

# Systematic Literature Review on Infographic Adaptation and Acceptance Factors in Facilitating Teaching and Learning Across Higher Education and Medical Fields

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## ABSTRACT

*Infographics are visual representations of information designed for rapid understanding at a glance. As powerful stimulators of visual communication, infographics have gained significant popularity among educators in higher education and medical fields. The creation of engaging teaching and learning materials has become increasingly critical, yet systematic reviews focused on infographic acceptance and adaptation remain scarce. This study conducts a comprehensive systematic literature review adhering to the ROSES protocol (RepOrting standards for Systematic Evidence Syntheses), selecting studies from Scopus, Science Direct, and Google Scholar. A total of 19 empirical studies were included in the final synthesis. A thematic analysis revealed four main themes: (1) Clarity and Efficiency in Information Delivery; (2) Enhancing Comprehensibility; (3) Development of Visual Literacy Competencies; and (4) Promotion of Active Teaching and Learning Practices. The findings highlight the essential role of infographics in enhancing comprehension, promoting engagement, and facilitating the rapid transfer of knowledge, particularly in health-related education. This paper contributes meaningful insights into the role of infographics in teaching and learning while identifying key areas for future research and curriculum development.*

**Keywords:** Infographics, Higher Education, Visual Literacy, Medical Education, Systematic Literature Review



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## 1 INTRODUCTION

The demand for effective visualization tools in education has significantly increased, driven by the need for rapid analysis and the growing importance of engaging students with complex information. The technological revolution has greatly influenced changes in various aspects of life, including education. For example, the use of multimedia materials in learning sessions offers many benefits, particularly in capturing students' attention in the classroom (Ramli et al., 2023). Across educational levels, instructors are increasingly adopting visual aid to enhance learning comprehension and foster deeper understanding. As educators strive to make their lessons more engaging, the use of infographics has become a prominent method for conveying complex information in a way that is both visually appealing and easily accessible to students.

Infographics, which combine elements such as text, images, charts, and graphics, provide a powerful tool for simplifying complex concepts and facilitating the transmission of knowledge. This

method is particularly effective in today's digital age, where the emphasis on visual literacy is crucial for both students and educators. Visual literacy, the ability to interpret and utilize visual information, is essential for educators aiming to enhance the communication of knowledge in the classroom (Afify, 2018). By integrating visual elements with textual content, infographics support both visual and verbal cognitive channels, making them effective in conveying information quickly and memorably (Rahim et al., 2016).

In recent years, infographics have become a key component of educational technology, especially in disciplines that require the communication of dense or intricate information. While infographics are widely used in various media forms, including newspapers, television broadcasts, and websites, their application in classroom settings is still limited (Naparin & Saad, 2017). Despite the increased use of technology in teaching, research on how infographics can specifically enhance student learning outcomes remains scarce (Dunlap & Lowenthal, 2016). The multimodal nature of infographics allows them to present information not only as text but also as visual elements, including images, charts, and diagrams, thereby enabling students to interact with the material in multiple ways. This approach enhances comprehension and retention, especially for complex topics.

Infographics have proven especially useful in health education, where they have been employed to communicate critical public health information, including during the COVID-19 pandemic. Infographics detailing important health measures, such as mask usage and social distancing, have shown to improve the public's recall of important guidelines and health information (Egan et al., 2021). In particular, the collaboration between the Singaporean Ministry of Health and the World Health Organization demonstrated that infographics significantly boosted the retention of correct mask-wearing techniques, with 85.2% of participants reporting that the information was effectively conveyed (Egan et al., 2021).

The use of infographics has also been evaluated in pharmacist training, where their effectiveness in conveying important information during consultations was assessed. Studies have shown that infographics are a valuable tool for healthcare professionals to present clear and concise information to patients, thereby improving communication and decision-making (Tidd et al., 2022). In this context, infographics have proven to be an efficient means of delivering complex medical knowledge in a simplified, engaging format, allowing for more effective interactions between healthcare providers and patients (Damman et al., 2018).

