

Visual narratives in higher education: a scoping review of comic, manga, graphic novels and cartoons as educational tools

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Abstract

This scoping review explores the use of comics, graphic novels, manga and cartoons in higher education (HE) for learning and teaching. Drawing on eighteen articles published between 2000 and 2023 across diverse academic disciplines, it examines teaching approaches, motivations and outcomes associated with these visual media.

The review finds that comics function both as educational resources and as tools for promoting active learning in such fields as economics, psychology, health sciences, biology, chemistry, computer science and the creative industries. These media help make complex academic content more accessible, engaging and comprehensible, while enhancing student motivation and engagement. Educators employ comics to initiate activities, illustrate professional and social realities and stimulate discussion, dialogue and reflection. This approach broadens students' perspectives, fosters critical reflection and supports the development of both critical thinking and professional skills.

Despite the potential of comics, the review identifies a lack of detailed pedagogical strategies and guidance, or 'comics literacy', to optimise their educational benefits. It calls for a critical evaluation and a theoretical underpinning to guide their use in HE and highlights the need for further research to realise fully their potential in this sector.

Keywords: active learning, comics, manga, graphic novels, higher education, graphic medicine

Introduction

Visual storytelling media, such as comics, cartoons, manga and graphic novels, combine images – and often text – to convey ideas, explore abstract concepts and engage a wide range of audiences. These media are commonly referred to as sequential art, visual narratives, or graphic narratives. While there is no universally agreed definition (Meskin, 2017; Stein and Thon, 2013), a widely cited example comes from McCloud (1994, p.9), who defines comics as *"juxtaposed pictorial and other images in deliberate sequence, intended to convey information and/or produce an aesthetic response in the viewer"*.

Although distinctions are sometimes made between comics, cartoons and graphic novels, particularly in relation to intended readership (such as associating comics with younger audiences and graphic novels with adults), these boundaries are not always consistent (Tabachnick, 2009; Short *et al.*, 2013). The global diversity of visual storytelling traditions reflects a wide range of cultural contexts, genres and

stylistic forms. Examples include manga in Japan, manhwa in Korea, bande dessinée in French-speaking countries, fumetti in Italy and historieta in Latin America (Gerde and Foster, 2008; Petersen, 2011). Each of these traditions offers distinct stylistic and narrative conventions. Moreover, the cultural appreciation and academic legitimacy of comics may vary significantly from one culture to another. Globalisation, digital technologies and fan cultures have increasingly blurred such distinctions, giving rise to hybrid formats and creating new educational opportunities (Bouissou, 2010; Lamerichs, 2016; Pellitteri, 2018).

This review adopts a broad understanding of the term 'comics', encompassing various forms of visual media, such as manga, graphic novels, and cartoons (including both sequential narratives and single-panel illustrations), as well as related visual formats, provided they are used for learning and teaching in higher education (HE). While debates around terminology are acknowledged, the review focuses on how comics and similar visual media can support educational practice.

While comics have long existed at the intersection of popular culture and education, their use as legitimate learning tools has followed a complex trajectory in English-speaking contexts. In early educational settings, such as Sunday schools and military training manuals, they were employed to convey moral messages or behavioural guidance (Hutchinson, 1949; Sones, 1944). More recently, comics and graphic novels have become established in primary and secondary education, where they are credited with enhancing engagement, reading comprehension and conceptual understanding (Bakis, 2014; Brozo *et al.*, 2013). They are particularly relevant in subjects such as science, language arts, art education, history and mathematics (Robin *et al.*, 2021; Weiner and Syma, 2013; Bakis, 2014; Brozo *et al.*, 2013; Burger, 2018; Kirtley *et al.*, 2020).

Despite their educational potential, the use of comics in formal learning has been contested. Concerns that comics might undermine traditional literacy or contribute to cultural decline led to their widespread exclusion from curricula in the mid-20th century (Pizzino, 2015). In recent decades, however, the academic study of comics has gained traction, supported by a growing body of scholarship, specialist journals and conferences. This revival has positioned comics not only as tools for entertainment or literacy development, but also as valuable resources for exploring abstract and academic themes, such as ethics, identity and social critique (Syma and Weiner, 2013; Kirtley *et al.*, 2020).

In today's HE landscape, lecturers and institutions face growing challenges in fostering motivation, participation and critical thinking among increasingly diverse student groups. Traditional lecture-based and text-centric methods are often perceived as less effective in sustaining engagement, underscoring the need for active, innovative and multimodal approaches to learning (Matsushita, 2018). The rising popularity of comics, especially among younger, media-literate students, offers fresh opportunities for their application in HE (Carter, 2017; Short and Reeves, 2009). Comics are now used to explore complex topics and humanise abstract ideas across various disciplines, including health sciences, economics, architecture and the social sciences (van der Sluis, 2021). Graphic medicine, which combines visual storytelling with healthcare communication, is gaining attention in medical education for its capacity to depict patient experiences, ethical dilemmas and clinical practice (Al-Jawad, 2015; McNicol, 2016). However, as van der Sluis (2021) argues, despite practitioner enthusiasm, claims about the impact of using comics in HE remain largely anecdotal, with limited empirical evidence supporting their effectiveness.

