



OPEN ACCESS

EDITED BY

Gemma San Cornelio,
Fundació per a la Universitat Oberta de
Catalunya, Spain

REVIEWED BY

Verena Elisabeth Fäßler,
Vorarlberg University of Applied
Sciences, Austria
Candela Ollé,
Open University of Catalonia, Spain

*CORRESPONDENCE

Abd Allah Aljalabneh
✉ ajalabneh@zu.edu.jo

RECEIVED 03 September 2024

ACCEPTED 28 October 2024

PUBLISHED 27 November 2024

CITATION

Aljalabneh AA (2024) Visual media literacy:
educational strategies to combat image and
video disinformation on social media.
Front. Commun. 9:1490798.
doi: 10.3389/fcomm.2024.1490798

COPYRIGHT

© 2024 Aljalabneh. This is an open-access
article distributed under the terms of the
[Creative Commons Attribution License \(CC
BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in
other forums is permitted, provided the
original author(s) and the copyright owner(s)
are credited and that the original publication
in this journal is cited, in accordance with
accepted academic practice. No use,
distribution or reproduction is permitted
which does not comply with these terms.

Visual media literacy: educational strategies to combat image and video disinformation on social media

Abd Allah Aljalabneh *

Department of Radio and Television, Zarqa University, Zarqa, Jordan

The proliferation of misinformation on social media, particularly through manipulated visual content, poses significant challenges. This study explores the role of visual media literacy in addressing these challenges, focusing on its application in educational settings in Jordan. Employing a mixed-methods approach, the research integrates semi-structured interviews with 18 university media literacy educators and a quantitative case study analyzing rumor dissemination from January to August 2024. The aim is to develop strategies that enhance critical evaluation skills among students, equipping them to navigate and discern the vast array of visual information encountered online. The findings reveal that educators utilize specific strategies, such as employing reverse image searches and cross-referencing with reputable sources, to ensure students grasp the importance of verifying the authenticity of visual content. Educators also emphasize the need to contextualize visual media by analyzing the creator's background and motivations, thereby uncovering potential biases and promoting a more nuanced understanding of visual messages. Moreover, the study highlights the critical role of the Picture Superiority Effect (PSE) in visual media literacy, illustrating how images are more likely to influence memory and perception than text. The case study provides empirical evidence of the pervasiveness of misinformation, with 481 rumors recorded over 8 months, 85.5% of which were disseminated via social media platforms and 58% related to political and security issues. Educators address these challenges by teaching students to critically engage with images and videos, recognizing the power of visuals to shape opinions. The findings of this research are crucial for educators and policymakers, aiding in the creation of a more informed and resilient society better equipped to counter disinformation.

KEYWORDS

disinformation, media literacy education, misinformation, social media, visual media literacy, picture superiority effect

1 Introduction

The digital age has ushered in an unprecedented abundance of information, both accurate and misleading (Trattner et al., 2022; Lo et al., 2022; Stephens et al., 2023). In recent years, both in Jordan and internationally, numerous videos disseminated on social media have contributed to public misinformation, significantly influencing discourse at local and global levels (Bock, 2023). Visual misinformation, which often involves the manipulation or alteration of images or videos to misrepresent reality

and create a false narrative, has become particularly pervasive (Da et al., 2021; Hameleers, 2024; Luo et al., 2021). This can include techniques such as photoshopping, deepfakes, or selective editing, as well as using images out of context to support misleading claims. These manipulations distort reality, painting a misleading picture that obscures the truth (Jin et al., 2016; Newman and Schwarz, 2023; Shin, 2024).

The ability to critically evaluate visual media has thus become essential, as manipulated imagery can significantly influence public discourse and perceptions (Brennen et al., 2021; Bock, 2023). The need to foster image credibility, accuracy, and trustworthiness becomes relevant in the online news and information sphere, where these factors play a crucial role in shaping public perception and building trust (Kasra et al., 2018; Lago et al., 2019). Media literacy interventions have demonstrated efficacy in augmenting individuals' capacity to discern and authenticate misinformation, resulting in heightened competencies in social media literacy and a diminished propensity to disseminate inaccurate information (Zhang et al., 2022; Zhao et al., 2023).

The prevalence of visual mis/disinformation can be attributed to several factors, including the sheer volume of visual content generated daily and the speed at which it spreads (Wu et al., 2023). In Jordan, these challenges are compounded by varying levels of digital media literacy among citizens, further exacerbating the problem (Safari and Ananbeh, 2023). Consequently, while global studies (e.g., Ford et al., 2023; Maloy et al., 2022; Farmer, 2022; Dame Adjin-Tetty, 2022) have emphasized the relevance of media literacy, there remains an insufficiency in the realm of qualitative research that explores how these insights are applied within the educational frameworks in Jordan, highlighting the need for localized strategies. This study contributes to the field by providing new insights into the strategies employed by educators in Jordan to combat visual misinformation and enhance critical evaluation skills. Specifically, it examines how these educators design and implement curriculum strategies, teaching methodologies, and engagement practices to foster visual media literacy.

Emerging research highlights the potent role of visual content in spreading false information (Khan et al., 2023). In contrast, other studies emphasize the positive potential of visual communication in fostering societal engagement and conveying memorable messages (Catanzaro and Collin, 2023; Hou et al., 2023). The unique capacity of visuals to elicit emotional responses and enhance memory retention underlines the necessity for an enhanced comprehension of how visual features contribute to the credibility and persuasiveness of information (Hou et al., 2023). As Bock (2023) argues, images possess greater emotional power and memorability than words, requiring a distinct approach to literacy.

In Jordan, the rise of misinformation and manipulative visual media tactics on social media has revealed the public's vulnerability to emotional and psychological manipulation, especially during major news events and crises (Al-Jalabneh et al., 2022). Manipulative videos and images often gain widespread attention and are frequently shared, influencing public opinion and behavior (AL-Jalabneh, 2023; Li et al., 2020; Ng, 2022). For instance, in August 2024, prior to the Jordanian parliamentary elections, images were manipulated to falsely promote political candidates, sometimes featuring characters from popular television shows (see

Figure 1). Another example is the circulation of a deepfake video that falsely featured a prominent media figure endorsing a financial scheme. This was later exposed by the Jordanian Media Credibility Monitor, Akeed, as being manipulated using artificial intelligence (see Figure 2) (Akeed, 2024a,b,c; Chayyek, 2024). Similarly, images were circulated on social media platforms following Israeli strikes on Lebanon and were attributed solely to those strikes, but they were actually from both southern Lebanon and Gaza (see Figure 3) (Chayyek, 2024). These trends draw attention to the urgent need for more effective regulation and media literacy education to equip individuals with the essential skills to critically analyze and interpret visual content (Habes et al., 2023; UNDP, 2023). Additionally, the increasing use of AI in generating visual content, including deepfakes and other manipulated media, presents both opportunities and challenges (Aljalabneh et al., 2024). Therefore, strategies should be developed to maximize the benefits of AI while minimizing its potential to spread harmful misinformation in the context of social media. This issue is also impacting the broader Middle East, including Jordan, where several economic and sociopolitical challenges are exacerbated by ongoing conflicts and wars in the region. In such contexts, visually deceptive content thrives, particularly on social media platforms, where it can be used to mislead and influence public opinion. Jordan, despite being stable, is still somewhat affected by the regional turmoil and shares the digital vulnerabilities prevalent across the Middle East. Given the limited research on visual media literacy in this geographical context, this study becomes both timely and essential.

In light of the aforementioned context, the necessity of this research becomes apparent. The objective is to tackle the phenomenon of visual disinformation by highlighting the significance of visual media literacy in the fight against misinformation in Jordan. This research endeavor also aims to equip individuals with the competencies essential for the critical appraisal and interpretation of visual media through the analysis of particular visual elements and formats that facilitate the dissemination of misleading visual materials on social media.

2 Research questions

RQ1: How do university educators in Jordan integrate visual media literacy into their curricula to enhance students' ability to critically evaluate visual content, particularly in the context of social media disinformation?

RQ2: What specific educational strategies are employed by media literacy educators in Jordan to address the cognitive and emotional manipulation associated with visual misinformation?

