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Conceptions of visual literacy in school-age education: a systematic review

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ABSTRACT

This systematic review examined conceptions of visual literacy in school-age education (ages 4–18). Drawing on 34 empirical studies across 21 countries, it found that while empirical studies reflect current research and highlight emerging frameworks; the application and assessment of visual literacy within school-age education remain conceptually fragmented. The review maps these differences across three overlapping strands: 1) visual literacy as interpretation/understanding of visuals, 2) visual literacy as creation/communication through visuals and 3) visual literacy as critical practice (e.g. critique of visual culture, power, ideology). By applying this analysis, we suggest that visual literacy in this context is yet to become a unified construct. Instead, it functions on multiple levels, is highly context dependent, and is shaped by educational phases, subject disciplines and epistemological traditions. These differences include diversity of application, methodological variation and a lack of a widely adopted theoretically comprehensive, developmentally sequenced and cross-contextually validated measure of visual literacy for school-age learners. Future research that understands these complexities and limitations is therefore required to advance the critical development of visual literacy within school-age education.

KEYWORDS

Visual literacy; education; schools; teaching and learning; multi-literacies; visual cognition; art and design

Introduction

Contemporary society is saturated with visual images; therefore, visual literacy, i.e. the ability to critically read, interpret and create visual content is central to the educational development of young people. However, school-age, education-specific conceptions of visual literacy remain under-theorized, and there is still no clearly agreed-upon operational definition of visual literacy (Brumberger, 2019). The term *visual literacy* is often attributed to John Debes' seminal paper, *The Loom of Visual Literacy*, presented at the first National Conference on Visual Literacy in Rochester,

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New York (Debes, 1969). However, scholars highlight that the use of visual images as tools for teaching, learning and language development, can be traced back as far as ancient philosophy (Pettersson, 1994; Velders, 2000).

Debes conceptualized visual literacy as a set of vision-based competencies developed through seeing, while also integrating other sensory experiences. These competencies, he argued, enable individuals to communicate creatively with others. However, as Velders (2000) notes, effective communication depends on mutually agreed-upon competencies. Therefore, a clear understanding of what these competencies are, and how they function is essential for a more precise conceptualization of this construct. More recent definitions include that of the Association of College and Research Libraries (ACRL) (2011) who describe visual literacy as 'a set of abilities that enables an individual to effectively find, interpret, evaluate, use and create images and visual media'. They suggest that these skills enable individuals to effectively engage with the 'contextual, cultural, ethical, aesthetic, intellectual and technical components involved in the production and use of visual materials' (The Association of College & Research Libraries, 2011).

Significant contributions include the work of Maria Avgerinou (2007, p. 46) who situates visual literacy within the context of 'human, intentional visual communication', whereby visual literacy is defined as a 'group of largely acquired abilities, i.e. the abilities to understand (read), and to use (write) images, as well as to think and learn in terms of images'. Avgerinou's body of work draws on earlier scholarship, including Seels (1994) who organizes visual literacy around three key terms: visual thinking (visualization, mental models and metaphorical thought), visual learning (learning through visuals while combining prior knowledge and experiences), and visual communication (using visuals to express ideas). These terms are often cited in the literature and make up three of the five components suggested by Avgerinou and Pettersson (2011) required to establish a theory of visual literacy, combining visual thinking, visual learning, and visual communication with visual language and visual perception. These integrated components rest on the premise that a visual language exists, that visual language parallels verbal language, and that it can be both taught, learnt about and developed across time.

Building on the above, the most contemporary educational conceptualization is provided by the Common European Framework of Reference for Visual Literacy (CEFR-VL) (Wagner & Schönau, 2016) and its subsequent update, the Common European Framework of Reference for Visual Literacy Competencies (CEFR-VC) (Schönau et al., 2020). Developed to support the foundations of curricula and assessment, the CEFR-VC extends the earlier framework by more explicitly outlining competencies within education, particularly within the domains of production (creating and using images) and reception (responding to images). These competencies and domains are designed to support visual literacy in schools and have been used by researchers to underpin measurement tools and to develop curricula (Granville, 2022; Groenendijk et al., 2020). While the literature spans visual literacy as a construct, discipline, competency framework and as a pedagogical practice; this review aligns with Seels (1994, p. 102) who suggests that there is no field or profession of visual literacy due to the 'practice of visual literacy tak[ing] place in other professions' and therefore situates visual literacy as a theoretical construct to be operationalized within disciplines. Avgerinou and

Ericson (1997, p. 281) argued that the concept of visual literacy is a potentially 'powerful weapon' for understanding the world in an age of visual mass media. However, they also pointed out that there had been little consensus at the time in various disciplinary conceptualizations of visual literacy. Three decades later the task of understanding conceptualizations of visual literacy within education, both as a theoretical construct and as a way of understanding, defining and operationalizing visual literacy competencies within practices, remains an important and compelling task.

While the literature implies that visual literacy is inherently developmental, analysis of current research evidences a significant lack of empirical studies that explore visual literacy learning outcomes, instead privileging pedagogical case studies and conceptual or theoretical articles (Brumberger, 2019). Existing studies have largely focused on questions based in identifying visual literacy, pedagogical strategies, and practical and ethical concerns alongside explorations of how visual literacy intersects with public action and civic discourse (Brumberger, 2019, p. 175). They also signpost the need for robust evidence that continues to advance the field. Similarly, Thompson et al. (2022) identify key opportunities, challenges, and emerging trends and highlight that the creative (productive) dimension of visual literacy remains under-theorized. They suggest that this gap, together with ongoing advocacy, represents a critical opportunity for advancing the evidence-base of visual literacy.

What is clear from the evidence, however, is that visual literacy is not static and that it has and will continue to evolve in line with technological and cultural shifts across time. One recent perspective proposes *three waves of visual literacy* (Peña, 2025), with step changes coming in the advent of television (consumption), photography (creation) and digital environments (interaction). Arguably, we are now experiencing a fourth wave, driven by the rise of artificial intelligence and the rapid proliferation of images used to constantly engage young people in online content creation, consumption and in some cases misinformation and disinformation. The urgency for more precise conceptualizations of visual literacy is therefore intensified by the conditions under which young people now encounter and use visual media. Images function as a primary mode of communication across digital environments, where meaning is produced and circulated rapidly, often with limited contextual framing. Although children are immersed in visual media from an early age, familiarity does not equate to competence and students do not necessarily develop the ability to select, interpret, or contextualize images in informed and critical ways (Matusiak et al., 2019). This distinction is increasingly consequential in digital contexts, where visual content must be evaluated in relation to their source, intent and credibility. In this sense, visual literacy extends beyond interpretation and expression to include evaluative judgement, which is central to young people's capacity to navigate potentially misleading visual material and is reflected in recent policy emphasis on digital awareness and resilience (Department for Education, 2025a, 2025b; Hemsley & Snyder, 2018).

At the same time, visual literacy is increasingly recognized as a foundational, though under-theorized, component of broader literacy development (Bombara & Duan, 2024; Lopatovska et al., 2016). Children engage with visual information prior to and alongside texts, and continue to rely on visual modes for learning, communication and social interaction (Rideout, 2021). Emerging evidence suggests that these competencies may support wider outcomes, including reading development (Farrar et al., 2024).

However, despite its developmental significance, visual literacy remains conceptually fragmented across disciplines and inconsistently conceptualized within educational research. This lack of coherence limits both its pedagogical application and the extent to which research can evaluate its impact – particularly in understanding how children interpret and evaluate visual information. Clarifying this construct is therefore necessary to specify how visual literacy contributes to young people's critical engagement with visual culture. This creates a pressing need to understand the nature and extent of existing empirical evidence within school-age education, in order to identify gaps in the literature and to highlight how research design, assessment and application can shape an education-specific conceptualization of visual literacy.

