SLE; positive feedback regarding debriefing and psychometric emphasis; negative feedback regarding authenticity.

Table 1, continued

Reference	Study Location	Design	Study Sample	Study Purpose	Simulation Type	Study Outcome
Henton & Vansant (2024)	USA	Mixed-method	*n* = 20	Evaluate the effectiveness of a novel training approach using immersive, augmented reality (AR) simulations to prepare graduate SLP students.	Standardized Patients; Augmented reality	Simulation programs (e.g., I-HeLPS, SPICE) enhanced empathy and clinical skills in simulated learning for hearing loss.
Howells et al. (2019)	Australia	Mixed-method (repeated measures)	*n* = 52	Explore student views on confidence, clinical skill growth, and overall learning experience via simulation and teletherapy service delivery.	Standardized Patients; Augmented reality	AAC in SLP curriculum yielded positive outcomes for confidence and clinical skills within simulated learning utilizing tele-practice.
Peker & Rosa-Lugo (2021)	USA	Mixed-method; quasi-experimental; pretest, posttest	*n* = 24	Examine the utilization of simulation by SLP graduate students for practicing clinical techniques.	Computer-based	Increased confidence; improved questioning techniques with need for additional practice.
Stead et al., (2020)	USA	Mixed-method	*n* = 75	Describe four simulation experiences in medical SLP curriculum to enhance student learning and clinical competency development.	Manikins; Standardized Patients	Task trainers, manikins, and standardized patients provided clinical training among those lacking traditional placements.

Results

Each data line coded for analysis received an additional code consistent with the established coding framework and the research question (Appendix B). The coding framework that guided this study included the measured learner outcomes of perceived changes, confidence, knowledge, clinical skills, and critical thinking, as outlined by Clinard (2020). The following paragraphs will revisit the research question and systematically align the findings with the coding framework and identified research themes.

Student Learning Perceptions. Within the field of speech-language pathology, the areas of perception and associated variables of perceived anxiety, confidence, and changes in clinical skill development were the most widely researched related to simulated learning (Alanazi & Nicholson, 2023; Clinard, 2020; Hill et al., 2013; Howells et al., 2019; Miles et al., 2016). Within the study, student learning perceptions included perceived changes in confidence and knowledge (Table 2).

Learning influencers and *learning roadblocks* were the most common analytical themes associated with student learning perceptions (Table 2). Factors that influenced learning were related to exposure opportunities, with students requesting additional practice opportunities, the inclusion of simulated learning into academic coursework, and additional instruction provided by clinical educators within the simulated experiences (Bartlett et al., 2021; Clinard, 2018; Elliott & Brumbaugh, 2021; Howells et al., 2019; Peker & Rosa-Lugo, 2021; Stead et al., 2020). Additionally, learning was positively influenced through exposure to different intervention techniques, intervention material, feedback provided through clinical educator input, and autonomy provided through task-part trainers in the form of simulated computer programs and standardized patients (Clinard & Dudding, 2019; Henton & Vansant, 2024; Stead et al., 2020).
Factors contributing to *learning roadblocks* related to student perception were challenges with generalization to a traditional clinical patient, differences in learning style, working with peers under time constraints and perceived assignment pressure or requirements, and a lack of explanation specific to simulated instruction and prior knowledge within the area (Elliott & Brumbaugh, 2021; Henton & Vansant, 2024; Howells et al., 2019; Peker & Rosa-Lugo, 2021; Stead et al., 2020).

Subjective Outcomes. Subjective outcomes included the coding framework components of confidence, knowledge, clinical skills, and critical thinking, which took the form of clinical competency, instrumental manipulation, intervention practices, and application of academic knowledge (Table 2). The most common analytical theme associated with subjective outcomes was enhanced experience (Table 2). Simulated learning opportunities were thought to enhance learning experiences achieved through the application of academic knowledge in clinical practice completed by the use of field-specific terminology, exposure to various clinical components of evaluation, active discussions with peers and clinical educators, and an authentic experience with different patient populations (Bartlett et al., 2021; Clinard, 2018; Elliott & Brumbaugh, 2021; Henton & Vansant, 2024; Howells et al., 2019; Stead et al., 2020).

