

Predictive Modeling of Critical Thinking Skills: An Ordinal Regression Approach

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Abstract. The Philippine higher education system requires developing critical thinking skills in Bachelor of Arts (BA) in History to deconstruct complex narratives and evaluate sources. However, in this generation of information overflow, imparting these skills has become a challenge. To address this, this study investigated the level of critical thinking skills among 166 BA History students and explored how specific analytical and reflective competencies predict academic year-level progression. Utilizing a quantitative correlational design, data gathered through twenty (20) item questionnaires were analyzed using descriptive statistics and ordinal logistic regression. Results revealed that students maintain high baseline competencies across both domains, excelling at tracking cause-and-effect pathways and post-task self-improvement, while showing minor challenges in structural problem decomposition. Crucially, predictive modeling identified evidence-based interpretation as a significant positive predictor of year-level progression, validating primary source verification as the program's developmental backbone. Conversely, recognizing one's own knowledge limitations emerged as a negative predictor, capturing an intellectual shift from lower-class level's naïve cognitive confidence to advanced students sophisticated academic humility. Based on these findings, distinct interventions may be considered to maximize student development. History teachers may transition from passive lectures toward highly scaffolded instruction that explicitly teaches structural problem-decomposition frameworks. Furthermore, educators may design assessments that normalize the limitations of historical data and reward the cognitive humility shown by advanced students. Concurrently, history students may transition from reactive emotional reflection to proactive, active self-regulated learning. They may deliberately audit the operational efficiency of how they study, replacing passive reading with active source interrogation while continuously anchoring all historical arguments in verifiable empirical footprints of the past.

Keywords: Analytical Skills; Critical Thinking Skills; Evaluative Skills; History Program; Ordinal Regression Analysis

Introduction

In an era characterized by unprecedented overflow of information, the landscape of higher education has undergone a profound paradigm shift. Critical thinking has established itself as an essential component of higher education, particularly in contexts where the overabundance of information demands skills of discernment and rigorous assessment (Aston, 2024). Within the humanities and social sciences, this intellectual competency is not merely an auxiliary asset but the very foundation of scholarly inquiry. Various authors agree that this competency involves the ability to analyze, evaluate and synthesize information, questioning assumptions and contrasting multiple perspectives in order to make informed judgments (Saiz & Rivas, 2023; Thornhill-Miller et al., 2023). For students pursuing a Bachelor of Arts in History, mastering these cognitive dimensions is paramount, as historical inquiry fundamentally relies on the capacity to deconstruct complex narratives, identify systemic biases, and evaluate conflicting primary and secondary sources.

This rigorous cognitive demand directly aligns with the institutional mandates governing historical education. As explicitly outlined in national academic standards, the history program aims to provide a wide variety of introductory and advanced courses that will introduce students to the ways in which historians recreate the past, and to build skills of historical research, analysis and writing (Commission on Higher Education [CHED], 2017). Through this expansive lens, students of history study individuals, groups, communities, and nations from every imaginable form the variety of perspective, using all the techniques of

the humanities and the social sciences to understand why events happen, how people experienced these events, and how these events reshaped the societies we live in.

To cultivate these sophisticated national and analytical values, the pedagogical framework surrounding historical instruction must evolve beyond archaic paradigms. History is defined by Karl Marx as the relationship between man and his environment and the influence of his environment on man. Unpacking this dynamic relationship requires an active, dialectical classroom environment. Consequently, as argued by Uma et al. (2022), a new concept of teaching history is emerging. However, a significant disconnect persists between these contemporary conceptual goals and actual classroom practices. The major problem teaching of history is facing the approach being used by the history teachers in imparting such body of knowledge to their learners. In fact, there are various methods of teaching ranging from discussion, lecture, inquiry methods and the like. But majority of history teachers of today tend to overemphasize the use of lecture method. The over-usage of this method makes history as mere storytelling, boring and irrelevant (Ubodiom & Ariye, 2026). This instructional stagnation poses severe threat to the development of higher-order cognitive capacities, potentially stalling students' progress from passive memorizers to advanced analytical thinkers.

This pedagogical crisis necessitates a robust, data-driven investigation into how critical thinking skills actually develop and mature as students progress through their academic program. Traditional descriptive studies often treat student development as static; however, tracking student growth across distinct year levels demands an advanced predictive modeling framework. Within this conceptual and methodological framework, this study evaluates the specific trajectories of cognitive development among BA History students.