To provide some evidential substance to these claims, this scoping review aims to offer an overview of the use of comics in HE learning and teaching, drawing on published research that presents empirical evidence, whether quantitative or qualitative, of their effectiveness. The guiding research question is: Why and how have HE academics used comics and what have these practices achieved? In other words, the review explores the rationale for their use (why), the ways in which they have been applied (how), and the outcomes or impacts on student learning and engagement (what).

Methodology

A scoping review aims to map the existing research on a particular topic or research area, especially when the topic is broad or has not yet been extensively reviewed. This approach is particularly suited to exploratory research with open or understudied questions, where study designs and contexts may be diverse. It is more inclusive in terms of inclusion criteria, and places less emphasis on methodological rigour (Pham *et al.*, 2014). A scoping review is therefore appropriate for this study, enabling exploration of the relatively under-researched literature on the use of comics in HE teaching.

The review followed the first five stages of the methodological framework originally proposed by Arksey and O'Malley (2005). This framework was subsequently refined by Levac *et al.* (2010) and followed the PRISMA guidelines for reporting scoping reviews, as outlined by Tricco *et al.* (2018). The stages followed included: 1) identifying the research question(s); 2) identifying relevant studies; 3) selecting studies for inclusion; 4) charting the data; and 5) collating, summarising and reporting the results. The optional sixth stage, involving consultation, which is particularly relevant for reviews in the medical context, was not included in this study.

After formulating the research question (stage 1), efforts were made to identify relevant studies from different HE disciplines (stages 2 and 3). Figure 1 below presents a flowchart outlining the steps involved in the PRISMA selection process.

Identifying, searching and screening

Searching the Google Scholar database, and also ResearchGate, ensured inclusion of a wide range of sources; both give access to academic publications across multiple disciplines, including peer-reviewed articles, conference papers and other grey literature – especially relevant in an emerging area such as HE's use of comics. Screening of the first ten pages of each database applied the same combination of Boolean keyword searches. Variants of the following keywords ensured appropriate context: 'teaching', 'learning' and 'higher education', together with such variations as 'HE', 'university', and 'college'. To guarantee sufficient scope, the search also included teaching approaches involving cartoons in a broad sense, using variants of the following keywords: 'comics', 'cartoons', 'manga' and 'graphic novels'.

The search targeted only articles published in English between 2000 and 2023. Of the 600 records screened across both databases, 448 were excluded after reviewing the titles and abstracts, as they were found to be out of context, out of scope, or outside the date range.

Accessing and eligibility

After screening, 152 articles were accessed, downloaded, and assigned an ID. To avoid duplication of records when searching different databases, the following details were collated in a spreadsheet: ID, author names, year of publication, title of publication and abstract.

To determine the eligibility of the downloaded articles, the introduction, methodology and conclusion of each article were read. The spreadsheet was extended to record whether or not the teaching approaches focused on learning and teaching in the context of HE. To ensure that an empirical evaluation – whether qualitative, quantitative, or mixed – had taken place, additional columns were added to document the number of participants involved in each study and the research approach adopted. As a result, seventy-seven records were excluded because they described teaching approaches outside HE. These articles focused on practices using comics in contexts such as teacher training or primary, secondary or further education. Articles exploring the use of comics or cartoons with general audiences, patients or clients, first- and second-language development, science literacy or outreach were also excluded.

A further fifty-seven articles were excluded because they did not include a qualitative or quantitative evaluation of the teaching approach or did not explicitly mention the number of participants involved in the evaluation. In line with the principles of a scoping review, the rigour of the research methods used was not considered an eligibility criterion; nor was peer review, which would have excluded, for example, conference papers (Pham *et al.*, 2014). These aspects are not discussed in the findings below.

The remaining eighteen articles met the inclusion criteria, were considered eligible and are summarised in table 1. These articles are summarised and reported in the results section.

Inclusion and analysis

In the final two stages (4 and 5), the eighteen articles were included and analysed in detail. The articles were coded and analysed thematically according to the research questions outlined above (Clarke and Braun, 2013; Savin-Baden and Major, 2013). The findings are presented and discussed in the following sections, which are organised according to the research questions. A summary of the findings is then provided in the conclusion section.

