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Subjectivity and experience in the laboratory: the meaning of clinical simulation in the working memory of university students

Subjetividad y experiencia en el laboratorio: significado de la simulación clínica en la memoria de trabajo de estudiantes universitarios

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Abstract

Clinical simulation offers significant experiences in a controlled environment that favors the development of cognitive processes, the practice of skills and collaborative work, thus strengthening learning in university contexts. Considering this, the purpose of this work was to analyze subjectivity and experience in the laboratory, as well as the meaning of clinical simulation in the working memory of university students. The research was developed from a qualitative approach, with a phenomenological design. The participants were six teachers from a private university in Lima, who acted as key informants. A semi-structured interview was used to collect data, guided by a structured instrument. Among the results, it was evident that clinical simulation, in relation to working memory, is associated with learning strategies, skills training, the development of cognitive processes and the characteristics of the simulation scenario. In conclusion, clinical simulation, as a training strategy, contributes to strengthening students' skills through the repetition of procedures in realistic situations, which favors the retention of information and the automation of responses. Likewise, the importance of debriefing or subsequent reflection is highlighted, since it

allows decisions to be reviewed and corrected, thus reinforcing working memory and consolidating significant learning.

Keywords: clinical simulation, working memory, cognitive development.

Resumen

La simulación clínica ofrece experiencias significativas en un entorno controlado que favorece el desarrollo de procesos cognitivos, la práctica de habilidades y el trabajo colaborativo, fortaleciendo así los aprendizajes en contextos universitarios. Considerando ello, el presente trabajo tuvo como finalidad analizar la subjetividad y la experiencia en el laboratorio, así como el significado de la simulación clínica en la memoria de trabajo de estudiantes universitarios. La investigación se desarrolló desde un enfoque cualitativo, con diseño fenomenológico. Los participantes fueron seis docentes de una universidad privada de Lima, quienes actuaron como informantes clave. Para la recolección de datos se empleó la entrevista semiestructurada, guiada por un instrumento estructurado. Entre los resultados, se evidenció que la simulación clínica, en relación con la memoria de trabajo, se asocia con las estrategias de aprendizaje, el entrenamiento de habilidades, el desarrollo de procesos cognitivos y las características del escenario de simulación. En conclusión, la simulación clínica, como estrategia formativa, contribuye al fortalecimiento de las habilidades de los estudiantes mediante la repetición de procedimientos en situaciones realistas, lo que favorece la retención de información y la automatización de respuestas. Asimismo, se destaca la importancia del debriefing o reflexión posterior, ya que permite revisar y corregir decisiones, reforzando así la memoria de trabajo y consolidando el aprendizaje significativo.

Palabras clave: simulación clínica, memoria de trabajo, desarrollo cognitivo.

Introduction

Working memory, as it relates to clinical simulation, is a construct drawn from cognitive psychology and neuroscience that describes how the brain temporarily holds and manipulates information in order to carry out complex cognitive tasks. When this function operates alongside another cognitive capacity, it can compromise visual search performance during reading (Redden et al., 2023). Clinical simulation, in this sense, serves not only to train technical skills but also to surface participants' learning expectations, build integrity, trust, and mutual respect among them, and orient them to the simulation environment. The simulation phase itself is the point at which participants engage with the simulated clinical scenario in pursuit of specific learning objectives (Watts et al., 2021).

Across Latin America, students with dyslexia have been shown to experience working-memory impairments that translate into slower learning, difficulty forming morphemes, and problems storing and retrieving phonemes (Quintero et al., 2022). In Chile as well, students between the ages of 10 and 17 display learning difficulties and working-memory deficits that may stem from altered components in certain subtypes of attention-deficit/hyperactivity disorder (Milla & Gatica, 2020). Taken together, these findings suggest that working-memory limitations are not isolated occurrences but part of a broader pattern that undermines academic performance and the development of professional competencies.

Although simulation is widely used in the education and training of health professionals, pinning down its degree of realism and educational value remains difficult. Some authors argue that the value of realism varies across students and that what matters most is offering an accurate representation of the clinical case through cues and stimuli experienced from the participant's own perspective (Tun et al., 2015). Even so, greater realism in simulation tends to enhance student learning: repeated exposure to high-fidelity simulation has been shown to facilitate mastery and readiness for practice. High fidelity refers to simulation experiences that afford learners a strong sense of realism, allowing for deeper immersion in the clinical scenario (Guerrero et al., 2021).

Within the Peruvian context, a study conducted in Junín found that 55% of students showed only a moderate level of working memory (Angulo, 2021). Similarly, 43.3% of university students were reported to demonstrate a moderate level of virtual clinical simulation, a finding that points to a considerable difficulty (Vargas, 2021). These figures reveal challenges across the study categories at the national level and underscore the need to strengthen training strategies that bring working-memory development together with simulated practice.

At the local level, difficulties have been identified in working memory, particularly with respect to retained information, that is, knowledge that was, at some point, needed to meet a specific cognitive or procedural demand. This information is stored in long-term memory through a process involving repetition and consolidation. Previously stored information, in turn, can be retrieved by means of short-term memory, which acts as a bridge between permanent storage and the execution of immediate tasks (Castro, 2019).

Within the university setting, students have shown problems in the cognitive processes underlying working memory, which in turn affects their academic performance. Because they struggle to retain information over longer periods and apply it later, they have trouble filtering out or disregarding irrelevant or distracting information, which undermines concentration and attention on specific tasks. They also find it difficult to organize sequences of information or carry out tasks that require planning and the coordination of multiple steps. The causes underlying working-memory problems include genetic or biological factors, alterations in brain structure or function, mental health conditions such as attention-deficit/hyperactivity disorder, and environmental factors — life experiences, exposure to environmental toxins, chronic stress, or a lack of cognitive stimulation — all of which can compromise cognitive functioning. Faculty, for their part, need training in strategies for developing clinical simulation that help strengthen students' working memory.