Research Questions

This study assessed the level and predicting factors of BA History students on their critical thinking skills as they progress in their academic year level. Specifically, the study addressed the questions;

1. What is the level of critical thinking skills among BA History students across different year levels in terms of:
 - 1.1 Analysis and Interpretation, and
 - 1.2 Reflection and Evaluation?
2. To what extent do individual items within the analysis and interpretation, and reflection and evaluation domains significantly predict BA History student's academic year level progression?

Scope and Delimitation of the Study

This study assessed the critical thinking skills of BA History at Sulu State University, during the school year 2025-2026. It focused on analysis and interpretation domain, and reflection and evaluation domain, and examined the predicting factors as students progress. The study covered all year level under the program study.

Literature Review

Critical Thinking Skills in Higher Education and History Studies

Critical thinking has established itself as an essential component of higher education, particularly in contexts where the overabundance of information demands skills of discernment and rigorous assessment (Aston, 2024). Various authors agree that this competency involves the ability to analyze, evaluate, and synthesize information, questioning assumptions and contrasting multiple perspectives in order to make informed judgments (Saiz & Rivas, 2023; Thornhill-Miller et al., 2023). In the context of a Bachelor of Arts in History program, critical thinking transitions from a generic academic skill to the primary mechanism of historical reasoning. Historical inquiry fundamentally relies on the capacity to deconstruct complex narratives, identify systemic biases, and evaluate conflicting primary and secondary sources. As a result, modern history education has undergone a paradigm shift away from rote memorization and passive knowledge consumption toward active, inquiry-based frameworks (Basri et al., 2024). Within historical training, critical thinking serves as the cognitive vehicle that allows students to actively construct historical knowledge, enabling them to understand the diverse dimensions of human experiences and link past events to contemporary societal values.

Analysis and Interpretation

Within the architecture of critical thinking, the sub-domain of analysis and interpretation constitutes the core procedural engine of historical literacy. Research indicates that historical analysis requires students to go beyond surface-level text reading to interrogate sources, trace cause-and-effect relationships, and draw

evidence-grounded inferences (Thorp & Persson, 2020). Empirically, examining cause and consequence stands out as a baseline cognitive metric that allows history majors to visually map the structural connections between historical agents and their environments (Thornhill-Miller et al., 2023). Furthermore, this domain encompasses the ability to explicitly differentiate objective facts from subjective opinions, a capacity that is reinforced as students interact with multi-layered historical documents (Trigueros-Cano et al., 2022). However, empirical literature also notes that while undergraduate students demonstrate high proficiency in tracing macro-causal patterns and determining evidentiary relevance, they frequently experience localized difficulties with micro-analytical problem decomposition—specifically, the practice of breaking complex, ill-defined historical problems into smaller, distinct sub-components (Purmintasari et al., 2024). Developing this domain requires targeted exposure to archival research and primary source validation, forcing students to abandon speculative claims and tie their historical assertions to verifiable, documented footprints of the past; thereby operationalizing the core analytical competencies through their structured learning experiences (Barrie et al, 2025).

Reflection and Evaluation

The reflection and evaluation sub-domain represent the metacognitive regulation engine that drives independent historical thinking and self-directed academic development. Critical thinking relies heavily on a student's conscious awareness of their own cognitive actions, allowing them to explicitly identify structural shortcomings in their reasoning and systematically correct them (Rivas et al., 2022). In undergraduate cohorts, this manifests as a strong commitment to post-task self-improvement and active learning from mistakes, where students utilize errors as descriptive benchmarks for subsequent cognitive refinement (Ratnayake et al., 2024). Furthermore, the evaluative dimension is heavily reinforced through collaborative socialization, such as group discussions, where students must test their ideas against differing peer perspectives to correct individual biases. Despite these high reflective tendencies, studies point out a distinct cognitive gap in students' adaptive regulation: while university students excel at monitoring immediate task outcomes or recognizing personal limitations, they routinely display lower relative capacity when evaluating the broader, systemic effectiveness of their learning strategies (Xue & Khalid, 2026). Advanced historical training, which exposes seniors to conflicting historiographical schools and contradictory primary accounts, ultimately transforms this domain into a vehicle for academic humility, making students highly cautious, self-aware, and acutely conscious of the natural boundaries of historical certainty.

