

Interplay of media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills of pre-service teachers

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Abstract

Aim: This study examined how cognitive-related factors influence the development of critical viewing skills among pre-service teachers, focusing on the relationships among media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills within teacher education contexts.

Methodology: A quantitative descriptive–correlational design was employed involving 122 pre-service teachers selected through systematic random sampling. Data were collected using an adapted survey questionnaire and a standardized critical-viewing skills test. Descriptive statistics, canonical correlation, and multiple regression analyses were used to determine relationships and predictive influences among the variables.

Results: Findings revealed high levels of media literacy exposure, visual bias recognition, and cognitive flexibility, while critical viewing skills were at a moderate level. Regression analysis showed that the predictor variables collectively influenced critical viewing skills. The model was statistically significant. However, exposure to media literacy did not significantly predict critical viewing skills, whereas recognition of visual bias emerged as a significant positive predictor. In contrast, cognitive flexibility showed a significant negative predictive relationship.

Conclusion: The findings indicate that critical viewing skills are more strongly associated with higher-order cognitive processes, particularly bias recognition, than with media exposure alone. This highlights the need for teacher education programs to integrate structured media analysis, bias detection, and metacognitive regulation strategies to advance media competencies. The study underscores the importance of cognitively engaging instructional approaches in developing critical media competencies among future educators.

Keywords: *media literacy exposure, visual bias recognition, cognitive flexibility, critical viewing skills, pre-service teachers*

INTRODUCTION

Digital media is widespread in contemporary society, making media literacy an essential competency for both students and teachers. As digital platforms increasingly shape how information is produced and interpreted, educational institutions are expected to equip learners to analyze media critically. However, despite constant exposure to media, many students still lack the critical viewing skills necessary to interpret messages accurately, distinguish facts from opinions, and evaluate content objectively.

The integration of Media and Information Literacy (MIL) into educational curricula has been widely recognized as essential for developing informed and critical citizens (Rojas-Estrada et al., 2024). Nevertheless, challenges persist across educational systems.

In the Philippine context, inconsistencies in curriculum integration, limited teacher training, and insufficient resources continue to hinder the development of these competencies (Baja & Borja, 2025). These conditions highlight the need to better prepare pre-service teachers in guiding future learners in critiquing media using viewing skills.

Existing literature underscores the role of teacher education programs in addressing digital communication challenges, misinformation, and visual bias; however, more recent studies highlight persistent gaps in the pedagogical integration of media literacy among pre-service teachers. (Mazman Akar et al., 2025; Neira et al., 2024).

Moreover, studies indicate that although pre-service teachers frequently use digital media, they often rely on limited evaluative strategies, reflecting insufficient structured learning opportunities for critical media engagement (Trixa & Kaspar, 2024).

Despite growing attention to media literacy, gaps remain in understanding how media literacy exposure, visual bias recognition, and cognitive flexibility interact to influence critical viewing skills, particularly within localized teacher education contexts. While previous studies have examined these variables independently, limited research has investigated their combined influence, especially among pre-service teachers in the Philippine setting (Rojas-Estrada et al., 2024; Trixa & Kaspar, 2024).

Addressing this gap, the pedagogical contribution of this study lies in its integrated examination of cognitive flexibility and visual bias recognition as key regulators of critical media engagement among pre-service teachers in Cagayan de Oro City. Moving beyond traditional exposure-based approaches, this study combines cognitive and media-related factors to provide a more comprehensive understanding of how critical media engagement develops (Aljalabneh, 2024; Spinde et al., 2024). The findings are expected to inform the design of cognitively engaging instructional strategies that explicitly develop bias detection, framing analysis, and metacognitive regulation. These insights may further guide curriculum design, instructional practice, and policy development aligned with Sustainable Development Goal 4 (Quality Education).

Review of Related Literature and Studies

This chapter reviews the literature and studies relevant to the research variables. Recent sources from various databases have been selected to provide comprehensive background information for the current investigation.

Critical Viewing Skills

Critical viewing in digital environments requires the ability to interpret multiple modes of communication, including images, text, and sound. Cross-modal analysis emphasizes how these elements interact to construct meaning, allowing learners to critically engage with complex media messages (Serafini & Gee, 2021). In this context, critical viewing extends beyond passive consumption and involves analytical evaluation, interpretation, and reflection.

Research indicates that pre-service teachers initially demonstrate limited multimodal awareness; however, their interpretive skills improve through sustained engagement with multimodal texts and digital literacy experiences (Bixler & Norman, 2024; Isaacs et al., 2024). Instructional approaches such as video analysis and digital storytelling have been found to effectively support the development of analytical and interpretive skills by encouraging learners to examine content from multiple perspectives (Lepp et al., 2023; Navila et al., 2023).

