

Assessing Argumentative Competence: A CAPNA/PTA Analysis of Student Exam Essays

Case of Third year EFL level at ENS Laghouat

Evaluation de la compétence argumentative : une analyse CAPNA/PTA des dissertations d'examen

Cas des étudiants de troisième année d'Anglais à l'ENS de Laghouat

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Abstract: This study analyzes argumentation in seven exam essays written by third-year university students using the Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) and the Periodic Table of Arguments (PTA). Focusing on a listening lesson plan design prompt, the research investigates the types and strength of premises used. A quantitative approach examines the frequency and distribution of premise types (Premise of Fact/Value, Premise of Value/Policy, Implicitly Linked Premise of Value/Policy) and the strength of their reasoning (strong, moderately strong, weak). The combined CAPNA/PTA framework reveals a consistent weakness in strong reasoning, despite variations in premise types, highlighting the need for pedagogical interventions focused on argument structure, critical thinking, and targeted feedback to improve argumentative competence in academic contexts.

Keywords: Argumentation, CAPNA, PTA, exam essays, argument structure.

Résumé: Cette étude analyse l'argumentation dans sept dissertations d'examen rédigées par des étudiants universitaires de troisième année en utilisant la Procédure d'Évaluation Complète de l'Argumentation Naturelle (CAPNA) et le Tableau Périodique des Arguments (PTA). Se concentrant sur une consigne de conception de plan de leçon d'écoute, la recherche examine les types et la force des prémisses

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utilisées. Une approche quantitative examine la fréquence et la distribution des types de prémisses (Prémisse de fait/valeur, Prémisse de valeur/politique, Prémisse de valeur/politique implicitement liée) et la force de leur raisonnement (fort, modérément fort, faible). Le cadre combiné CAPNA/PTA révèle une faiblesse constante dans le raisonnement solide, malgré les variations dans les types de prémisses, soulignant la nécessité d'interventions pédagogiques axées sur la structure de l'argument, la pensée critique et une rétroaction ciblée pour améliorer la compétence argumentative dans les contextes académiques.

Mots clés : Argumentation, CAPNA, PTA, dissertations d'examen, structure de l'argument.

1. Introduction:

The ability to construct and defend well-reasoned arguments is a cornerstone of academic success, particularly in essay-based examinations. Evaluating the quality of student argumentation, however, can be a complex task, often relying on subjective assessments of clarity, relevance, and persuasiveness. This article presents an analysis of student argumentation in ten exam essays, utilizing the Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) (Hinton, 2021) in conjunction with the Periodic Table of Arguments (PTA) (Wagemans, 2016, 2019, 2020c). This combined framework offers a systematic and insightful approach to evaluating student reasoning, moving beyond simple identification of fallacies to a deeper understanding of argument structure and strength.

Traditional methods of assessing argumentation often rely on informal criteria and comparative judgments, which can lack precision and consistency. The CAPNA, with its three-part focus on process, reasoning, and expression, provides a more structured approach.¹ While this study primarily concentrates on the reasoning aspect, it acknowledges the interconnectedness of these three elements in effective argumentation. Furthermore, the integration of the PTA provides a valuable tool for analyzing the underlying structure of



student arguments. By categorizing arguments based on their form, substance, and lever, the PTA allows for a more nuanced understanding of how students construct and justify their claims. This framework allows us to identify not only what arguments students make, but also how they attempt to support them, revealing potential strengths and weaknesses in their argumentative strategies.

This article will first briefly outline the key principles of CAPNA and PTA, focusing on their application to the analysis of student argumentation. It will then present the results of the analysis of the ten exam essays, highlighting common patterns and variations in the students' argumentative approaches. Finally, the article will discuss the implications of these findings for pedagogical practice, suggesting ways in which instructors can better support the development of students' argumentation skills. By applying CAPNA and PTA to the evaluation of student work, this study aims to contribute to a more objective and insightful assessment of argumentative competence in academic contexts.

2.1 Literature Review

2.1.1 Argumentation

Argumentation is a fundamental aspect of human communication and reasoning, permeating various domains from everyday conversations to formal debates and scientific discourse (Toulmin, 2003). It involves the process of constructing and evaluating arguments, which are comprised of claims supported by reasons or evidence (Walton, 2006). A core function of argumentation is persuasion, aiming to influence beliefs, attitudes, or actions (O'Keefe, 2016). However, argumentation is not solely about winning an argument; it also plays a crucial role in knowledge creation, problem-solving, and fostering mutual understanding (van Eemeren & Grootendorst, 2004).