Methodology

Research Design

This study employed a quantitative correlational research design to assess the level of critical thinking skills of the BA History students. This gathered quantitative data through surveys on the students' learning experiences and their perceptions of critical thinking skills in studying history, both local and international history, in this era of digital environment. This method ensured appropriateness to achieve its purpose to explore the relationship in this phenomenon.

Sampling Design

The study employed a probability sampling method, specifically simple random sampling. Simple random sampling facilitated the selection of the respondents for this study. This ensures that this satisfy the underlying mathematical assumptions of ordinal logistic regression model which requires independent and identitically distributed observations. By completely eliminating subjectivity and convenience bias, the simple random sampling desing guarantees that both the descriptive levels of critical thinking skills and the subsequent predictive modeling trajectories accurately represent the wider student body within the program. The number of respondents was limited to 166, 40% of total population of 415 BA History students.

Research Locale

The study was conducted at Sulu State University in Barangay Bangkal, Patikul, Sulu, located 1.6 kilometers of the Jolo proper. The University offers education from undergraduate to graduate programs. The respondents were students from BA History program, one of the pioneering program within the institution since its establishment. A total of one hundred sixty-six (166) students enrolled in BA History at Sulu State University were the randomly chosen as the respondents of this study. This covered all year levels of students which were selected through simple random sampling, emphasizing the diversity of learning experience and perceived program relevance of critical thinking skills in studying history and their future career.

Research Instrument

A self-reported questionnaire was adopted consisting of 20 items for assessing critical thinking skills in aspect of analysis and interpretation, and reflection and evaluation. Since the questionnaire was adopted, content validation has been conducted. To check reliability, this study utilized Cronbach's alpha to measure consistency of the questionnaire to ensure the items objectively represent the desired construct.

Data Gathering Procedure

An actual survey was conducted among all one hundred sixty-six students from the BA History program in Sulu State University. A formal letter of request to launch and conduct the study was sought from the Dean of College of Arts and Sciences. After securing permission, the researchers personally collect the data from the target respondents. Informed consent was sought from all participants securing compliance to ethical standards and transparency. The results were tallied, analyzed and interpreted respectively.

Results and Discussions

Research Question 1: What is the level of critical thinking skills among BA History students across different year levels in terms of Analysis and Interpretation and Reflection and Evaluation?

Table 1. Level of Critical Thinking Skills among BA History students in terms of Analysis and Interpretation

No.	Statement	Mean	SD	Verbal Description
1	I can identify the main issues in a given situation.	3.52	1.45	Often
2	I analyze problems by breaking them down into smaller parts.	3.34	1.43	Sometimes
3	I distinguish between facts and opinions when studying.	3.60	1.41	Often
4	I interpret information based on evidence.	3.58	1.51	Often
5	I evaluate the relevance of information before using it.	3.66	1.38	Often
6	I can identify assumptions in group discussions or texts.	3.52	1.33	Often
7	I make connections between ideas when analyzing a problem.	3.56	1.40	Often
8	I look for causes and effects in the issues we study.	3.68	1.46	Often
9	I seek clarification when information is unclear.	3.53	1.49	Often
10	I recognize patterns in data, problems, or arguments.	3.54	1.39	Often
Weighted Mean		3.55	1.264	Often

Table 1 reflects the BA History students' Critical Thinking Skills in terms of analysis and interpretation. It can be inferred from this table that the respondents obtained a weighted mean of 3.55 with a standard deviation of 1.264 which often utilizes analysis and interpretation skills. More specifically, the highest-rated item was No.8 – analysis on cause and effect ($M = 3.68$, $SD = 1.46$), emphasizing the significance of the cause and effect in analyzing and interpreting data. This aligns with prior findings of Thornhill-Miller et al. (2023) that analyzing cause-and-effect relationships stands out as a core metric of baseline cognitive analysis. Other highly rated indicators included evaluation of the relevance (No.5, $M = 3.66$), distinction between facts and opinions (No.3, $M = 3.60$), and interpretation based on evidence (No.4, $M = 3.58$). These results support the assertions of Thorp & Persson (2019) who argue that academic history programs naturally cultivate disciplinary literacy centered on source interrogation and evidence-led inference. Moreover, Trigueros-Cano et al. (2022) confirms that objective facts and subjective opinions are among the most frequently consolidate cognitive mechanisms when students interact with historical texts. The lowest-rated items, although still relatively high, was dissecting problems into smaller parts (No.2, $M = 3.34$). These findings suggest that students have encountered challenges in deconstructing multi-layered historical problems into discrete, smaller sub-problems. This supports the findings of Purmintasari et al. (2024) that this has been the most challenging phase of historical analysis for students.