Table 2

Study Components and Associated Framework

Research Question Component	Associated Analytical Themes	Coding Framework Elements
Student Learning Perceptions	Learning Influencers, Learning Roadblocks	Confidence, Knowledge
Subjective Outcomes	Enhanced Experience	Confidence, Knowledge, Clinical Skills, Critical Thinking
Attitudes about Simulated Learning	Learning Influencers	Perceived Changes, Clinical Skills, Critical Thinking

Attitudes About Simulated Learning. Within the study, related to the coding framework and research question, attitudes about simulated learning included perceived changes in attitude, clinical skills, and critical thinking. Perceived changes in attitude account for the majority of the framework component (Table 2). The analytical theme of *learning influencers* was the most common theme associated with attitudes about simulated learning (Table 2). Students have varied attitudes, both positive and negative, associated with simulated learning, and thus, this was reflected within the established themes of the study. Learning opportunities were negatively influenced by program limitations (i.e., lack of response or corrective feedback, lack of behavior modifications) and limited practice chances (Elliott & Brumbaugh, 2021; Henton & Vansant, 2024; Stead et al., 2020). Positive attitudes were associated with instrumental assessment and intervention tools and the sense of comfort found within exercises when exposure and practice were offered (Bartlett et al., 2021; Clinard & Dudding, 2019; Elliott & Brumbaugh; Henton & Vansant, 2024; Stead et al., 2020).

Discussion

Through systematic thematic analysis, several key themes were identified that enhance the understanding of the impact of simulated learning on speech-language pathology education. These themes, derived through systematic thematic analysis, span from broad analytical insights to specific descriptive themes, offering a comprehensive view of the simulated learning experience (see Table 3).

Analytical Themes. Analytical themes go beyond descriptive themes and primary study findings to establish additional concepts and further understanding (Lucas et al., 2021; Thomas & Harden, 2008). Three analytical themes of *learning influencers*, *enhanced experiences*, and *learning roadblocks* were established (see Table 3 and Appendix B).

Table 3

Analytical Themes and the Associated Descriptive Themes

Analytical Theme	Descriptive Themes
Learning Influencers	Positive Reaction; Demands; Functionality of the Experience
Enhanced Experience	Allowed for Clinical Growth; Interpersonal Qualities
Learning Roadblocks	Unfavorable Outcomes

Learning influencers were factors within the learning environment that directly enhanced engagement and effectiveness, such as realistic interactions, collaboration, and structured learning opportunities. These influencers acted as individual components that positively impacted the learning process. Learning influencers revealed notable patterns in communication and interaction. Through practice and exposure, students experienced advances in communication effectiveness with peers, educators, simulation facilitators, and standardized patients, contributing to enhanced confidence**.** Learning was further shaped by the awareness of techniques acquired through practice, leading to increased comfort and reduced fear during clinical tasks**.** Students actively sought corrective feedback and guidance from clinical educators and utilized simulated platforms. The impact of authenticity on learning became evident, with genuine voices and real patient interactions positively influencing clinical education compared to virtual representations. Other influential factors included promoting problem-solving, providing communication opportunities, exposure to clinical documentation, and fostering autonomy and flexibility.

Enhanced experiences emerged as the outcomes resulting from the learning influencers. This analytical theme encompassed the comprehensive enrichment of the learning process, leading to deeper knowledge, better preparation, and increased confidence in real-life scenarios. Enhanced experience emerged from the exposure to clinical practices, structured learning assignments, and simulated scenarios, significantly enriching the educational experience. Active participation on simulation platforms and interactions with peers and facilitators were fundamental. This included authentic communication with standardized patients, practical exercises with manikins, and collaborative debriefing sessions. These clinical components were instrumental in enhancing critical thinking, problem-solving skills, and hands-on capabilities in assessment, intervention, and documentation. Additionally, enhancements in social awareness and emotional intelligence were observed, improving the ability to understand and respond to patients' emotional needs. Other notable aspects included providing evaluation opportunities, building confidence, allowing for reflective practice, and improving clinical skills. These elements are vital for effective patient-centered care, ensuring learners can engage with patients' experiences in clinical environments.