Different theoretical perspectives offer varied approaches to understanding argumentation. Formal logic focuses on the structural

validity of arguments, examining whether the conclusion necessarily follows from the premises (Copi & Cohen, 2009). Informal logic, on the other hand, deals with the soundness of arguments, considering the relevance and sufficiency of the evidence provided (Govier, 2018). Rhetoric emphasizes the persuasive aspects of argumentation, exploring how language and other communicative strategies are used to influence audiences (Perelman & Olbrechts-Tyteca, 1969). Pragmatics combines elements of formal logic, informal logic, and rhetoric, focusing on the rules of communicative interaction in argumentative dialogues (van Eemeren & Grootendorst, 2004).

Analyzing argumentation presents several challenges. Arguments in natural language are often implicit, enthymematic, and embedded within complex communicative contexts (Hinton, 2010). Furthermore, the quality of an argument is not solely determined by its logical validity but also by its relevance, acceptability, and persuasiveness within a specific context (Walton, 2006). Traditional methods of argumentation analysis, often rooted in formal logic, may not adequately capture the richness and complexity of real-world arguments (Toulmin, 2003). This necessitates the development of more comprehensive and context-sensitive approaches to argumentation analysis.

2.1.2 The Comprehensive Assessment Procedure for Natural Argumentation (CAPNA)

The Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) was developed by Hinton and Wagemans (2013) to address the limitations of traditional argumentation analysis methods. CAPNA offers a more holistic and nuanced approach by considering three key dimensions of argumentation: process, reasoning, and expression.

1-The Process Dimension examines the dynamic unfolding of an argument, including the order in which claims and supporting evidence

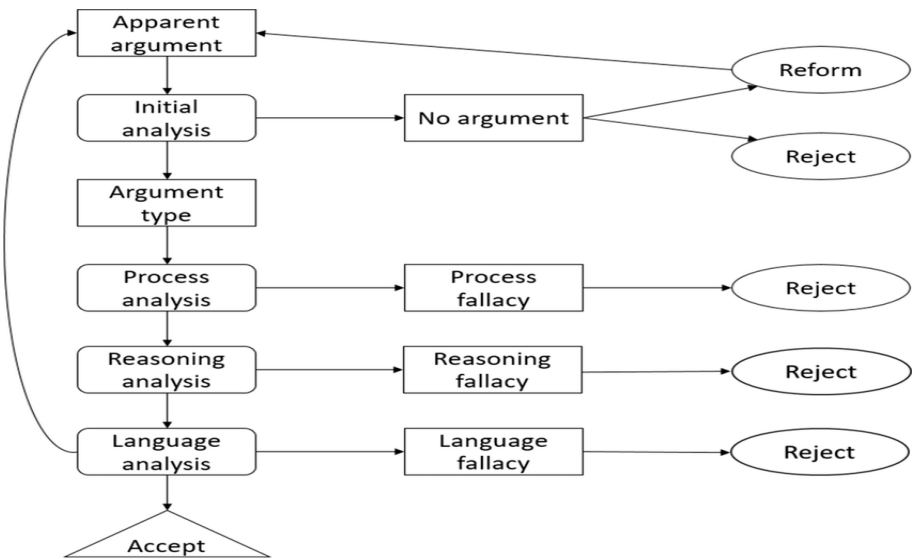
are presented, the use of rhetorical devices, and the interaction between arguers (Hinton, 2010). CAPNA recognizes that arguments are not static entities but rather evolve over time, influenced by the context and the participants involved.

2-The Reasoning Dimension focuses on the logical connections between claims and evidence, evaluating the strength and validity of the inferences made (Walton, 2006). CAPNA provides tools for identifying different argument schemes and assessing their appropriateness within the given context.

3-The Expression Dimension considers the linguistic and stylistic choices made in presenting the argument (Perelman & Olbrechts-Tyteca, 1969). CAPNA analyzes how language is used to enhance persuasiveness, clarify meaning, and manage the interaction between arguers.

By considering these three dimensions, CAPNA provides a more comprehensive understanding of argumentation than traditional approaches. It allows analysts to identify not only the strengths and weaknesses of an argument's logical structure but also its rhetorical effectiveness and its dynamic development within a communicative context. CAPNA has been applied to various domains, including legal reasoning, political discourse, and everyday conversations, demonstrating its versatility and potential for advancing the study of argumentation (Hinton & Wagemans, 2013).