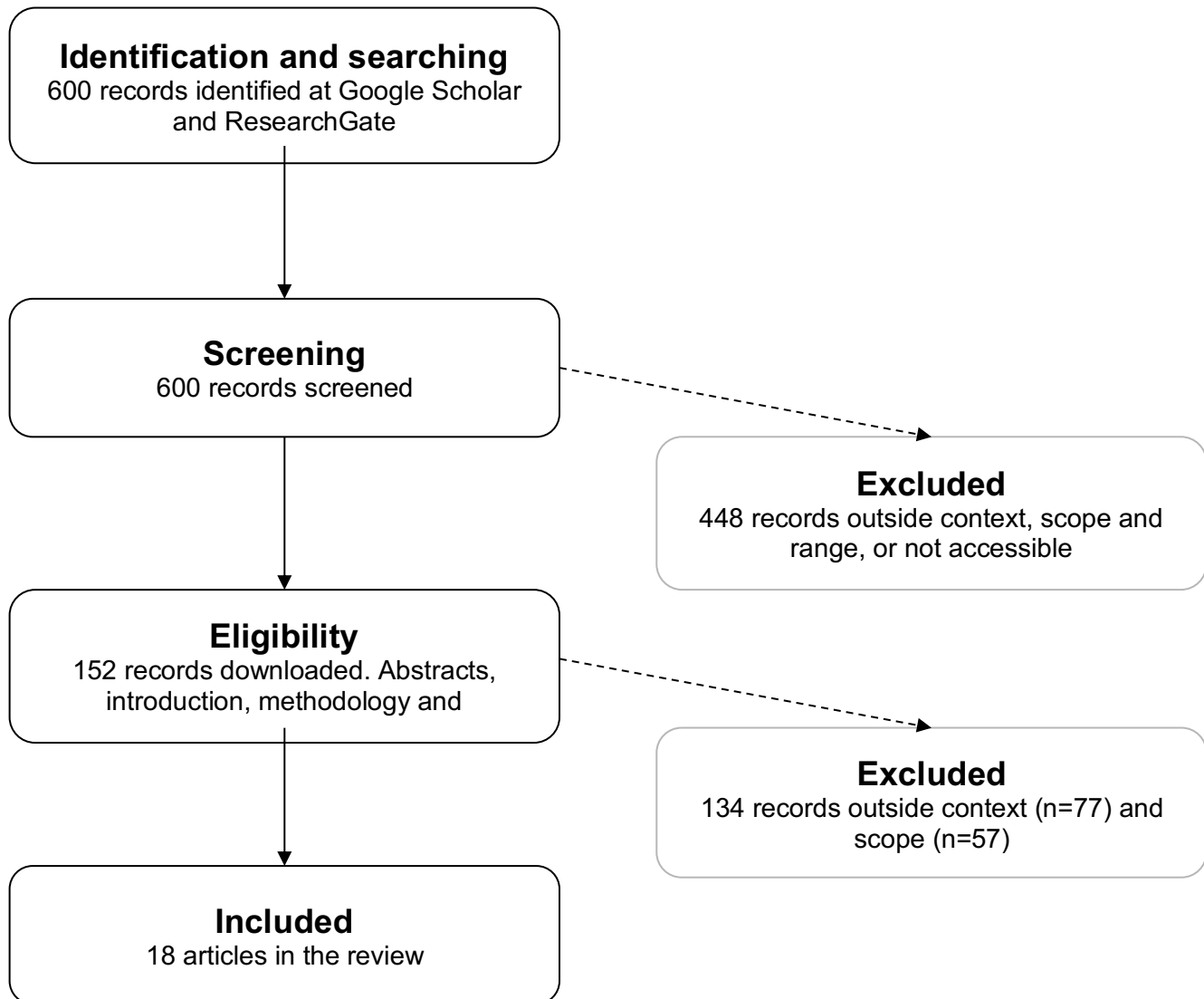


Figure 1. The PRISMA flowchart for selecting articles for the scoping review.

Findings

The research question was: "Why and how have academics used comics in HE, and what have these practices achieved?" To answer this question, the review included eighteen articles. This section summarises the educational practices in more detail. Table 1 provides an overview of all eighteen included papers, each briefly summarising the subject area, the country, research approach, number of participants and level of study, as well as a brief description of the main findings in each study.