Learning roadblocks were identified as obstacles that hindered the learning process, making it more difficult for learners to effectively acquire knowledge or skills. These included mismatches between simulated and real-life experiences, insufficient preparation, discomfort, and various limitations in the learning environment. Additional barriers included inauthentic experiences, absence of corrective feedback, constrained requirements, patient disconnect, underinformed

students, and application challenges. Such barriers underscore the need for tailored educational strategies that accommodate diverse learner needs, including potential software program enhancements, comprehensive instruction, and consideration of instructional time constraints.

Descriptive Themes. Organizational or descriptive themes remain connected and adjacent to codes and themes found within primary studies (Thomas & Harden, 2008) and identify and characterize patterns found within the data across included studies (Ryan et al., 2018). This process produced six descriptive themes. The six descriptive themes were allowed for clinical growth, functionality of the experience, demands, positive reaction, interpersonal qualities, and unfavorable outcomes (Table 3).

The theme of allowed for clinical growth captures the direct benefits of simulated learning environments in fostering clinical skills and competency development. Students experienced tangible growth through extensive practice opportunities, including treatment selection and clinical documentation. This growth was further supported by the functionality of the experience, which revealed that simulations help reduce negative emotions such as fear and anxiety. This reduction in negative emotions, in turn, enhances task performance and communication effectiveness within clinical settings.

The demands theme explored students' expectations and requirements within simulated settings, highlighting the necessity of feedback and practice opportunities to optimize learning outcomes. Additionally, the positive reaction theme reflects favorable student responses to the collaborative and interactive aspects of simulations, such as interactions with clinical educators, various types of patients, and peer-to-peer interactions. These elements significantly contribute to the development of students' clinical and communicative proficiency.

Exposure to simulated environments also fostered the development of personal attributes such as empathy and cultural sensitivity. Enhanced awareness and perceptiveness were noted within computer-based simulations using virtual reality. However, the theme of unfavorable outcomes addressed the less positive aspects of simulation. These included the impact of authenticity issues, constraints imposed by current technological hardware and software, and their effects on student learning and satisfaction. This theme underscored the importance of fostering awareness of time, student preparedness, and understanding of platform navigation prior to use.

Conclusion

Simulated learning within the field of speech-language pathology is a growing method of instruction. Outcomes obtained from the evaluation of simulated learning experiences can measure the success and effectiveness of the simulation as well as its ability to support student learning (Clinard, 2020). Pedagogical practices can be developed, advanced, or modified based on information collected and gleaned from the evaluation of educational experiences (Johnston et al., 2018). Investigating and exploring the perceptions, attitudes, knowledge attainment, and the associated outcomes of simulated practice experiences found within current literature that shape learning allows for a broader interpretation of findings related to pedagogical practices in the field of speech-language pathology.

Learning within the varied simulated platforms is enhanced through diverse forms of interaction, encompassing authentic communication, hands-on instrumental practice, and collaborative sessions with peers and educators. Improved communication effectiveness is perceived as a positive result, fostering confidence through exposure to various communication partners. Clinical components within activities offer valuable learning opportunities, promoting critical thinking, problem-solving, and social awareness, while practice in assessment, intervention, and documentation enhances skill development. Exposure to techniques aids in student comfort and reduces fear, with active seeking of corrective feedback from clinical educators. The impact of authenticity is evident, with genuine voices and standardized patients positively influencing clinical education.

Recognizing diverse perspectives and learning styles among individual students is crucial, as simulated learning is not a one-size-fits-all approach. Differences in group dynamics, especially related to time constraints and specific task demands, often highlight these individual variances. Furthermore, incorporating technology into simulations presents its own set of challenges. Notably, students reported learning limitations related to task-trainer assignments with decreased ability to provide effective problem-solving opportunities or approaches to handle complex situations. This shortfall is primarily due to software limitations that inadequately match the complexities of real-world clinical scenarios. Additionally, some students expressed curiosity regarding the generalizability of simulated tasks to traditional patient care.

Evidence supports the inclusion of simulated learning in speech-language pathology educational practices. Results found within this thematic synthesis help explain perceived outcomes regarding simulated education within the field of speech-language pathology to increase understanding of educational methods and barriers that impact learning. Collectively, educators can develop, modify, or advance current practices that support student learners and student learning outcomes in simulated learning for speech-language pathology students.