Assessing visual literacy

A central issue in clarifying the construct of visual literacy is to explore how it is assessed. Assessment is tightly linked to the conceptualization of a construct: it is not simply a technical concern, but a defining element of how a construct is understood and interpreted (Kane, 2013). Within this broader domain, measurement refers more specifically to the instruments and procedures used to capture aspects of the construct. Where a construct is weakly or inconsistently conceptualized, its measurement becomes ambiguous, making it difficult to determine whether different studies are assessing the same phenomenon or producing comparable findings. This issue of weakly conceptualized measures has been recognized within visual literacy research, where the absence of clear operational definitions has been identified as a barrier to both investigation and assessment (Li & Potter, 2023). Without some degree of clarity and consistency in how visual literacy is assessed, it becomes difficult to determine how the construct can be developed, how it can be supported through educational interventions, and how it relates to wider learning outcomes. Examining how visual literacy is assessed provides an additional lens through which to understand how the construct is conceptualized across contexts.

Several attempts have been made to articulate visual literacy through structured frameworks, including works by Avgerinou (2007), which identifies core visual abilities, and the CEFR-VL (Wagner & Schönau, 2016), which organizes visual competencies across production and response domains. However, it is unclear how these frameworks have been widely operationalized into shared or standardized measurement instruments in the current literature. Visual literacy conceptions vary considerably, resulting in a wide range of corresponding and often weakly aligned assessment approaches. This variability, therefore, highlights the need for a systematic exploration of how visual literacy is assessed across educational contexts.

Current study

The primary aim of this review was to systematically map and critically examine *conceptions* of visual literacy within peer-reviewed literature relating to school-age education (ages 4–18). Conceptions can be understood as mental images, whereby a conception is the 'forming of an idea' in your mind of a specific phenomenon (HarperCollins, 2026). This includes the way in which people form ideas based on

their prior experiences, their current interactions and individual contexts. Here, in this review, these conceptions are articulated through written forms which demonstrate how these ideas are understood, applied and assessed. Understood in this way, it is likely that multiple conceptions exist; therefore, the review extends beyond Art and Design education to incorporate research from multiple subject areas in which visual literacy informs or supports teaching and learning practices. In doing so it sought to identify conceptions of visual literacy and to examine how these conceptions vary across disciplines. Through analysis of these studies, the review proposes a contemporary, education-specific conceptualization of visual literacy. Additionally, the inclusion criteria allowed for the examination of empirical studies, including those that use instruments or tools to assess visual literacy, thereby, enabling the analysis and categorization of current assessment methods. The following research questions reflect the above aims and are designed to be both descriptive and analytical.

RQ1. What empirical evidence exists regarding visual literacy and how can it be mapped to identify trends, gaps and future research opportunities?
RQ2. How is visual literacy conceptualized by researchers within the above literature?
RQ3. How is visual literacy operationalized across empirical studies, and what assessment approaches are used?

Methods

The review was conducted systematically following the PRISMA reporting and protocol standards (Page et al., 2021). The primary evidence source in this review was academic literature including qualitative or quantitative empirical evidence. Grey literature was excluded to maintain a focus on peer-reviewed academic literature and ensure consistency in methodological and reporting standards across included sources. All primary data were selected through a systematic process as set out below.

Information sources and search strategy

The search strategy was agreed by the research team and followed the PRESS Guidelines (McGowan et al., 2016), i.e. (1) Translation of the research question, (2) Boolean and proximity operator, (3) Subject headings (database-specific), (4) Text word search, (5) Spelling, syntax and line numbers and (6) Limits and filter. Following agreement, the strategy was deployed through an extensive search across the following three databases.

1. Scopus
2. EBSCO
3. Web of science

The electronic search took place in November 2025. The exact search terms are set out below, including the NOT operator which excluded commonly associated terms which are outside of the research phenomenon or age range of the study.

visual literacy* OR multi-modal literacy* OR multi-literacies* OR image literacy* OR visual cognition*

AND school* OR education* OR primary school* OR secondary school* OR high school* OR K-12 OR elementary school* OR junior school* OR college* OR 6th form* OR sixth form* OR alternative provision* OR special school* OR pupil referral unit* OR independent school* OR hospital school* OR prison education*

NOT 'visual acuity' OR ophthalmology* OR optometry OR retina* OR eye* OR blindness OR strabismus NOT 'university' OR 'higher education' OR 'undergraduate' OR 'tertiary' OR 'university' OR 'higher education' OR 'undergraduate' OR 'tertiary'

Additionally, the review limited inclusion to available full texts and articles which were published in English between 1 November 1995–1 November 2025. This timeframe reflects the modern era of visual literacy, i.e. post the invention of the World Wide Web and concurrent with seminal publications said to be era defining, e.g. *Visual Literacy: A Spectrum of Visual Learning* (Moore & Dwyer, 1994) and *A Pedagogy of Multiliteracies* (The New London Group, 1996).

Eligibility criteria

The initial search yielded 689 results. However, this search included additional terms beyond *visual literacy* to help the research team identify studies that, while potentially relevant, might fall outside the review's primary scope and to better understand how visual literacy was positioned within the broader literature. These additional terms included *multimodal literacy*, *multiliteracies*, *image literacy* and *visual cognition*. In the subsequent stage of the research, these terms were removed, and the search was refined to focus exclusively on the discrete term *visual literacy*, which was the central focus of the review. This decision shaped the final corpus of literature by excluding diffused conceptualizations which use proxy terms for visual literacy. By doing so the review provides precision to a conceptualization based on specific terminology while acknowledging that this excludes some articles from the wider literature. However, having reviewed the abstracts of excluded studies at stage one, there were no significant omissions of new educational disciplines except for some additional studies which span mathematics (e.g. using the term *visual maths literacy*).

The second stage, where the review focussed specifically on the term *visual literacy* yielded 262 articles, which following removal of duplicates resulted in 216 which were screened by the research team. This was primarily done by one reviewer with dual-reviewer screening limited to 40% of included abstracts. Inter-related agreement was not calculated; however, in cases where uncertainty or disagreement arose, queries were documented within a spreadsheet and reviewed by two additional members of the research team to support consistency and transparency. The articles were screened to meet the following criteria.

Population

Articles were included where the population included young people within school-age education, i.e. Age 4–18. No exclusion or inclusion criteria were set regarding individual characteristics, e.g. sex, gender, race, ethnicity, socio-economic status, sexuality, or special

educational needs. School level characteristics were also unlimited and therefore the review had the potential to include mainstream, independent, and specialist schools, alternative provision, and other settings such as hospital and prison education. Population was considered as contextual rather than individual; therefore, the review also allowed for the inclusion of relevant articles that assessed visual literacy within the curriculum.

Phenomenon

The second inclusion criterion was that visual literacy constituted the primary phenomenon under investigation. While it is understood that this term was likely to be used differently across the articles in the review, inclusion required visual literacy to be explicitly named and a central focus in the research.

Study type

All articles selected for full text review were required to include an empirical element, either through direct assessment of visual literacy or through the inclusion of visual literacy as part of an intervention which measured other variables.

Resulting full texts

Title and abstract screening resulted in 44 articles being retrieved for full text screening. Of these 10 further articles were excluded due to not being the exact phenomenon ($n = 6$), not empirical or empirically grounded ($n = 1$), out of scope, i.e. age range ($n = 2$) and not peer-reviewed article ($n = 1$). The subsequent articles ($n = 34$) represent the corpus of literature included in this review and the outcome of the screening process represented in Figure 1, PRISMA flow diagram (Page et al., 2021).