Despite these successes, there is a notable gap in the literature regarding the systematic integration of infographics in both general education and medical education. Most studies have either focused on specific fields, such as nursing or public health, or have provided broad overviews without addressing the unique challenges and needs of different educational contexts. Moreover, while the role of visual literacy in facilitating the use of infographics is increasingly recognized, a comprehensive review of how infographics are adopted and utilized across various educational settings is still lacking.

The aim of this study is to bridge this gap by systematically reviewing and synthesizing two existing literature reviews: one focusing on infographic acceptance factors in higher education (Ahmad et al., 2022) and another concentrating on medical and health-related education (Ahmad et al., 2024). By integrating these perspectives, this research seeks to examine the key themes, challenges, and future directions in the use of infographics as educational tools. This study specifically addresses the following objectives: (1) to identify the factors that influence the acceptance and effectiveness of infographics in facilitating teaching and learning; (2) to compare the use of infographics in medical and non-medical educational contexts; and (3) to propose future research directions and practical recommendations for improving the use of infographics in higher education. Ultimately, this study contributes to the growing body of knowledge on visual pedagogy and provides valuable insights for educators, curriculum designers, and policymakers interested in optimizing the use of infographics for educational purposes.

## 2 METHODOLOGIES

This study employed the ROSES protocol (RepOrting Standards for Systematic Evidence Syntheses) as the methodological framework guiding the systematic literature review (SLR). Originally developed for systematic reviews and evidence maps in environmental management research (Haddaway et al., 2018), ROSES provides structured guidance applicable to a variety of synthesis methods, including narrative and qualitative analyses. Its emphasis on transparent, repeatable, and objective procedures ensures that reviews minimize bias and maximize reliability. Although ROSES was initially tailored for conservation and environmental fields, its rigorous standards and comprehensive approach make it equally valuable for systematic evidence syntheses in educational research contexts. By following ROSES, researchers are prompted to deliver sufficient information with the appropriate level of detail at every stage of the review process. While ROSES was selected as the guiding protocol for this review, other established frameworks such as the PRISMA Statement are also widely recognized for their structured approach to systematic reviews. The PRISMA Statement enables the formulation of clear research questions, identifies inclusion and exclusion criteria, and facilitates a comprehensive review of a large database of literature within a defined timeframe (Ramli et al., 2024).

Following the ROSES framework, this study began by formulating a clear and focused research question. Systematic reviews often assess the effectiveness of interventions or explore the impacts of specific actions within complex systems. Accordingly, the research question was constructed to explore how infographics are accepted and adapted to facilitate teaching and learning in higher education settings. The formulation of the research question was guided by the PICo framework, which stands for Population, Interest, and Context. This approach, particularly suited for qualitative reviews, facilitates the understanding of phenomena and their contextual relationships. In this study, the Population refers to students, the Interest centres on infographic acceptance, and the Context pertains to higher education environments.

Following the development of the research question, a systematic searching strategy was implemented, comprising three primary phases: identification, screening, and eligibility. During the identification phase, comprehensive searches were conducted across multiple academic databases using predefined keywords and Boolean operators to capture a broad range of relevant literature. The screening phase involved reviewing titles and abstracts to exclude irrelevant studies, followed by a full-text assessment during the eligibility phase to ensure all selected studies met the predefined inclusion criteria.

Subsequently, a rigorous quality appraisal of the selected articles was conducted to ensure the methodological soundness and relevance of the studies included in the synthesis. The authors employed a structured evaluation strategy, assessing elements such as clarity of objectives, appropriateness of study design, robustness of data collection and analysis, and alignment with the research question. Finally, data were systematically abstracted from the eligible studies into a structured extraction form, facilitating consistency and accuracy. The abstracted data were then analysed thematically to identify patterns, themes, and relationships, ensuring the findings were robust and reflective of the available evidence. Validation steps were also undertaken to cross-check data coding and theme development, maintaining the integrity and reliability of the synthesis process.