Moreover, emotional factors play a significant role in shaping how individuals interpret media. Emotional engagement influences perspective awareness and can affect how learners evaluate and respond to media messages in digital environments (Lee et al., 2025; Wang et al., 2023). These findings suggest that critical viewing is a multidimensional skill that integrates cognitive, analytical, and affective processes.

Media Literacy Exposure

In relation to the development of critical viewing skills, engagement with media literacy plays a significant role in shaping learners' ability to engage with and evaluate media content. Media literacy exposure refers to the extent to which pre-service teachers encounter media literacy concepts, tools, and practices during training.

Studies indicate that experiencing media literacy activities enhances the ability to evaluate information, analyze digital content, and engage in critical thinking. However, the implementation of media proficiency remains uneven due to constraints, such as limited training, insufficient instructional time, and a lack of resources (Trixa & Kaspar, 2024; McNelly & Harvey, 2021). These challenges highlight the need for more structured and consistent integration of media awareness in teacher education.

Instructional approaches, such as using digital tools, simulation-based learning, and media analysis tasks, have been shown to support the development of critical thinking and viewing skills (Lepp et al., 2023; Widora et al., 2025). Additionally, engagement with diverse media formats—including social media, AI-generated content, and multimedia platforms, provides opportunities for deeper critical evaluation and reflective learning (Micallef, 2023; El Saddik et al., 2025). Despite these developments, research emphasizes the need for more systematic integration of media literacy across teacher education programs, as well as greater consideration of contextual differences in implementation (Mazman Akar et al., 2025).

Visual Bias Recognition

Beyond exposure to media, the ability to recognize visual bias is another critical component of developing critical viewing skills. Visual bias recognition refers to the capacity to identify how images, graphics, and visual representations may influence interpretation, shape perception, and present selective perspectives.

This skill allows learners to examine how visual elements shape meaning. In digital environments where visual content is prevalent, the ability to detect bias is essential for accurate interpretation and informed decision-making.

Studies in teacher education emphasize the importance of visual bias recognition in strengthening critical thinking and analytical reasoning. Ariza et al. (2021) found that analyzing socio-scientific issues and graphical representations enhanced pre-service teachers' ability to construct arguments and evaluate evidence. Similarly, reflective inquiry approaches have been shown to improve critical thinking and awareness of bias, enabling learners to question underlying assumptions in media content (Verawati et al., 2021).

In addition, instructional strategies such as mobile-assisted learning and digital storytelling have been associated with improved analytical skills and deeper engagement with media texts (Isaacs et al., 2024). These findings suggest that visual bias recognition requires sustained instructional support and guided practice to develop learners' evaluative judgment.

Cognitive Flexibility

In addition to media-related competencies, cognitive flexibility is a crucial factor that supports the development of critical viewing skills. Cognitive flexibility refers to the ability to adapt thinking, consider multiple perspectives, and respond effectively to complex and dynamic situations.

In teacher education, cognitive flexibility is recognized as an essential skill that enables pre-service teachers to navigate diverse classroom contexts and integrate new knowledge into practice. Research consistently shows that cognitive flexibility is strongly associated with higher-order thinking, reasoning, and adaptability among pre-service teachers (Cankaya & Aydogan, 2022; Orakci & Khalili, 2024).

Furthermore, flexible thinking skills support effective technology integration and reflective practice in authentic learning environments, allowing learners to adjust their interpretations and respond to evolving information (Pitura et al., 2024). Studies also highlight the role of mindfulness, adaptability, and cultural awareness in enhancing cognitive flexibility. For instance, mindful attention and adaptive teaching practices are associated with improved responsiveness in complex educational contexts (Erarslan, 2023; Tudayan et al., 2024). Overall, the literature identifies cognitive flexibility as a key factor in enabling pre-service teachers to evaluate multiple perspectives, interpret complex information, and engage in critical analysis within digital environments.

Synthesis and Research Gap

Overall, the reviewed literature indicates that critical viewing skills are influenced by media literacy exposure, visual bias recognition, and cognitive flexibility. While media literacy enhances interpretation and evaluation, exposure alone does not ensure deeper critical analysis (Trixa & Kaspar, 2024; Rojas-Estrada et al., 2024). Visual bias recognition supports understanding of media framing, while cognitive flexibility enables the evaluation of multiple perspectives (Aljalabneh, 2024; Spinde et al., 2024). However, these variables are often examined independently, with limited research on their combined influence, particularly among pre-service teachers in the Philippine context (Rojas-Estrada et al., 2024). This gap highlights the need to examine how these factors collectively contribute to critical viewing skills.