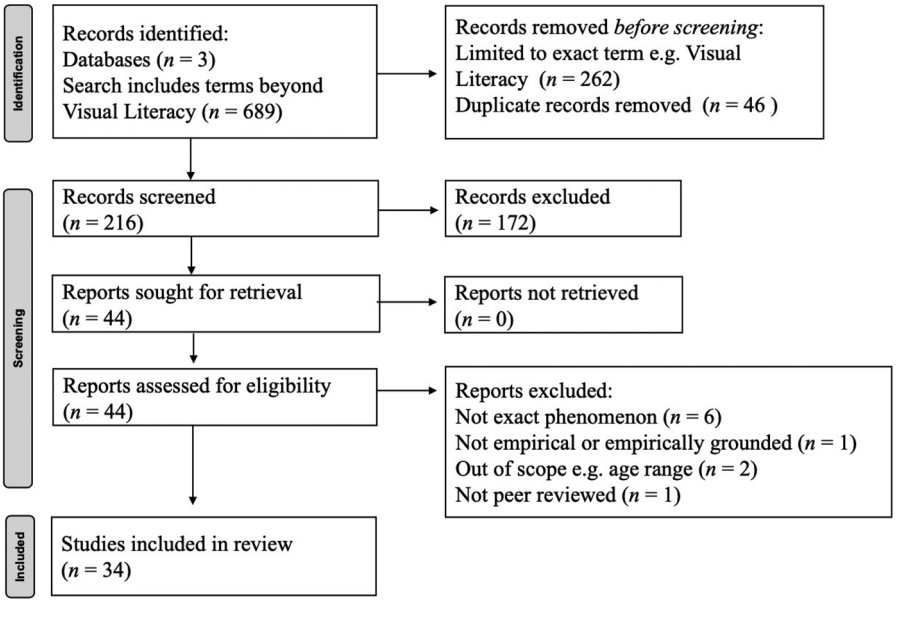


Figure 1. PRISMA flow diagram.

Data extraction

Data were extracted regarding context (country, school type, subject discipline), methodology (design, methods, population, sample size), assessment and measurement tools (scales, rubrics, psychometric tests) and outcomes (visual literacy as a dependent or independent variable, additional/alternative outcomes). Information was also recorded regarding the articles' overall aims and its use of the term visual literacy (descriptions, citations, definitions, interactions with existing frameworks).

While all studies represented empirical investigations, not all included discrete measurement or assessment approaches. If the purpose of the review had been solely to examine assessment tools, these studies may have been excluded. However, as the review aimed both to explore conceptualizations of visual literacy and to analyze current assessment approaches, studies with limited engagement in assessment were retained. This inclusive approach enabled a broader understanding of visual literacy within school-age education and allowed for cross-subject analysis. Assessment was therefore treated as a continuum across the data, ranging from qualitative practitioner reflections on visual literacy competencies, to its use as an intervention or independent variable, and, at the most discrete end of the continuum, to studies employing statistical instruments designed to directly measure visual literacy – mirroring contemporary reflections on measurement within the field of visual literacy (Li & Potter, 2023). Therefore, while the studies included in this review were identified through an agreed systematic search and selection process designed to address the research questions, they are not intended to provide a comprehensive representation of all empirical work published during the time-period. Instead, the resulting corpus reflects a continuum of measurement tools situated within a diverse range of studies offering varied conceptualizations of visual literacy across different subject areas.

A formal quality appraisal was not conducted, reflecting the review's desire to map conceptions of visual literacy, rather than to synthesize effects or evaluate interventions. Therefore, the included studies span a wide range of methodological and epistemological approaches, making a single appraisal framework inappropriate and potentially misleading (Dixon-Woods et al., 2006). Instead, we reported key methodological characteristics to support interpretation of the evidence, whereby systematic methodological strategies enabled the review to answer specific questions such as the findings that relate to assessment approaches and measurement tools.

Results

The results of this review are drawn from 34 studies, full details of which can be seen in the Appendix. This ensures transparency by presenting key characteristics of each study and enables comparison across dimensions such as sample size and methodological approach. While also serving as an organizing framework and evidential backbone for the review's analysis and conclusions.

Descriptive overview of included studies

The data in this study represents a diverse range of studies (34 studies; 21 countries) predominantly involving students as participants ($n = 31$) with ages ranging

from 4 to 18. Secondary aged studies (11–18 years; $n = 14$) were marginally more common than primary aged (4–11 years; $n = 12$). Five studies spanned both age ranges and three studies did not include students, instead examining examination and curriculum documents. Analysis of methodological approaches shows that 44% ($n = 15$) employed quantitative methods, while 44% ($n = 15$) used qualitative approaches and only 12% ($n = 4$) adopted mixed or multiple methods with examples including the combination of autoethnography and a psychometric test examining patterns, spatial visualization, visuospatial working memory and visual perception (Ramulumo, 2024).

Methodological variation was evident across subject areas and age groups. Studies relating to the arts were predominantly qualitative, whereas those concerned with science-based disciplines tended to favour quantitative approaches. These differences, not only demonstrate methodological variation, but can be interpreted as broader divergences in how disciplines conceptualize knowledge, suggesting underlying epistemological distinctions between the arts and the natural sciences whereby the latter perhaps tend to prioritize measurable precision over interpretation and therefore may adopt a more positivist approach. Similarly, studies that included younger students were more likely to adopt qualitative methods, whereas those with older participants reported methods that were more often quantitative.

Studies which employed mixed and multiple methods were in the minority, reflecting a significant limitation within the empirical data. This is highlighted here as it is understood that operational definitions of visual literacy which relate to both the encoding and decoding of visual images need to consider both quantitative and qualitative assessment techniques (Li & Potter, 2023) and therefore assessment will also require these attributes to enable valid and reliable measures of visual literacy across diverse educational domains. Moreover, empirical evidence within this review demonstrates small-to-medium sized samples, with a mean average sample size of ~158 participants. Studies were often limited to one individual school site and where multiple sites were reported the exact details relating to school level characteristics were not always present. These observations create further issues for those wishing to advance the evidence on visual literacy within school-age education as it is understood that schools represent significant cultural and socio-economic diversity and that evidence-informed practices are often drawn from a combination of large-scale research projects, smaller context-specific insights and locally developed practitioner inquiry.

Education-specific conceptualizations of visual literacy

This review provides an education-specific conceptualization; however, visual literacy in school-age education is not considered as a universal construct. Instead, it functions on multiple levels, is highly context dependent, and is shaped by educational phases, subject discipline expectations, and the epistemological traditions embedded within school-age education. These contextual factors influence the way in which visual literacy is conceptualized, highlighting that a construct is not solely articulated through individual competencies, but emerges through their interactions with disciplinary and educational contexts.

Conceptual synthesis

We analyzed the dataset of 34 studies through iterative close reading and multiple rounds of structured notetaking. Initial, inductive and deductive coding (using codes constructed from the data and drawn from the literature) was carried out by multiple reviewers. These codes were discussed at research meetings and checked through iterative reading of included studies. These discussions led to the generation of a broader set of candidate strands, including a provisional fourth strand capturing learner responses to interventions; however, this category occurred too infrequently and inconsistently to warrant retention. The final framework was therefore reduced to three strands based on frequency and conceptual coherence across studies. Importantly, these strands were not mutually exclusive at the level of individual studies. Several subject domains reflected multiple conceptualizations of visual literacy; for example, research situated within STEM education commonly combined interpretation and understanding with elements of creation and communication. The strands identified: visual literacy as interpretation/understanding; visual literacy as creation/communication; and visual literacy as critical practice offer a framework grounded in the prior research of Avgerinou and Pettersson (2011, 2020), Brumberger (2019), Thompson (2019) and Schönau et al. (2020) to explore how conceptualizations of visual literacy vary across subject areas. These strands were considered to reliably reflect the conceptualization of school-age visual literacy, due to sufficient frequency and conceptual coherence across the data set.

We constructed a Sankey diagram (a flow diagram in which the width of connections represents magnitude) in order to represent the distribution of visual literacy conceptualizations across school subjects. In the diagram, flows connect conceptualization categories to the respective domain, with link widths proportional to frequency. Where a single unit (e.g. Art and Design) exhibited multiple conceptualizations, its contribution was proportionally divided across the corresponding flows, such that total weight per unit was conserved.