### 2.1 Formulation of the Research Questions

The research questions guiding this study were formulated using the PICo framework. PICo, an acronym for Population, Phenomenon of Interest, and Context, serves as a valuable tool for constructing appropriate research questions, particularly in the context of qualitative reviews. Unlike quantitative studies, qualitative research seeks to explore the meaning and relationships underlying phenomena, necessitating a different approach to question development. The PICo framework ensures clarity focus and relevance in the formulation process.

## 2.2 Identification

The identification phase of the systematic literature review (SLR) involved a series of activities aimed at systematically searching for synonyms and related terms associated with the study's main keywords. The researchers were focused on determining the quantity, quality, and types of databases to use for the review. Following this framework, various keywords related to the study's focus were developed, such as infographic acceptance, visual literacy, and higher education students. These keywords were initially selected based on the research questions and were further refined during the identification process (Okoli, 2015). To enhance the search results, the researchers utilized several resources, including an online thesaurus, keywords from previous studies, recommendations from Scopus, and expert suggestions. The identification phase was designed to ensure a comprehensive search, employing a combination of keyword variations and related terms to retrieve a broader set of relevant articles. It was essential to diversify the sources and search methods instead of relying solely on database searches. This approach allowed for a more thorough search by developing full search strings and query development skills, enabling a more robust search strategy (Gusenbauer & Haddaway, 2020).

For the SLR, the authors focused on two primary databases Scopus and Science Direct which are widely recognized for their comprehensive search functionalities and proven quality control measures (Martin-Martin et al., 2018). Google Scholar was also included as a supplementary database. For more effective results, the researchers employed Boolean operators (OR, AND) and phrase searching to combine terms such as “infographics,” “education,” “students,” and “visual literacy.” These four initial keywords, however, were not sufficient on their own and needed to be expanded. Additional synonyms, related terms, and variations were identified to refine the search further.

Despite its widespread use, Google Scholar proved to be unsuitable as the primary database for this review due to several limitations, including quality control issues and technical challenges such as a lower tolerance for complex search queries and a lack of advanced search features (Halevi et al., 2017). Nevertheless, Google Scholar was utilized as a secondary database to complement the main search, assisting in broadening the list of articles (Haddaway et al., 2015).

Moreover, the researchers recognized the importance of manual searching alongside database searches to ensure a more complete and accurate selection of relevant studies. This multi-source approach emphasized both the comprehensiveness and accuracy of the search results. While specific keywords can yield more relevant results, overly restrictive terms may risk missing important articles. The search process across the three main databases Scopus, Science Direct, and Google Scholar resulted in a total of 934 articles.

## 2.3 Search Strategy

A comprehensive search was conducted across three major academic databases: Scopus, Science Direct, and Google Scholar. The search employed combinations of keywords such as “infographic acceptance,” “infographic adaptation,” “visual literacy in education,” “teaching and learning with infographics,” “medical education infographics,” and “visual communication in education.” Boolean operators (AND, OR) and manual snowballing techniques were used to broaden the search results.

**Table 1** The Search String

"infographic" OR "infographics" OR "visual representation" OR "visual literacy" OR "visual learning") AND ("education" OR "teaching and learning" OR "higher education" OR "medical education"

### **Inclusion And Exclusion Criteria**

#### **Inclusion Criteria:**

- Empirical studies published between 2014 and 2024.
- Studies focusing on the use, acceptance, or impact of infographics in educational settings.
- Peer-reviewed journal articles written in English.
- Studies related to higher education or medical education.

#### **Exclusion criteria:**

- Opinion papers, editorials, and non-peer-reviewed conference proceedings.
- Studies focusing on non-educational infographics (e.g., marketing or journalism without educational focus).
- Studies where infographics were not a central focus of the research.

## **2.4 Study Selection and Screening**

Screening represents the second critical phase in the systematic literature review process, wherein articles are evaluated against predefined inclusion and exclusion criteria. This process systematically determines which studies are eligible for further analysis and is often facilitated by the sorting functions embedded within academic databases. The selection criteria were established based on the research questions, in alignment with best practices proposed by Kitchenham et al. (2009).

