Improving learning outcomes through social simulation

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Abstract

Traditional cognitive-focused learning often leads to disengagement and a lack of motivation among students. To foster a more engaging and interactive learning environment, the use of simulation methods has emerged as a promising pedagogical strategy. Despite growing interest, a comprehensive synthesis of evidence on the effectiveness of simulation-based learning remains limited. This study aims to analyze the impact of simulation methods on student learning outcomes through a meta-analytic review of national journal articles. The research employed a literature review approach with a meta-analysis design to aggregate findings from studies investigating improvements in student learning facilitated by simulation techniques. The analysis revealed consistent enhancements in student engagement and comprehension, indicating that simulation methods support more effective learning strategies. These methods not only aid in the acquisition of teaching materials but also contribute significantly to the overall quality of learning outcomes. The findings highlight the importance of integrating simulation into instructional design to support deeper learning and sustained academic achievement.

Keywords: Instructional design; learning outcomes; meta-analysis; simulation method; student engagement

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1. INTRODUCTION

Simulation originates from the term "simulate," defined as the act of imitation or behavior not conducted with full seriousness. Within pedagogical methodologies, simulation refers to the presentation of learning experiences through artificial scenarios aimed at facilitating comprehension of foundational concepts, principles, and skills. Accordingly, simulation may be characterized as a model encompassing devices and distinctive traits representative of actual living systems (Muslihuddin & Hendra, 2012; Smith & Lee, 2023). Simulation enables the identification of specific decision-making characteristics and facilitates the alteration of perceived reality. Effective learning necessitates interaction between instructional personnel and learners. The instructional relationship assumes a functional nature, typically represented through lecturer-learner engagement (Hokanson et al., 2015; Nguyen et al., 2022). The primary objective of educational processes is the attainment of specified learning outcomes. Instructional objectives, therefore, represent the convergence of educator and learner goals. Several components are essential in supporting instructional efficacy, with emphasis placed on methods conducive to comprehensive learner understanding (Joyce et al., 2016; Zhou & Liu, 2024).

To cultivate creativity and innovation, learning activities must be structured to prevent monotony and disengagement, thereby positively influencing academic performance positively. One of the measurable indicators of instructional success is demonstrated through learner outcomes. Academic achievement is shaped by both external and internal influences. Among external influences, instructional methodologies are significant; instructors functioning as facilitators may activate learner participation through various active learning strategies designed to enhance academic achievement. Hence, conducive learning environments, characterized by learner comfort and enjoyment, are critical. Social simulation represents one such method, offering immersive learning through structured imitation of real-world dynamics. In pedagogical contexts, simulation encompasses representational activities replicating situational conditions (Papanikolaou et al., 2017; Ribeiro et al., 2021). This form of training does not occur under real circumstances but simulates authentic conditions, incorporating multiple factors (Ilhami, 2020; Turgut & Aydoğdu, 2022).

Empirical evidence based on interviews revealed that several midterm assessment scores in the ISBD course at STKIP Abdi Payakumbuh were classified as low, with an average score of 79. This average indicates a misalignment between student performance and expected learning achievements. Learner comprehension of the provided materials remains limited, and signs of disengagement during instructional sessions are evident. Instructors occasionally fail to employ innovative pedagogical strategies, often relying on traditional lecture and discussion formats that primarily target cognitive domains, resulting in diminished learner motivation and attention. Contributing factors include insufficient facilities, limited access to appropriate learning media, and unsupportive external environmental conditions, all of which adversely affect learning outcomes (Ambiyar, 2021).

Addressing these challenges necessitates the implementation of an effective and context-appropriate instructional model, enabling active learner engagement and improved comprehension. Instructional success depends significantly on the role of educators as facilitators and motivators. To fulfill this role effectively, instructional personnel must utilize pedagogical tools, including teaching media, instructional models, and educator role models, to meet educational objectives. These variables merit further exploration through the application of simulation methodologies to examine their impact on learning outcomes and overall educational quality (Bastos et al., 2021).

Utilization of social simulation has demonstrated effectiveness, as evidenced by research conducted by Olga et al. (2020), which highlights the potential of social simulation in facilitating the acquisition of complex skills in higher education (Chernikova et al., 2020). Such learning environments positively influence learner development by bridging the gap between instructional experiences and complex interdisciplinary competencies. Additional findings by Mulyaningtyas (2018) affirm that the implementation of simulation techniques yields improved academic performance, as demonstrated through results associated with the DOER method in economic instruction.

Research by Sierra García et al. (2022) indicates that educational initiatives within business, management, and economics disciplines can enhance efficiency and promote education for sustainable development. Findings demonstrate that adoption of social methodologies contributes to improved social and economic performance aligned with sustainability objectives. Furthermore, simulation techniques enhance learning outcomes, particularly in areas related to problem solving, critical thinking, and interpersonal skill development. Integration of role-play activities further strengthens affective learning outcomes, facilitating application across various economics course contexts (Sierra García et al., 2022).