Several prior studies inform this discussion. Jefferies et al. (2024) found that complex, emotionally charged tasks set within environments that challenge students' educational needs reveal memory to be a key feature of how students process, learn, and adapt to new information in their surroundings, playing a central role in both learning and teaching. Sobuwa (2023), examining which aspects of clinical simulation assessment can lead to poor academic performance, concluded that although clinical simulation is a useful pedagogical resource for training health-profession students in patient management, difficulties remain that can depress student performance, particularly when reflection and feedback strategies are lacking. Finally, Morocho (2023) investigated the effectiveness of simulator-based teaching, focusing on how it is applied, how faculty skills are assessed, how much value students place on it, and which competencies it develops; the study concluded that clinical simulators represent a valuable tool in obstetrics education provided they are integrated systematically into the curriculum.

The theoretical framework underpinning clinical simulation draws on the experiential learning theory advanced by Dewey (1933), who stressed the importance of hands-on experience within the educational process. Learner experience, arising from the activities students carry out and intentionally directing them toward the proposed learning objectives, thus becomes the central element of education itself. It is worth noting that this approach draws on a range of tools, including active learning devices, technical language, simulated scenarios, trained patient actors, and infrastructure and technological equipment designed to mimic reality (Piña & Amador, 2015). Experiential learning theory recognizes and values individual differences: it builds on learners' prior knowledge, enabling them to acquire new schemas that, once integrated smoothly, give rise to meaningful learning. This process, in turn, drives discernment and growth through innovation in teaching and learning (Espinar & Vigueras, 2020) and functions as an external stimulus that generates experience, guiding skill development through effort and expert practice (Valdés & Luna, 2017).

Clinical simulation has been defined as a complex educational intervention characterized by several design features with the potential to shape cognitive load, that is, the mental effort required to take in new information and learn (Lapierre et al., 2022). It recreates clinical scenarios involving real patients or manikins; performing clinical skills, however, is not the primary aim of simulation. Rather, students are expected to demonstrate abilities such as problem-solving, communication with patients and bystanders, coordination with hospital staff, and the technical skills needed to achieve specific outcomes within a medical or trauma context (Jones et al., 2015). Simulation also fosters the cognitive and conceptual development of these processes, allowing students to apply knowledge and skills effectively during actual clinical practice, which in turn helps reduce iatrogenic harm caused by inadequate techniques or practices (Afanador, 2010). Clinical simulation is, without question, a fundamental technique for building skills and competencies among health professionals in training. Its success, however, hinges on thoughtful implementation that weighs both its benefits and its limitations; by balancing technology, pedagogy, and available resources, institutions can maximize its potential as a key educational tool.

Clinical simulation should be promoted as both a teaching and an assessment methodology, with the simulator serving as a vehicle for conveying theoretical knowledge to students. Course-workshops that combine simulated practice with guided reflection offer one way of achieving this (Zuleta, 2023). Bogo et al. (2014), for their part, documented the pedagogical benefits of simulation-based learning: all of their interviewees agreed that clinical simulation draws on simulators and audiovisual resources, videos and presentations among them, to recreate complex clinical scenarios and strengthen students' visual and kinesthetic memory alike, ultimately improving knowledge retention and problem-solving.

Working memory also finds theoretical grounding in integrated information theory, put forward by Tononi and Koch (2016), who argued that consciousness consists in the brain's capacity to process and integrate information rapidly, acting as a holistic synthesizer of the individual's surrounding context. This capacity depends on a thalamocortical system capable of generating gamma-frequency oscillations. The link between working memory and consciousness is likewise evident in the multicomponent model of Baddeley (2017), which is directly relevant to the present study. Working memory has been defined as one of the executive functions responsible for

preparing, executing, regulating, and adjusting behavior, emotion, and cognition (Romero et al., 2017). The optimal functioning of working memory and other cognitive processes is considerably impaired in crisis situations that affect people's subjective and family well-being, as well as their developmental conditions and quality of life (Ramírez et al., 2020).

Given its importance, working memory warrants targeted intervention, yet few programs are currently devoted to this function. Within the field of cognitive stimulation of executive functions, fostering working memory through extracurricular activities not directly tied to the traditional teaching model has been proposed. Such activities include physical and artistic exercises that act as cognitive reinforcers; incorporating them into the school curriculum or into daily routines has proven highly beneficial for many students (Riaño et al., 2018). Working memory is an essential component of cognitive functioning, operating as a temporary "mental workspace" in which symbols and information are stored and processed before being learned or discarded. Although this concept is widely accepted, applying it in practice through pedagogical strategies calls for critical analysis that weighs both its impact and the limitations inherent in the process.

Methodology

This study followed a qualitative approach grounded in the phenomenological-hermeneutic method, through which the phenomenon under study was analyzed and interpreted. The phenomenological component centered on grasping the actual meaning of the phenomena examined (experiences, perceptions, and ideals) through the researcher's own subjective engagement, while the hermeneutic component enabled an in-depth analysis of the interviews aimed at uncovering the meanings underlying participants' discourse. Reporting of the study adhered to the criteria set out in the STROBE guideline for observational studies, particularly with respect to the clear description of context, participants, variables, instruments, and data analysis.