Given the vast volume of published literature, it is impractical for researchers to review all existing studies comprehensively. Thus, applying a structured screening process becomes essential to ensure the focus and manageability of the review. Following the guidance of Okoli (2015), the temporal range for article selection was limited from 2014 to 2023, covering the most recent eight years. This time frame was chosen in response to a notable increase in research concerning infographic implementation and acceptance observed since 2014, ensuring that the review captures the most current and relevant findings.

To maintain high quality within the selected articles, only studies published in peer-reviewed journals and containing empirical data were included. During the inclusion process, studies were assessed for alignment with the key characteristics of the target population, namely students engaged with infographics in educational contexts, to directly address the formulated research questions. Conversely, the exclusion process filtered out articles featuring populations or contexts that might introduce bias or produce results incongruent with the aims of the review, as suggested by Patino and Ferreira (2018). Through this systematic screening, a total of 865 articles were excluded for failing to meet the inclusion criteria, particularly due to a lack of focus on educational applications of infographics. Consequently, 69 articles remained and proceeded to the eligibility stage.

## **2.5 Eligibility**

The final stage of the selection process involved the eligibility assessment, during which the researchers manually reviewed all articles shortlisted through the screening phase to ensure that they fully met the predefined inclusion criteria. Recognizing that automated database filters could miss certain nuances, a detailed manual verification was essential to validate the thematic relevance and methodological rigor of the selected studies.

This eligibility evaluation was conducted through careful reading of the titles, abstracts, and, when necessary, the full texts of the articles. This process allowed the researchers to identify and exclude any studies that, despite passing earlier screening stages, did not adequately align with the research focus on infographic acceptance and adaptation in higher education and medical education contexts.

Eligibility checks serve as a critical quality control mechanism in systematic reviews, enabling researchers to address potential limitations arising from database indexing inaccuracies or keyword mismatches. Following this thorough manual review, a total of only 19 empirical studies were confirmed as meeting all eligibility requirements and were included in the final synthesis.

## **2.6 Quality Appraisal**

Each study was evaluated using a standard checklist assessing criteria such as clarity of research questions, methodological rigor, relevance to the review objectives, and quality of data analysis. The selected publications in this study were provided to two experts for quality assessment, and the experts categorised the remaining articles into three quality categories: high, moderate, and low. Studies were categorized as high or moderate quality based on this appraisal. A subject matter expert with expertise in the relevant field has the ability to evaluate the content of the indicators and determine whether the content is sufficient to represent the indicators (Noorlida et al., 2022). This process rated all 19 articles as high. As a result, all the remaining articles were eligible for review.

## **2.7 Data Extraction and Thematic Synthesis**

To ensure accuracy and minimize errors, two independent experts conducted the data extraction process (Charrois, 2015). Each of the 19 selected papers was thoroughly reviewed, with a focus on the abstract, results, and discussion sections, aligning with the study's research objectives. Data relevant to the research questions were systematically extracted from the papers. In cases of discrepancies between the experts regarding the extracted data, discussions were held to reach consensus on whether to retain or exclude specific information, as outlined by Kitchenham and Charters (2007).

Following the data extraction, the authors performed a thematic analysis to identify the primary themes and sub-themes emerging from the dataset. This process involved identifying patterns and relationships, clustering similar data, and noting recurring issues (Braun & Clarke, 2006). Thematic analysis was guided by the goal of grouping abstracted data into coherent categories or themes based on their relevance to the research questions.

In total, four main themes were identified and developed. These themes were carefully reviewed and refined to ensure their relevance and alignment with the study's objectives. After the initial categorization, the themes were presented to a panel of two expert evaluators, who confirmed that the themes were appropriate and accurately reflected the results of the review. This iterative validation process ensured that the thematic analysis was robust, comprehensive, and aligned with the study's aims.

## **3 RESULTS AND THEMES**

### **3.1 Background of Selected Papers**

The systematic review managed to obtain a total of 19 selected articles. Based on the thematic analysis, four primary themes were developed, namely Clarity and Efficiency in Information Delivery, Enhancing Comprehensibility, Development of Visual Literacy Competencies and Promotion of Active Teaching and Learning Practices. Among the 19 selected articles, 8 studies were conducted in the United States of America, while one study each was carried out in Malaysia, the United Kingdom, Australia,

Lithuania, Spain, Saudi Arabia, Germany, and the Philippines. Additionally, two studies were conducted in Turkey.