Table 1 shows that comics, cartoons, graphic novels or manga have been meaningfully integrated into different HE subjects, such as design studies (Wang *et al.*, 2019), business education (Fischbach and Conner, 2016), psychology (Aleixo and Sumner, 2017), health sciences and medical education (Finbråten *et al.*, 2022; Shin *et al.*, 2013), biology and chemistry education (Hosler and Boomer, 2007; Kumasaki *et al.*, 2018), and computer science (Zaibon *et al.*, 2018). The majority of studies (n = 14)

applied comics in undergraduate settings, followed by postgraduate studies ($n = 3$), while one study could not be classified. Furthermore, almost half of the reviewed articles, specifically eight out of eighteen, highlight the use of comics in non-English contexts, including regions such as Europe (Finbråten *et al.*, 2022; Racamora-Perez *et al.*, 2016), Asia (Junhasavasdikul *et al.*, 2017; Kumasaki *et al.*, 2018; Shin *et al.*, 2013; Zaibon *et al.*, 2018), South America (Nuñez *et al.*, 2018) or the explicit appreciation of South Asian comics for educational purposes in English-speaking countries (Bose and Baugus, 2020).

Nr	Author(s)	Year	Subject area	Country	Research Approach	Participants	Level of Studies	Main findings
1	Aitken, A. and Hatt, G.,	2012	Business Education, Information Systems	Australia	Quantitative	n≈1000	Undergraduate	Graphic novels increased student satisfaction and engagement
2	Aleixo, P.A. and Sumner, K.	2017	Psychology	United Kingdom	Quantitative	n=90	Undergraduate	Comic books improved memory for biopsychology material
3	Bose, F. and Baugus, B.	2020	Economics	United States	Mixed Methods	n=37	Undergraduate	Comics increased interest and understanding in economics
4	Finbråten, H.S., Grønlien, H.K., Pettersen, K.S., Foss, C. and Guttorsrud, Ø.	2022	Health Sciences Education, Nursing	Norway	Mixed Methods	n=343	Undergraduate	Concept cartoons improved anatomy and physiology understanding and exam preparation
5	Fischbach, S. and Conner, S.L.	2016	Business Education	United States and United Arab Emirates	Quantitative	n=312	Undergraduate	Graphic novels enhanced empathy, mentalising and ethical decision-making
6	Giese, R.W.	2020	Biochemistry	United States	Qualitative	n=105	Undergraduate	Student-created cartoons improved engagement and creativity in biochemistry
7	Green, M.J.	2015	Medical Education	United States	Qualitative	n=58	Postgraduate	Discusses comics' utility in medical education and the humanities
8	Hosler, J. and Boomer, K.B.	2007	Biology	United States	Quantitative	n=75	Undergraduate	Science comic books effectively conveyed biology and improved attitudes
9	Joshi, A., Hillwig-Garcia, J., Joshi, M., Lehman, E., Khan, A., Llorente, A. and Haidet, P.	2019	Medical Education, Psychiatry	United States	Mixed Methods	n=113	Postgraduate	Comics improved medical students' understanding and clerkship transition

10	Junhasavasdikul, D., Sukhato, K., Srisangkaew, S., Theera-Ampornpunt, N., Anothaisintawee, T. and Dellow, A	2017	Medical Education	Thailand	Quantitative	n=79	Undergraduate	Cartoon handouts led to higher post-learning test scores
11	Kumasaki, M., Shoji, T., Wu, T.C., Soontarapa, K., Arai, M., Mizutani, T., Okada, K., Shimizu, Y. and Sugano, Y.	2018	Chemistry Education	Japan, Taiwan, and Thailand	Quantitative	n=141	Undergraduate	Manga effectively taught chemical safety and hazard identification
12	Núñez, M.T.E., Medina, A.M. and Cubides, J.E.O.	2018	Political education	Colombia	Qualitative	n=10	Undergraduate	Enhancing critical thinking through task-based political cartoon analysis.
13	Rocamora-Pérez, P., López-Liria, R., Aguilar-Parra, J.M., Padilla-Góngora, D., del Pilar Díaz-López, M. and Vargas-Muñoz, M.E.	2016	Health Sciences Education, Physiotherapy	Spain	Qualitative	n=63	Undergraduate	Graphic novels promoted engagement, empathy and patient understanding
14	Shin, D.S., Kim, D.H., Park, J.S., Jang, H.G. and Chung, M.S.	2013	Medical Education, Anatomy	South Korea	Quantitative	n=93	Postgraduate	Anatomy comic strips improved grades and communication skills
15	Short, J.C., Randolph-Seng, B. and McKenny, A.F.	2013	Business Education	United States	Quantitative	n=253	Undergraduate	Graphic novels enhanced learning experiences and verbatim recognition
16	Wang, Z., Dingwall, H., and Bach, B.	2019	Design Studies, Data visualisation	United Kingdom	Qualitative	n=23	Unspecified	Data comic workshops provided insights into data storytelling challenges