1.1.   Conceptual and theoretical framework

Methods possess a systematized definition oriented toward the achievement of specific objectives, involving sequential steps designed to facilitate implementation for goal attainment. A method may be characterized as a procedural approach grounded in predetermined aims, exhibiting general adaptability across contexts. Instructional personnel are expected to employ learning methods aligned with educational objectives, instructional content, learner characteristics, available resources, and allocated time frames. The central concern in the present study is the extent to which learning methods can engage learners actively on physical, cognitive, and emotional levels within the instructional process. Learner participation constitutes an integral component of the learning environment and contributes to the determination of academic success indicators. Based on the aforementioned perspectives, a method may be interpreted as a cognitive framework for task execution. In instructional contexts, a method represents a structured approach to developing and delivering the educational process, particularly in pursuit of optimal learning outcomes (Joyce et al., 2016).

The simulation method is defined as the practice of imitation. In educational settings, simulation entails the presentation of instructional experiences through contrived or artificial scenarios to support comprehension of foundational concepts and specific skill sets. In essence, simulation serves as a model incorporating variables that reflect real-life systems. Simulation constitutes a decision-making mechanism enabling modification of situations in real-time conditions. An alternative conceptualization describes simulation as a representation of unreal or hypothetical scenarios (Cubbit, 2000). Simulation manifests in behaviorally structured formats, such as educational plans implemented within designated time constraints. Consequently, simulation may be understood as a model that encapsulates the dynamics of living systems.

The simulation model serves multiple instructional objectives. It aims to enhance practical competencies applicable to everyday contexts, reinforce conceptual understanding based on foundational principles, and foster the development of problem-solving capabilities. The simulation model also increases instructional effectiveness and functions as a motivational strategy by encouraging active engagement. Moreover, it promotes collaborative learning through intergroup interaction, supports the cultivation of creativity, and contributes to broader comprehension and appreciation of diverse viewpoints.

The simulation foundation refers to the structured application of simulation principles within various

instructional frameworks. This foundation is applied specifically in the Basic Socio-Cultural Sciences (ISBD) course, with competency standards aligned to the contextual and theoretical bases of simulation. Accordingly, material selection adheres to the established RPS and syllabus through the incorporation of simulation principles. The simulation foundation is also contextualized to emphasize the significance of understanding both methodological characteristics and theoretical underpinnings of simulation. This includes clarification of core competencies associated with each instructional unit in the ISBD curriculum (Brigas, 2019).

1.1. Purpose of study

This study aims to analyze the impact of simulation methods on student learning outcomes through a meta-analytic review of national journal articles.

2. METHOD AND MATERIALS

This study employed a structured literature review to explore the effectiveness of social simulation methods in improving learning outcomes. A total of ten national journal articles were selected based on relevance to the theme of social simulation in education. Articles were identified through a targeted search using the Google search engine and were filtered based on thematic alignment and academic rigor.

Each article was reviewed and analyzed according to predetermined indicators, including the impact of social simulation on student engagement, comprehension, and performance. The findings from each source were compared and synthesized to identify recurring patterns, theoretical contributions, and pedagogical implications. This analysis served to contextualize and support the discussion of simulation methods within the broader field of educational practice (Moher et al., 2009; Khotimah & Saputri, 2021).

3. RESULTS

Learning outcomes serve as a cornerstone in the measurement of educational effectiveness. The absence of learning equates to a failure in achieving educational objectives. Learning is not a peripheral aspect of education; rather, it constitutes its essence. As a dynamic and continuous process, learning involves acquiring knowledge, skills, attitudes, and values through cognitive, affective, and psychomotor engagement. Within the academic context, learning connects various disciplines, including educational psychology and the psychology of learning, which examine how individuals change and grow through structured educational experiences.

Sabrianti (2018) defined learning as a process that fosters transformation in individual personality, manifested through improved behavioral competencies such as knowledge, skills, understanding, efficiency, and cognitive strategies. This definition underscores that effective learning leads to holistic development, not only in knowledge acquisition but also in character and emotional maturity. The development of behavior, as a product of learning, reflects the internalization of educational experiences.

Riyanto and Trisharsiwi (2018) described learning as the connection of new knowledge to existing cognitive frameworks. Learning, therefore, is not an isolated accumulation of information but an integrative process that enhances prior knowledge through critical thinking, reflection, and emotional engagement. The learning process becomes meaningful when students can relate new information to previously held concepts, creating a more comprehensive and coherent understanding.

Widiasworo (2017) emphasized the behavioral and experiential dimensions of learning, suggesting that learning outcomes are influenced not only by content but also by the context and sequence of experiences.

From a qualitative standpoint, learning includes the interpretation and internalization of the surrounding environment, making the process both subjective and situational. This perspective highlights the role of context, interaction, and cognitive engagement in shaping learning experiences and outcomes.

Drawing from these theoretical perspectives, the reviewed literature was analyzed and categorized based on nine types of learning that frequently appear in the educational discourse. Each type contributes uniquely to student development and supports the integration of simulation methods in the learning process:

1. **Varied Learning Activities**: The learning process involves diverse activities shaped by the nature of the material, educational goals, and desired behavioral changes. These activities respond to learners' multidimensional needs and reflect differentiated instructional strategies tailored to academic content and learner profiles.