Theoretical Framework

This study is anchored on three theories: Media Literacy Theory, Cognitive Flexibility Theory, and Framing Theory. Together, these explain how pre-service teachers develop critical viewing skills.

Media Literacy Theory (Buckingham, 2003; Hobbs, 2011) posits that individuals are active interpreters of messages rather than passive recipients. It emphasizes that content is constructed and influenced by social, cultural, and ideological factors, requiring learners to carefully analyze sources, identify bias, and evaluate meaning. In relation to the present study, this theory supports the inclusion of media literacy as a key variable, as it explains how structured engagement with media-related practices enhances pre-service teachers' ability to interpret information sources.

Cognitive Flexibility Theory (Spiro et al., 1991) explains how individuals adapt their thinking when dealing with complex and ill-structured information. It highlights the importance of perspective shifting, adaptability, and the ability to reorganize knowledge based on new information. In this study, cognitive flexibility serves as a cognitive mechanism that enables pre-service teachers to interpret media from multiple perspectives and respond to diverse and sometimes conflicting information, thereby influencing their critical viewing skills.

Framing Theory (Entman, 1993) describes how the media shapes meaning by emphasizing certain aspects of information while omitting others, thereby influencing audience perception. This theory is particularly relevant to visual bias recognition, as it explains how images, graphics, and media representations may present selective perspectives. In the context of this study, Framing Theory provides a basis for understanding how pre-service teachers identify bias and evaluate the credibility of visual media.

These theories are relevant to the research problem, which addresses the need to understand how pre-service teachers develop critical viewing skills despite widespread exposure to digital media. While exposure alone does not guarantee critical analysis, the ability to recognize bias and adapt thinking plays a crucial role in interpreting media messages effectively.

Furthermore, these theories guided the research design, data collection, and interpretation of results. Media Literacy Theory informed the measurement of media literacy exposure and its role in shaping analytical skills. Framing Theory guided the inclusion of visual bias recognition as a variable related to evaluating media content. Cognitive Flexibility Theory informed the assessment of participants' ability to adapt their thinking and consider multiple perspectives. Together, these frameworks supported the use of a quantitative descriptive-correlational design to examine the relationships and predictive influence of these variables on critical viewing skills.

Conceptual Framework

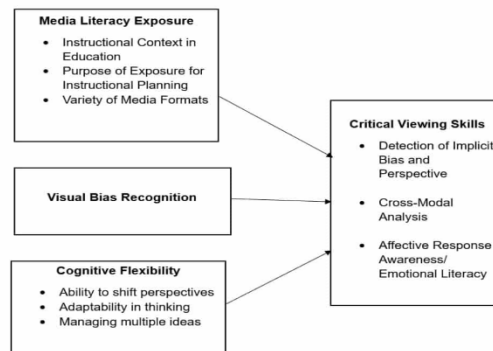


Figure 1. Schematic Presentation of the Study

Figure 1 presents the conceptual framework of the study, identifying media literacy exposure, visual bias recognition, and cognitive flexibility as the independent variables, and critical viewing skills as the dependent variable. Specifically, media literacy exposure provides foundational experiences for engaging with media content; however, exposure alone does not ensure deeper critical analysis. In contrast, visual bias recognition enables pre-service teachers to identify framing and detect implicit bias, thereby supporting analytical evaluation of media. Similarly, cognitive flexibility facilitates perspective shifting, adaptability, and the interpretation of complex information from multiple viewpoints.

In this study, critical viewing skills were operationalized in terms of the detection of implicit bias and perspective, cross-modal analysis, and affective response awareness (emotional literacy). Overall, the framework assumes that while media literacy exposure is essential, visual bias recognition and cognitive flexibility play a more critical role in developing critical viewing skills. Consequently, this framework guided the identification of variables, instrument development, research design, and interpretation of findings.

Statement of the Problem

Despite the increasing integration of media and information literacy in education, the development of critical viewing skills among pre-service teachers remains inconsistent. Although exposure to digital media is widespread, such engagement does not necessarily translate into the ability to analyze media content effectively, recognize visual bias, and evaluate multiple perspectives. This gap presents a significant pedagogical concern, as future teachers are expected to guide learners in navigating complex digital information environments.

Moreover, existing studies have largely examined media literacy exposure, visual bias recognition, and cognitive flexibility as independent variables, with limited attention to their combined influence on critical viewing skills, particularly within the Philippine teacher education context. This lack of integrative research limits the development of evidence-based instructional strategies for enhancing critical media competencies.

This study examines how these factors influence critical viewing skills and investigates the levels, relationships, and predictive influence of media literacy exposure, visual bias recognition, and cognitive flexibility on the critical viewing skills of pre-service teachers.

Research Objectives

General Objective

To examine the critical viewing skills of pre-service teachers and determine the influence of media literacy exposure, visual bias recognition, and cognitive flexibility on these skills.