3 The concept of visual media literacy

The concept of "Visual Literacy" has a rich and multifaceted history, beginning with John Debes' pioneering definition in 1969. Debes, a key figure in the realm of visual literacy, laid the foundation by describing visual literacy as a set of "vision-competencies" essential for interpreting and communicating

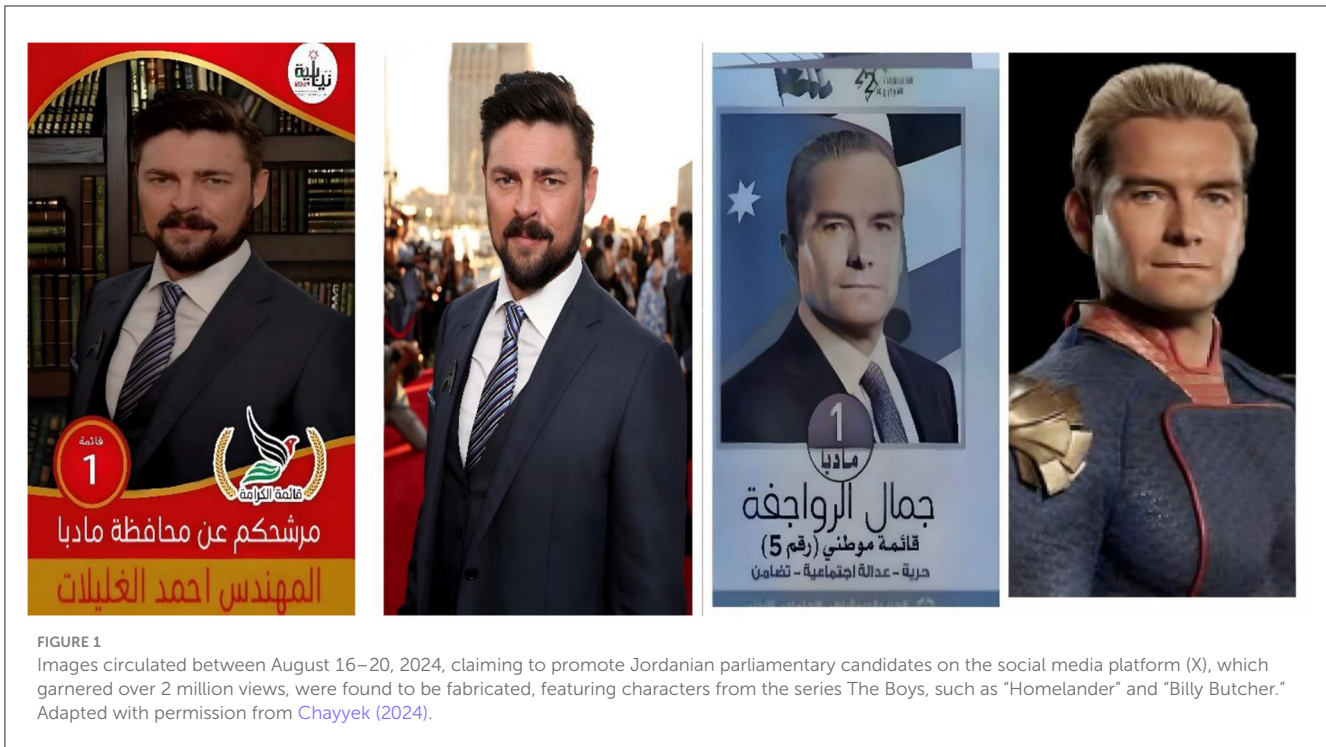


FIGURE 1

Images circulated between August 16–20, 2024, claiming to promote Jordanian parliamentary candidates on the social media platform (X), which garnered over 2 million views, were found to be fabricated, featuring characters from the series *The Boys*, such as “Homeland” and “Billy Butcher.” Adapted with permission from Chayyek (2024).

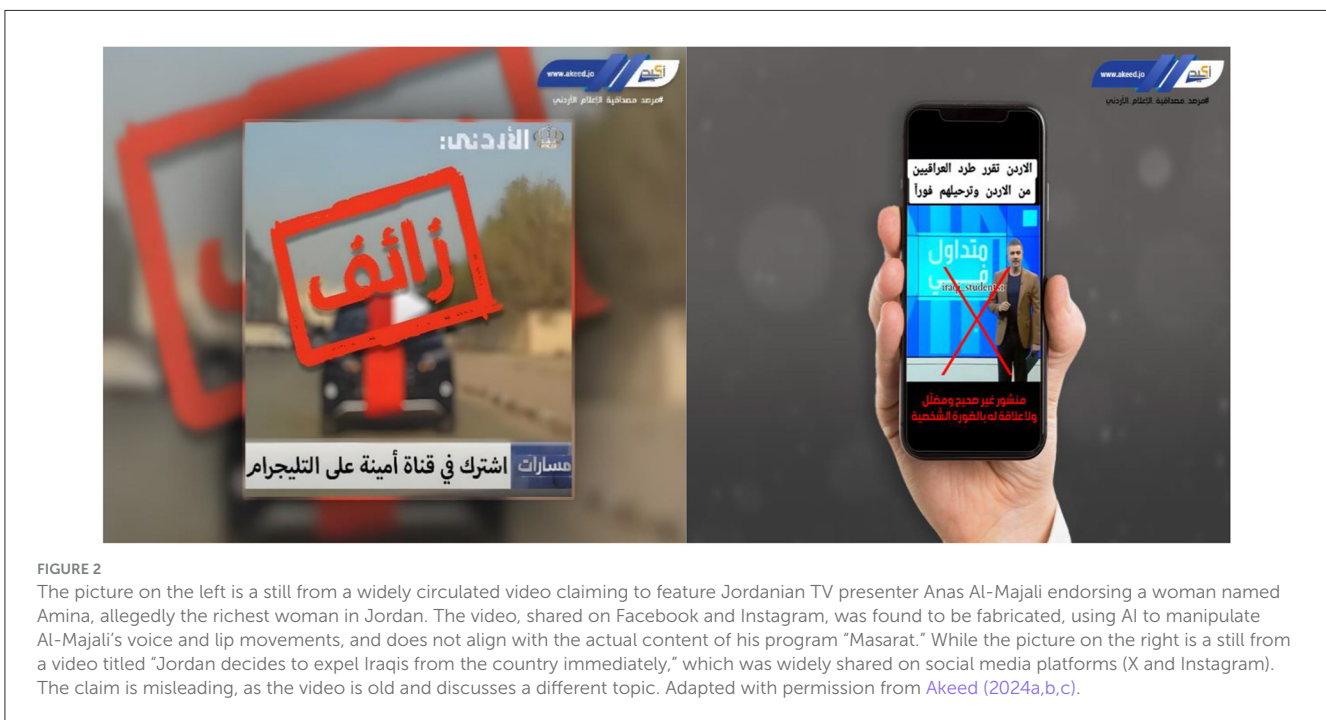


FIGURE 2

The picture on the left is a still from a widely circulated video claiming to feature Jordanian TV presenter Anas Al-Majali endorsing a woman named Amina, allegedly the richest woman in Jordan. The video, shared on Facebook and Instagram, was found to be fabricated, using AI to manipulate Al-Majali’s voice and lip movements, and does not align with the actual content of his program “Masarat.” While the picture on the right is a still from a video titled “Jordan decides to expel Iraqis from the country immediately,” which was widely shared on social media platforms (X and Instagram). The claim is misleading, as the video is old and discusses a different topic. Adapted with permission from Akeed (2024a,b,c).

through visual means (e.g., Avgerinou and Ericson, 1997; Williams and Debes, 1970). His definition emphasizes that visual literacy is not merely about seeing but goes beyond that in integrating visual alongside various sensory stimuli to improve comprehension and communication.

Over time, this initial definition by Debes has been expanded upon by numerous scholars, each contributing unique perspectives to the evolving concept of visual literacy. The diversity of

definitions reflects the interdisciplinary nature of visual literacy, drawing from major fields such as education, media studies, psychology, and communication. For instance, Wileman (1993) defines visual literacy as “the ability to read, interpret, and understand information presented in pictorial or graphic images” (p. 114), emphasizing the interpretative aspect of visual literacy and the importance of making meaning from visual representations.



FIGURE 3

Images were circulated on social media platforms following Israeli strikes on Lebanon and were attributed solely to those strikes, but they are actually from both southern Lebanon and Gaza. Adapted with permission from [Chayyek \(2024\)](#).

As the media landscape has evolved, so too has the broader concept of media literacy. Early foundational work by [Aufderheide \(1993\)](#) laid the groundwork for modern understandings of media literacy, positing that a media-literate individual should be able to “decode, evaluate, analyze, and produce both print and electronic media.” This definition underscores the importance of not only consuming media critically but also participating in its creation which is a dual focus that remains relevant. Building on this foundation, scholars such as [Potter \(2004\)](#) have emphasized the cognitive processes involved in media literacy, including the need to filter information, interpret messages, and construct meaning from media texts. Potter highlighted the necessity for individuals to be aware of the influence that media messages have on attitudes and behaviors, framing media literacy as both a protective and empowering skill.

As digital and visual media became ubiquitous, the concept of media literacy expanded to include visual media literacy. Scholars like [Kress and van Leeuwen \(1996\)](#) introduced the concept of visual grammar, which provided a framework for understanding how images function as a form of communication. They argued that images, like language, follow specific syntactic rules that can be decoded and interpreted. [Braden \(1996\)](#) further expanded this scope by suggesting that visual media literacy includes the ability to “create or select appropriate images to convey a range of meanings, from concrete information to abstract concepts,” highlighting both interpretation and creation as essential components of visual literacy.

[Messaris \(1998\)](#) contributed by analyzing how visual literacy impacts cognitive development and the ways in which visual media influences the viewer’s understanding of the world. He emphasized the importance of distinguishing between semantic and syntactic conventions in visual media, underscoring the representational conventions of visual communication. [Hobbs \(2010\)](#) further developed these ideas by recognizing the dynamic and participatory nature of visual literacy in the digital age. She argued that visual literacy involves a constantly evolving set of skills necessary for full participation in a media-rich society, emphasizing critical thinking and ethical considerations when engaging with visual content.

[Chauvin \(2003\)](#) highlighted the distinctions between visual and media literacy, noting that while the terms are often used interchangeably, they carry different meanings that can create confusion in educational contexts. This distinction is crucial for understanding the specific competencies required for each type of literacy.