17	Wayne, C.R., Kaller, M.D., Wischusen, W.E. and Maruska, K.P.	2023	Biology, Science Literacy	United States	Quantitative	n=353	Undergraduate	Science comic books equalled or exceeded texts for learning and engagement
18	Zaibon, S.B., Azman, F.N. and Shiratuddin, N.	2018	Computer Science	Malaysia	Quantitative	n=87	Undergraduate	Digital educational comics improved web programming performance

Table 1. Articles included in the review

Rationale for using comics: engagement, communication and broadened perspectives

Comics have been used primarily for two related purposes: (1) to communicate academic content in an engaging and accessible way, thereby activating, broadening, and deepening students' understanding and thinking; and (2) to challenge students' perspectives, address misconceptions, and promote active learning through reflection and dialogue. For example, concept cartoons have been shown to be effective in developing understanding and clarifying misconceptions (Finbråten *et al.*, 2022), while the creation of comics as summary assignments or active learning artefacts has been introduced as an innovative way to promote engagement with course material (Giese, 2020; Wang *et al.*, 2019; Zaibon *et al.*, 2018).

Comics have also provided prompts for online discussion boards and essay assignments, so fostering creativity, increasing engagement and broadening intercultural perspectives (Bose and Baugus, 2020). Whether as a tool for reading or production, they uniquely illustrate lived experiences of clinical practice, socio-political realities and ethical dimensions of professional practice, making abstract concepts more relatable. This approach helps to broaden students' horizons, stimulate critical thinking and reflection, develop interpersonal and communication skills and foster empathy (Fischbach and Conner, 2016; Green, 2015; Nuñez *et al.*, 2018; Rocamora-Perez *et al.*, 2016).

In addition to theoretical considerations, authors often link the rationale for using comics to their commercial success, popularity and familiarity, particularly among younger audiences. They argue that visual media, such as comics, can communicate information effectively and engagingly in different contexts. Furthermore, comics are increasingly seen as more than just entertainment: their growing recognition provides a compelling argument for their integration into HE (Aitken and Hatt, 2012; Bose and Baugus, 2020; Fischbach and Conner, 2016; Green, 2015; Junhasavasdikul *et al.*, 2017; Short *et al.*, 2013). This rationale is particularly cited by those who advocate the replacement by comics of traditional learning resources, such as textbooks, which are perceived as less appealing to younger generations of students. In contrast, comics are considered to be more engaging, making learning materials more accessible and enjoyable (Aitken and Hatt, 2012; Aleixo and Sumner, 2017; Joshi *et al.*, 2019; Hosler and Boomer, 2007; Junhasavasdikul *et al.*, 2017; Short *et al.*, 2013; Wayne *et al.*, 2023), although, as discussed below, these assumptions require further evaluation.

Applications of comics in HE: educational resources and active learning approaches

Within HE, comics have found diverse applications, falling into two intersecting categories: comics as educational resources to facilitate learning; comics as a means of active learning through activities, assignments or assessments. As a visual medium format conveying information and narrative, academics have used comics to enhance, supplement or replace traditional learning materials. For example, comics specifically designed as an educational resource have been employed as alternative handouts to support student self-study of core course content (Junhasavasdikul *et al.*, 2017) or as resources to clarify lecture topics, present subject knowledge or outline case studies (Aitken and Hatt, 2012; Shin *et al.*, 2013). Specially designed comics or manga have served as pre-reading or induction materials to prepare students for clinical practice (Joshi *et al.*, 2019) or as guides on health and safety before laboratory sessions (Kumasaki *et al.*, 2018). Summaries from comic-illustrated textbooks have replaced existing learning resources to explain key concepts within a discipline (Aleixo and Sumner,

2017). Comic book summaries have also been introduced as alternatives to traditional academic texts, such as journal articles (Wayne *et al.*, 2023). Furthermore, commercially available non-fiction graphic novels have been used as alternative or primary textbooks, replacing traditional academic texts (Hosler and Boomer, 2007; Short *et al.*, 2013).

Beyond conveying information and narratives, comics have been used in a variety of ways to foster active learning – an approach that engages students through participation, discussion, problem-solving and reflection. Academics have deployed comics, for instance, as prompts for online discussions (Bose and Baugus, 2020). Commercially available graphic novels have illustrated aspects of clinical practice, the experiences of patients and practitioners and the broader social and economic contexts of professional practice; they have served as prompts for discussion and reflection (Green, 2015; Rocamora-Perez *et al.*, 2016). Political cartoons have been employed to illustrate complex realities, providing a prompt for dialogues on socio-political issues and as initiators for workshop activities (Nuñez *et al.*, 2018).

In addition to their use in guided activities, comics supported self-directed learning, assignments and formative assessments. Comics initiated short essay assignments (Bose and Baugus, 2020) and comic summary assignments (Giese, 2020); comics illustrating course content served as a formative tool to prepare students for upcoming assessments (Shin *et al.*, 2013).