The sample consisted of six faculty members from a private university in Lima, who served as key informants. Data were collected through semi-structured interviews, a technique that entails direct interaction between researcher and participant and allows relevant information to be exchanged in a manner that is flexible yet purposefully guided. Consistent with the STROBE guideline, the procedure unfolded in the following stages. First, informed consent was obtained from each faculty member interviewed, following a sensitization process covering the study's objectives and scope. Individual interviews with each participant were then conducted. The information gathered was organized into a transcription matrix and coded according to the categories and subcategories previously defined. Finally, the data were processed using Atlas.ti software, which was used to systematize the information through hermeneutic networks addressing clinical simulation in working memory. Throughout, the study adhered to the ethical principles of research, ensuring participants' anonymity, confidentiality, and respect for autonomy.

Results

The results were processed on the basis of the information provided by the interviewees, who shared their experiences of clinical simulation in relation to working memory. The interviews were transcribed, coded, and analyzed with the support of ATLAS.ti software, which facilitated the systematic organization of the qualitative data and made it possible to identify meaningful patterns, categories, and relationships within participants' discourse.

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Figure 1

Network of clinical simulation in the working memory of students at a private university

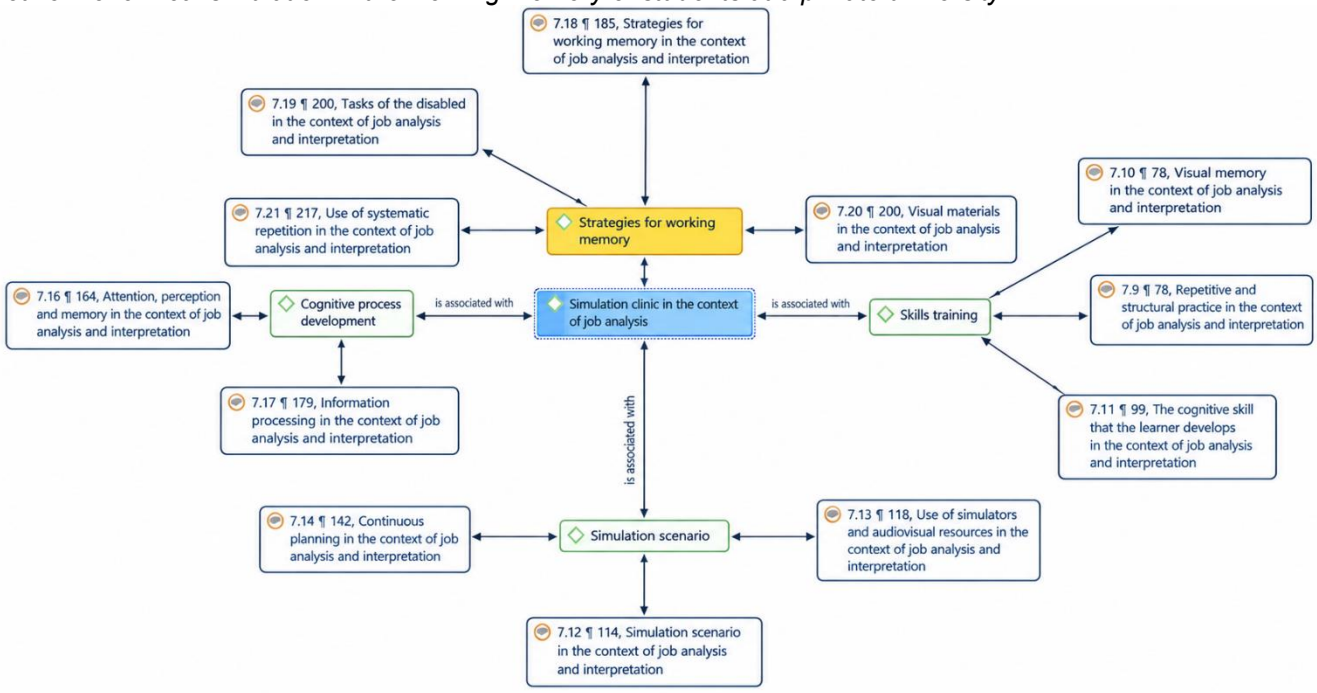


Figure 1 shows that clinical simulation, as it bears on working memory, is associated with four key dimensions: working-memory strategies, skills training, the development of cognitive processes, and the simulation scenario. Interviewees generally agreed that clinical simulation is an effective strategy for improving students' skills through the repetition of procedures in realistic situations, which favors information retention and the automation of responses. They also emphasized the importance of *debriefing*, or post-simulation reflection, as an opportunity to review and correct decisions, a process that reinforces both working memory and meaningful learning.

Figure 2

Network of skills training in students' working memory

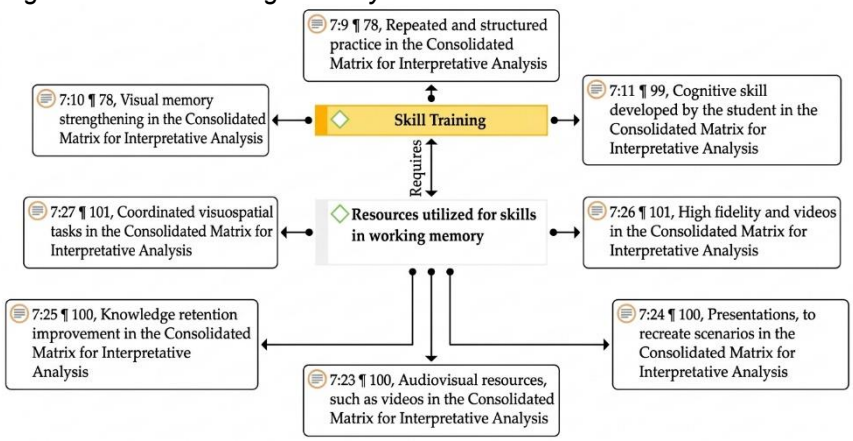


Figure 2 shows that skills training takes place through repeated, structured practice at stations, where students work in groups to develop sequences that strengthen visual memory, manual memory, and perception. This approach optimizes learning through constant feedback and allows students to acquire critical clinical skills by repeating tasks and correcting errors, a process that helps prevent cognitive overload while consolidating what has been learned. Station-based work, moreover, was highlighted as a way for students to overcome fear, learn from their mistakes, and improve how they process information through the simulator. Interviewees agreed that clinical