Figure 2 highlights how the data in this review can be articulated through three key strands: 1) visual literacy as interpretation/understanding of visuals, 2) visual literacy as creation/communication through visuals and 3) visual literacy as critical practice (e.g. critique of visual culture, power, ideology). This distinction between interpretation, communication and critique reflects long-standing traditions in visual literacy such as Avgerinou's work on visual abilities, Avgerinou and Pettersson's theory of visual literacy, ACRL's find/interpret/evaluate/use/create framing and the CEFR-VL (and subsequent CEFR-VC) distinction between production and reception. However, this education-specific conceptualization extends these ideas by showing how they appear unevenly, inconsistently and developmentally across school-age empirical research. Therefore, the strands in this article should be read as applied manifestations of the theoretical architecture articulated here through engagement with the study characteristics and existing literature, such as Avgerinou and Pettersson's theory of visual literacy (Avgerinou & Pettersson, 2011, 2020).

The first strand demonstrates the most universal set of competencies, i.e. the ability to interpret and understand visuals through observations, inference and analysis. This represents the widest conceptualization across subjects. All studies drew on this interpretive conceptualization of visual literacy in one way or another, reinforcing the

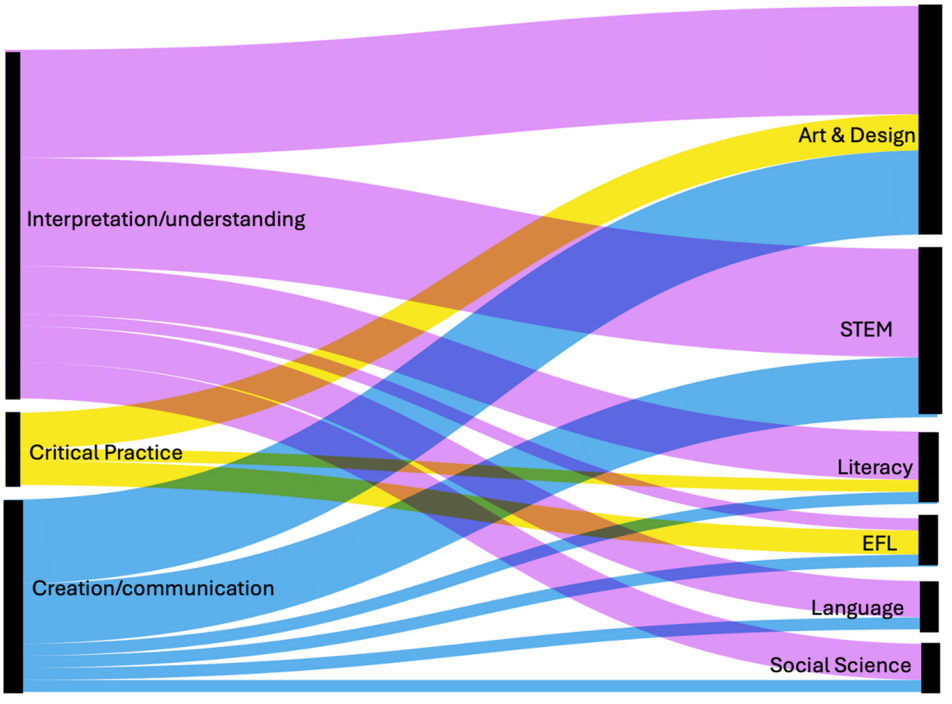


Figure 2. Conceptualization by school subject.

notion of visual literacy as a group of competencies that are used to interpret visual encounters. Within the data these skills were often used as guides to develop other cognitive abilities, such as English comprehension (Golding & Verrier, 2021; Níkleva & Rodríguez-Muñoz, 2022) and creative writing (Falk & Pellegrino, 2021; Franco & Unrath, 2015). However, they were also considered as cognitive attributes in themselves, which could be developed and assessed (Al Ashran, 2024), albeit often in relation to other developmental assessments such as academic achievement (Demirezer & İlkörücü, 2024). This strand reinforces the idea that visual literacy can be conceptualized through competencies or abilities (Avgerinou, 2007) and that these abilities require the fundamental condition of visual perception; a position which echoes previous theoretical conceptualizations (Avgerinou & Pettersson, 2011, 2020). This conceptualization also reflects the receptive domain within the CEFR-VL (and subsequent CEFR-VC), while reinforcing the notion of visual thinking. Here studies demonstrated how students were not merely perceiving images but using visuals to support reasoning, comprehension, inference and cognition. In this way this strand also begins to integrate visual learning, demonstrated through developmental progression across educational phases. A position that supports the claim that visual literacy is tied to processes and contexts, rather than existing as an isolated competency. Ultimately, these reflections suggest that this first strand demonstrates a distribution of visual literacy that is both dependent on visual perception and is shaped by cognitive processes within school-age educational contexts.

The second strand is grounded in interpretation and understanding while demonstrating a shift from decoding or interpreting images to the production of visuals. A

significant percentage of studies (62%), conceptualized visual literacy within the idea of making images to communicate meaning; however, fewer studies operationalized this in application or assessment. Examples of where creative processes were used include museum and school partnerships (Noble, 2021), studies which include parallel activities such as drawing and writing (Franco & Unrath, 2015), analyses of diagrammatic drawings (García Fernández & Ruiz-Gallardo, 2023; Guo et al., 2024) and development tools which seek to measure visual literacy within receptive and productive domains (Groenendijk et al., 2018). Limited examples were found where visual literacy was applied within the production of art and design purely for aesthetic purposes, with more tangible examples of visuals created within the natural sciences, such as the diagrammatic drawings mentioned above. This strand once again reflects the CEFR-VL (and subsequent CEFR-VC) – this time drawing on the production domain, while also corresponding directly with the visual communication element of Avgerinou and Petterson's theoretical model (2011, 2020).

This second strand also shows the importance of visual language due to the way in which students are said to use visual conventions to convey meaning. This is most evident in the observations that arrows, diagrams, or symbols carry different meanings across disciplines, supporting the idea that visual language is contextual and culturally situated (Avgerinou & Pettersson, 2011, 2020). While extending this idea by showing that in a school-age educational context, visual language itself becomes increasingly discipline-specific with age and curricula specialization.

The third strand within our conceptualization represents the most analytical stage, where visual literacy is understood as critical visual literacy. In this strand visual literacy is used as a critique of visual culture, power and ideology – where the focus is centred on uncovering power relationships embedded within the production and consumption of visual images (Baker et al., 2023; Brown, 2019; Papen, 2020). Here the purpose of visual literacy became the ability to identify and challenge visual stereotypes, to uncover hidden agendas and to understand who benefits from the reproduction of visual images. Specific examples within the data include apprenticing students into political participation (Baker et al., 2023), challenging stereotypes within Norwegian, English as a Foreign Language classes (Brown, 2019) and using picture books as a critical visual literacy intervention (Papen, 2020).

These three strands of visual literacy could be interpreted as a developmental progression from understanding – to communication – to critique, whereby images are not only read or made, but are interrogated within a broader socio-cultural context (Brown, 2019; Topelberg & Ventura, 2025). Suggesting that the way visual literacy is shaped in education is influenced by curricular context and that it is an applied field (Avgerinou & Pettersson, 2011). It also implies that an education-specific conceptualization of visual literacy should account for how its competencies are locally constructed in response to the individual demands of curriculum needs. By doing so this third strand foregrounds the socio-cultural dimensions within visual language, while also drawing on visual communication and visual thinking as prerequisites for culturally attuned critical practice. These ideas (held within this strand) are implicit within much of the wider literature; however, by making them explicit within this conceptualization, this article provides a shift towards the expectation that images should be read in relation to power, identity and privilege. It does this by showing how visual language

is not neutral but instead is ideologically and socially constructed (see Topelberg & Ventura, 2025), by critically engaging with visual thinking whereby students evaluate the origins of stereotypes (see Brown, 2019) and by approaching visual communication through the lens of social consequences of image production (see Baker et al., 2023).

In addition, the analysis of our 34 studies suggests that developmental age and ability interact with subject disciplines as a shaping force in the conceptualization of visual literacy. Within early years education, visual literacy was situated in holistic development, expression and in some cases introductory science concepts. The primary phase represented visual literacy as an embedded concept across art and design, reading comprehension and as an increasing presence within the science curriculum. Whereas the secondary phase seemed to demonstrate a shift towards discipline specific visual literacy, e.g. within science (biology and physics), specific visual arts courses and English as a foreign language. This phase also included visual analytics (within social sciences) that begin to touch on mathematical skills (largely absent from the data). Overall, this suggests a temporal shift across educational stages from broadly exploratory approaches to integrated applications tied to subject knowledge, and finally to more specialized, discipline-specific practices.