These developments illustrate the challenges in arriving at a single, universally accepted definition of visual literacy. The coexistence of various disciplines in which each contributing different perspectives and methods, highlights the diverse nature of the concept. This diversity is both a strength and a challenge, allowing for a broad understanding of visual literacy but also making it difficult to pin down a single, comprehensive definition.

Building on these concepts and definitions, this research highlights a comprehensive understanding of visual media literacy, which encompasses not only the ability to decode and interpret visual messages but also to engage critically with and ethically produce visual content. Videos, in contrast to static images, combine both visual and auditory elements as they function as audio-visual media. This distinction is critical because the affordances of videos, such as sound, motion, and time-based storytelling, significantly differ from those of still images. In this framework, visual media literacy can be described as the capability to critically engage with, ethically produce, and effectively interpret visual content across various platforms, incorporating an awareness of the symbolic and communicative strength of images. This literacy entails the ability to navigate and decode visual messages in a manner that is informed by the swiftly changing landscape of digital media, ensuring that individuals can distinguish between truth and misinformation and contribute thoughtfully to the online visual sphere.

4 The picture superiority effect in the context of social media disinformation

The phenomenon known as the “picture superiority effect” (PSE) is particularly relevant in the context of social media, where

images and videos dominate communication. The PSE refers to the cognitive bias where images are more likely to be remembered and influence behavior compared to text. This effect was first identified and coined by Paivio and Csapo (1973). Their work laid the foundation for understanding how images, through dual coding theory, are encoded both imaginably and verbally, leading to their superior recall compared to words alone (Paivio and Csapo, 1973).

This effect can be further understood through the cognitive and perceptual processing advantages that images possess, as highlighted by Stenberg (2006). Conceptually, images are easier to understand and recall, while perceptually, their rich detail engages multiple cognitive pathways, making them particularly memorable.

Previous investigations have substantiated PSE across diverse contexts, encompassing associative memory and recognition assessments. For instance, Hockley and Bancroft (2011) illustrated that the PSE manifests in associative recognition evaluations, wherein images are linked to superior memory outcomes in comparison to lexical items. In a similar vein, Curran and Doyle (2011) discovered that images, irrespective of whether they are examined or recalled as images or words, correlate with enhanced accuracy in recognition assessments, thereby reinforcing the durability of the PSE in memory recall.

Social media platforms have undeniably facilitated the rapid dissemination of both information and misinformation, particularly during public crises and political events (Ahmad et al., 2022). Visual content, such as images and videos, holds a powerful sway over perceptions of truth, often misleading viewers even when not explicitly altered or falsified (Newman and Schwarz, 2023). The emergence of deepfake technology exacerbates this issue by enabling the creation of highly convincing yet entirely fabricated visual content that blurs the lines between reality and fiction (Maniyal and Kumar, 2024). These deceptive visuals have serious implications for individual perceptions, social discourse, and decision-making processes (Peng et al., 2023; Weikmann and Lecheler, 2023; Lo et al., 2022).

Moreover, the widespread accessibility of advanced editing tools has made it easier to produce deceptive media, raising the need for a critical evaluation of the veracity of visual content encountered online. The problem is multifaceted, now encompassing new forms of visual deception, ranging from synthetic media and manipulated imagery to the strategic use of stock photos or visuals that misrepresent the corresponding narrative.

The PSE's influence extends directly to social media engagement, where research shows that posts featuring images generally receive higher engagement than those without (Li and Xie, 2020). This increased engagement, however, could also amplify the spread of misinformation. Misleading visuals, due to their memorable nature, can lead to durable misperceptions that persist even after corrections are issued (Ecker et al., 2014a,b). Research shows that while corrective information generally improves belief accuracy, its effects can diminish over time or be counteracted by reinforcing cues from influential sources (Nyhan, 2021). This complexity is especially relevant in visual-centric platforms, where the challenge of correcting misinformation is further amplified by the memorable and emotionally impactful nature of visuals. This issue is further compounded by the speed at which these deceptive

visuals can go viral, reaching vast audiences and eroding trust in media, politicians, and visual information in general (Weikmann and Lecheler, 2023).

In understanding the spread of misinformation, researchers have identified a wide spectrum of false and misleading information ranging from unintentional satire or parody to more deliberate forms of misleading content and synthetic media (Thomson et al., 2020; Pérez-Escobar et al., 2023). The factors contributing to the spread of visual misinformation are varied, including the sheer volume of visuals created daily, the speed at which they are shared, and the differing levels of digital and visual literacy among consumers. Disinformation, defined as deliberately misleading or deceptive information spread with the intent to deceive, encompasses various forms, including visual disinformation, which can cause significant harm to individuals, communities, and society as a whole (Erhardt and Pentland, 2022).

Visual disinformation, in particular, can have a powerful and persuasive impact because it taps into our innate tendency to trust what we see. Such content can quickly spread and influence public opinion, decision-making, and broader societal discourse (Fallis, 2015). The potential consequences of visual disinformation are far-reaching, as it has the capacity to distort reality, undermine democratic processes, erode trust in institutions, and contribute to the polarization of important societal issues (Horvitz, 2022).

Given the compelling influence and propensity for the viral spread of manipulated imagery, scholars have emphasized the importance of exploring various approaches to mitigate the spread of visual disinformation. These approaches include implementing advanced techniques, regulations, and technological interventions to curb the detrimental effects of visual disinformation (Fallis, 2015; Peng et al., 2023; Horvitz, 2022). However, the debate remains open regarding the most effective strategies, highlighting the need for ongoing research and discussion to address this critical issue in the digital era.

5 Methodology

This study employed a qualitative inductive research approach, supplemented by a quantitative case study, to investigate the role of visual media literacy in combating misinformation and enhancing critical evaluation skills. Specifically, the research aimed to explore the perceptions, experiences, and strategies of university media educators and psychologists regarding visual media literacy within educational institutions and community engagement settings, while also providing empirical data on the prevalence and nature of visual mis/disinformation in Jordan.

Participants for the qualitative component were purposively chosen based on specific qualifications, including at least 5 years of experience in teaching or research on subjects related to media literacy, visual communication, media and psychology, or media education, along with their active participation in community media literacy initiatives. Additionally, these individuals have demonstrated active engagement in media literacy initiatives within their communities, where they have played key roles in advancing public understanding of visual media's impact on society. Their professional backgrounds reflect a combination of academic rigor

TABLE 1 Participants' profile.

Interview number	Letter	Gender	Field of expertise
1	A	Male	Media Literacy
2	B	Male	Visual Communication
3	C	Female	Media Education
4	D	Male	Media and Psychology
5	E	Female	Media Literacy
6	F	Male	Media and Psychology
7	G	Male	Media Education
8	H	Female	Visual Communication
9	I	Female	Media Literacy
10	J	Female	Media Education
11	K	Male	Media and Psychology
12	L	Male	Visual Communication
13	M	Male	Media Literacy
14	N	Male	Media Education
15	O	Female	Media and Psychology
16	P	Female	Media Education
17	Q	Female	Visual Communication
18	R	Male	Media Literacy

and practical application, such as developing and delivering media literacy curricula, leading research projects on media literacy education and visual communication, and mentoring students and peers in the field.

The selection process was meticulously crafted to guarantee a wide variety of perspectives, with participants chosen from six universities, three of which were government and three private, representing diverse academic institutions, experience levels, and community outreach initiatives in Jordan. This approach ensured that the collected insights would be comprehensive. The participants were assigned letter names ranging from A to R. Among them were 10 males and 8 females, with ages spanning from 36 to 66 years (see Table 1).

Data collection for the qualitative component was conducted via semi-structured interviews, carefully crafted to correspond with the research questions. The interviews concentrated on three primary aspects: the incorporation of visual media literacy into educational curricula; the pedagogical approaches utilized to foster critical evaluation skills in the fight against visual mis/disinformation; and the educators' experiences in designing effective public awareness campaigns, initiatives, and workshops in educating students and the public on the subject. Each interview commenced with open-ended questions, allowing participants to express their views freely before transitioning to more specific inquiries related to these key themes. The interviews were conducted in settings convenient for the participants from mid-April until the end of June 2024, either in person or via video conferencing using Zoom, and typically lasted between 60 and

90 min. All interviews were audio-recorded with the participants' permission to ensure the accuracy of the data.

Subsequent to data collection, six of the interviews were conducted in Arabic and then translated verbatim into English, while the remaining interviews were conducted in English. The study employed thematic analysis following Braun and Clarke (2006)'s framework, allowing themes to emerge inductively from the data. This process began with familiarization, where transcripts were read multiple times to gain a deep understanding of the content. Initial coding was carried out by identifying significant statements and concepts, which were subsequently grouped into categories. Recurring patterns were identified, refined, and interpreted in relation to the study's objectives. The final themes were carefully validated to ensure they accurately reflected the participants' insights.

Before each interview, the researcher briefly explained the ethical protocol, in accordance with the Jordanian Personal Data Protection Law No. (24) of 2023 and the ethical guidelines set by Zarqa University Ethics Committee. Participants were informed about the purpose of the research, and all recording permissions were obtained. Confidentiality, anonymity, and the right to withdraw within 1 month without consequences were assured. Data handling, storage, and disposal procedures were also clearly outlined before beginning the recordings.