In terms of publication years, one study was published in 2014, two studies were published in 2016, one study was published in 2017, three studies were published in 2018, three studies were published in 2019, two studies were published in 2020, two studies were published in 2021, four studies were published in 2022, and one study was published in 2023.

The diversity of countries and the distribution of publication years reflect the growing global interest in the role of infographics in enhancing teaching and learning processes, particularly in higher education and medical education settings. These articles collectively contributed to the identification of critical themes that underpin the acceptance and adaptation of infographics as educational tools.

### **3.2 Clarity and Efficiency in Information Delivery**

Infographics were consistently recognized for their ability to convey complex information in a visually attractive and efficient manner. Fadzil (2018) emphasized that students perceived infographics as time-saving tools, summarizing large volumes of content without omitting key points. Fleig et al. (2021) demonstrated that the concise and engaging nature of public health infographics enhanced both comprehension and trust among readers during critical health campaigns. Savini et al. (2022) found that incorporating infographics into healthcare education expedited the assimilation of procedural information compared to traditional text-based resources. Additionally, studies by Plotnick et al. (2021) and Thakur (2021) highlighted the importance of clear design layouts and visual hierarchy in promoting information recall and rapid cognitive processing. Well-structured infographics significantly enhanced the clarity and efficiency of educational content delivery across various learning contexts.

### **3.3 Enhancing Comprehensibility**

Infographics played a vital role in making complex, abstract, or technical information more comprehensible and accessible to learners. Zikmund-Fisher et al. (2014) showed that well-designed health infographics improved comprehension of statistical risk information among non-expert audiences. Mayer et al. (2020) further argued that multimedia principles combining visual and verbal channels reduce cognitive overload and support better understanding. Cairo (2016) and Krum (2018) emphasized that effective visual storytelling within infographics enhanced narrative flow and bridged gaps in students' background knowledge. Gallagher and Savage (2020) observed that in health behavior education, infographics improved message retention and decreased misinterpretations compared to traditional pamphlets. Collectively, the studies reveal that infographics simplify complex concepts, lower cognitive load, and foster clearer mental models among learners.

### **3.4 Development of Visual Literacy Competencies**

The promotion of visual literacy emerged as a significant outcome of infographic usage. Jaleniauskiene and Kasperuniene (2022) highlighted those students engaged in infographic creation activities demonstrated enhanced digital competencies and multimodal communication skills. Ozdamli and Ozdal (2016) showed that training students to design and interpret infographics nurtured critical thinking, creativity, and analytical abilities. Reyes-Torres et al. (2018) emphasized that integrating infographics into curricula supports the development of multimodal literacies essential for 21st-century communication. Darcy (2019) argued that analyzing and constructing infographics fostered critical digital literacy, enabling students to decode visual data critically and ethically. Tham (2017) illustrated that in science education, infographic storytelling nurtured students' ability to visually represent and interpret complex scientific concepts. These findings consistently suggest that infographics actively build essential visual literacy and higher-order thinking skills among students.

### 3.5 Promotion of Active Teaching and Learning Practices

Infographics significantly contributed to facilitating teaching and learning by promoting student engagement, motivation, and active participation. Alyahya (2019) found that integrating infographic assignments into coursework improved academic performance and heightened intrinsic motivation. Traboco et al. (2022) demonstrated that students exposed to infographic-based lessons exhibited higher engagement levels and greater satisfaction with learning experiences. Bowe et al. (2022) and Schneider et al. (2023) showed that utilizing infographics in healthcare and technical education enhanced critical reflection and allowed learners to synthesize and apply knowledge more effectively. Fadzil (2018) emphasized that in Malaysian higher education, infographics helped bridge communication gaps between lecturers and students, fostering more dynamic and interactive classroom environments. Collectively, these studies underscore the vital role of infographics in promoting learner-centered education models, supporting both the affective and cognitive dimensions of learning.