Figure 1. The CAPNA diagram.



2.1.3 The frameworks Utilized to Implement the CAPNA

A key innovation is the integration of the PTA (Wagemans, 2016, 2019, 2020c) into the CAPNA framework. The (PTA), developed by Wagemans (2016), offers a novel framework for understanding arguments by considering not just *form* but also *substance* (Fact, Value, Policy) and *lever* (how the premise supports the conclusion). Key principles include a *combinatorial taxonomy* (Wagemans, 2019), the *Law of the Common Term* (Wagemans, 2020c) (shared term between premise and conclusion), and two basic *argument forms* (Predicate and Subject). The PTA is used in research for argument type identification (Visser et al., 2018, 2021; Gobbo et al., 2019), evaluation (Hinton, 2021), and theoretical development (Wagemans, 2019, 2020c). Its strengths include comprehensiveness, systematicity, insightful analysis, and applicability to natural language. Limitations include complexity, some subjectivity, and the need for further development. The PTA offers a valuable, though still evolving, tool for analyzing arguments. specifically for the analysis of reasoning. The PTA provides

a systematic way to categorize arguments based on their *form*, *substance*, and *lever*. This structured approach offers several advantages:

- 1- Systematic Argument Identification Procedure (ATIP) : it provides a clear, step-by-step method for identifying the type of argument according to the PTA. This promotes consistency and reduces the subjectivity inherent in more informal approaches.
- 2- Targeted Reasoning Analysis (TRA): By identifying the argument type, the CAPNA can then utilize specific procedural questions tailored to that type. This allows for a more focused and relevant evaluation of the argument's reasoning.
- 3- Beyond Fallacy Labeling(BFL): The PTA and CAPNA together move beyond simply labeling arguments as instances of known fallacies. Instead, they provide a framework for understanding *why* an argument is weak, based on the strength of its lever and the acceptability of its premises. (Hinton, 2021)

3.2 Methodology

3.1Method and sample

This study employed a descriptive methodology using the Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) (Hinton, 2021) to analyze the argumentation present in seven student exam essays. CAPNA provides a structured framework for dissecting arguments, allowing for the identification and categorization of their constituent parts. Specifically, this analysis focused on the premises used to support the students' claims. The premises were categorized as either Premise of Fact/Value (pre VF), Premise of Value/Policy (pre VP), or Implicitly Linked Premise of Value/Policy. Furthermore, the reasoning supporting each premise was assessed and classified as either strong, moderately strong, or weak.

The approach taken was primarily quantitative, focusing on the frequency and distribution of these different premise types and their associated reasoning strength across the seven essays. This quantitative approach was chosen for several reasons. First, it allows for a systematic and objective analysis of a relatively small sample of student writing. While qualitative analysis could provide richer descriptions of individual arguments, the quantitative approach allows for the identification of broader trends and patterns in argumentation across the sample. Second, by quantifying the types and strength of premises used, it becomes possible to compare and contrast the argumentative strategies employed by different students, even within a limited dataset. Third, this approach facilitates a more concise and readily interpretable presentation of the findings. The numerical data provides a clear picture of the prevalence of different argument components and the overall strength of student reasoning. Finally, using CAPNA in a quantitative way allows for a more structured and replicable analysis, which enhances the reliability of the findings. While the sample size is limited, this structured, quantitative approach, guided by the CAPNA framework, provides a valuable snapshot of student argumentation skills and highlights areas for potential pedagogical intervention.

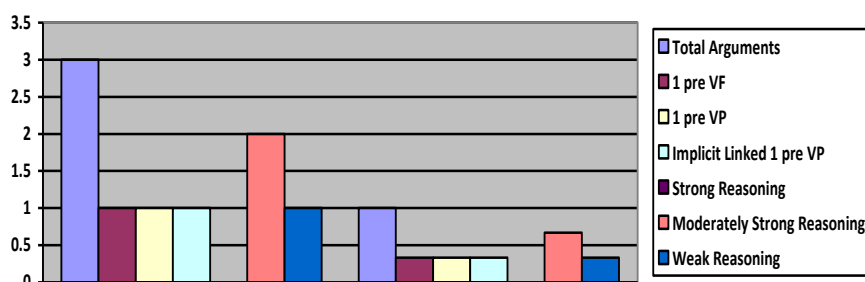
The sample for this study consisted of seven exam essays written by third-year university students enrolled the English language department at the Teachers Higher College Commonly known as ENS Laghouat during the academic year 2020/2021. These essays were selected randomly from a larger pool of student submissions. All students were responding to the same exam question: "In view of the list of difficulties learners faced in a listening session, write a short essay (3 pages) in which you present a listening lesson plan that should be methodologically designed to deal with the aforementioned learning problems." This particular question was chosen for the exam because it required students to not only demonstrate their understanding of common listening comprehension challenges but also to apply