simulation relies on simulators and audiovisual resources such as videos and presentations to recreate complex clinical scenarios and strengthen students' visual and kinesthetic memory alike, with the aim of improving knowledge retention and problem-solving.

Figure 3

Network of the simulation scenario in students' working memory

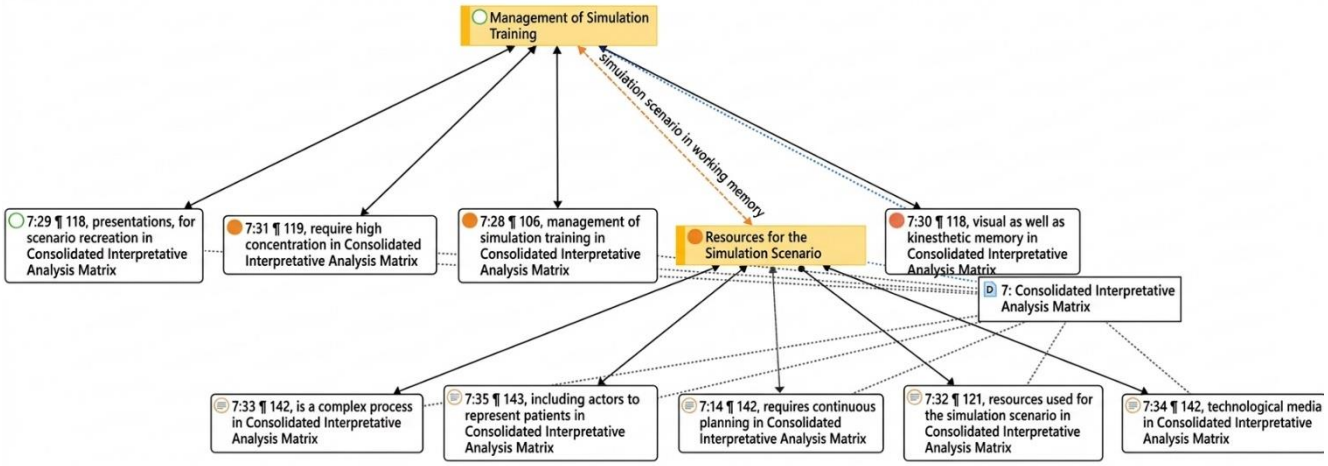


Figure 3 shows that clinical simulation relies on simulators and audiovisual resources, videos and presentations among them, to recreate complex clinical scenarios and strengthen students' visual and kinesthetic memory alike, with the aim of improving knowledge retention and problem-solving. Interviewees emphasized, on one hand, the use of advanced technology such as real-time feedback software and virtual-reality tools to simulate high-pressure clinical environments; on the other, they underscored the value of incorporating actors to portray patients, alongside videos, audio recordings, and more traditional tools such as presentations and assessments, all intended to facilitate learning and enrich the training experience.

Figure 4

Network of cognitive processes developed within working memory

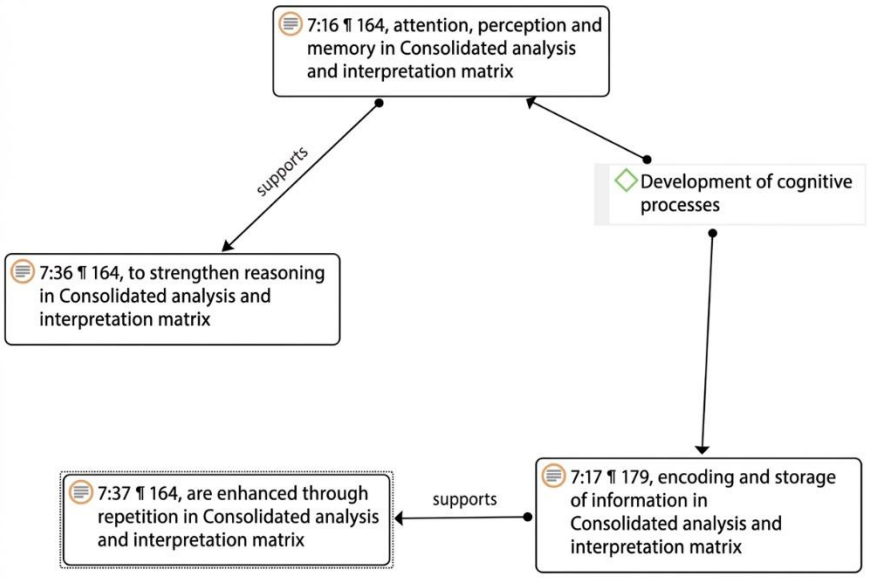


Figure 4 shows that the development of cognitive processes (attention, perception, and memory) is fundamental to strengthening students' clinical reasoning. These processes are enhanced through the repetition of tasks, the use of simulations, and the integration of high-demand cognitive skills such as rapid decision-making and

real-time problem-solving, all aimed at improving working memory and the capacity for clinical analysis and judgment. Interviewees stressed, on one hand, the importance of concentration and of reinforcing the ability to encode and retrieve prior information in the present moment; on the other, they highlighted how working memory enables physiotherapy students to develop professional competencies and respond assertively when managing complex clinical cases.