In addition to the qualitative interviews, the quantitative case study was conducted to analyze the dissemination of visual disinformation in Jordan. Data for this case study were obtained from the Jordanian Media Credibility Monitor (Akeed), an established organization that monitors and analyzes media content in Jordan. The case study focused on rumors involving images and videos that were identified and documented by Akeed over the period from January to August 2024. This empirical data provided a comprehensive overview of the nature (e.g., health, education, politics), source, and dissemination channels of visual mis/disinformation in Jordan, thereby offering contextual grounding for the qualitative findings.

The rumors were organized into cumulative tables, highlighting key trends and patterns in visual mis/disinformation. Descriptive analysis was conducted to calculate frequencies and percentages, providing statistical insights into the prevalence and characteristics of misinformation spread over social media in Jordan. Specific case examples from the Akeed reports were also analyzed to illustrate the real-world impact of visual mis/disinformation on public perception and societal trust. This integration of quantitative data served to complement and reinforce the qualitative findings from the interviews. Employing this mixed-methods approach enabled a more comprehensive understanding of the role of visual media literacy in combating misinformation.

6 Case study results

6.1 Case study: visual mis/disinformation dissemination in Jordan (January–August 2024)

In recent years, social media usage in Jordan has become a vital component of daily life, with an increasing number of individuals

TABLE 2 Rumors by field (January–August 2024).

Field	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total	Percentage (%)
Political	19	19	18	13	24	7	20	18	138	28.7%
Security	11	11	22	33	10	24	13	17	141	29.3%
Social	9	4	6	15	10	17	15	12	88	18.3%
Economic	5	8	9	7	5	15	10	8	67	13.9%
Public Affairs	2	5	2	3	5	11	3	6	37	7.7%
Health	0	1	1	0	3	0	2	3	10	2.1%
Total	46	48	58	71	57	74	63	64	481	100%

TABLE 3 Rumors by source (January–August 2024).

Month	Internal	External	Total
January	40	6	46
February	38	10	48
March	46	12	58
April	51	20	71
May	47	10	57
June	68	6	74
July	47	16	63
August	40	24	64
Total	377	104	481

TABLE 4 Rumors by publishing platform (January–August 2024).

Month	Social media	Media outlets	Total
January	39	7	46
February	39	9	48
March	52	6	58
April	60	11	71
May	43	14	57
June	70	4	74
July	56	7	63
August	52	12	64
Total	411	70	481

TABLE 5 Case examples of visual mis/disinformation in Jordan (January–August 2024).

Month	Case title	Description	Clarification
Mar	Video of Malfunction During Aid Drop in Gaza	A video showing a parachute malfunction during an aid drop was attributed to a Jordanian aircraft	Officials clarified that the malfunction did not involve any Jordanian planes
July	Video of Shooting Incident Misattributed to Jordan	A video showing gunfire was circulated with claims it occurred within Jordan	The Public Security Directorate confirmed the incident happened outside Jordan and is unrelated locally
Aug	Videos Suggesting Earthquakes Caused by Gaza Bombings	Visual content claimed that bombings in Gaza were triggering earthquakes in the region	Experts refuted these claims, stating there is no scientific basis linking bombings to seismic activity

turning to digital platforms for communication, entertainment, and news consumption. As of January 2024, Jordan’s population stands at 11.36 million, with 91% internet penetration and 56.2% of the population actively using social media (Kemp, 2024). This widespread adoption signifies the integral role of digital services in the social and economic fabric of Jordan. The landscape of news consumption in Jordan has shifted considerably, with social media platforms becoming the dominant sources of information. Traditional news outlets, while still relevant, are often accessed through social media, which facilitates real-time updates and user engagement.

This study incorporates a case study analyzing the dissemination of disinformation in Jordan over an 8-month period, from January to August 2024. While the data encompasses both textual and visual rumors, the focus here is on understanding the overall landscape of misinformation to highlight the urgency of enhancing visual media literacy. This case study aims to illustrate the real-world context in which visual disinformation occurs, reinforcing the necessity for improved educational strategies.

Data for this case study were obtained from the Jordanian Media Credibility Monitor (Akeed), an established organization dedicated to monitoring and analyzing media content within the country. The collected data were organized into three cumulative tables, providing a comprehensive overview of the nature, origin, and dissemination channels of disinformation in Jordan. Specific

case examples involving visual disinformation are also presented to illustrate the impact of such content.

The data indicate that over the 8-month period, a total of 481 rumors were recorded across various fields. Political (28.7%) and security (29.3%) rumors constitute the majority, together accounting for 58% of all rumors. This prevalence suggests

that misinformation frequently targets sensitive areas that can significantly influence public opinion and national stability. While not all these rumors are necessarily visual in nature, the fields with higher percentages are often areas where visual content is used to amplify the message's impact. For instance, political and security-related misinformation may include manipulated images or videos designed to provoke emotional responses or mislead the audience (Table 2).

The majority of rumors originated from internal sources (78.4%), indicating that domestic factors play a significant role in the spread of misinformation. External sources accounted for 21.6% of rumors, suggesting that foreign entities also contribute to the misinformation landscape, possibly with differing agendas. Understanding the source of rumors is crucial in addressing misinformation. Internal rumors may stem from misunderstandings, lack of information, or deliberate attempts to influence public opinion. External rumors might involve geopolitical interests or attempts to destabilize societal cohesion. Visual content from external sources may be particularly challenging, as it can be unfamiliar and harder for the public to verify (Table 3).

A significant 85.5% of the rumors were disseminated through social media platforms, highlighting the critical role these platforms play in the spread of misinformation. Social media's rapid information-sharing capabilities and wide reach make it a fertile ground for both textual and visual disinformation. The lower percentage of rumors originating from traditional media outlets (14.5%) suggests that while these outlets are not immune to spreading misinformation, they may have more stringent editorial controls compared to social media. However, when traditional media do disseminate false information, it can lend undue credibility to the content (Tables 4, 5).

7 Results of the interviews

The analysis of the interview data highlighted four key themes that reflect the approaches and strategies used by educators to foster visual media literacy in Jordan. These themes provide a comprehensive understanding of how educators equip students to critically engage with visual content, particularly in addressing the challenges posed by misinformation on social media.

7.1 Mastering source verification

This theme underscores the critical role of verifying the authenticity and reliability of visual media sources to combat the pervasive spread of misinformation. The interviews revealed a multifaceted approach required to equip individuals with the skills necessary for discerning credible information from falsehoods. This approach focuses on understanding the origin of visual content, evaluating the credentials of content creators, and cross-referencing information included in the visuals (i.e., images and videos) with reputable sources.

A number of participants stressed the importance of understanding the origin of visual content as a foundational step in source verification. Tracing images or videos back to their

initial creation or upload helps assess their context and authenticity, preventing the spread of misinformation. For instance, Participant A recounted an instance where viral photographs allegedly depicting a severe sandstorm disaster were revealed to be older images repurposed to sensationalize a current mild sandstorm. He stated: "These images were widely shared and caused unnecessary panic, so it is important for us to verify the authenticity and context of visual content before drawing conclusions."

And in an effort to strengthen this skill in the classroom, Participant A mentioned: "I designed a series of exercises and lessons where students were assigned to trace the origins of viral videos and images spread on social media." He gave an example of a recurrent occurrence that he usually noticed on electronic news websites in Jordan. He said:

These websites reuse old images to current news events which sometimes can be misleading or could create public panic I remember last year in winter while it was raining across the country a popular news website stated that the weather is worsening with pictures showing floods happening so when I checked those images myself, I found them to be old images that were even taken from other countries. So, any way long story short, going back to the exercises I do with my students; by using reverse image search tools, students identified the original sources and uncovered instances where images had been manipulated or taken out of context to influence public opinion. After completing these exercises, class discussions would take place to focus on how these images could sway public perception and what measures could be taken to mitigate their influence (Expert, A).

He then stressed: "This interactive activity not only enhanced my students' technical expertise in source verification but also expanded their awareness of the far-reaching effects of visual misinformation."

Another participant highlights the critical need for students to use verification tools like reverse image search engines to uncover the true source and context of visual media. By identifying where and when the content first appeared, students can better assess its potential biases.

Well, our knowledge and what we teach our students about source verification today is different from what it was in the past, I now teach students to use tools like reverse image search, which can help them identify whether a picture was published before. Then, I instruct them to use tools like Google Earth Pro or Bing to locate where the picture was taken. If there is a person in the picture, I personally teach them to use a tool like PimEyes to look up that individual. Finally, I encourage them to think and reflect on why the picture was taken (Expert, L).

He then emphasized his belief by stating, "I believe that teaching students to use these tools can help them uncover the true source and context of such media, preventing the spread of misinformation."

Another crucial aspect of source verification discussed by the interviewees is evaluating the credentials of content creators.

In an era where anyone can publish content, understanding the background and expertise of the creator is vital for assessing the reliability of the information presented. One participant shared experience of uncovering the true credentials of individuals who upload content online, which often revealed a lack of expertise or a history of sensationalism. For example, he stated:

A widely shared image in Jordan claimed an asteroid is going to hit Earth in 5 days. This photo was debunked upon investigating the history of the Facebook page, which usually stages images for sensational impact. And you know the sad thing is that there were many random people sharing the same news story, which I think they believed was true (Expert, B).

He then also added:

A few days ago, I encountered another example of a sponsored video on Facebook. This video claimed that NASA was hiding a secret method for activating a certain part of the human brain. Immediately, I could tell that the video was fabricated because NASA specializes in space activities, not health. Additionally, when I opened the page hosting the video, it appeared very suspicious true (Expert, B).