Specific Objectives

The study aims to:

1. Determine the levels of media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills of pre-service teachers.
2. Analyze the significant relationships among media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills.
3. Determine the predictive influence of media literacy exposure, visual bias recognition, and cognitive flexibility on critical viewing skills.

Research Questions

1. What is the participants' level of media literacy exposure in terms of:
 - 1.1 instructional context in education;
 - 1.2 purpose of exposure for instructional planning; and
 - 1.3 variety of media formats?
2. What is the participants' level of visual bias recognition?
3. What is the participants' level of cognitive flexibility in terms of:
 - 3.1 ability to shift perspective;
 - 3.2 adaptability in thinking; and
 - 3.3 managing multiple ideas?
4. What is the participants' level of critical viewing skills in terms of:
 - 4.1 detection of implicit bias and perspective;
 - 4.2 cross-modal analysis; and
 - 4.3 affective response awareness (emotional literacy)?
5. Are media literacy exposure, visual bias recognition, and cognitive flexibility significantly associated with critical viewing skills?
6. Do media literacy exposure, visual bias recognition, and cognitive flexibility significantly influence critical viewing skills?

Hypotheses

H₀₁: There is no significant relationship between media literacy exposure and critical viewing skills.
H₀₂: There is no significant relationship between visual bias recognition and critical viewing skills.
H₀₃: There is no significant relationship between cognitive flexibility and critical viewing skills.
H₀₄: Media literacy exposure, visual bias recognition, and cognitive flexibility do not significantly predict critical viewing skills.

METHODOLOGY

Research Design

The study employed a quantitative descriptive–correlational research design to examine the relationships among media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills of pre-service teachers. The descriptive component determined the levels of the variables, whereas the correlational component analyzed their relationships and predictive influence on critical viewing skills.

Media literacy exposure was examined in terms of instructional context, purpose for instructional planning, and variety of media formats. Meanwhile, visual bias recognition focused on the ability to identify bias and framing in visual media. In addition, cognitive flexibility included perspective shifting, adaptability in thinking, and management of multiple ideas, while critical viewing skills covered detection of implicit bias, cross-modal analysis, and affective response awareness.

Furthermore, multiple regression and canonical correlation analysis were used to determine the contribution of the independent variables to critical viewing skills. Overall, this design was appropriate as it allowed objective analysis of relationships among variables without manipulation.

Population and Sampling

A total population of 194 pre-service teachers was identified as eligible for inclusion in the study. Inclusion criteria consisted of pre-service teachers currently enrolled in second to fourth year levels at a Catholic faith institution during the academic year 2025-2026 who provided informed consent. First-year pre-service teachers were excluded, as they served as pilot participants. To ensure an appropriate and representative sample size, the Taro Yamane formula was used.

Subsequently, systematic random sampling was employed to select the participants. An ordered list of eligible pre-service teachers was used, and a sampling interval was determined based on the total population. Participants were then selected at regular intervals to ensure equal probability of selection and to minimize selection bias. In addition, the selected participants represented pre-service teachers across different year levels, ensuring variability in experiences and exposure to media literacy practices.

Out of the total population, 136 pre-service teachers participated in the study. However, outliers were identified using standardized residuals and subsequently removed to improve data reliability. After data screening, a total of 14 outliers were excluded, resulting in a final sample of 122 participants included in the analysis. Outlier removal was conducted to improve the accuracy and reliability of the regression model, following standard statistical practice in quantitative educational research. This procedure does not compromise the ethical integrity of the study, as all data were collected with informed consent before screening.

Research Instruments

The primary data-gathering instruments consisted of an adapted survey questionnaire and a researcher-modified standardized critical viewing skills test. The survey questionnaire was adapted from the constructs of Brown (1991) on media literacy-related competencies, containing a total of 70 items distributed across three subscales: Media Literacy Exposure (30 items), Visual Bias Recognition (10 items), and Cognitive Flexibility (30 items). All items were measured using a five-point Likert scale ranging from 1 – Strongly Disagree to 5 – Strongly Agree.

The critical viewing skills test was based on established critical viewing competencies in media literacy literature and was researcher-modified to align with the Philippine teacher-education context. The final version consisted of 27 items measuring three domains: detection of implicit bias, cross-modal analysis, and affective response awareness. Responses were interpreted using a five-point scale, with mean score ranges interpreted as follows: 1.00–1.50 (Very Low), 1.51–2.50 (Low), 2.51–3.50 (Moderate), 3.51–4.50 (High), and 4.51–5.00 (Very High).

Overall, minor wording and contextual modifications were made to the research instruments to ensure suitability for pre-service teachers in the Philippine teacher-education context, while preserving the original theoretical constructs.