Table 2. Level of Critical Thinking Skills among BA History students in terms of Reflection and Evaluation

No.	Statement	Mean	SD	Verbal Description
1	I reflect on the effectiveness of my learning strategies.	3.50	1.40	Often
2	I evaluate whether my conclusions are supported by evidence.	3.54	1.42	Often
3	I ask myself if my decisions were the best possible ones.	3.66	1.50	Often
4	I reconsider my perspective when presented with strong evidence.	3.69	1.43	Often
5	I reflect on group discussions to improve my understanding.	3.70	1.44	Often
6	I evaluate the credibility of information before accepting it.	3.57	1.41	Often
7	I check for errors in my reasoning or solutions.	3.68	1.40	Often
8	I recognize the limitations of my own knowledge.	3.72	1.46	Often
9	I learn from mistakes by identifying what went wrong.	3.78	1.47	Often
10	I think about how to improve my performance after every task.	3.81	1.51	Often
Weighted Mean		3.671	1.320	Often

Table 2 reflects the BA History students' Critical Thinking Skills in terms of reflection and evaluation. It can be inferred from this table that the respondents obtained a weighted mean of 3.67 with a standard deviation of 1.320 which often utilizes reflection and evaluation. More specifically, the highest-rated item was No.10 – "I think about how to improve my performance after every task" ($M = 3.81$, $SD = 1.51$), reflecting the students' commitment for improvement through individual performance reflection and evaluation. This supports previous research of Rivas et al. (2022) suggesting that critical thinking relies entirely on a conscious awareness of cognitive actions, enabling to explicitly identify what was not executed well and systematically correct it. Students also often reflect on their mistakes (No.9, $M = 3.78$), recognize their limitations (No.8, $M = 3.72$), and engage on group discussions for better understanding (No.5, $M = 3.70$). These findings support the study of Ratnayake et al. (2024) that students track and evaluate their own study strategies that which students actively self-monitor by reflecting on mistakes and identifying their conceptual boundaries or limitations. The lowest-rated items, although still relatively high, was the reflection on the effectiveness of their learning strategies (No.1, $M = 3.50$). These findings support the study of Xue & Khalid (2026) that while students explicitly proficient at baseline performance tracking, they routinely exhibit lower relative capacities in the adaptive regulation phase.

Research Question 2: To what extent do individual items within the analysis and interpretation, and reflection and evaluation domains significantly predict BA History student's academic year level progression?

Table 3. Ordinal Logistic Regression for Critical Thinking Skills: Analysis and Interpretation

Statement	B	SE	Wald	p	Odds Ratio	Interpretation
No.4 I interpret information based on evidence.	.60	.21	8.00	.005	1.83	Significant positive predictor

Table 3 presents the ordinal logistic regression for critical thinking skills among BA History students in terms of analysis and interpretation. It can be inferred from the table that out of 10 statements under this domain, only statement No.4 shows significant positive predictor with the p value of .005. This means that as the BA History students climb from second-year level to the fourth-year level, they shift toward strict and evidence-grounded analysis and interpretation of the historical account presented to them. This finding strongly aligns with the core requirements of historiography and historical methodology. Lower-class students often rely on narrative summaries or secondary accounts. In contrast, upper-class students are actively immersed in archival research, primary source verification and independent historical writing. They are forced to move away from conjecture and explicitly link their historical claims to verifiable, documented footprints of the past. The data demonstrates that evidence-based interpretation is the defining operational benchmark of an advancing history major.