This highlights the necessity of scrutinizing the source from which the content comes or the professional affiliations and backgrounds of content creators to gauge the credibility of visual media. In the same vein, Participant J stated, “We should encourage students to look into the creator’s portfolio, affiliations, and history of work in order to help them gauge the reliability of the visual content they encounter online.” Likewise, Participant D emphasized the role of comprehensive background checks on creators. He said: “It is not enough to take content at face value; one must delve deeper into the creator’s past work and affiliations to truly understand their credibility.”

Another essential aspect, consistently emphasized by the participants, is the importance of cross-referencing visual media with information from reputable sources in a thorough source verification process. This practice helps confirm or refute the claims made on social media by comparing them with data from established institutions and experts. One expert highlighted this approach by emphasizing the need to verify visual media with reports from reliable news organizations, academic publications, and official statements. She elaborated:

I made my students compare claims made in a dubious video on COVID-19 with reports from the World Health Organisation, revealing significant discrepancies, especially in health subjects. I would say double-checking the information is a must because there is so much out there, and we do not know what is right and what is false (Expert, C).

Similarly, Participant N mentioned: “Cross-referencing visual media with reputable sources is another key strategy I teach my students. Jordan has got reliable official news outlets which can provide confirmation or refutation to social media visual content claims, especially during major news events.” Further reinforcing

this approach, Participant E outlined the importance of diversifying sources when consuming the news online. She stressed: “Relying on multiple reputable sources ensures a more rounded and accurate verification process, reducing the likelihood of falling prey to misinformation.” This practice illustrates how cross-referencing with reputable sources is essential for validating the authenticity of visual media.

7.2 Bias and perspective analysis

A prominent issue raised by the interviewees is that not many social media users recognize the biases and perspectives shaping today’s social media sphere, making it crucial to identify and understand these influences for accurate and thoughtful interpretation of visual content. The interviews revealed key strategies that individuals need to navigate this issue, such as recognizing biases, understanding the influence of perspectives, analyzing symbolism and imagery, and mitigating personal biases.

Participants consistently emphasized the need to develop a critical eye when analyzing how different visual representations can introduce bias through selective framing and presentation. Participant M, who has extensive experience in media literacy education, elaborated on this by stating: “Encouraging students to analyze multiple sources covering the same subject helps reveal biases and provides a more balanced understanding.”

In addition to the importance of understanding biases, Participant R highlighted the value of contextual knowledge, stating: “Understanding a creator’s affiliations and personal beliefs can provide context for the perspectives presented in their visual content.” This insight was further supported by another participant, who stressed the power of visuals, especially if they are charged with the creator’s previous biases and prejudices. He noted:

Well, students must be made aware of the prejudices that exist in pictures because, first, of the significant power they hold, and second, their influence over humans because we instinctively tend to quickly believe what we see, and third, sometimes we see news reporting that does not represent the full picture on the ground so one should look up who is behind the reporting (Expert, N).

Building on these points, Participant I emphasized the importance of examining the broader context and background of media outlets: “Knowing the editorial stance of the media organizations helps us all understand why certain images were chosen over others.” To illustrate the impact of these biases and perspectives, one participant provided an example, describing a scenario involving two videos filmed in the same place but portraying different narratives. He said:

As you know, Jordan is home to many touristic spots. In one instance, a video published by a travel blog showcased a serene and picturesque view of an area at sunset, highlighting its natural beauty and tranquility. However, about a week later, I came across another video from an environmental advocacy page run by activists, which focused on the environmental challenges in the same region, such as the impact of tourist

activities, overgrazing, and desertification. Although both videos were filmed in the same location, they conveyed vastly different narratives (Expert, K).

Another critical aspect of bias and perspective analysis that emerged in the interviews is understanding the perspectives or viewpoints embedded in visual content. This involves examining the creator's background and the broader context in which the content was produced. For example, one participant explained: "I always display this example in my trainings in the local community to show how different perspectives might look like." She said:

In my media literacy lessons, whether at the university or when I give lectures to the local community, I present two YouTube videos on the same subject. One video is created by a travel vlogger who often collaborates with luxury hotels and resorts, showcasing the opulent and glamorous side of traveling in Jordan, highlighting high-end accommodations and exclusive experiences. The other video is produced by a local resident and independent filmmaker, focusing on the cultural heritage and everyday life of local communities, emphasizing authenticity and the importance of supporting local businesses. Both videos offer valuable insights, but present different viewpoints shaped by the creators' backgrounds and affiliations (Expert, P).

This underlines the necessity of understanding the creator's perspective and its influence on the narrative. Furthermore, thorough bias and perspective analysis involves examining the symbolism and imagery used in visual media. This practice helps uncover underlying messages and biases intended to influence viewers.

The last element that participants emphasized is the importance of deconstructing visual elements in media, such as color schemes, settings, and character portrayals. She provided an example:

When ads for luxury cars consistently feature affluent, happy individuals in exotic locations, they subtly promote the idea that owning the car equates to success and happiness. This example helps students see how imagery and symbolism are used to convey biased messages and shape consumer perceptions (Expert, C).

This point was echoed by Participant Q, who asserted: "Guiding students to deconstruct visual elements in media can uncover underlying messages and biases intended to influence viewers."

7.3 Decoding emotional and psychological tactics

"We all know how powerful visuals can be, they can move us, inspire us, and sometimes even manipulate us" (Expert, Q). This theme emphasizes the importance of recognizing and understanding how visual content can influence emotions and opinions, aiming to combat the widespread dissemination of misinformation. The data revealed various strategies for identifying manipulative visual content on social media.

When participants were asked about this aspect in visual content, most of the participants stressed the importance of recognizing emotional manipulation or the use of emotional appeals as a foundational step in media literacy. Being aware of how visual media can evoke strong emotional responses helps in developing a critical eye. For instance, one participant stated:

There was a case where a charity advertisement on YouTube featuring distressing images of malnourished children was analyzed. The ad was designed to elicit strong emotional responses and drive donations. While the cause was genuine, the use of emotionally manipulative imagery made the participants aware of the power of this kind of appeal in delivering visual content and also raised ethical questions, such as: Is the advertisement exploiting the suffering of the children? (Expert, E).

This scenario highlights the critical need for students to analyze their emotional reactions to visual content. Participant A elaborated: "Encouraging students to take a step back and analyze their emotional reactions to visual content can help in critically assessing emotionally charged visuals."

Another crucial aspect of understanding emotional manipulation discussed by the interviewees is identifying psychological tactics used in misinformation. Common strategies discussed by the participants were fearmongering and sensationalism. One participant shared:

During COVID-19, there were many videos that spread all over social media that made people anxious and afraid. These videos used dramatic music and sensational imagery to instill fear. When played later in the classroom, many students admitted that they had felt afraid and anxious after watching these videos, regardless of whether the videos were credible or not (Expert, F).

He then asserted that "Explaining such videos and identifying signs of sensationalism, the appeals used, and verifying questionable claims with reputable sources were so game-changing and revealing to the students." Similarly, Participant J emphasized: "It is important to discuss examples involving students reviewing several videos that use emotional appeals such as ads or regular YouTube videos, and noting how these elements were used to create an emotional connection and influence upon the viewers." He then added:

In a particular classroom activity, the students were asked to analyze a viral video that used sensational imagery and dramatic music to evoke fear about a public health issue. And then after identifying the emotional and psychological tactics employed, students reflected on how these elements influenced their initial reactions and how it could mitigate their impact (Expert, J).

This practice illustrates how analyzing emotionally charged media can help students understand manipulative tactics especially in the age of influencers and their way of utilizing the emotional appeal in their content. One participant argued:

We live in an era where we witness a new influencer every single day and many of whom we do not know as parents and educators, and our youth are so consumed by them. So, implementing teaching exercises where students deconstruct emotional videos made by influencers can help them identify future emotional tactics and understand their impact on opinions and behaviors (Expert, H).

7.4 Promoting visual media literacy education

This theme highlights the need for equipping individuals, especially the youth, with the skills to critically evaluate visual content and recognize misinformation. Educational initiatives on media literacy and public awareness efforts are now vital in the ever-changing digital environment, fostering a well-informed society. The interviews revealed that schools and universities in Jordan should focus on implementing media literacy education as a mandatory subject, as only a very few universities teach media literacy at the moment. According to the participants, universities should not only adopt teaching one course as part of the university requisites but should also design effective awareness campaigns and public lectures and workshops aimed at the public and community on the subject.

Participants unanimously highlighted the importance of integrating media literacy education as a foundational step in fostering critical thinking skills and a society with media aware individuals. Many of the participants emphasized that integrating media literacy into school curricula from an early age is essential. One participant stated:

But you know, not only adults are using social media today; many children, including mine, now have mobile phones and are digitally connected. For example, if you go on Facebook or TikTok, you will find profiles of children. These children are consuming the same content that older people consume. And therefore, I want their schools to make them aware, as I know many children listen more to their schools than they do to their parents (Expert, H).

Similarly, Participant B mentioned: “A few weeks ago, I gave a voluntary two-day media literacy course for diploma college students. The course aimed to provide students with the basic knowledge to critically assess the content produced online.” He added:

I gave an exercise that involved students analyzing news photographs without knowing they were all deepfake photos. The task was to identify whether the photos were real, and almost 95 percent of the students got them wrong. So, for me, I can assure you that this hands-on approach significantly enhanced their ability to distinguish credible photos from misleading ones (Expert, B).