pedagogical principles in designing a practical solution – a lesson plan. The essay format allowed students to develop their arguments in a more extended and nuanced manner than would be possible in shorter answer formats, providing richer material for analysis of their argumentation skills. The three-page limit, while providing ample space for development, also encouraged conciseness and focus in their arguments. The essays were collected as part of the students' regular coursework and were anonymized before being analyzed for this study.

3.2Results

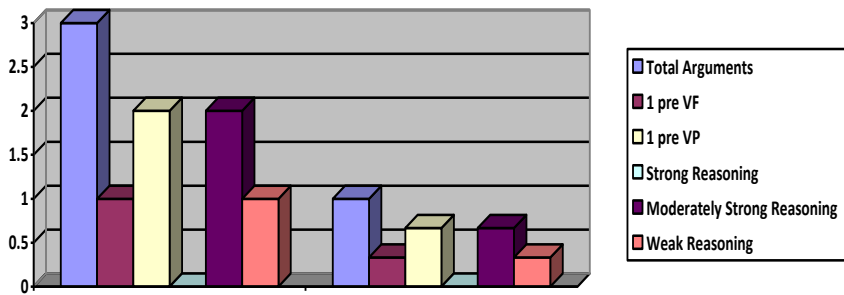
In Essay One, all three arguments were evenly distributed between Premise of Fact/Value (pre VF), Premise of Value/Policy (pre VP), and an Implicitly Linked Premise of Value/Policy, each comprising 33.3% of the total. While two-thirds (66.7%) of the arguments were supported by moderately strong reasoning, one-third (33.3%) relied on weak reasoning. Notably, no arguments demonstrated strong reasoning.

Figure 2 . Statistical overview of essay 1 argumentation .



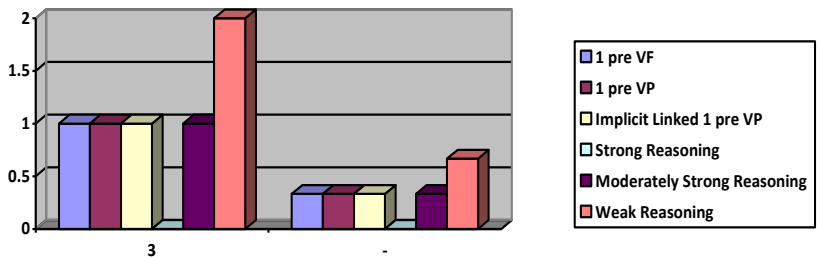
Essay Two also presented three arguments, with one-third (33.3%) being a Premise of Fact/Value (pre VF) and two-thirds (66.7%) being Premises of Value/Policy (pre VP). Similar to Essay One, no arguments exhibited strong reasoning, while two-thirds (66.7%) were moderately strong and one-third (33.3%) were weak.

Figure 3 . Statistical overview of essay 2 argumentation .



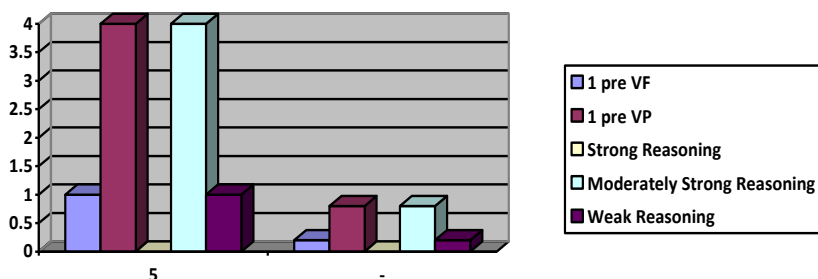
Essay Three contained three arguments, each type (pre VF, pre VP, and Implicitly Linked pre VP) accounting for 33.3% of the total. Again, strong reasoning was absent. Only one-third (33.3%) of the arguments used moderately strong reasoning, while the remaining two-thirds (66.7%) were based on weak reasoning.