Students created cartoons as a classroom activity or assignment. For instance, starting as an in-class activity and then as homework to complete, students created comics illustrating aspects of the course content and their learning experience with the material (Zaibon *et al.*, 2018). In addition to reading and discussing graphic novels and political cartoons, students drew comics to illustrate their professional experience or their individual social and political circumstances (Green, 2015; Nuñez *et al.*, 2018). Moreover, students summarised journal articles in the form of a cartoon (Giese, 2020) or created data comics (comics constructed from data-driven visualisations) during a workshop on data visualisation and storytelling techniques, based on a subject and dataset of their choice (Wang *et al.*, 2019).

Tools for creating and distributing educational comics

The comics used by academics were either: developed individually (Wayne *et al.*, 2023; Shin *et al.*, 2013), as a multidisciplinary group with different specialisms and backgrounds (Aitken and Hatt, 2012; Kumasaki *et al.*, 2018), using existing commercially available comics or graphic novels (Bose and Baugus, 2020; Green, 2015); or: produced by students as a result of activities or assignments (Wang *et al.*, 2019).

The authors employed a variety of tools to distribute and create comics, but most provided little practical detail. To disseminate comics, graphic novels or manga as learning resources, they chose traditional printouts (Shin *et al.*, 2013), the portable document format (PDF) for direct sending or uploading to virtual learning environments (Aitken and Hatt, 2012), dedicated mobile applications (Joshi *et al.*, 2019) and homepages or social media platforms (Shin *et al.*, 2013).

Some papers provided information on the creation of educational comics. Junhasavasdikul *et al.* (2017) drew by hand and used Adobe Photoshop CC for the colouring after scanning the cartoons. Aitken and Hatt (2012) describe the use of specialised software such as Comic Life to create graphic novels, while Zaibon *et al.* (2018) report that students were tasked with creating comics using the now obsolete

BitStrips online authoring tool. In classroom or workshop settings, students worked with a variety of drawing materials, including coloured pencils, and digital tools such as RAWgraphics, an online data visualisation tool (Wang *et al.*, 2019), as well as, where permitted, templates or online images (Giese, 2020).

Guidance and training for using and creating comics in HE

Several authors have discussed guidance provided to students regarding the use or creation of comics in educational settings. They explain the utilisation of comics as educational tools; for instance, as handouts or introductions to clinical practice to enhance learning (Junhasavasdikul *et al.*, 2017; Joshi *et al.*, 2019) and describe their use of comics and graphic novels to promote active learning, such as by facilitating class discussions (Rocamora-Perez *et al.*, 2016; Short *et al.*, 2013). However, the majority of the papers do not explicitly mention the specific training methods employed to deepen students' comprehension of visual media or how to employ them effectively for their learning.

A few sources offer insights into the guidance given to students for activities involving comic creation. Giese (2020) underscores the significance of aligning comic-based activities with learning objectives, providing students with clear assessment criteria and offering detailed instructions for summarising articles visually. These instructions include techniques for writing summaries, creating speech balloons for the comics and focusing the summaries effectively. Zaibon *et al.* (2018) detail the process in which students were provided with instructions and templates, alongside the use of an online authoring tool, to facilitate the creation of their own comics, ensuring a structured approach to organising and presenting their grasp of course concepts. In a workshop context, Wang *et al.* (2019) emphasise the critical balance between offering structured guidance and constructive feedback on students' artwork, and fostering creativity to enrich the learning experience.

Outcomes of using comics in HE: learning, engagement and skill development

The integration of comics has been shown to have a number of positive outcomes, which, in line with the findings above, may be grouped thematically into: stimulating deeper understanding and retention; increasing engagement and motivation with course content; stimulating reflection and critical thinking; and the development of professional and academic skills.

Using comics, graphic novels or cartoon-style handouts to present subject knowledge – whether these serve as an accompaniment, a supplement or a central learning resource – has been found to enhance the accessibility of educational materials. These visually rich media are shown to be at least as effective as traditional text-based resources in conveying information and may even surpass traditional methods in improving comprehension and retention of the material (Aleixo and Sumner, 2017; Junhasavasdikul *et al.*, 2017; Short *et al.*, 2013; Wayne *et al.*, 2023). Presenting or summarising course content (either in the form of comics, concept cartoons or self-drawn reflective comics) facilitates reflection on and understanding of complex topics from different perspectives aids learning of scientific terms and leads to better academic outcomes (Finbråten *et al.*, 2022; Shin *et al.*, 2013; Zaibon *et al.*, 2018), improved understanding and a smoother transition to clinical practice (Joshi *et al.*, 2019). Resources in manga

format have raised student awareness of potential health and safety issues in the laboratory environment (Kumasaki *et al.*, 2018). In addition to improving understanding and retention, comics have contributed to an increase in: student engagement (Bose and Baugus, 2020; Giese, 2020); student motivation to engage with and take interest in subject knowledge (Short *et al.*, 2013); student satisfaction with course content (Aitken and Hatt, 2012); and student interest in and positivity towards science (Hosler and Boomer, 2007; Wayne *et al.*, 2023).