As an effective complementary tool for teaching visual media literacy, which not many educators use, Participant O discussed

how she uses visual aids, such as pictures, infographics, and visual quizzes, to accompany her lessons on media literacy. She finds these tools highly effective in engaging students. She said: “By teaching students how to interpret these visuals, I ensure that they can not only absorb the content but also analyze the information presented to them, and I found that this approach works well with them.”

Another aspect of promoting visual media literacy, as discussed by the interviewees, is the development and implementation of effective public awareness workshops and campaigns. Participant P stressed: “Public lectures, workshops, and campaigns play a vital role in raising awareness about visual misinformation and promoting responsible media consumption.” Likewise, one participant stated:

The youth in Jordan is so much bombarded with online content, and now with the spread of deepfakes due to the advancement of artificial intelligence, there must be a strong focus by policymakers on running workshops and campaigns. These are effective and quick tools to reach out to public audiences and educate them on how to deal with online content, including photos and videos (Expert, A).

Furthermore, other participants highlighted the necessity of creating engaging and relatable content to effectively communicate the message. Participant R emphasized: “I think as educators, we should design more personalized lectures that draw from our daily experiences and our online environment in Jordan and the broader Middle East.” Similarly, Participant L noted, “Designing interactive and engaging activities that allow students to practice media literacy skills can foster a deeper understanding of visual content evaluation.”

In the same vein, Participant J stated: “I think the most powerful tool in addressing the surge of online content and misleading information is through providing engaging lectures that promote critical evaluation skills, supported by ongoing public awareness campaigns and community training.” Adding to this perspective, Participant D mentioned the role of utilizing multiple platforms to reach a broad audience. He said: “Combining online and offline efforts, such as social media campaigns, public lectures, and interactive workshops, can effectively raise awareness and engage the community.”

According to the majority of the participants, engaging the community through targeted media literacy education is highly effective. Participant K emphasized: “Fostering collaborations with community organizations, schools, and libraries can extend the reach of media literacy programs and have a lasting impact.” Further reinforcing this approach, one participant argued:

I think our way of dealing with disinformation on social media is through engaging the community via face-to-face discussions, giving them the space to ask questions, share their experiences, and learn from experts. This, I believe, enhances their understanding and ability to deal with online content (Expert, G).

8 Discussion

The findings of this study highlight the critical importance of visual media literacy, particularly in combating misinformation and fostering a well-informed society. As visual content continues to dominate digital communication, the need to develop and implement strategies for critical evaluation becomes increasingly urgent. The integration of the case study analyzing rumor dissemination in Jordan from January to August 2024 reinforces this urgency by providing empirical evidence of the pervasive nature of misinformation. Moreover, the findings provide strategies and a framework to navigate the complexities of visual media content in a digital environment.

To begin with, Mastering Source Verification emerged as a foundational skill essential for discerning credible information from falsehoods. The findings emphasized the necessity of equipping individuals, especially students, with tools and techniques to verify the authenticity and reliability of visual media sources. This aligns with the broader concept of media literacy, which integrates cognitive and interpretive skills to critically engage with media content (Potter, 2004; Livingstone, 2004; Messaris, 1998; Mrisho et al., 2023). The case study revealed that a staggering 85.5% of the 481 recorded rumors were disseminated through social media platforms, highlighting the critical role these platforms play in spreading misinformation. The ability to trace the origins of visual content, assess the credentials of creators, and cross-reference information with reputable sources is crucial in preventing the spread of misinformation. In particular, teaching students these skills through hands-on activities, such as reverse image searches, not only enhances their technical expertise but also broadens their understanding of the implications of visual misinformation.

Furthermore, the Picture Superiority Effect (PSE), as explored in the literature, underscores the potent influence of images in memory retention and behavior shaping. This effect, which demonstrates that images are more likely to be remembered and influence behavior compared to text, is particularly relevant in the context of social media. Visual content on platforms like Facebook and Instagram often drives engagement and can sometimes be misleading (Klein, 2020; Yang et al., 2023). The prevalence of political and security-related rumors in the case study, which together accounted for 58% of all rumors, exemplifies how visual content can be used to manipulate public perception on sensitive issues. The study's findings suggest that integrating PSE awareness into visual media literacy educational settings is crucial for helping students recognize the power of visuals to shape opinions and the importance of questioning the credibility of these images. This approach aligns with previous research which suggests that critical engagement with visual content can help mitigate the impact of misinformation (Brennen et al., 2021; Chen et al., 2022). Therefore, the findings of this study are highly relevant, especially considering that although visual media is widespread and misinformation has garnered increasing scholarly attention, research on visual misinformation remains relatively scarce (Peng et al., 2023).

Additionally, Bias and Perspective Analysis emerged as a particularly significant theme in this study, reflecting the profound impact that biases and perspectives can have on the interpretation

of visual content. The ability to recognize these biases and understand how perspectives shape media messages is crucial for developing a critical approach to visual media. The findings suggest that selective framing and presentation can significantly influence public perceptions, as highlighted by participants who noted the importance of developing a critical eye in evaluating the context in which visual content is produced and shared. The case study's indication that 78.4% of rumors originated from internal sources and 21.6% from external sources further underscores the need to understand the origins of information and potential biases inherent in content.

This observation aligns with existing scholarship that has long emphasized the role of framing in media. For instance, Entman (1993)'s framing theory posits that the way information is presented in terms of inclusion and exclusion can significantly influence how audiences interpret and respond to that information. This theory has been applied extensively in studies of news media, where it has been shown that framing can subtly, yet powerfully, shape societal views and perceptions (Ahmad, 2022; Schnell et al., 2021). The findings of this study suggest that similar dynamics are at play in visual media, where the framing of images, the selection of visual elements, and the use of particular symbols can guide viewers toward specific interpretations while obscuring alternative perspectives. The case examples from the case study, such as the misattributed videos and images that led to public panic or distrust, illustrate the real-world consequences of biased visual content.

Moreover, the study highlights the importance of teaching students to deconstruct visual content by considering the creator's background, the intended audience, and the socio-political context in which the content is produced. This approach is consistent with critical media literacy frameworks that advocate for a deeper analysis of the media (Funk et al., 2016). By encouraging students to engage with visual content in this way, educators can help them develop a more nuanced and informed perspective, one that recognizes the inherent subjectivity and potential biases in media messages. This is particularly important given the findings from the case study, where misinformation often stemmed from internal sources, emphasizing the need for critical evaluation of domestic media content.

Furthermore, Decoding Emotional and Psychological Tactics was identified as a critical aspect of visual media literacy. The findings reveal that understanding how visual content can manipulate emotions and opinions is essential for developing critical thinking skills. This is particularly relevant in the context of the PSE, where emotionally charged images can have a disproportionate impact on viewers (Ecker et al., 2014a; Ng, 2022). The case study provided examples of how emotionally manipulative content, such as videos claiming to show imminent security threats or health crises, led to public panic and confusion. In light of this, the study emphasizes the importance of educating students about emotional manipulation techniques such as fearmongering and sensationalism, enabling them to critically assess the emotional and psychological tactics used in visual media. This approach not only helps in combating misinformation but also equips students to navigate the emotional appeals prevalent in social media content, particularly those utilized by influencers (Roosenbeek et al., 2022; Lee and Theokary, 2021; Preston et al., 2021).

Finally, the study highlights the pivotal role of Promoting Visual Media Literacy through Systematic Education and Community Engagement. The findings align with the literature that underscores, first, the responsibility of educators to fulfill their role in supporting democratic values and leading the way in teaching media and information literacy (Muñiz-Velázquez, 2023), and second, the need for integrating visual media literacy into school curricula from an early age to foster critical thinking skills and nurture media-savvy individuals (Suprianto et al., 2019; Cheung and Jhaveri, 2016). The case study's revelation that a significant portion of misinformation is disseminated through social media platforms (85.5%) underscores the urgency of these educational initiatives. Moreover, the development of public awareness workshops and campaigns is crucial in raising awareness about visual misinformation and promoting responsible media consumption. By engaging the community through interactive workshops and seminars, educators can ensure that visual media literacy education is accessible to diverse demographic groups, fostering a more informed and critical society.