Content Validation

The instrument underwent content validation by three subject-matter experts, consisting of:

- a research professor and director (Graduate School)
- a thesis professor and vice president for administration
- a research professor and director (Research Planning and Development Office).

The experts involved in the validation process possessed at least a master's degree and demonstrated extensive experience in teacher education, media literacy, and educational research. The instrument was subjected to expert review to ensure its content adequacy, clarity, and relevance in measuring media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills. Feedback from the validators was carefully considered and incorporated to enhance the overall quality of the instrument.



Reliability Testing

Reliability testing was conducted through pilot administration of the instrument to 30 participants who were first-year pre-service teachers not included in the actual study. Cronbach's alpha yielded coefficients ranging from 0.804 to 0.961, indicating good to excellent internal consistency and confirming the instrument's suitability for measuring media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills.

Data Collection Procedure

Data were collected from second- to fourth-year pre-service teachers enrolled in a Catholic tertiary institution in Cagayan de Oro City during the second semester of the academic year 2025–2026. With the assistance of course instructors, printed copies of the survey questionnaire and the critical viewing skills test were administered in person.

The administration was conducted during scheduled class periods in a supervised classroom setting. Standardized instructions were provided to all participants before the administration of the instruments. Participants completed the survey questionnaire first, which required approximately 30–40 minutes, followed by the critical viewing skills test, which took an additional 25–30 minutes.

Both instruments were completed in a single session lasting approximately 50–65 minutes. Participants were given adequate time to finish the tasks under normal classroom testing conditions, and no collaboration or use of external materials was permitted during the administration.

Treatment of Data

Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to determine the levels of media literacy exposure, visual bias recognition, cognitive flexibility, and critical viewing skills across their respective subdomains. To examine relationships among variables, multiple regression analysis and canonical correlation analysis were employed. Multiple regression analysis was used to determine the predictive influence of media literacy exposure, visual bias recognition, and cognitive flexibility on critical viewing skills, while canonical correlation analysis was applied to assess the multivariate relationships among the variables.

The following scoring procedure was used to interpret pre-service teachers' critical viewing skills.

Total Score of Critical Viewing Skills	
Score Range	Overall Interpretation
24.00-27.00	Very High
18.00-23.99	High
12.00-17.99	Moderate
16.00-11.99	Low
0.00-5.99	Very Low

Ethical Considerations

Ethical approval for the study was obtained from the institutional Research Ethics Committee before data collection, and formal permission to conduct the research was secured from the participating tertiary institution. All participants were provided with an informed consent form explaining the study's purpose, procedures, potential risks, and benefits. Participation was strictly voluntary, and respondents were informed of their right to withdraw at any stage without penalty.

To ensure anonymity, no personally identifiable information was collected in the survey or test instruments. Each participant was assigned a numerical code used solely for data organization and analysis. In maintaining confidentiality, all responses were treated as confidential and reported only in aggregate form. Individual responses were not shared with any institutional authority, instructor, or third party.

Moreover, all collected data were stored in password-protected digital files accessible only to the researchers. The data were used exclusively for academic and publication purposes and handled in accordance with institutional data protection guidelines. After completion of the study and publication process, data will be securely archived and retained for research documentation purposes in line with institutional retention policies.

The study adhered to established ethical standards for research involving human participants.

RESULTS and DISCUSSION

This section presents and interprets the findings on pre-service teachers' critical viewing skills and their associated cognitive predictors.

Table 1

Summary Table of Media Literacy Exposure

Media Literacy Exposure	Mean	Interpretation	SD
Instructional Context in Education	4.06	High	0.61
Purpose of Exposure in Instructional Planning	4.21	High	0.64
Variety of Media Formats	4.15	High	0.64
Overall Media Literacy Exposure	4.14	High	0.59

Table 1 presents the overall level of media literacy exposure among pre-service teachers, with a mean of 4.14, interpreted as high. This indicates that pre-service teachers frequently engage with digital and multimedia resources within their teacher education programs.

This finding reflects the growing integration of digital tools in teacher preparation, where learners are regularly exposed to media-based instructional tasks. However, high exposure primarily represents access and participation rather than deeper critical processing or analytical engagement.

Consistent with previous studies (Mazman Akar et al., 2025; Trixa & Kaspar, 2024), exposure to media-rich environments increases familiarity with digital tools but does not automatically lead to the development of critical evaluative competencies.

From a pedagogical perspective, this suggests that teacher education programs need to move beyond exposure-oriented activities and incorporate explicit instruction in critical media literacy. Teacher educators may consider integrating structured analysis tasks, guided reflection, and critical questioning strategies into coursework.