Figure 5

Network of strategies developed within students' working memory

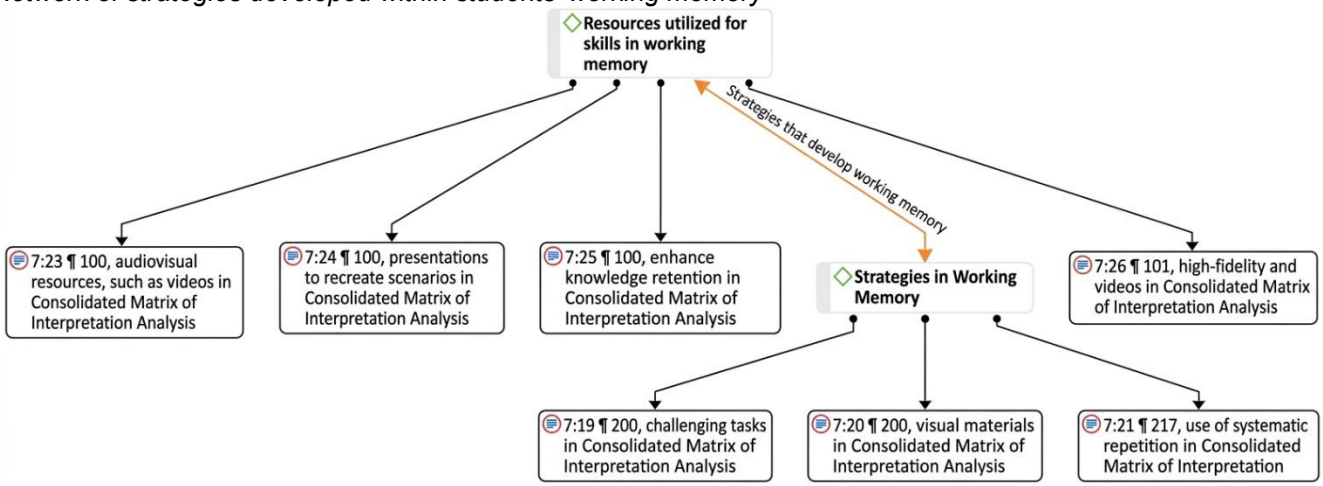
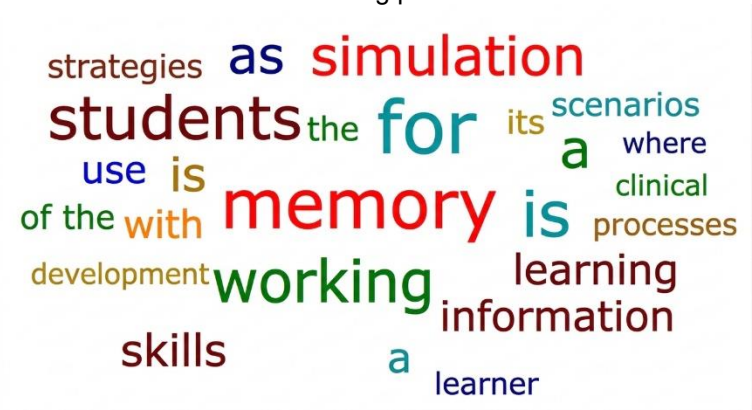


Figure 5 shows that training resources include strategies that draw on visual materials, scenario-recreating presentations, simulators, mnemonic devices, and case analysis, all intended to organize thinking, prioritize information, and ensure students' active participation. On one hand, the use of graduated training and interactive practice, supported by technological resources and simulators of varying complexity, stands out; on the other, students' active participation and the analysis of clinical cases emerge as key strategies for skills acquisition, since they foster direct student involvement in their own learning process.



The word cloud reflected the most frequent terms: memory, working, simulation, skills, information, students, learning, processes, scenarios, strategies, clinical, and development. This pattern points to the conclusion that improving working memory calls for clinical simulation that integrates the development of skills, processes, and strategies, thereby ensuring meaningful learning. This finding is consistent with the educational context of the private university studied, confirming clinical simulation as an effective strategy for advancing student learning and enabling students to face and resolve clinical problems autonomously and reflectively.

Discussion

Clinical simulation, in relation to working memory, is associated with working-memory strategies, skills training, the development of cognitive processes, and the simulation scenario. As a training strategy, it also

improves students' skills through the repetition of procedures in realistic situations, favoring information retention and the automation of responses. Participants further underscored the importance of *debriefing*, or post-simulation reflection, for reviewing and correcting decisions, a process that reinforces both working memory and meaningful learning. This finding aligns with Sobuwa (2023), who noted that although clinical simulation is a useful educational tool for training health-profession students in patient management, difficulties remain that can lead to poor student performance, particularly in the absence of adequate feedback strategies.

Morocho (2023), for her part, established the effectiveness of simulator-based teaching, examining how it is applied, how faculty skills are assessed, how students perceive its value, and which competencies it develops. That study also demonstrated the simulators' effectiveness, highlighting their practical application and functionality, while noting that some faculty members showed only limited commitment to this educational tool. Even so, practice with simulators was found to facilitate the assimilation of knowledge and skills, reduce the risk of error, and increase students' confidence and security in real-world situations. Vargas (2021), by contrast, found that participation in virtual clinical simulation has a significant influence on meaningful learning among medical students, concluding that such participation is an influential factor in meaningful learning for this population.