Limitations of the Study

This study has limitations related to generalizability, as the findings are specific to graduate speech-language pathology students in the studied geographical area (United States of America and Australia) and cannot be extended beyond these regions. The study is constrained to the simulated modalities investigated in the included primary studies. Additionally, potential bias in quotes used for coding could exist as the researchers of this study did not conduct the primary studies. The study's search strategy may also limit its comprehensiveness; relevant studies might have been missed due to the specificity of the search strategy.

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Appendix A

Critical Appraisal

Criteria	Question(s)
Purpose of the Study	*1. Did author(s) provide clear research questions? If not, is there a clear purpose statement to guide the investigation?
Research Design	*2. Is a qualitative research design appropriate for addressing the research purpose? Including the consideration of a qualitative component of a mixed-methods study. 3. Did author(s) specify their selected qualitative method? 4. Did author(s) provide an explanation of why the selected qualitative method was chosen? 5. Was the selected qualitative method appropriate to answer the research question(s)? *6. Did author(s) describe the setting/context for data collection?
Sampling	*7. Did author(s) describe the specific sample of the population being studied? 8. Did author(s) explain why the selected participants/documents/events were chosen? 9. Did author(s) describe their process for selection? 10. Did the author specify the sample size?
Data Collection	11. Did author(s) specify their data collection method(s) 12. Did author(s) provide an explanation of why the selected data collection methods were chosen? 13. Did author(s) provide any description of the data collection procedures?
Data Analysis	14. Did author(s) specify their data collection method(s)? (e.g., interviews, observation) 15. Did author(s) provide an explanation of why the selected data collection methods were chosen? 16. Did author(s) provide any description of the data collection procedures?
Findings	17. Were the findings explicit and clear? 18. Did author(s) provide verbatim evidence representing the participant's voices?
Value of Research	19. In the concluding sections, did the author(s) describe implications for teaching/learning/practice AND/OR implications for future research? 20. Did author(s) state the contribution to the field or how the study fills a gap in the existing literature?
Trustworthiness & Reliability	21. Did the author(s) discuss methods used to enhance the quality of data collection instruments? 22. Did author(s) describe methods used to enhance the reliability of their data analysis?

Note. * Indicates *red flag* items. Any study missing one of the *red flag* items was considered low quality.

Note. Adapted from *The qualitative evidence behind the factors impacting online learning experiences as informed by the community of inquiry framework: A thematic synthesis*. Caskurlu et al. (2021).

Appendix B

Abbreviated Codebook

Code	Research Question Component	Analytical Theme	Coding Framework	Example	Reference
Valued briefing	Student Learning Perceptions	Learning Influencers	Knowledge	"I liked being able to talk during the debriefing and pre-briefing"	Clinard & Dudding (2019)
Confidence gained	Subjective Outcomes	Enhanced Experience	Confidence	"Having experience with these infants will be the only way to feel more confident."	Clinard (2018)
Difficulty with generalization	Student Learning Perceptions	Learning Roadblocks	Knowledge	"I'm not sure how to generalize this to real patients yet. It's really hard to see how this"	Stead et al. (2020)
Empathy	Student Learning Perceptions	Learning Influencers	Knowledge	"It makes more of a connection (empathy) for my future client."	Henton & Vansant (2024)
Discussion assisted learning	Subjective Outcomes	Enhanced Experience	Critical thinking	"I think it was nice to be able to talk about the tests in-depth and their purpose and why we"	Elliott & Braumbaugh (2021)
Appreciated interaction	Attitudes about Simulated Learning	Learning Influencers	Critical Thinking	"I really enjoyed seeing the flow of events, with speaking with the nurse"	Bartlett et al. (2021)
Appreciated feedback	Attitudes about Simulated Learning	Learning Influencers	Clinical Skills	"I really liked the feedback from the facilitator"	Howells et al. (2019)
Insufficient preparation	Student Learning Perceptions	Learning Roadblocks	Knowledge	"Being underprepared was the biggest problem"	Peker & Rosa-Lugo (2021)