At the curriculum level, curriculum developers may embed critical media literacy competencies into program outcomes, while institutional leaders may support initiatives that strengthen the integration of structured media literacy instruction in teacher education curricula.

Table 2

Descriptive Statistics and Frequency Distribution of Visual Bias Recognition

Range	Description	Interpretation	Frequency	Percentage
4.51 – 5.00	Strongly Agree	Very High	28	22.95
3.51 – 4.50	Agree	High	73	59.84
2.51 – 3.50	Neutral	Moderate	17	13.93
1.51 – 2.50	Disagree	Low	1	0.82
1.00 – 1.50	Strongly Disagree	Very Low	3	2.46
Total			122	100
Mean				4.04
Interpretation				High
SD				0.71

Table 2 shows that pre-service teachers demonstrate a high level of visual bias recognition, with a mean score of 4.04. This suggests that participants are generally proficient in identifying framing techniques, stereotypes, and biased representations in visual media.

The results indicate that pre-service teachers possess foundational interpretive skills that support critical engagement with media messages, which may have been developed through prior involvement in academic tasks focused on media evaluation and analysis.

These findings align with earlier studies (Dancis, 2022; Quinn & Hakim, 2023), which emphasize that structured analytical activities in teacher education enhance learners' capacity to identify underlying assumptions and biases in media content.

From a pedagogical standpoint, this underscores the importance of explicitly incorporating visual literacy strategies into teacher education programs. At the curriculum level, the integration of systematic visual analysis tasks may further strengthen pre-service teachers' ability to critically evaluate media messages and contribute to the broader development of critical media literacy skills.

Table 3

Summary Table of Cognitive Flexibility

Cognitive Flexibility	Mean	Interpretation	SD
Ability to Shift Perspectives	4.11	High	0.65
Adaptability in Thinking	4.07	High	0.65
Managing Multiple Ideas	3.96	High	0.68
Overall	4.05	High	0.61

Table 3 presents the level of cognitive flexibility among pre-service teachers, with an overall mean of 4.05, interpreted as high. This indicates that participants demonstrate strong abilities in perspective shifting, adaptability in thinking, and managing multiple ideas.

Cankaya & Aydogan (2022) and Orakcı & Khalili (2024) emphasized that cognitive flexibility is closely linked to advanced thinking skills. However, the findings imply that this ability does not automatically translate into structured critical evaluation without intentional instructional support.

From an instructional viewpoint, this suggests that pre-service teachers possess the cognitive readiness needed to engage with complex and ambiguous media content, particularly in digital environments where multiple interpretations are possible. Such flexibility provides a strong foundation for higher-order thinking and adaptive reasoning. Moreover, teacher education programs may therefore consider strengthening metacognitive scaffolding, structured analysis frameworks, and guided reflection activities to help pre-service teachers apply cognitive flexibility more effectively in critical media evaluation tasks.

Table 4

Frequency Distribution of Overall Critical Viewing Skills

Score Range	Interpretation	Frequency	Percentage
24.00 – 27.00	Very High	18	14.75
18.00 – 23.99	High	36	29.51
12.00 – 17.99	Moderate	52	42.62
6.00 – 11.99	Fair	16	13.11
0.00 – 5.99	Poor	0	0.00
Total		122	100
Mean			17.64
Interpretation			Moderate
SD			1.42

Table 4 presents the overall level of critical viewing skills, with a mean of 17.64, interpreted as moderate. This indicates that while pre-service teachers demonstrate basic analytical abilities, their capacity for deeper critical evaluation remains underdeveloped.

This finding highlights a critical gap in teacher education, where exposure to digital media does not necessarily translate into higher-order analytical competencies. Consistent with previous studies (Castellví et al., 2020; Hu & Hwang, 2024), pre-service teachers often struggle with complex evaluative tasks such as source verification and perspective comparison.

From a pedagogical perspective, this suggests that teacher education programs may need to move beyond passive exposure to media and incorporate explicit instruction in critical viewing strategies, including guided analysis, structured questioning, and reflective discussion. For teachers and teacher educators, this underscores the importance of integrating multimodal analysis tasks and scaffolded critical thinking activities into classroom practice.

At the curriculum level, curriculum developers may consider embedding critical media analysis competencies within learning standards, ensuring that students are systematically trained to evaluate digital content. School leaders and policymakers may also support professional development initiatives that equip teachers with strategies for teaching critical viewing skills in technology-rich learning environments.