The findings also suggest that comics are effective in developing academic and professional skills. Graphic novels used to broaden students' understanding, as well as to stimulate critical thinking, introspection, and reflection, have been shown to develop empathy, deepen awareness of patients' and clients' lived experiences, and improve interpersonal mentalising and communication skills (Fischbach and Conner, 2016; Green, 2015; Rocamora-Perez *et al.*, 2016). Enhancement of students' understanding of, for example, intercultural perspectives or social and political realities has also been observed (Bose and Baugus, 2020), as well as improved critical thinking and problem-solving skills (Nuñez *et al.*, 2018). Creating data comics activities has improved data literacy, critical thinking and storytelling, as well as improving students' analytical skills (Wang *et al.*, 2019).

Theoretical foundations and conceptual gaps in the use of comics

In the discussion of their findings, authors emphasise the benefits of using comics for conveying complex information engagingly and accessibly, enhancing motivation and stimulating critical thinking. The effectiveness of comics, which integrate images and text, is attributed to dual coding theory, which argues that combining visual and verbal explanations boosts cognitive processing and comprehension. This theory suggests that comics can improve comprehension and retention by engaging both visual and verbal channels (Aleixo and Sumner, 2017; Hosler and Boomer, 2007; Junhasavasdikul *et al.*, 2017; Kumasaki *et al.*, 2018). Additionally, the value of narrative-based learning is highlighted, indicating that humans are predisposed to learning more effectively through stories. Comics, with their inherent narrative structure, may thus facilitate learning by making abstract concepts more relatable (Short *et al.*, 2013; Wayne *et al.*, 2023).

Authors also refer to educational principles or learning theories to frame their discussions, such as Bloom's taxonomy for critical thinking skills (Nuñez *et al.*, 2018), active learning (Finbråten *et al.*, 2022) and a constructivist learning perspective, which posits that learners construct understanding through engagement with prior knowledge and through social interaction (Finbråten *et al.*, 2022; Nuñez *et al.*, 2018). Despite these references, there is a noticeable lack of detailed conceptualisation of the findings related to these theories and many authors do not explicitly discuss their use and findings within a theoretical or educational framework.

Limitations and discussion

This review examines articles published in English that demonstrate the use of comics in HE and include an empirical evaluation. While the representativeness of a scoping review requires careful consideration (Pham *et al.*, 2014), nearly half of the articles included in this study explore the use of comics in non-

English contexts, such as Europe, Asia, and South America. This highlights the cross-cultural application, appeal and relevance of comics in HE globally (Gerde and Foster, 2008; Petersen, 2011; Meskin *et al.*, 2017). As noted in the introduction, visual media are referred to by different terms, depending on the language and geographical region (Gerde and Foster, 2008). The findings should be interpreted within the context of literature in the English language and may omit insights specific to other linguistic or cultural traditions.

An important consideration is how contextual and cultural factors influence the use of comics in HE across countries. While this review highlights their global appeal, integration is shaped by national educational systems, cultural perceptions and pedagogical traditions. In East Asian contexts, such as Japan and South Korea, manga is an established and respected format, which may make its use in fields such as chemistry (Kumasaki *et al.*, 2018) and medical education (Shin *et al.*, 2013) more readily accepted by students. By contrast, in some English-speaking contexts, where comics are often associated with leisure or childhood, their use may face scepticism or require more justification. These differences highlight the importance of considering local educational and cultural settings, which affect both student reception and academic adoption. Future research could adopt comparative approaches to examine how cultural familiarity, media norms and institutional contexts shape educational practices and learning outcomes, related to comics.

Furthermore, this review specifically addresses the use of comics in HE and excludes their use in primary and secondary education (Clark, 2017; Wallner and Barajas, 2020), teacher training (van Wyk, 2011; von Reumont and Budke, 2021) or outreach initiatives (Kim *et al.*, 2012). Similarly, it does not cover the use of comics in language teaching or literacy development, which spans different educational domains (Burger, 2018). Future syntheses in these areas may uncover additional applications and benefits that academics could draw upon.