Figure 4 . Statistical overview of essay 3 argumentation .

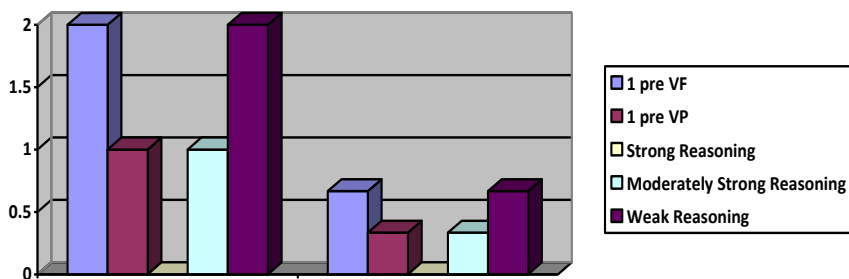


Essay Four, with five total arguments, deviated slightly from the three-argument pattern. Here, Premises of Value/Policy (pre VP) dominated, making up 80% of the arguments, while Premises of Fact/Value (pre VF) accounted for the remaining 20%. Despite the higher number of arguments, none demonstrated strong reasoning. However, a larger proportion (80%) used moderately strong reasoning, with only 20% relying on weak reasoning.

Figure 5 . Statistical overview of essay 4 argumentation .

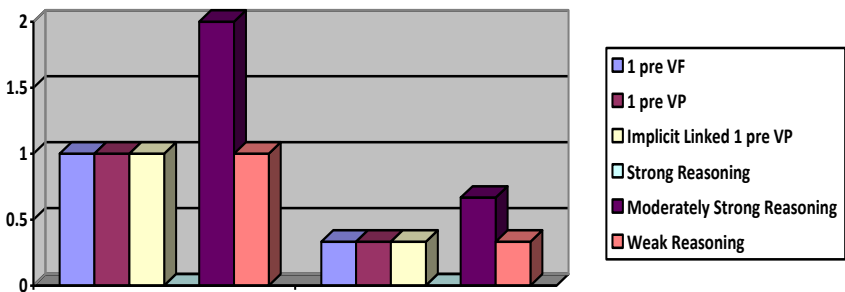


Essay Five, with three arguments, showed a different distribution of premise types. Premises of Fact/Value (pre VF) constituted two-thirds (66.7%) of the arguments, while Premises of Value/Policy (pre VP) made up the remaining one-third (33.3%). As with previous essays, strong reasoning was absent. One-third (33.3%) of the arguments were supported by moderately strong reasoning, while two-thirds (66.7%) were weak.

Figure 6 . Statistical overview of essay 5 argumentation .

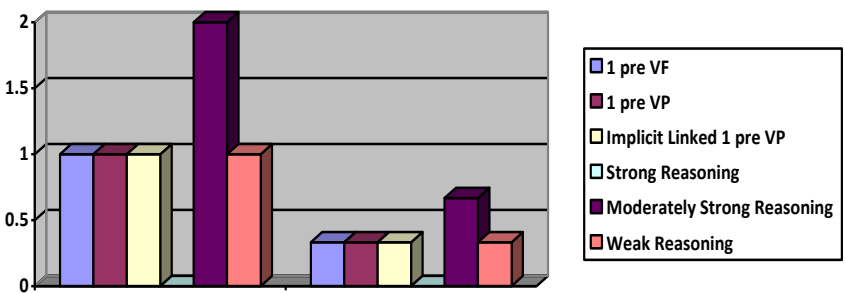
Essay Six, also with three arguments, had an even split between Premise of Fact/Value (pre VF), Premise of Value/Policy (pre VP), and an Implicitly Linked Premise of Value/Policy, each accounting for 33.3% of the total. No arguments used strong reasoning, two-thirds (66.7%) used moderately strong reasoning, and one-third (33.3%) used weak reasoning.

Figure 7. Statistical overview of essay 6 argumentation .



Finally, Essay Seven, containing three arguments, again showed an even distribution across Premise of Fact/Value (pre VF), Premise of Value/Policy (pre VP), and an Implicitly Linked Premise of Value/Policy, each comprising 33.3% of the total. Consistent with the overall trend, no arguments used strong reasoning. Two-thirds (66.7%) of the arguments were supported by moderately strong reasoning, and one-third (33.3%) relied on weak reasoning.

Figure 8 . statistical overview of essay 7 argumentation .