9 Conclusion

This research explored the crucial role of visual media literacy in combating misinformation and enhancing critical evaluation skills among students and the public. Through qualitative interviews with university educators and psychologists, combined with a case study analyzing rumor dissemination in Jordan, the study offers comprehensive insights into the challenges and strategies of visual media literacy. The findings highlight the necessity of comprehensive source verification, including understanding the origin of visual content and cross-referencing with reputable sources. The case study showed that 85.5% of rumors were spread via social media, demonstrating the urgency of equipping individuals with critical skills to assess such content. Furthermore, recognizing biases and perspectives within visual media is essential. The study revealed that 78.4% of rumors originated from internal sources, emphasizing the need for individuals to be vigilant about biases, regardless of the source. The research also underscored the significance of identifying emotional and psychological tactics in visual media. The case examples illustrated how emotionally charged visuals could lead to public panic, highlighting the importance of teaching individuals to decode manipulative strategies. By doing so, individuals can critically assess emotional appeals used in misinformation. These findings carry significant implications for education and public awareness. Educators and policymakers may integrate visual media literacy into school curricula to help students develop critical evaluation skills early on. Public awareness campaigns and community engagement efforts, such as

workshops and seminars, can further promote media literacy and responsible media consumption in today's online sphere. Given the high volume of rumors and the dominance of social media, these initiatives are essential for fostering a more informed and critical society.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethics Committee of the Scientific Deanship of Zarqa University, Zarqa, Jordan. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AA: Writing – original draft, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. The author declares that this research was funded by the Deanship of Scientific Research at Zarqa University, Jordan.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Ahmad, A. K., AL-Jalabneh, A. A., Mahmoud, A., and Safori, A. (2022). "Covid-19 and the resurgence of the hypodermic needle theory applicability in times of crises,"

in *International Conference on Business and Technology* (Cham: Springer International Publishing), 1423–1436. doi: 10.1007/978-3-031-08954-1_124

- Ahmad, R. (2022). Analysis of media bias—Glenn Beck TV shows: a content analysis. *J. Creat. Commun.* 17, 67–87. doi: 10.1177/09732586211048990
- Akeed (2024a). Jordanian Media Credibility Monitor. *Circulation of a video on social media featuring a Jordanian TV presenter endorsing a financial scheme was found to be manipulated using AI*. Akeed. Available at: <https://feji.us/nvpeo7> (accessed October 9, 2024).
- Akeed (2024b). Jordanian Media Credibility Monitor. *Images not from southern suburb bombing in Lebanon*. Available at: <https://shorturl.at/MWBiP> (accessed October 9, 2024).
- Akeed (2024c). Jordanian Media Credibility Monitor. *The circulated video claiming to feature the richest woman in Jordan using the voice of Jordanian TV presenter Anas Al-Majali is fabricated*. Akeed. Available at: <https://shorturl.at/sCXTf> (accessed October 9, 2024).
- Aljalabneh, A., Aljawawdeh, H., Mahmoud, A., Sharadqa, T., and Al-Zoubi, A. (2024). “Balancing efficiency and ethics: the challenges of artificial intelligence implementation in journalism,” in *Intelligent Systems, Business, and Innovation Research* (Springer), 763–773. doi: 10.1007/978-3-031-36895-0_64
- AL-Jalabneh, A. A. (2023). Health misinformation on social media and its impact on COVID-19 vaccine inoculation in Jordan. *Commun. Soc.* 36, 185–200. doi: 10.15581/003.36.1.185-200
- Al-Jalabneh, A. A., Safori, A. O., and Shlool, H. (2022). “Covid-19 and misinformation prevalence: A content analysis of fake news stories spread in Jordan,” in *The Implementation of Smart Technologies for Business Success and Sustainability: During COVID-19 Crises in Developing Countries* (Cham: Springer International Publishing), 535–545. doi: 10.1007/978-3-031-10212-7_44
- Aufderheide, P. (1993). *Media Literacy: From a Report of the National Leadership Conference on Media Literacy*. Queenstown, MD: The Aspen Institute.
- Avgerinou, M., and Ericson, J. (1997). A review of the concept of visual literacy. *Br. J. Educ. Technol.* 28, 280–291. doi: 10.1111/1467-8535.00035
- Bock, M. A. (2023). Visual media literacy and ethics: images as affordances in the digital public sphere. *First Monday* 28:13233. doi: 10.5210/fm.v28i7.13233
- Braden, R. A. (1996). “Visual literacy,” in *Handbook of Research for Educational Communication and Technology*, ed. D. Jonassen (New York: McGraw-Hill), 49–520.
- Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. doi: 10.1191/1478088706qp0630a
- Brennen, J. S., Simon, F. M., and Nielsen, R. K. (2021). Beyond (mis)representation: visuals in COVID-19 misinformation. *Int. J. Press/Politics* 26, 277–299. doi: 10.1177/1940161220964780
- Catanzaro, M., and Collin, P. (2023). Kids communicating climate change: learning from the visual language of the SchoolStrike4Climate protests. *Educ. Rev.* 75, 9–32. doi: 10.1080/00131911.2021.1925875
- Chauvin, B. A. (2003). Visual or media literacy? *J. Visual Liter.* 23, 119–128. doi: 10.1080/23796529.2003.11674596
- Chayyek (2024). *Featuring superheroes in Jordan's elections: misleading images surface on social media*. Available at: <https://shorturl.at/6FOiT> (accessed October 9, 2024).
- Chen, G., Ciuccarelli, P., and Colombo, S. (2022). “VisualBubble: Exploring how reflection-oriented user experiences affect users' awareness of their exposure to misinformation on social media,” in *CHI Conference on Human Factors in Computing Systems Extended Abstracts*, 1–7. doi: 10.1145/3491101.3519615
- Cheung, C. K., and Jhaveri, A. D. (2016). Developing students' critical thinking skills through visual literacy in the New Secondary School Curriculum in Hong Kong. *Asia Pacific J. Educ.* 36, 379–389. doi: 10.1080/02188791.2014.959470
- Curran, T., and Doyle, J. (2011). Picture superiority doubly dissociates the ERP correlates of recollection and familiarity. *J. Cogn. Neurosci.* 23, 1247–1262. doi: 10.1162/jocn.2010.21464
- Da, J., Forbes, M., Zellers, R., Zheng, A., Hwang, J. D., Bosselut, A., et al. (2021). “Edited media understanding frames: Reasoning about the intent and implications of visual misinformation,” in *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing*. 2026–2039. doi: 10.18653/v1/2021.acl-long.158
- Dame Adjin-Tettey, T. (2022). Combating fake news, disinformation, and misinformation: experimental evidence for media literacy education. *Cogent Arts Human.* 9:2037229. doi: 10.1080/23311983.2022.2037229
- Ecker, U. K., Lewandowsky, S., Chang, E. P., and Pillai, R. (2014a). The effects of subtle misinformation in news headlines. *J. Exper. Psychol.* 20:323. doi: 10.1037/xap0000028
- Ecker, U. K., Lewandowsky, S., Fenton, O., and Martin, K. (2014b). Do people keep believing because they want to? Preexisting attitudes and the continued influence of misinformation. *Memory Cogn.* 42, 292–304. doi: 10.3758/s13421-013-0358-x
- Entman, R. M. (1993). Framing: toward clarification of a fractured paradigm. *J. Commun.* 43, 51–58. doi: 10.1111/j.1460-2466.1993.tb01304.x
- Erhardt, K., and Pentland, A. (2022). Disambiguating disinformation: extending beyond the veracity of online content. *arXiv preprint arXiv:2206.12915*. doi: 10.48550/arXiv.2206.12915
- Fallis, D. (2015). What is disinformation? *Library Trends* 63, 401–426. doi: 10.1353/lib.2015.0014
- Farmer, L. (2022). Visual literacy and fake news: Gaining a visual voice. *Stud. Technol. Enhanc. Learn.* 2:36. doi: 10.21428/8c225f6e.b34036b2
- Ford, T., Yankoski, M., Facciani, M., and Weninger, T. (2023). Online media literacy intervention in Indonesia reduces misinformation sharing intention. *J. Media Liter. Educ.* 15, 99–123. doi: 10.23860/JMLE-2023-15-2-8
- Funk, S., Kellner, D., and Share, J. (2016). “Critical media literacy as transformative pedagogy,” in *Handbook of Research on Media Literacy in the Digital Age*, 1–30. doi: 10.4018/978-1-4666-9667-9.ch001
- Habes, M., Elareshi, M., Mansoori, A., Pasha, S., Salloum, S. A., and Al-Rahmi, W. M. (2023). Factors indicating media dependency and online misinformation sharing in Jordan. *Sustainability* 15:1474. doi: 10.3390/su15021474
- Hameleers, M. (2024). The nature of visual disinformation online: a qualitative content analysis of alternative and social media in the Netherlands. *Polit. Commun.* 1–19. doi: 10.1080/10584609.2024.2354389. [Epub ahead of print].
- Hobbs, R. (2010). *Digital and Media Literacy: A Plan of Action*. Aspen Institute. 1 Dupont Circle NW Suite 700, Washington, DC 20036.
- Hockley, W. E., and Bancroft, T. (2011). Extensions of the picture superiority effect in associative recognition. *Canadian J. Exper. Psychol.* 65:236. doi: 10.1037/a0023796
- Horvitz, E. (2022). “On the horizon: interactive and compositional deepfakes,” in *Proceedings of the 2022 International Conference on Multimodal Interaction*, 653–661. doi: 10.1145/3536221.3558175
- Hou, J. R., Zhang, J., and Zhang, K. (2023). Pictures that are worth a thousand donations: how emotions in project images drive the success of online charity fundraising campaigns? An image design perspective. *Manag. Inf. Syst. Quart.* 47, 535–584. doi: 10.25300/MISQ/2022/17164
- Jin, Z., Cao, J., Luo, J., and Zhang, Y. (2016). Image credibility analysis with effective domain transferred deep networks. *arXiv preprint arXiv:1611.05328*. doi: 10.48550/arXiv.1611.05328
- Kasra, M., Shen, C., and O'Brien, J. F. (2018). “Seeing is believing: how people fail to identify fake images on the web,” in *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–6. doi: 10.1145/3170427.3188604
- Kemp, S. (2024). *Digital 2024: Jordan — DataReportal — Global Digital Insights*. DataReportal – Global Digital Insights. Available at: <https://datareportal.com/reports/digital-2024-jordan> (accessed October 9, 2024).
- Khan, S. A., Sheikhi, G., Opdahl, A. L., Rabbi, F., Stoppel, S., Trattner, C., et al. (2023). Visual user-generated content verification in journalism: an overview. *IEEE Access* 11, 6748–6769. doi: 10.1109/ACCESS.2023.3236993
- Klein, O. (2020). Misleading memes. The effects of deceptive visuals of the British national party. *Particip. Conflitto* 13, 154–179. doi: 10.1285/i20356609v13i1p154
- Kress, G. R., and van Leeuwen, T. (1996). *Reading Images: The Grammar of Visual Design*. New York, NY: Routledge.
- Lago, F., Phan, Q. T., and Boato, G. (2019). Visual and textual analysis for image trustworthiness assessment within online news. *Secur. Commun. Netw.* 2019:9236910. doi: 10.1155/2019/9236910
- Lee, M. T., and Theokary, C. (2021). The superstar social media influencer: Exploiting linguistic style and emotional contagion over content? *J. Bus. Res.* 132, 860–871. doi: 10.1016/j.jbusres.2020.11.014
- Li, H., Bailey, A., Huynh, D., and Chan, J. (2020). YouTube as a source of information on COVID-19: a pandemic of misinformation?. *BMJ Global Health* 5:e002604. doi: 10.1136/bmjgh-2020-002604
- Li, Y., and Xie, Y. (2020). Is a picture worth a thousand words? An empirical study of image content and social media engagement. *J. Market. Res.* 57, 1–19. doi: 10.1177/0022243719881113
- Livingstone, S. (2004). Media literacy and the challenge of new information and communication technologies. *Commun. Rev.* 7, 3–14. doi: 10.1080/10714420490280152
- Lo, L. Y. H., Gupta, A., Shigyo, K., Wu, A., Bertini, E., and Qu, H. (2022). “Misinformed by visualization: what do we learn from misinformative visualizations?” in *Computer Graphics Forum*, 515–525. doi: 10.1111/cgf.14559
- Luo, G., Darrell, T., and Rohrbach, A. (2021). Newsclippings: Automatic generation of out-of-context multimodal media. *arXiv preprint arXiv:2104.05893*. doi: 10.48550/arXiv.2104.05893
- Maloy, R., Butler, A., and Goodman, L. (2022). Critical media literacy in teacher education: discerning truth amidst a crisis of misinformation and disinformation. *J. Technol. Teach. Educ.* 30, 167–176.
- Maniyal, V., and Kumar, V. (2024). Unveiling the deepfake dilemma: framework, classification, and future trajectories. *IT Prof.* 26, 32–38. doi: 10.1109/MITP.2024.3369948