Many of the papers reviewed describe the creation of comic resources and assignments by academics or students. However, few authors have used specialised tools or technologies (Zaibon *et al.*, 2018) that could support users with limited experience in creating more sophisticated comics (Tanaka *et al.*, 2018). While low-tech approaches – such as hand-drawn comics with or without templates – have been highlighted as affordable and sustainable options for supporting students and lowering barriers to participation (Fradkin, 2018; Kim *et al.*, 2017), advances in generative artificial intelligence (GenAI) might offer new opportunities. GenAI tools, such as specialised text-to-image generators, could facilitate the creation of multimodal resources (Kukulska-Hulme *et al.*, 2024). These tools could allow users to create comics from prompts or scripts, reducing the barriers to participation. Investigating how GenAI tools can be effectively integrated into comic creation, while maintaining pedagogical soundness and accessibility, will be an important direction for future research.

One significant challenge in using comics as a learning activity might be the lack of guidance provided to students. When comics are used as a learning activity, students may struggle with selecting appropriate formats, visualising content and creating narratives (Kim *et al.*, 2017; Wang *et al.*, 2019). Few of the studies reviewed here address what might be termed 'comics literacy', or the ability to interpret, analyse and create meaning from visual media. Providing students with an understanding of the core principles of comics – such as storyboarding, framing, transitions and the historical context of comics – could be highly beneficial for activities involving comics' creation. While such guidance is available in handbooks

for other educational sectors (Bakis, 2014; Brozo *et al.*, 2013; Burger, 2018; Kirtley *et al.*, 2020; Syma and Weiner, 2013), there is a further need for resources that can support students and academics in the effective use of comics for learning and teaching purposes in HE.

While some authors referenced educational principles and/or theory, there is a notable gap in discussing findings within broader conceptual frameworks. Additionally, the rationale for using comics in HE often relies on assumed benefits rather than a critical evaluation. These assumptions are related to factors such as: the reading habits of contemporary learners; the affinity of non-traditional students for visual media; and the capacity of comics to make materials more accessible, engaging and enjoyable (Aitken and Hatt, 2012; Finbråten *et al.*, 2022; Hosler and Boomer, 2007; Junhasavasdikul *et al.*, 2017; Zaibon *et al.*, 2018). While these assumptions are often supported by findings, such as those by Finbråten *et al.* (2022), who reported no significant differences in the benefits of concept cartoons across gender, age or entry qualifications, and by Junhasavasdikul *et al.* (2017), who found that cartoon-style handouts were particularly beneficial for students with middle and lower grade point averages (GPAs), more research is needed. Future work could investigate the characteristics of visual media and perceptions among different groups, such as by age, gender, previous academic achievement, and sociocultural background. It could also examine the educational value of comics compared to traditional academic texts and established teaching methods (Aitken and Hatt, 2012; Gerde and Foster, 2008). Such efforts would contribute to a more nuanced understanding of the potential benefits of comics for diverse learners in HE.

Conclusion

This scoping review analysed eighteen articles published between 2000 and 2023, indexed in Google Scholar and ResearchGate, to explore why and how comics, cartoons, graphic novels and manga have been used for learning and teaching in HE and to understand the outcomes of these practices. The findings demonstrate the multifaceted application of comics across a wide range of subjects, including design studies, business education, psychology, health sciences, biology, chemistry and computer science. They highlight the cross-cultural value of comics, with nearly half of the studies based in non-English-speaking countries across Europe, Asia and South America.

Academics have employed comics in two main ways: as educational resources to simplify complex information and enhance understanding and retention and as active learning tools to engage students through assignments, discussions and formative assessments. By presenting course content in a visually appealing and accessible format, comics make learning more engaging and enjoyable compared to traditional text-based materials. Their use encourages critical reflection, challenges perspectives and supports the development of academic and professional skills.

The findings of this review underscore the significant potential of comics as a versatile HE tool. By enhancing comprehension, engagement and motivation, comics may help students achieve better academic outcomes. Beyond these benefits, their integration into educational activities promotes critical thinking, reflection and the development of professional capabilities. Comics also offer a unique means of fostering empathy, broadening intercultural and political perspectives and strengthening

communication and problem-solving abilities, making them a powerful medium for preparing students to navigate complex academic and professional landscapes.

This review highlights the value of comics for educators, particularly in supporting more inclusive teaching practices. Their multimodal format makes complex or abstract content more approachable (especially for students with limited subject-specific knowledge), international learners and those less engaged by conventional materials. Comics can introduce sensitive, ethical, or culturally situated topics into the curriculum and their creation or analysis can foster voice, identity, creativity and agency.

Finally, the review identifies clear areas for further research. There is a need for more robust theoretical frameworks, as well as the development of 'comics literacy', which refers to resources and guidance that support the effective use of comics in academic settings. Addressing these gaps will lead to a deeper understanding of how comics can support learning and teaching. This review ultimately advocates for their wider adoption and continued exploration as a dynamic, inclusive and powerful medium for enhancing education within HE.

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