The sresults show that while Premises of Value/Policy (pre VP) were frequently used, the essays generally struggled with strong reasoning. Moderately strong reasoning was more common, but a notable portion of arguments across all essays relied on weak reasoning. The absence

of strong reasoning suggests a potential area for improvement in argumentation skills.

The results presented have several pedagogical implications for instruction in argumentation and persuasive writing. The consistent lack of strong reasoning across all seven essays, despite varying distributions of premise types (pre VF, pre VP, and Implicitly Linked pre VP), highlights a key area for pedagogical focus. While students seem capable of generating different kinds of claims (value, policy, fact/value), they struggle to adequately support these claims with robust reasoning. This weakness is particularly concerning given the importance of strong argumentation in academic contexts, including exam preparation. Students should be equipped to analyze and construct arguments effectively, not only for writing assignments but also for demonstrating their understanding of complex material on exams. Reading widely and critically is essential for this development, as it exposes students to diverse perspectives and well-supported arguments. This exposure can help them develop their own reasoning skills and learn to construct more compelling arguments.

Several specific pedagogical strategies could address this weakness:

1. Explicit Instruction on Argument Structure: Students need explicit instruction on how to construct a strong argument. This includes clearly defining the relationship between claims, supporting evidence, and reasoning. Teaching models like Toulmin's argument structure (claim, data, warrant, backing, qualifier, rebuttal) can provide a framework for building more compelling arguments. This framework is not only useful for essay writing but also for analyzing and responding to arguments presented in exam questions.

2. Focus on Warrants and Backing: The weakness in reasoning likely stems from a lack of well-developed warrants (the connection between evidence and claim) and backing (support for the warrant itself). Instruction should emphasize the importance of explicitly stating

these connections and providing sufficient support for them. Activities that require students to identify and evaluate the warrants in existing arguments can be beneficial. Analyzing arguments in texts assigned for exam preparation can be a valuable exercise.

3. Developing Critical Thinking Skills: Strengthening critical thinking skills is essential for improving argumentation. Students need to be able to analyze information, identify biases, evaluate evidence, and formulate logical connections. Activities that promote these skills, such as debating, analyzing current events, and evaluating different perspectives on an issue, can contribute to stronger reasoning. These skills are also essential for effectively processing information and formulating well-reasoned responses on exams.

4. Targeted Feedback and Revision: Providing targeted feedback on the reasoning within student arguments is crucial. Feedback should not only identify weaknesses but also offer concrete suggestions for improvement. Revision activities that focus specifically on strengthening the reasoning component of arguments can be highly effective. Peer review can also be incorporated, with clear guidelines on how to evaluate the strength of reasoning. This process of feedback and revision should be extended to exam preparation, where students practice constructing arguments under timed conditions.

5. Modeling Strong Arguments: Teachers should model strong argumentation by demonstrating how to construct well-reasoned arguments. This can involve analyzing examples of effective arguments, thinking aloud while constructing an argument, and providing clear explanations of the reasoning behind each step. Modeling how to approach argumentative questions on exams can be particularly helpful.

6. Argumentation Across the Curriculum: Argumentation skills should not be confined to a single writing or debate unit. Opportunities for argumentation should be integrated across the curriculum, allowing

students to practice and refine these skills in different contexts. This reinforces the idea that argumentation is not just for essays but a valuable skill for learning and demonstrating understanding in all subjects, including exams.

4.Conclusion

In conclusion, this study, utilizing the Comprehensive Assessment Procedure for Natural Argumentation (CAPNA) (Hinton, 2021) to analyze seven student exam essays, offers valuable insights into their argumentation skills. The quantitative approach, focusing on the frequency and strength of different premise types (pre VF, pre VP, and Implicitly Linked pre VP), revealed a consistent weakness in strong reasoning. While students demonstrated the ability to formulate various claim types, they struggled to adequately support them with robust, well-developed reasoning, particularly in constructing strong warrants and providing sufficient backing. These findings suggest a need for targeted pedagogical interventions. Specifically, students would benefit from explicit instruction in argument structure, emphasizing the crucial link between claims, evidence, and reasoning. Furthermore, cultivating critical thinking skills, providing targeted feedback on reasoning, modeling effective argumentation, and integrating argumentation practice across the curriculum are essential for improvement. Ultimately, these pedagogical strategies, informed by the CAPNA analysis, can better equip students to construct compelling, well-supported arguments, both in their written work and exam performance, thereby fostering stronger critical thinking and persuasive communication skills.

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