## 4 DISCUSSIONS

The findings of this systematic review consolidate the evidence that infographics serve as highly effective educational tools capable of transforming traditional learning environments. By merging visual and textual content, infographics align with cognitive theories of multimedia learning, supporting dual-channel processing, minimizing extraneous cognitive load, and enhancing germane cognitive load associated with meaningful learning. The emergent themes reflect a comprehensive narrative: infographics improve clarity and efficiency in information delivery, enhance comprehensibility, develop visual literacy competencies, and promote active teaching and learning practices.

The theme of Clarity and Efficiency in Information Delivery highlights how infographics address contemporary educational demands for timesaving yet rich communication strategies. Particularly in crisis contexts such as the COVID-19 pandemic, their rapid information delivery capabilities proved crucial. Infographics enable the distillation of complex academic content into formats that maximize immediate comprehension without sacrificing depth, making them indispensable for both educational and public health communication.

The theme of Enhancing Comprehensibility underscores the cognitive benefits associated with visual learning. Infographics' ability to simplify intricate concepts enhances students' information retention and comprehension, especially in subjects with dense factual or technical content like medical education. By translating abstract ideas into tangible visuals, infographics cater to diverse learning styles and reduce barriers to understanding.

The Development of Visual Literacy Competencies emerged as another critical outcome of infographic use. As students engage in both interpreting and designing infographics, they cultivate critical thinking, creative expression, and analytical skills essential for navigating a digital, visual world. The acquisition of visual literacy not only enhances academic performance but also equips students with lifelong skills crucial for professional success and societal participation.

Finally, the Promotion of Active Teaching and Learning Practices demonstrates how infographics foster engagement, curiosity, collaboration, and active participation. Infographics shift learners from passive consumers to active producers of knowledge, aligning closely with constructivist educational theories that emphasize learner autonomy, engagement, and deeper cognitive processing.

However, while the advantages are clear, challenges remain. Risks such as oversimplification, information distortion, and the absence of standardized visual literacy assessment tools must be carefully managed. Educators must balance visual appeal with informational accuracy and ensure that infographics align with pedagogical goals. Future research should explore the longitudinal impacts of infographic use on learning outcomes, discipline-specific adaptations, and the potential of AI-assisted infographic generation to personalize learning experiences.

In conclusion, the integration of infographics represents not merely a technological enhancement but a pedagogical shift toward richer, more effective educational experiences. Their systematic adoption, grounded in empirical evidence, holds transformative potential for both higher education and medical education contexts.

## **5 CONCLUSIONS**

This systematic review consolidates strong evidence on the role of infographics as transformative tools in higher education and medical education. Through thematic analysis of 19 high-quality empirical studies, it is evident that infographics significantly contribute to improving knowledge dissemination, comprehension, visual literacy development, and active teaching and learning practices. Infographics are more than technological enhancements; they serve as cognitive scaffolds that bridge complex information and learner understanding. By presenting information efficiently and attractively, infographics cater to the cognitive needs of modern learners who are often overwhelmed by textual overload. Their ability to enhance understandability and foster visual literacy equips students with essential skills for academic success and professional readiness in a visually dominant digital world. Moreover, infographics stimulate learner engagement, creativity, and critical thinking, aligning with contemporary educational paradigms that emphasize active, student-centered learning.

Nevertheless, the deployment of infographics must be approached thoughtfully. Potential risks such as information oversimplification and misinterpretation necessitate careful design, validation, and pedagogical alignment. Future research should focus on developing standardized frameworks for evaluating infographic quality, assessing visual literacy competencies, and exploring the impact of emerging technologies such as AI-generated personalized infographics.

Overall, this review advocates for the systematic integration of infographics into educational practices, curricula, and professional development programs. Leveraging the unique cognitive, emotional, and motivational strengths of infographics can significantly enhance learning outcomes, making education more effective, engaging, and accessible in an increasingly complex information environment.

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All authors played equal contributions towards the production of this paper.

## **CONFLICT OF INTEREST**

The author declares no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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