Table 5*Canonical Correlation Analysis Between Media Literacy Exposure and Critical Viewing Skills*

Variable	Cross loading	R _c	R _c ²	F(9, 282)	p
Media Literacy Exposure					
Instructional Context in Education	-0.15				
Purpose of Exposure in Instructional Planning	-0.20				
Variety of Media Formats	-0.27	0.29	0.08	1.649	0.101
Critical Viewing Skills					
Detection of Implicit Bias and Perspectives	-0.21				
Cross-Modal Analysis	0.13				
Affective Response Awareness	-0.12				

Table 5 illustrates the relationship between media literacy engagement and critical viewing skills, revealing a weak and non-significant correlation ($p = 0.101$). This suggests that mere exposure to media-related activities does not significantly improve critical viewing abilities.

The finding implies that passive or unstructured engagement is insufficient for developing higher-order analytical skills. Although learners may gain familiarity with media tools and formats, such familiarity does not necessarily translate into the capacity to analytically evaluate media content.

This result is consistent with previous research, which emphasizes that the development of media literacy requires guided instruction and reflective engagement rather than simple exposure (Trixa & Kaspar, 2024; McNelly & Harvey, 2021). Pedagogically, this highlights the need for teacher education programs to move beyond exposure-based approaches and adopt structured, skill-oriented strategies that explicitly cultivate critical viewing competencies through guided analysis, reflection, and evaluation.

Table 6*Canonical Correlation Analysis Between Visual Bias Recognition and Critical Viewing Skills*

Variable	Cross loading	R _c	R _c ²	F(3, 118)	p
Visual Bias Recognition	0.28				
Critical Viewing Skills					
Detection of Implicit Bias and Perspectives	0.24	0.28	0.08	3.321*	0.022
Cross-Modal Analysis	0.10				
Affective Response Awareness	0.10				

*Significant at 0.05 two-tailed alpha level.

Table 6 presents the relationship between visual bias recognition and critical viewing skills, revealing a statistically significant positive correlation ($p = 0.022$). This indicates that individuals who are more capable of identifying bias, framing techniques, and selective representation in media are also more likely to demonstrate stronger critical viewing abilities. In other words, the capacity to detect bias appears to play a meaningful role in how effectively learners analyze and interpret media content.

This finding suggests that visual bias recognition serves as a foundational cognitive component of critical media literacy. Learners who can recognize how media messages are constructed through framing, omission, or emphasis are better equipped to question the credibility of information, assess underlying intentions, and make informed judgments about the content they encounter. Thus, bias recognition goes beyond simple awareness and directly supports deeper analytical processing and interpretation.

Furthermore, bias detection is widely recognized as a central element of media literacy competence. Its strong association with critical viewing skills highlights the need for deliberate instructional support. From an instructional perspective, this underscores the importance of integrating explicit visual bias analysis activities, guided interpretation exercises, and structured evaluation tasks into teacher education curricula. Such approaches can help pre-service

teachers systematically develop the skills needed to critically examine media messages and foster higher levels of critical media literacy (Aljalabneh, 2024; Spinde et al., 2024).

Table 7
Canonical Correlation Analysis Between Cognitive Flexibility and Critical Viewing Skills

Variable	Cross loading	R	R ²	F(9, 282)	p
Cognitive Flexibility					
Ability to Shift Perspectives	-0.25				
Adaptability in Thinking	-0.14				
Managing Multiple Ideas	-0.04				
Critical Viewing Skills		0.34	0.12	1.931*	0.048
Detection of Implicit Bias and Perspectives	-0.29				
Cross-Modal Analysis	0.12				
Affective Response Awareness	-0.11				

*Significant at 0.05 two-tailed alpha level.

Table 7 presents the relationship between cognitive flexibility and critical viewing skills, revealing a statistically significant correlation ($p = 0.048$). This suggests that pre-service teachers who are more cognitively flexible, those who can shift perspectives and consider multiple viewpoints, tend to demonstrate stronger critical viewing performance. However, regression results later indicate a negative predictive effect, suggesting that cognitive flexibility alone may not consistently lead to accurate critical evaluation without structured guidance.

This finding indicates that cognitive flexibility supports how learners process and evaluate media content by enabling them to reconsider initial judgments, compare alternative interpretations, and remain open to new information. However, without clear criteria or structured analytical frameworks, flexible thinkers may still struggle to distinguish between credible and misleading information.

Consistent with previous studies by Cankaya & Aydogan (2022) and Orakci & Khalili (2024), cognitive flexibility is closely linked to adaptive reasoning and critical thinking. Pedagogically, this highlights the importance of guiding pre-service teachers in applying this flexibility effectively. Teacher education programs should therefore integrate structured media literacy instruction, such as guided analysis, explicit evaluation criteria, and reflective tasks, to channel cognitive flexibility into more systematic and accurate critical viewing practices.