These more specialized conceptualizations can be seen in the analysis of anatomical diagrams (García Fernández & Ruiz-Gallardo, 2023; Mnguni & Moyo, 2021) and visual-based physics questions (Wang & Wei, 2024). This not only shows the discrete nature of visual literacy but also demonstrates how visual symbols often hold differing meanings dependent on context, for example 'a line segment with an arrow can represent the sequence of events over time in history, while in physics, it can be used to represent the magnitude and direction of forces' (Wang & Wei, 2024, p. 12). This suggests that conceptualizations not only evolve across the age range but across subjects, becoming, in some cases, more precise and increasingly context dependent.

The observations suggest that the subjects within which visual literacy is applied and the educational phases within which they are located significantly shaped its conceptualization. This can be interpreted as a continuum of conceptualization that privileges either creative inference or accuracy and precision, spanning the traditional poles of the arts on one end, and the natural sciences on the other. This shift across phases of education, echoes the methodological differences within studies in this review, from qualitative methods that capture holistic and evaluative perspectives to quantitative methods that generate numeric data within a more positivist framework.

Assessment of visual literacy

Analysis of the 34 studies shows that the assessment of visual literacy is highly heterogeneous, varying both in construct alignment and methodological approach (see Table 1). To clarify this variation, assessment approaches were categorized into five groups: psychometric instruments, performance-based assessments, rubric-based evaluations, qualitative evidence and proxy measures. This typology highlights substantial variation not only in how visual literacy is assessed, but in what is assumed to constitute the construct itself.

Qualitative approaches were most prevalent ($n = 17$) with visual literacy frequently inferred through observations, interviews, discourse analysis and the interpretation of student-produced materials (e.g. Baker et al., 2023; Bodén & Stenliden, 2019). While

Table 1. Categories of visual literacy assessment approaches.

Category	Example approaches	Key limitations	Key benefits	Count
Psychometric instruments	Likert scales, validated tests	Alignment with theory	Precision and generalizability	13
Performance-based assessments	Diagram tasks	Low comparability	Real-world application and benchmarking	17
Rubric-based evaluations	Scoring of compositions, creativity	Limited generalizability and standardization	Ease of use and clear assessment criteria	4
Qualitative evidence	Observations, interviews	Not designed for measurement; limited generalizability	Deep contextual understanding	17
Proxy measures	Reading tests	Indirect; raises construct validity concerns	Integrates with existing school systems	4

Note. Studies may be included in more than one category where multiple assessment approaches were used.

these approaches provide rich, context-sensitive insights, they are not designed as standardized assessment tools and limit comparability across studies. Psychometric instruments ($n = 13$), including Likert-scale questionnaires and validated tests (e.g. Hanci, 2022; Ünal, 2024), were also commonly used, although these varied considerably in their underlying constructs and domains. Performance-based assessments ($n = 17$), such as diagram production and visual interpretation tasks (e.g. Simon et al., 2022), offered more direct demonstrations of visual literacy but were typically context-specific and lacked broader standardization. Rubric-based evaluations ($n = 4$) were less frequently employed and similarly showed limited consistency across studies. A small subset of studies ($n = 4$) employed proxy measures such as reading comprehension, writing proficiency, or engagement scales (e.g. Golding & Verrier, 2021; Morris et al., 2017), which do not assess visual literacy directly but assume its influence on adjacent outcomes.

Across all categories, no single instrument was consistently used. Only two unlinked studies (Hanci, 2022; Ünal, 2024) appeared to employ a common measure: the Visual Literacy Competencies Scale (Kiper et al., 2012), originally validated with university students in Turkey. This lack of shared measurement, combined with variation across both direct and proxy approaches, limits comparability across studies and reinforces the conclusion that visual literacy remains inconsistently operationalized within school-age education.

Few studies drew on established frameworks such as Avgerinou's Avgerinou (2007) visual literacy index or the CEFR-VL (and subsequent CEFR-VC) model. These systematic conceptual frameworks were rarely operationalized into coherent assessment instruments, highlighting a disconnect between conceptual development and assessment practices. Two studies by Groenendijk et al. (2018, 2020) reported measures informed by the production and reception dimensions of the CEFR-VL (and subsequent CEFR-VC); representing the data set's limited engagement with this framework despite its significance and potential application in multiple educational contexts. Similarly, Avgerinou's (2007) visual literacy index was referenced across several studies, primarily as a source of component abilities (e.g. visual thinking, visual discrimination and critical viewing), but did not underpin the development of validated or transferable measurement tools. More broadly, references to visual literacy frameworks tended to remain at the level of theoretical orientation, with limited translation into validated, developmentally appropriate measures.

The selection of assessment approaches closely reflected how visual literacy was conceptualized within each study, aligning with the three strands identified in this review: interpretation/understanding, creation/communication and critical practice. Studies in the interpretation/understanding strand typically relied on comprehension-based assessments and verbal or written protocols to evaluate students' ability to decode and make sense of visual material (e.g. Golding & Verrier, 2021). In contrast, studies in the creation/communication strand employed performance-based, psychometric or rubric-driven approaches, assessing students' capacity to produce and communicate meaning through visual artefacts (e.g. Groenendijk et al., 2018). Research situated within the critical practice strand (although scarce) predominantly adopted qualitative methodologies, including discourse analysis and thematic interpretation, to examine how learners interrogate issues of meaning, power and representation embedded in visual culture (e.g. Baker et al., 2023).

The range of assessment approaches across the 34 studies reveals a clear imbalance of coverage of the three conceptual strands. Most instruments prioritized assessment of interpretation/understanding and creation/communication, while comparatively few studies attempted to operationalize the critical practice strand. The use of fragmented direct approaches and proxy indicators suggests that studies are often not assessing a shared or clearly defined construct. Taken together, these findings highlight the need for integrated, multi-dimensional assessment approaches capable of capturing the full range of visual literacy competencies, strands and domains identified in this review. The absence of a widely adopted, theoretically comprehensive, developmentally sequenced and cross-contextually validated measure of visual literacy for school-age learners limits comparability across studies and constrains the development of a cumulative and coherent empirical evidence base.

Discussion

This review sought to explore conceptions of visual literacy within school-age education. In doing so it mapped existing empirical evidence demonstrating examples across all age ranges and diverse subject disciplines. Key findings include:

a. that the conceptualization and application of children's visual literacy is not homogeneous, but instead represents significant differences across age ranges and subject disciplines,
b. that methodological approaches adopted in research on children's visual literacy vary considerably,
c. that assessment of children's visual literacy is fragmented, with no widely adopted, theoretically comprehensive, developmentally sequenced and cross-contextually validated measure of visual literacy for school-age learners and
d. that these differences can be interpreted and conceptualized through three strands: interpretation/understanding, creation/communication and critical practice

This review proposes the conceptualization of visual literacy as a multidimensional, developmental set of competencies through which learners interpret, create and critically evaluate visual meaning. Across educational contexts, agreement exists around the core abilities to decode and analyze visual representations. However, these competencies were context-dependent, shaped by age, disciplinary epistemologies and curricular purposes. Crucially, beyond interpretation and creation, critical visual literacy was seen to enable learners not only to construct and communicate knowledge, but also to interrogate the power structures and assumptions embedded in visual images. This criticality provides a significant, ongoing opportunity for education whereby visual literacy can be seen as a protective factor against persuasive design, decontextualization and emotionally driven misinterpretation.