These results are consistent with Lapierre et al. (2022), who defined clinical simulation as a complex educational intervention characterized by several design features capable of shaping cognitive load, the mental effort required to take in new information and learn. Such simulations recreate clinical scenarios with real patients or manikins. Performing clinical skills is not their primary purpose; students are instead expected to demonstrate abilities such as problem-solving, communication with patients and bystanders, coordination with hospital staff, and the technical skills needed to achieve specific outcomes within a medical or trauma context (Jones et al., 2015). The simulation scenario, in turn, lays out processes and provides guidance for using clinical simulation as a teaching strategy, serving as a reference point for the faculty teams responsible for running simulations (Zuleta, 2023).

With respect to cognitive functions, the development of learning skills has been shown to encompass working memory, processing speed, attention, and phonological processing, all of which are closely tied to difficulties in calculation and problem-solving (Coello et al., 2023). Skills training takes place through repeated, structured practice at stations, where students work in groups to develop sequences that strengthen visual and manual memory as well as perception, optimizing their learning through feedback and enabling them to acquire critical clinical skills by repeating tasks and correcting errors. This finding echoes Jefferies et al. (2024), who concluded that memory is a defining feature of how students process, learn, and adapt to new information within their environment, playing a central role in both learning and teaching. Drawing on cognitive load theory, simulation pedagogy can therefore treat memory as a defining ingredient in the practice of skills development.

On this point, Barragán et al. (2017) noted that skills training consists of teaching that draws on a variety of pedagogical, technological, and innovative tools to facilitate the acquisition of competencies, clinical simulation among them, regarded as a strategy for meaningful learning. Clinical simulation relies on simulators and audiovisual resources such as videos and presentations to recreate complex clinical scenarios and strengthen students' visual and kinesthetic memory alike, with the aim of increasing knowledge retention and improving problem-solving. Similarly, Lapierre et al. (2022) proposed that technology-based instruction delivered before or during a simulation activity is associated with greater cognitive load. Clinical simulation remains a fundamental technique that facilitates the acquisition of skills and competencies through the use of materials, objects, and equipment known as simulators, which are used to bring students closer to real-world situations.

According to Zuleta (2023), the simulation scenario lays out the processes of clinical simulation, involving the creation of a detailed document that provides guidance for using clinical simulation as a teaching strategy and serves as a reference for the faculty teams responsible for running simulations. The development of cognitive processes (attention, perception, and memory) is essential to strengthening students' clinical reasoning, and these processes are enhanced through the repetition of tasks, the use of simulations, and the integration of high-demand cognitive skills such as rapid decision-making and real-time problem-solving, all aimed at improving working memory and the capacity for clinical analysis and judgment.

Mizare (2022), however, suggested that clinical simulation is closely linked to the development of clinical competencies, concluding that this teaching methodology can serve as a valuable pedagogical tool during health emergencies such as a pandemic. Romero et al. (2017), by contrast, defined working memory as one of the executive functions responsible for preparing, executing, regulating, and adjusting behavior, emotion, and cognition, noting that its optimal functioning, along with that of other cognitive processes, is considerably impaired in crisis situations that affect people's subjective and family well-being, as well as their developmental conditions and quality of life (Ramírez et al., 2020).

Developing strategies that incorporate challenging tasks, visual materials, simulators, mnemonic devices, and case analysis, together with formative-assessment tools and assertive feedback, serves to organize thinking,

prioritize information, and secure students' active participation. The use of such strategies also provides a basis for understanding how information is processed and stored across the different stages of the memory system. Sensory memory constitutes the first stage of information processing, receiving and holding sensory input (visual, auditory, tactile, and so forth) for a very brief period, from milliseconds to a few seconds; only a small fraction of this information is then transferred to short-term memory (Atkinson & Shiffrin, 1968).

Working memory is important to develop, and intervention targeting this function should therefore be promoted, given how few programs are currently devoted to this purpose. Within the field of cognitive stimulation of executive functions, developing working memory through extracurricular activities not directly tied to the traditional teaching model has been proposed; such activities include physical and artistic exercises that act as cognitive reinforcers and have proven highly beneficial when incorporated into teaching (Riaño et al., 2018). Challenging tasks, referred to as authentic tasks, consist of activities grounded in authenticity, reality, and cognitive domains (Bautista et al., 2023). Visual memory, for its part, is the cognitive activity involving sensory perceptions that underpins learning (Verzosi et al., 2024). Cognitive ability likewise emerged as a relevant construct, requiring reflective individuals who understand information, evaluate it, and act accordingly, generating diverse and original ideas that shape social environments characterized by well-being, justice, and equity (Frías et al., 2017).

Conclusion

Clinical simulation is directly associated with the strengthening of working memory, as it integrates cognitive strategies, skills training, the development of higher mental processes, and contextualized practice scenarios. As a pedagogical strategy, it fosters the acquisition and automation of clinical competencies through the repetition of procedures in realistic settings, which improves information retention and the consolidation of automated responses. *Debriefing*, or guided reflection following simulation, further allows decisions to be reviewed, errors to be corrected, and both working memory and meaningful learning to be reinforced.

Skills training is structured around stations of repeated, sequenced practice, where students work collaboratively to develop routines that strengthen visual and manual memory as well as spatial perception. This approach, grounded in continuous feedback and error correction, facilitates the acquisition of critical clinical skills through the progressive consolidation of behavioral patterns.

Clinical simulation makes use of high-fidelity simulators and audiovisual resources (videos, presentations, interactive cases) to recreate complex clinical scenarios. This multimodal design engages visual and kinesthetic memory simultaneously, optimizing knowledge retention and problem-solving capacity under conditions of uncertainty.