Table 4. Ordinal Logistic Regression for Critical Thinking Skills: Reflection and Evaluation

Statement	B	SE	Wald	p	Odds Ratio	Interpretation
No.8 I recognize the limitations of my own knowledge.	-.54	.23	5.49	.019	.58	Significant negative predictor

Table 4 presents the ordinal logistic regression for critical thinking skills among BA History students in terms of reflection and evaluation. It can be inferred from the table that out of 10 statements under this domain, only statement No.8 shows significant negative predictor with the p value of .019. This means that second-year students, who are newer to the sheer complexity of historical discourse, frequently exhibit higher levels of unearned confidence or naïve realism regarding what they know. Conversely, as BA History students advance to their senior year, they undergo rigorous training in competing historical schools of thought, conflicting primary accounts of identical historical events, and complex socio-political contexts. They realize that history is rarely black and white. This immense intellectual exposure often causes advanced students to become highly cautious, analytically critical, and deeply self-aware of how fragile historical certainty can be. They rate themselves more conservatively on this item because they have developed a mature, realistic, and acute understanding of just how elusive complete knowledge is in historical research. The overall model fit for analytical skills (Table 3) and evaluative skills (Table 4) were non-significant since both models yielded p -values greater than the conventional 0.05 threshold. Consequently, these models lack strong predictive generalizability. Despite the non-significant overall model fits, specific individual predictors emerged as statistically significant within these exploratory frameworks: statement No.4 functioned as a significant positive predictor for analytical skills; while statement No.8 surfaced as a significant negative predictor for evaluative skills.

Ethical Considerations

To safeguard the dignity, rights, and well-being of the respondents, this study strictly adhered to established institutional and legal ethical standards. Prior to data collection, formal clearance was secured from the institution's Ethics Committee to ensure the research protocol met all academic and ethical benchmarks for investigation. In strict compliance with the Philippine Data Privacy Act of 2012 (Republic Act No. 10173), data privacy and security measures were implemented. Participation was entirely voluntary, and explicit written informed consent was obtained from each student prior to their evaluation, outlining the study's purpose, scope and their right to withdraw at any juncture without penalty. To ensure absolute confidentiality and anonymity, all personally identifiable information was redacted and responses were processed using coded identifiers. All collected data were stored securely, accessed exclusively by the research team and utilized solely for academic research and institutional program improvement.

Conclusion

The findings of this study reveals that BA History students consistently manifest robust, high-functioning baseline competencies across both critical thinking domains. In terms of analysis and interpretation, the cohort excels at mapping historical cause-and-effect relationships and evaluating informational relevance, though they face slight difficulties in breaking down complex historical problems into smaller, manageable parts. Within the reflection and evaluation domain, students exhibit a strong commitment to post-task self-improvement and active learning from mistakes, although they are less proficient at assessing the systemic efficiency of their overall study strategies. This close alignment between structured academic engagement and targeted self-monitoring reinforces the findings of Barrie et al. (2025), who note that a student's structured learning experiences directly dictate how effectively they operationalize the core analytical competencies of their academic program. However, the predictive capacity of these specific cognitive dimensions on academic year level progression must be interpreted with strict nuance, since the overall regression models demonstrated non-significant fits. In this case, the statistical relationships identified were treated as exploratory rather than definitive. Within this framework, the data points out toward localized dynamics: an inclination to interpret information based strictly on evidence appear alongside advancing year levels, suggesting that primary source verification remains a key developmental focus of the history major. Conversely, recognizing the limitations of one's own knowledge acts as a negative predictor of progression. This inverse relationship marks a mature intellectual evolution: while lower-class levels often exhibit unearned cognitive confidence, upper-class levels students exposed to competing historiographical schools and conflicting primary accounts develop a sophisticated academic humility and an acute awareness of the boundaries of historical certainty.

Recommendations

To maximize these developmental findings, distinct actions may be considered. For history teachers, they may consider moving away from passive lecture methods and implement scaffolded instruction that explicitly teaches problem-decomposition frameworks. They may also design assessments that normalize the limitations of historical data and reward the cognitive humility demonstrated by advanced students. Finally, for history students, they may consider transitioning from reactive emotional reflection to active self-regulated learning. They may deliberately audit how they study, replacing passive reading with active source

interrogation, while grounding all historical arguments in verifiable empirical evidence. Finally, given the non-significant overall model fits in this study, future researchers may consider expanding the model by incorporating broader institutional pedagogical and demographic variables. Additionally, employing mixed-methods designs and objective critical thinking assessment may be considered to enhance statistical coverage and uncover the unmeasured drivers of student cognitive progression.

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