Table 8
Regression Analysis on the Influence of Media Literacy Exposure, Visual Bias Recognition, and Cognitive Flexibility on Critical Viewing Skills

Predictor	Unstandardized Coefficients		β	95% CI		t	p
	B	SE		Lower	Upper		
Constant	22.55	1.00		20.57	24.54	22.49*	<.001
Media Literacy Exposure	0.58	0.50	0.21	-0.41	1.58	1.16	0.250
Visual Bias Recognition	1.01	0.37	0.44	-0.28	1.74	2.73*	0.007
Cognitive Flexibility	-1.24	0.43	-0.48	-2.09	-0.40	-2.90*	0.004
Model Summary							
R = 0.354		R ² = 0.125		Adjusted R ² = 0.103 F(3,118) = 5.62* p = 0.001			

Table 8 presents the regression analysis examining the influence of media literacy exposure, visual bias recognition, and cognitive flexibility on critical viewing skills. The model is statistically significant ($p = 0.001$), indicating that the predictors collectively explain a significant portion of the variance in critical viewing skills.

Among the predictors, media literacy exposure does not significantly predict critical viewing skills, reinforcing earlier findings that exposure by itself is inadequate for developing critical competencies. This supports the position of media literacy scholars who argue that mere exposure to digital or multimedia content does not automatically result in higher-order critical thinking unless accompanied by explicit analytical instruction (McNelly & Harvey, 2021; Trixa & Kaspar, 2024). Similarly, media literacy frameworks emphasize that passive engagement must

be transformed into active meaning-making and critical interrogation for learning transfer to occur (Buckingham, 2019).

In contrast, visual bias recognition emerges as a significant positive predictor, highlighting its central role in supporting analytical evaluation of media content. This finding is consistent with studies emphasizing that the ability to detect framing, stereotyping, and representational bias is a core component of critical media literacy (Spinde et al., 2024; Aljalabneh, 2024). Empirical research further suggests that learners who are trained in identifying visual bias demonstrate stronger evaluative judgment and improved interpretation of media messages (Quinn & Hakim, 2023). This reinforces the argument that bias recognition functions as a gateway skill toward deeper critical viewing competencies.

Conversely, cognitive flexibility shows a significant negative predictive relationship with critical viewing skills. This may suggest that cognitive flexibility, when not supported by structured evaluative frameworks, can lead to inconsistency in judgment or reduced analytical stability. This aligns with cognitive theories emphasizing that flexibility requires metacognitive regulation to avoid fragmented reasoning processes (Orakçı & Khalili, 2024; Cankaya & Aydogan, 2022).

Overall, these findings suggest that critical viewing skills are best developed through structured media literacy instruction, targeted bias recognition training, and guided cognitive regulation strategies. This aligns with constructivist and multiliteracies perspectives, which emphasize that critical meaning-making emerges from scaffolded engagement with multimodal texts rather than unstructured exposure (Serafini & Gee, 2021).

From an educational standpoint, this emphasizes the need for teacher education programs to integrate metacognitive scaffolding, critical analysis frameworks, and structured media evaluation tasks. Specifically, teacher educators may design learning experiences that require pre-service teachers to systematically evaluate media bias, reflect on their interpretive processes, and apply structured analytical tools when engaging with multimodal content. Curriculum developers and policymakers may likewise consider embedding these competencies in teacher education standards to ensure that critical viewing skills are explicitly cultivated rather than implicitly assumed.

Conclusions

The following conclusions were derived from the analysis and interpretation of the data.

1. Visual bias recognition plays a significant role in supporting critical viewing skills, emphasizing the importance of explicitly teaching bias detection in teacher education programs.
2. Media literacy exposure alone appears insufficient to develop higher-order analytical skills, highlighting the need for structured and cognitively engaging instructional approaches.
3. Cognitive flexibility demonstrates a complex relationship with critical viewing, suggesting that cognitive adaptability should be supported by metacognitive regulation to encourage more effective analysis.
4. The findings contribute to teaching and learning by emphasizing the integration of critical media analysis in instructional practice and curriculum design.
5. The study highlights the importance of combining media literacy, cognitive processes, and reflective learning in supporting the development of critical viewing skills among future educators.

Recommendations

Based on the study's findings, the following recommendations are put forward.

1. Pre-service teachers may engage in structured media analysis activities, including bias detection tasks and reflective discussions, to strengthen critical viewing competencies.
2. Teacher educators may integrate explicit instructional strategies such as guided media critique, case-based analysis, and metacognitive reflection to enhance analytical thinking.
3. Curriculum developers may embed critical viewing skills and media analysis competencies into teacher education curricula and learning standards.
4. School leaders may support professional development programs focusing on media literacy instruction and critical thinking strategies in digital learning environments.
5. Education policymakers may consider strengthening policies on media and information literacy integration to ensure systematic development of critical viewing skills across educational levels.

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