The development of cognitive processes (attention, perception, memory, and reasoning) is essential for enhancing clinical judgment. These processes are strengthened through the repetition of demanding tasks, the integration of progressively complex simulations, and the practice of high-level cognitive skills such as rapid decision-making and real-time problem-solving, all of which help improve analytical capacity and the efficiency of working memory.

Maximizing these benefits calls for instructional strategies that combine challenging tasks, visual materials, simulators, mnemonic devices, and clinical case analysis, supported by formative-assessment tools and assertive feedback. Such an approach helps organize clinical thinking, prioritize relevant information, and ensure students' active participation in their own learning process.

References

Amaya, A. (2012). Simulación clínica y aprendizaje emocional. *Revista Colombiana de Psiquiatría, 41*(1), 44–51. http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0034-74502012000500006&lng=es&tlng=es

Angulo, R. (2021). *Calidad de sueño, memoria de trabajo y rendimiento académico en estudiantes de secundaria de una institución educativa, Región Junín 2021* [Tesis de maestría, Universidad César Vallejo]. Repositorio Institucional UCV. https://repositorio.ucv.edu.pe/handle/20.500.12692/69050

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. En K. W. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 2, pp. 89–195). Academic Press. https://doi.org/10.1016/S0079-7421(08)60422-3

Barragán, J., Hernández, N., & Medina, A. (2017). Validación de guías de autoaprendizaje en simulación clínica para estudiantes de enfermería. *Revista Cuidarte, 8*(2), 1582–1590. https://doi.org/10.15649/cuidarte.v8i2.377

Baddeley, A. (2017). *Exploring working memory*. Taylor & Francis. https://doi.org/10.4324/9781315111261

Blanchard, M., & Muzás, M. D. (2016). *Los proyectos de aprendizaje: Un marco metodológico clave para la innovación*. Narcea.

Bogo, M., Rawlings, M., Katz, E., & Logie, C. (2014). *Using simulation in assessment and teaching: OSCE adapted for social work*. Council on Social Work Education. https://www.cswe.org/products/using-simulation-in-assessment-and-teaching-osce-adapted-for-social-work/

Castro Chávarry, C. P. (2019). Memoria de trabajo y comprensión lectora en estudiantes de una institución educativa estatal. *Revista Psicológica Herediana, 11*(1), 23–32. https://doi.org/10.20453/rph.v11i1.3626

Coello-Zambrano, E., & Ramos-Galarza, C. (2022). Construcción teórica neuropsicológica de las funciones ejecutivas. *Revista Ecuatoriana de Neurología, 31*(2), 74–83. https://doi.org/10.46997/revecuatneurol31200074

Dewey, J. (1933). *La búsqueda de la certeza: Un estudio de la relación entre el conocimiento y la acción* (E. Imaz, Trad.). Fondo de Cultura Económica.

Escudero, J., & Pineda, W. (2017). Memoria de trabajo: El modelo multicomponente de Baddeley, otros modelos y su rol en la práctica clínica. En *Estudios actuales en psicología: Perspectivas en clínica y salud* (pp. 1–13). Universidad Simón Bolívar. https://bonga.unisimon.edu.co/server/api/core/bitstreams/e5cb07fb-4339-4310-9d98-ffeaaf63b445/content

Espinar, E., & Vigueras, A. (2020). El aprendizaje experiencial y su impacto en la educación actual. *Revista Cubana de Educación Superior, 39*(3), e12. https://revistas.uh.cu/rces/article/view/2015?articlesBySimilarityPage=2

Guerrero, J., Hafiz, A., Eltohamy, N., Gomma, N., & Jarrah, I. (2021). Repeated exposure to high-fidelity simulation and nursing interns' clinical performance: Impact on practice readiness. *Clinical Simulation in Nursing, 60*, 18–24. https://doi.org/10.1016/j.ecns.2021.06.011

Hernández, R., & Mendoza, C. (2018). *Metodología de la investigación: Las rutas cuantitativa, cualitativa y mixta*. McGraw-Hill.

Jefferies, G., Fox, M., Dodds, L., & Davis, C. (2024). A theoretical framework for understanding the importance of implementing simulation in social work education. *Social Work Education, 24*. https://doi.org/10.1080/02615479.2024.2324906

Jones, F., Passos-Neto, C., & Braghiroli, O. (2015). Simulation in medical education: Brief history and methodology. *Principles and Practice of Clinical Research, 1*(2), 56–63. https://doi.org/10.21801/ppcrj.2015.12.8

Lapierre, A., Arbour, C., Maheu, M., Vinette, B., Fontaine, G., & Lavoie, P. (2022). Association between clinical simulation design features and novice healthcare professionals' cognitive load: A systematic review and meta-analysis. *SAGE Open, 53*(5). https://doi.org/10.1177/10468781221120599

Milla, C., & Gatica, S. (2020). Memoria de trabajo y flexibilidad cognitiva en niños típicos y con diagnóstico de TDAH. *Avances en Psicología Latinoamericana, 38*(3), 1–15. https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.7743

Morocho, M. (2023). *Enseñanza basada en simuladores clínicos en estudiantes de obstetricia de una universidad pública, Lima, 2022* [Tesis de maestría, Universidad César Vallejo]. Repositorio Institucional UCV. https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/112530/Morocho_CMA-SD.pdf?sequence=1&isAllowed=y