2. **Abstraction-Based Learning**: Learning that involves abstract thinking is central to disciplines such as mathematics, chemistry, theology, and astronomy. Abstract learning requires learners to engage in higher-order thinking, enabling them to analyze, infer, and reason beyond tangible phenomena. This type of learning develops the capacity to solve theoretical problems and construct conceptual frameworks.

3. **Motor Skill Learning**: Focused on neuromuscular coordination and physical efficiency, this type of learning is essential in disciplines such as physical education, music, visual arts, and certain religious practices. It emphasizes repetition, practice, and the development of muscle memory, facilitating skill mastery through kinesthetic experience.

4. **Social Learning**: Designed to address social and interpersonal challenges, social learning enhances competencies in collaboration, empathy, and communication. Through interaction with peers and social environments, learners develop the capacity to resolve social problems and function effectively within group dynamics.

5. **Scientific Problem-Solving Learning**: Learning grounded in scientific methods emphasizes hypothesis formulation, observation, experimentation, and analysis. This type of learning enhances cognitive competencies and supports rational decision-making processes, particularly in STEM-related disciplines.

6. **Rational Learning**: This form of learning promotes the acquisition of logical reasoning and decision-making skills. It is especially applicable in subjects that require exact solutions and critical analysis, such as mathematics, economics, and philosophy. Rational learning encourages learners to approach problems systematically and make informed judgments.

7. **Habitual Learning**: Focused on the formation and reinforcement of daily routines, this type of learning supports long-term behavioral change. It is often shaped by family and cultural influences and can be a foundation for lifelong learning and moral development. As stated in the 2003 National Education System Law (Chapter IV, Article 27), the family plays a vital role in shaping educational habits and values.

8. **Affective Learning**: Aimed at developing emotional intelligence and aesthetic appreciation, affective learning is essential in fields such as literature, ethics, and the arts. It involves cultivating attitudes, values, and emotional responses toward people, objects, or ideas and contributes to the moral and emotional development of learners.

9. **Experiential and Investigative Learning**: Based on direct observation and empirical inquiry, this form of learning is achieved through practical engagement, such as laboratory work and field research. It emphasizes experiential understanding, hands-on learning, and evidence-based reasoning. Learners acquire knowledge by interacting with their environment and drawing conclusions from real-world phenomena.

These diverse learning types align closely with the potential of **social simulation methods**, which create immersive environments that mimic real-life situations. Social simulation allows learners to engage in experiential, cognitive, and social processes simultaneously. Through simulated scenarios, learners practice decision-making, problem-solving, and interpersonal communication skills that are essential for academic and professional success.

Learning outcomes, as defined by behavioral change and cognitive growth, are also influenced by **internal and external factors**. Internal (endogenous) factors include physiological and psychological conditions. Physiological elements, such as brain function, sensory acuity, and physical health, play a significant role in learning efficiency. For example, normal neurological and sensory functioning supports information processing, comprehension, and motor response, while impairments may hinder learning performance.

Psychological factors, including emotional stability, motivation, self-concept, and attention, also significantly affect learning. A stable psychological state enhances learners' capacity to engage with instructional materials, manage academic stress, and persist through challenges. These internal factors are dynamic and interdependent, shaping how individuals interpret and respond to learning experiences (Riyanto and Trisharsiwi, 2018; Sabrianti, 2018).

The reviewed literature thus supports the use of **social simulation as an instructional method** that addresses both the cognitive and affective dimensions of learning. By incorporating real-world complexity into classroom activities, simulation helps learners transfer abstract concepts into practical applications, develop collaborative skills, and enhance overall academic performance.

4. CONCLUSION

The implementation of social simulation methods in educational settings demonstrates substantial potential to enhance learning outcomes. Learning, as a core element of education, is a multidimensional process influenced by cognitive, affective, behavioral, and social factors. The integration of simulation-based approaches enables the creation of artificial yet realistic learning environments that foster active engagement, critical thinking, problem-solving, and collaboration. These methods support the development of both theoretical understanding and practical competence by bridging abstract content with experiential application.

A review of relevant literature confirms that social simulation facilitates improvements across various domains of learning, including conceptual comprehension, interpersonal communication, and emotional involvement. The results further indicate that learning outcomes are significantly affected by both internal factors, such as psychological readiness and physiological health, and external factors, including instructional design, pedagogical strategies, and the availability of appropriate learning media.

In the context of higher education, particularly in courses such as Basic Socio-Cultural Sciences (ISBD), the use of simulation aligns with curriculum goals and competency standards. The method encourages student-centered learning and addresses challenges related to student disengagement, limited motivation, and lack of

instructional innovation. Through structured and reflective engagement, simulation promotes behavioral change, enhances affective learning, and improves academic achievement.

Therefore, the application of social simulation methods is recommended as an effective pedagogical strategy to support the achievement of instructional objectives and to improve the overall quality of student learning. Future studies are encouraged to examine the long-term impact of simulation-based learning on skill retention, emotional intelligence, and interdisciplinary integration.

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