- Messaris, P. (1998). Visual aspects of media literacy. *J. Commun.* 48, 70–80. doi: 10.1111/j.1460-2466.1998.tb02738.x
- Mrisho, D. H., Bulendu, D. E., and Dominic, N. A. (2023). Media literacy: Concept, theoretical explanation, and its importance in the digital age. *East African J. Arts Soc. Sci.* 6, 78–85. doi: 10.37284/eajass.6.1.1087
- Muñiz-Velázquez, J. A. (2023). (Dis) information literacy: a democratic right and duty of all citizens. *Media Commun.* 11, 1–4. doi: 10.17645/mac.v11i2.7029
- Newman, E. J., and Schwarz, N. (2023). Misinformed by images: how images influence perceptions of truth and what can be done about it. *Curr. Opin. Psychol.* 56:101778. doi: 10.1016/j.copsyc.2023.101778
- Ng, Y. (2022). *A Cross-National Study of Fear Appeal Messages in YouTube Trending Videos About COVID-19*. New York: The American Behavioral Scientist. doi: 10.31235/osf.io/mgjhj
- Nyhan, B. (2021). Why the backfire effect does not explain the durability of political misperceptions. *Proc. Nat. Acad. Sci.* 118:e1912440117. doi: 10.1073/pnas.1912440117
- Paivio, A., and Csapo, K. (1973). Picture superiority in free recall: imagery or dual coding?. *Cogn. Psychol.* 5, 176–206. doi: 10.1016/0010-0285(73)90032-7
- Peng, Y., Lu, Y., and Shen, C. (2023). An agenda for studying credibility perceptions of visual misinformation. *Polit. Commun.* 40, 225–237. doi: 10.1080/10584609.2023.2175398
- Pérez-Escobar, M., Lilleker, D., and Tapia-Frade, A. (2023). A systematic literature review of the phenomenon of disinformation and misinformation. *Media Commun.* 11, 76–87. doi: 10.17645/mac.v11i2.6453
- Potter, W. J. (2004). *Theory of Media Literacy: A Cognitive Approach*. London: Sage Publications. doi: 10.4135/9781483328881
- Preston, S., Anderson, A., Robertson, D. J., Shephard, M. P., and Huhe, N. (2021). Detecting fake news on Facebook: the role of emotional intelligence. *PLoS ONE* 16:e0246757. doi: 10.1371/journal.pone.0246757
- Roozenbeek, J., Van Der Linden, S., Goldberg, B., Rathje, S., and Lewandowsky, S. (2022). Psychological inoculation improves resilience against misinformation on social media. *Sci. Adv.* 8:eabo6254. doi: 10.1126/sciadv.abo6254
- Safari, A. O., and Ananbeh, A. A. (2023). The photo manipulation from the perspective of the photographers: evidence from Jordan. *Human. Soc. Sci. Series* 38:2120. doi: 10.35682/mjhsc.v38i2.632
- Schnell, F., Tahmaseb-McConatha, J., Magnarelli, J., and Broussard, J. (2021). Ageism and perceptions of vulnerability: framing of age during the Covid-19 pandemic. *Adv. Soc. Sci. Res. J.* 8:170. doi: 10.14738/assrj.82.9706
- Shin, D. (2024). “Conclusion: misinformation and AI—how algorithms generate and manipulate misinformation,” in *Artificial Misinformation: Exploring Human-Algorithm Interaction Online* (Cham: Springer Nature Switzerland), 259–277. doi: 10.1007/978-3-031-52569-8_10
- Stenberg, G. (2006). Conceptual and perceptual factors in the picture superiority effect. *Eur. J. Cogn. Psychol.* 18, 813–847. doi: 10.1080/09541440500412361
- Stephens, M., Poon, J., and Tan, G. (2023). “Misinformation in the digital age: an american infodemic,” in *Misinformation in the Digital Age* (Edward Elgar Publishing), 1–18. doi: 10.4337/9781789904895
- Suprianto, J., Sukartingsih, W., Indarti, T., and Subroto, W. T. (2019). Development of writing learning media based on visual literacy to improve critical thinking ability of second grade elementary school students. *Int. J. Sci. Res. Public.* 9, 295–300. doi: 10.29322/IJSRP.9.02.2019.p8639
- Thomson, T. J., Angus, D., Dootson, P., Hurcombe, E., and Smith, A. (2020). Visual Mis/disinformation in journalism and public communications: current verification practices, challenges, and future opportunities. *Journ. Pract.* 16, 938–962. doi: 10.1080/17512786.2020.1832139
- Trattner, C., Jannach, D., Motta, E., Costera Meijer, I., Diakopoulos, N., Elahi, M., et al. (2022). Responsible media technology and AI: challenges and research directions. *AI Ethics* 2, 585–594. doi: 10.1007/s43681-021-00126-4
- UNDP (2023). *Unravelling the Web of false Information in Jordan*. UNDP. Available at: <https://www.undp.org/jordan/blog/unravelling-web-false-information-jordan> (accessed October 9, 2024).
- Weikmann, T., and Lecheler, S. (2023). Visual disinformation in a digital age: a literature synthesis and research agenda. *New Media Soc.* 25, 3696–3713. doi: 10.1177/14614448221141648
- Wileman, R. E. (1993). *Visual Communicating*. Englewood Cliffs, NJ: Educational Technology Publications.
- Williams, C. M., and Debes, J. L. (1970). *Proceedings of the first national conference of visual literacy*. New York, NY: Pitman.
- Wu, H., Zhang, E., Liao, L., Chen, C., Hou, J., Wang, A., et al. (2023). “Exploring video quality assessment on user generated contents from aesthetic and technical perspectives,” in *Proceedings of the IEEE/CVF International Conference on Computer Vision*, 20144–20154. doi: 10.1109/ICCV51070.2023.01843
- Yang, Y., Davis, T., and Hindman, M. (2023). Visual misinformation on Facebook. *J. Commun.* 73, 316–328. doi: 10.1093/joc/jqac051
- Zhang, L., Iyendo, T. O., Apuke, O. D., and Gever, C. V. (2022). Experimenting the effect of using visual multimedia intervention to inculcate social media literacy skills to tackle fake news. *J. Inf. Sci.* 2022:01655515221131797. doi: 10.1177/01655515221131797
- Zhao, H., Xu, J., Iyendo, T. O., Apuke, O. D., Tunca, E. A., and Gever, V. C. (2023). The effectiveness of using audio-visual based media intervention for promoting social media literacy skills to curtail fake news on social media: a quasi-experimental investigation. *Inf. Dev.* 2023:02666669231217236. doi: 10.1177/02666669231217236