Ñaupas-Paitán, H., Valdivia-Dueñas, M. R., Palacios-Vilela, J. J., & Romero-Delgado, H. E. (2018). *Metodología de la investigación cuantitativa-cualitativa y redacción de la tesis* (5ª ed.). Ediciones de la U. http://www.biblioteca.cij.gob.mx/Archivos/Materiales_de_consulta/Drogas_de_Abuso/Articulos/MetodologiaInvestigacionNaupas.pdf

Piña-Jiménez, I., & Amador-Aguilar, R. (2015). La enseñanza de la enfermería con simuladores: Consideraciones teórico-pedagógicas para perfilar un modelo didáctico. *Enfermería Universitaria, 12*(3), 152–159. https://www.scielo.org.mx/scielo.php?pid=S1665-70632015000300152&script=sci_abstract

Quintero, C., Gil, V., Bolívar, L., Mazo, K., Serna, M., Ciro, L., & Restrepo, K. (2022). Memoria de trabajo en escolares con dislexia. *Ocnos: Revista de Estudios sobre Lectura, 21*(2). https://www.revistaocnos.com/index.php/ocnos/es/article/view/222/424

Ramírez, L., Lizarazo, Y., Bonilla, N., Cardozo, L., & Cornejo, A. (2020). Estrategias de intervención en la memoria de trabajo en niños y niñas sobrevivientes del desplazamiento forzado y la crisis fronteriza en Venezuela. *Archivos Venezolanos de Farmacología y Terapéutica, 39*(1), 98–104. https://www.redalyc.org/journal/559/55969798015/html/

Redden, R., Eady, K., Klein, R., & Saint-Aubin, J. (2023). Individual differences in working memory capacity and visual search while reading. *Memory & Cognition, 51*(2), 321–335. https://doi.org/10.3758/s13421-022-01357-4

Riaño-Garzón, M., Díaz-Carmargo, E., Torrado-Rodríguez, J., Uribe-Alvarado, J., Contreras-Velásquez, J., & Fierro-Zarate, C. (2018). Neurofeedback effects on cognitive performance in children with attention deficit.

Archivos Venezolanos de Farmacología y Terapéutica, 37(3). https://www.redalyc.org/journal/559/55963208006/55963208006.pdf

Romero, M., Benavides, A., Fernández, M., & Pichardo, M. (2017). Intervención en funciones ejecutivas en educación infantil. *International Journal of Developmental and Educational Psychology, 3*(1). https://www.redalyc.org/pdf/3498/349853365026.pdf

Sobuwa, S. (2023). Perceptions of staff and students of the role of clinical simulation on students' ability to perform academically. *African Journal of Health Professions Education, 15*(3), 2–7. https://doi.org/10.7196/AJHPE.2023.v15i3.1677

Tononi, G., Boly, M., Massimini, M., & Koch, C. (2016). Integrated information theory: From consciousness to its physical substrate. *Nature Reviews Neuroscience, 17*, 450–461. https://doi.org/10.1038/nrn.2016.44

Tun, J., Alinier, G., Tang, J., & Kneebone, R. (2015). Redefining simulation fidelity for healthcare education. *Simulation & Gaming, 46*(2). https://doi.org/10.1177/1046878115576103

Trujillo, C., Naranjo, M., Lomas, K., & Merlo, M. (2019). *Investigación cualitativa: Epistemología, consentimiento informado, entrevistas en profundidad*. Editorial UTN. https://www.academia.edu/61634935/INVESTIGACION_CUALITATIVA

Valdés, L., & Luna, S. (2017). ¿Cómo aprendemos de los referentes visuales en el diseño? Aproximación desde la teoría del aprendizaje experiencial de Kolb. *Revista de Diseño, 5*(1), 45–60. https://www.researchgate.net/publication/320143236_Como_aprendemos_de_los_Referentes_Visuales_en_el_Diseno_Aproximacion_desde_la_Teoria_Del_Aprendizaje_Experiencial_de_Kolb

Vargas, G. (2021). *Simulación clínica virtual y influencia en aprendizaje significativo en estudiantes de medicina séptimo ciclo de una universidad de Lima 2021* [Tesis de maestría, Universidad César Vallejo]. Repositorio Institucional UCV. https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/81468/Vargas_FGA-SD.pdf?sequence=1&isAllowed=y

Ventura, J., & Barboza, M. (2017). El tamaño de la muestra: ¿Cuántos participantes son necesarios en estudios cualitativos? *Revista Cubana de Información en Ciencias de la Salud, 28*(3). https://www.rcics.sld.cu/index.php/acimed/article/view/1138/687

Watts, P. I., McDermott, D. S., Alinier, G., Charnetski, M., Ludlow, J., Horsley, E., Meakim, C., Nawathe, P. A., & INACSL Standards Committee. (2021). Healthcare Simulation Standards of Best Practice™: Simulation design. *Clinical Simulation in Nursing, 58*, 14–21. https://doi.org/10.1016/j.ecns.2021.08.009

Webster, F., Piedra, M. J., & Estévez, F. (2019). Parental perception in children with executive deficits who have learning difficulties in mathematics. *Revista Ecuatoriana de Neurología, 28*(3), 52–58. http://scielo.senescyt.gob.ec/scielo.php?script=sci_abstract&pid=S2631-25812019000300052&lng=es&nrm=iso&tlng=en

Zuleta Uribe, M. (2023). *La simulación clínica como estrategia de enseñanza en los programas de formación en salud del Servicio Nacional de Aprendizaje (SENA), Colombia* [Tesis de maestría, Universidad Nacional de La Plata]. Repositorio de Tesis FAHCE-UNLP. https://www.memoria.fahce.unlp.edu.ar/tesis/te.2685/te.2685.pdf