These ideas of critical visual literacy reinforce the findings of Thompson (2019) who suggests that the proliferation of images in modern society is not in itself of concern, but rather that the problem lies in students who approach all images in the same way. This reinforces the idea that context matters and that enhanced criticality is needed in certain situations, e.g. when viewing what Thompson (2019, p. 112) describes as *deep* images, created and shared with differing intent, i.e. to 'inform, to mislead, to persuade and/or to sell'. This work provides a functional description of how to deploy these critical skills in practice in a higher-education context; however, this review demonstrates a lack of studies which directly engage with this issue in school-age education, providing a clear avenue for further research.

Assessment issues and implications

Our review examined how children's visual literacy is operationalized and assessed across 34 studies from a wide range of international settings. The findings reinforce the notion that inconsistencies in assessment shape how visual literacy is defined and understood (Kane, 2013). Across the reviewed studies, visual literacy was assessed through a continuum of approaches, ranging from implicit qualitative inference to formalized instruments, with no widely adopted, theoretically comprehensive, developmentally sequenced and cross-contextually validated measure of visual literacy for school-age learners. Even where purpose-built tools were used, these varied substantially in scope, structure, and theoretical grounding, and were rarely used beyond a single study. Although influential frameworks such as Avgerinou's visual literacy index and the CEFR-VL (and subsequent CEFR-VC) model provide structured accounts of visual literacy competencies, they have not yet been translated into widely adopted or standardized assessment instruments. Instead, they function largely as conceptual reference points, underscoring a persistent disconnect between theoretical development and empirical measurement.

This fragmentation in assessment of visual literacy is compounded by an imbalance in what is actually being assessed. Assessment practices focus largely on interpretation/understanding and, to a lesser extent, creation/communication, while the critical practice strand was rarely operationalized directly. In many cases, visual literacy was inferred through indirect measures such as reading comprehension, academic achievement, or engagement, obscuring the construct and weakening claims to validity. As a result, existing studies often do not assess a common construct, limiting comparability and

preventing the accumulation of a coherent evidence base. Addressing this requires the development of theoretically grounded, standardized and developmentally appropriate assessment frameworks that capture the multidimensionality of visual literacy, including its critical dimension, which remains largely absent from current assessment practices.

Implications for education

This review signposts the diversity of application and potential development outcomes. Moreover, it offers increased clarity of what is meant by visual literacy in school-age education and subsequently encourages educators to align their practices with this interdisciplinary construct. In practice, this means that educators should consider the incorporation of pedagogies that help develop the visual literacy competencies within their discipline that might enable learners to interpret and critically evaluate visual meaning and inferences in relation to disciplinary concepts. Teacher education should play a central role in equipping educators with the necessary critical and conceptual understandings of the ways that images are used or misused in an increasingly digital world. There are also important policy implications for educational systems that have often ignored or underplayed the importance of visual literacy within child development. The identification of a lack of universally agreed measurement tools creates an ongoing challenge for assessment of visual literacy competencies; however, articulating this gap creates a call to action which may result in new measures or practices which unify or further develop current frameworks of teacher standards, pedagogical practice and inspection. Finally, the momentum built by this review may also create new curriculum opportunities and encourage those educators, school leaders and educational policymakers unfamiliar with visual literacy to embed it within their curricula.

Limitations and future directions for research

Limitations of this review include the restriction of articles published in English and its timebound scope. This is perhaps most relevant to the years 1969–1995, following John Debes' seminal text and prior to the start of the review. However, relatively few studies from earlier years met the inclusion criteria, and the number of eligible studies increased over time. Furthermore, the assessment tools most commonly used in these studies were developed more recently, suggesting that construct defining, empirical work was more likely to be evidenced in more recent publications. Other limitations relate to the discrete use of the term *visual literacy*, which while important to the construction of an education-specific conceptualization, limited studies that used similar but differing terminology. This systematic enquiry yielded a significant dataset; however, the review also recognizes that additional studies may be available, potentially providing further value. A formal quality appraisal was not conducted, consistent with mapping approaches focused on characteristics of a field rather than evaluating the weight and quality of the evidence thus, we make no claims about the robustness and rigour of the included studies. Ultimately, the ideas in this review reinforce the notion that visual literacy is a construct rather than a discipline itself (Seels, 1994), and while significant work has taken place to clearly conceptualize and operationalize visual literacy, future research is still required to establish its value and place within school-age education.

Conclusion

While the term visual literacy has been previously theorized within research, its practical application and assessment is under-researched within school-age educational studies. Therefore, this review set out to map and analyze the existing literature on conceptualizations of visual literacy. In doing so it demonstrates the way in which conceptions of visual literacy are shaped by context with results showing diversity of methods, measurement tools and applications. These differences are organized (by this review) through three key strands: interpretation/understanding, creation/communication, and critical practice. While this review builds on existing scholarship, it also demonstrates the ongoing fragmented conceptualization within school-age education. Further research is therefore required to establish visual literacy as a valued construct in relation to individual subject disciplines, to provide the rationale and (within subject) measurement tools, and to continue to position visual literacy as a wider protective skill set in relation to persuasive imagery that young people will inevitably encounter across digital platforms, social media, advertising and other visually saturated environments.

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Appendix. Charting the data

Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Al Ashran (2024)	Jordan	Quasi-experimental study of images/ drawings on development of visual literacy	A visual literacy test consisting of '(24) questions; eight multi-choice questions, six drawings and colouring questions, and ten essay questions… distributed as (12) questions on visual thinking, (6) questions on visual learning, and (6) questions on visual communication' (p. 7618)	Psychometric; performance	60 students	10–11	Art and Design	'… set of skills (visual communication, visual thinking, and visual learning) that enable you to understand the characteristics of images and drawings' (p. 7611)
Baker et al. (2023)	Australia	Exploratory qualitative case study of critical visual literacy in art and design	Audio and video recordings, work samples, and semi-structured interviews. Uses domains of representational meanings, interactive meanings, and compositional meanings (Kress & van Leeuwen, 2006)	Qualitative	4 students	10–11	Art and Design	'Critical visual literacy builds on the foundations of critical literacy, established more than two decades ago by a range of educational researchers (The New London Group, 1996). Luke (2012) identifies the purpose of critical literacy as the analysis of text to critique and transform the practices that govern society' (p. 284)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Baz (2020)	Turkey	Qualitative lesson study	17-item true/false questions, comparative student text analysis, and qualitative assessment of learning diaries	Performance; qualitative	24 students	11–12	Turkish language lessons	'group of competencies to interpret what individuals visually encounter in their environment' such as 'perception, interpretation and evaluation of visual concepts' (p. 62)
Bodén and Stenliden (2019)	Sweden	Design-based research in visual analytics	Uses video data to observe how visual literacy emerges within practice, using socio-material analyses	Qualitative	97 students, three schools	13–15	Social Science (Visual Analytic)	'Involves critical viewing, visual reasoning, visual discrimination, visual thinking, visual association, and visual reconstruction as well as the construction and reconstruction of knowledge (Avgerinou & Pettersson, 2011)' (p. 41)
Brown (2019)	Norway	Qualitative study of critical visual literacy and visual stereotypes	Thematic analysis of qualitative data from focus group interviews and supplementary pupil texts	Qualitative; performance	83 students	15–16	English as a foreign language (EFL)	Described as 'critical visual literacy (CVL), which in this study is understood as an approach to images that focuses on uncovering the social interests and power relationships embedded in the production, reading, and challenging of images (Rose, 2001, p. 3)' (p. 121)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Demirezer and İlkörücü (2024)	Turkey	Quantitative non-equivalent control-group design exploring academic achievement, visual literacy and spatial visualization	Visual Literacy Scale, including domains of using the visual, perceiving the visual, recognising the visual, and thinking about the visual (Masters dissertation, Karaçam, 2020), used in conjunction with the Spatial Visualization Test (Dokumacı Sütçü & Oral, 2019).	Psychometric	180 students	12–13	Science	'Thus, visual literacy is a process that encompasses the skills of understanding and expressing visual images (Pilgrim & Bledsoe, 2013). Ausburn and Ausburn (1978) defined visual literacy as the skills that enable individuals to understand to use visual messages in order to communicate with others, while Wileman (1993) defined it as the ability to interpret and make sense of visual information and convert the information into visual images' (p. 633)
Falk and Pellegrino (2021)	United States of America	Qualitative school-based intervention supported by a museum during COVID-19	Qualitative analysis of online sessions including student responses	Qualitative; performance	Across three classes	High school (age NR)	Creative writing	Visual literacy is not defined; however, the project is framed with the Harvard Project Zero Thinking Routines Toolbox

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Franco and Unrath (2015)	United States of America	Qualitative multimodal study using conversations, interviews, artworks, and texts	Qualitative data coded thematically	Qualitative; performance	45 students	5–6	English: writing competencies of boys	Visual Literacy is positioned as a broad umbrella term within which Visual Thinking Strategies are used, i.e. 'us[ing] carefully sequenced visual art images to engage learners in sustained looking, critical and creative thinking, and effective communication within a collaborative group setting (Housen, 2001; Housen & Yenawine, n.d.; Yenawine, 1998)' (p. 27)
García Fernández and Ruiz-Gallardo (2023)	Spain	Mixed-methods study of scientific diagram production	Evaluation of biology diagram production performance and participant-reported perspectives on challenges encountered during diagram creation.	Performance; qualitative	254 pre-service teachers and 282 students across six schools	Mean reported age = 11.34	Science	Defined as a multidimensional, multidisciplinary process of communicating through images, including 'the abilities that make an individual competent 'to effectively find, interpret, evaluate, use and create images and visual media' (The Association of College & Research Libraries, 2011, 1) (p. 766)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Golding and Verrier (2021)	England	Quantitative quasi-experimental comics-based visual literacy intervention	'The comprehension summarization test (CST; Berkeley et al. 2011) is a four-item questionnaire designed to measure recall and understanding of a text' (p. 829)	Proxy	152 students, two schools	7–11	Reading comprehension	'Visual literacy is a learnt ability to critically consume visual sources of information (Avgerinou & Pettersson, 2011) and visually literate individuals will demonstrate skills in processing, analysing, and evaluating visuals… [competencies] include[e] interpretation, analysis and understanding, visual perception, evaluation, knowledge of grammar and syntax, and the ability to translate material from visual to verbal sources and vice versa…' (p. 825)
Groenendijk et al. (2018)	Austria, the Netherlands, Hungary and Germany	Validation study of a secondary-school self-assessment tool	Their own four-point scale for self-assessment of visual literacy competencies (Based on the CEFR-VL), using the domains of Making: designing, realising, using; and Responding: describing, interpreting, evaluation	Psychometric	R1 – 466 students, 15 teachers, 12 schools; R2 – 479 students, 12 teachers, 10 schools.	9–18	Art Education	Visual Literacy is defined within the Common European Framework of reference for Visual Literacy, which includes the dimensions of production (creating and using images) and reception (responding to images), situated within an overarching competence dimension of metacognition

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Groenendijk et al. (2020)	Austria, the Netherlands, Hungary and Germany	Feasibility study of a secondary-school self-assessment tool	Their own four-point scale for self-assessment of visual literacy competencies (Based on the CEFR-VL), using the domains of Making: designing, realising, using; and Responding: describing, interpreting, evaluation	Psychometric	R1 – 466 students, 15 teachers, 12 schools; R2 – 318 students, 11 teachers, 9 schools	12–18	Art Education	Visual Literacy is defined within the Common European Framework of reference for Visual Literacy, which includes the dimensions of production (creating and using images) and reception (responding to images), situated within an overarching competence dimension of metacognition
Guo et al. (2024)	United States of America	Qualitative verbal-protocol study of visual literacy	'Based on the Visual Literacy Assessment (VLA, Duke et al., 2011; also see Roberts & Brugar, 2017)' (p. 581), the study used a three-point scale to score results from students who required to (a) name the visuals, (b) explain their functions, (c) provide interpretations, and (d) identify the challenging features of each visual.	Performance; rubric	38 students	7–8	Science	'For example, we determined that the theme "visual literacy skills" was too broad, as it involves a set of skills such as interpret, evaluate and create visual graphics. As none of the responses were related to "creating visuals," we subsequently revised this theme as "use of visual conventions"' (p. 583–584)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Hanci (2022)	Turkey	Quantitative comparative analysis of visual literacy levels	A visual literacy scale developed by Kiper et al. (2012), this is a 29-item, five-point Likert scale using the domains: giving importance to visuality using office software, identifying printed visual materials, visual interpretation, distinguishing visual messages in daily life, and detecting messages in images	Psychometric	299 students, five schools	14–18	Visual Literacy	'Visual literacy refers to the set of visual competencies that people can develop by observing and integrating with other sensory experiences at the same time (Fransecky & Debes, 1972; Cited: Örs & Baş, 2018)… Visual literacy can be defined as the ability to critically understand, interpret and create visual images (pictorial and graphic) (Brown, 2004; Lopatovska et al., 2016).' (p. 612)
Lee (2024)	Korea	Qualitative discourse analysis of meaning-making in shared reading	Eight codes were developed to identify meaning-making strategies when analysing illustrations: Asking questions, making connections, constructing dialogues, expressing emotions, providing opinions, making inferences, making predictions, using schemata.	Qualitative; performance	6 students	7–8	Shared book reading	'Visual literacy is defined as "the learned ability to interpret visual messages accurately and to create such messages" (Heinich et al., 1982, p. 62). According to Avgerinou (2003), visual literacy is the skill to not only decode and interpret visual information but also encode and create visual reports' (p. 1376)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Lin et al. (2024)	Taiwan	Quantitative quasi-experimental	Measure of visual literacy including domains of, theme composition, aesthetic techniques, and creative imagination, using a four-point rubric to evaluate diagrams. The article suggests that these domains are derived from the unpublished work of Eisner, E. W. (1973).	Rubric; performance	104 students	12–13	Science	'Visual literacy involves understanding and applying visual media, from basic interpretation to advanced application and creation (Thompson et al., 2022)' (p. 4)
Mnguni and Moyo (2021)	South Africa	Quantitative study of animation effects on visualization skills	Validated tool for measuring Visualization Skills, including the domains of analysing, describing, illustrating, inferring and outlining guided by Mnguni (2019)	Psychometric	67 students	15–16	Science	'Researchers (e.g., Arneson & Offerdahl, 2018; Avgerinou & Ericson, 1997) define visual literacy as cognitive abilities that involve decoding and encoding ERs, interpreting ERs as well as creating visual representations of phenomena using pictures, diagrams, and other ERs. However, Mnguni (2019a) argues that because ERs are discipline-specific, visual literacy should also be discipline and context-specific' (p. 1–2)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Morris et al. (2017)	Australia	Explanatory mixed-methods study with diagnostic instrument and interviews	Visual Arts Responding Student Engagement Instrument (VARSEI), using a 15-item, six-point Likert scale, across the domains of autonomy, intrinsic motivation and meta-cognition	Qualitative; psychometric; proxy	147 students, multiple schools	15–17	Visual Arts	'Being visually literate means decoding images, understanding the relationship between image and context, and recoding personal experiences into visual artworks' (p. 493)
Níkleva and Rodríguez-Muñoz (2022)	Spain	Quasi-experimental longitudinal study of a visual literacy programme on reading comprehension	CLIP (Reading Comprehension Test for Primary Intervention) and CREA (Creative Intelligence Test)	Proxy; performance	211 students, six schools	11–16	Reading comprehension	Defined as reading and correctly interpreting images 'Like verbal text, the reading of iconic text requires prior systematic preparation. For images, prior knowledge is needed of the elements that constitute the visual code and the way these elements are integrated into the coding of a message' (p. 2)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Noble (2021)	England	Practitioner-led action research on a community of practice	Survey and email feedback, interviews, blog posts, photographs and artworks to investigate how continuous professional development impacted students' development of visual literacy and creativity skills	Qualitative; performance	68 teachers >40 primary schools, '… more than 500 children visited the museum… more than 3,800 studied it at school…' (p. 615)	4–11	Art and Design	Defined within 'constructivist approaches to learning and meaning making' (p. 622) 'However, visual literacy is much more than just an aesthetic response or the ability to interpret meaning from an image or object. Making, or the artistic dimension is also key (Boughton 1986)' (p. 624)
Özkubat and Ulutaş (2018)	Turkey	Quasi-experimental study of a Visual Awareness Enhancement Programme	The Visual Literacy Inventory for Pre-school Children (three-factor construct: Visual Discrimination, Visual Description, Visual Interpretation) and the Children's Visual Literacy Rating Inventory for Parents (single-factor construct) (Özkubat & Ulutaş, 2015)	Psychometric	40 students	4–5	Early development	'Visual literacy should be considered as a separate domain that enables students to communicate through images and enhance the quality of their learning process, rather than an as extension of any particular educational content' (p. 314)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Papademetriou and Makri (2015)	Greece	Qualitative comparative analysis of pre- and post-test student compositions	Compositions were analyzed using 'four criteria: (a) the modes of signalling information, (b) the forms of different semiotic modes integration, (c) integration codes of different semiotic modes, and (d) the kind of interaction between semiotic modes, intersemiotic synergy.' (p. 35)	Rubric; performance	46 students	11–12	Design	Visual literacy is positioned within the concepts of visual design, semiotics, and the associated meta language of visual grammar
Papen (2020)	England	Qualitative study of a critical visual literacy intervention using picture books	Observation notes, audio and video recordings and notes from regular analyzed through thematic analysis	Qualitative	Two groups of 10–14 students	9–11	Critical visual literacy intervention	'Critical visual literacy is a form of critical literacy that pays particular attention to the use of visual modes and how, together with writing, they create meaning' (p. 3)
Ramulumo (2024)	South Africa	Mixed-methods autoethnographic study of STEM education and visual literacy	A psychometric test targeted patterns, spatial visualization, visuospatial working memory, and visual perception. With additional interviews using flashcards.	Psychometric; qualitative	121 from STEM schools 87 from non-STEM schools	5–6	Science Technology Engineering and Mathematics (STEM)	'Visual literacy encompasses a range of abilities, including spatial visualization, visual-spatial reasoning, perception, and interpretation of visual information (Gadanidis & Namukasa, 2017; Hoffler & Leutner, 2007)' (p. 217–218)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Reis (2010)	Portugal	Quantitative comparative study of public artwork exposure	Their own 27-item questionnaire across the domains of aesthetic dimension, visual perception, and social functions	Psychometric	240 students, three schools	10–12	Public Art and relationship to school education	Positioned within aesthetics visual literacy is defined by 'three kinds of competences: communication (the capability to 'make any idea ordinary' using the specialist language of visual arts); creation (the capability to use visual signs and symbols appropriately, critically and creatively); and comprehension, (the capability to understand works of art in diverse contexts)' (p. 93)
Sakarya et al. (2023)	Turkey	Quantitative study of predictors of visual literacy skills	The Personal Information Form, the Rapid Automated Naming Test (HOTIT) and the Visual Literacy Assessment Tool for Children Aged 5–6 Parent's Form based on the Doctoral dissertation of Özkubat (2015)	Psychometric	160 students	5–6	Early development	Visual literacy is described as the capacity to read, understand and learn through visuals, 'first introduced by Debes (1968) and defined as a group learning ability that individuals develop by seeing and including all other perception experiences in this process' (p. 304)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Simon et al. (2022)	Hungary	Quantitative study of visual communication skills	Online interactive tests for visual communication sub skills: 2D composition, abstraction, symbolization, and modality shift.	Performance; psychometric	312 students, four schools	10–14	Primary education	Visual Literacy is defined within the Common European Framework of reference for Visual Literacy, which includes the dimensions of production (creating and using images) and reception (responding to images), situated within an overarching competence of metacognition
Stenliden et al. (2019)	Sweden	Design-based research	Uses video data to observe the 'dual aspects of visual literacy, information retrievement paired with the creation of interactive visualised stories' (p. 101)	Qualitative; performance	Two class groups	12–15	Social Science (Visual Analytics)	Visual literacy 'involves the ability to retrieve information in a visual analysis process paired with the ability to express the resulting knowledge through visual messages' (p. 102)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Sukserm and Wasanasomsithi (2023)	Thailand	Mixed-methods study of inquiry-based learning, visual literacy, and EFL writing	Writing tests, student portfolios, and focus group interviews were used to examine students' writing proficiency within the domains of content, organization, grammatical structures, and vocabulary	Proxy; qualitative; performance	20 students	16–17	EFL	Defined as '…the ability to interpret and create visual messages using various media and technologies (Hattwig et al., 2013). Visual literacy involves abilities to interpret, analyse, synthesise, and evaluate visual information, all of which are also the abilities required in order to be effective writers, so it can be used to enhance EFL writing ability (Maricimoi, 2017; Navidinia et al., 2018; Tayib, 2015; Yeom, 2018; Yunus & Chien, 2016).' (p. 804)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Topelberg and Ventura (2025)	Israel	Qualitative questionnaire study of The Visual Code "…to nurture the ability to decode visual cues" (p. 525)	14-item questionnaire grouped into the impact of the visual code on teachers and the effects of the visual code model on students. This 'visual code' uses the domains of attentive observation, interpretation, and validation.	Qualitative	67 teachers	Teaching staff only	Art and Design	Definitions signpost John Debes' group of vision-competencies and how 'visual literacy aims to provide viewers with tools for understanding sophisticated visual images so that they can resist their influence… (Shalita et al. 2011, 9–10) … Like in the cases of earlier studies, visual literacy is defined here as a multidisciplinary occupation that encompasses different fields such as social sciences and education, language studies, photography, business, media and communication, visual culture, and library and information science (Kędra and Žakevičiūtė 2019)' (p. 531)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Ünal (2024)	Turkey	Quantitative correlational study using descriptive statistics, t-test, and Pearson correlation	The Visual Literacy Competencies Scale (Kiper et al., 2012), a 29-item, five-point Likert scale using the domains: giving importance to visuality using office software, identifying printed visual materials, visual interpretation, distinguishing visual messages in daily life	Psychometric	188 students, two schools	10–13	N/A	'The most well-known definition of visual literacy is that of Fransecky and Debes (1972). According to this definition, visual literacy is a group of visual competencies that can be developed by seeing and also by experiencing and integrating other sensory experiences' (p. 713).
Vanderlip Taylor and Buchman (2022)	United States of America	Qualitative study of student collaboration during collage work	Qualitative process orientated analysis, using participant observations and descriptive reporting	Qualitative; performance	'~200 students, eight… classes from multiple schools' (p. 8)	5–8	Art and Design	'Teaching visual literacy provides students with tools for questioning and understanding the world while creating meaning through visual art. According to John Debes (1968), the term visual literacy (as used throughout this article) refers to competencies one develops that help one interpret visual imagery and communicate ideas visually' (p. 9)

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Author, date	Country	Methodology	Assessment approach description	Assessment approach category	Sample size	Age (years)	Subject area	Definition of visual literacy
Vermeersch and Vandenbroucke (2015)	Belgium (Flanders)	Qualitative curriculum analysis of visual literacy across school phases	Content analysis using NVIVO and ReCal2 for interrater reliability	Qualitative	N/A	N/A	Entire curriculum	Visual literacy is defined through a 'skill-based classification… differentiating four sets of VL skills: perception; imagination and creation; conceptualization; analysis' (p. 1)
Wang and Wei (2024)	China	Quantitative study of scientific visual literacy in high-stakes examinations	The Visualization Blooming Tool (Arneson & Offerdahl, 2018), using the domains of remember, understand, apply, analyze, evaluate, and create.	Performance; rubric	N/A	15	Science	'Some education scholars proposed that, like verbal literacy, visual literacy is a communication skill that can be defined as the ability to interpret and construct visual representations [26–28]. It should be noted that visual literacy is not a generic skill but rather a discipline-specific one [20,29]. In other words, the same visual convention may have different meanings across disciplines' (p. 2)