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THE USE OF LOGOS, PATHOS AND ETHOS IN STUDENT REASONING: A GENDER-BASED ANALYSIS USING THE ENNIS-WEIR CRITICAL THINKING ESSAY TEST

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Abstract:

This qualitative study investigates gender-based differences through the use if Aristotle's rhetorical appeals (Logos, Pathos and Ethos) in students' critical thinking performance specifically, reasoning. Using the Ennis-Weir Critical Thinking Essay Test as the instrument and Aristotle's rhetorical framework as the conceptual lens, the study aimed to identify the most and least preferred appeal employed by male and female respondents when constructing argumentative responses. This study involved ten first year second-semester diploma students (five male and five female) from a local public university. Their written responses were analysed to identify instances of reasoning and classify them according to Aristotle's appeals. The findings indicated that logos, or logical reasoning, was the most frequently used appeal by both genders which highlighted a shared emphasis on rational and structured argumentation. However, gender differences were evident in the use of pathos. Female respondents employed the emotional appeal specifically to invoke empathy, safety concerns and social well-being. Whereas, male respondents used pathos less frequently. This suggests a tendency among female respondents to integrate emotional and relational elements into their reasoning. Ethos or ethical appeal, was the least preferred by both genders, likely due to the limited opportunity within the task to establish personal credibility seen in the nature of the question posed. The results suggest that while logical reasoning is universally prioritised in structured academic contexts, female respondents are more inclined to employ affective appeals, producing a more nuanced and multi-dimensional rhetorical approach.

Keywords:

Critical Thinking, Aristotle's Rhetorical Appeals, Gender Differences, Ennis-Weir Critical Thinking Essay Test.

Introduction

As stated by The Malaysia Education Blueprint 2006-2010 the key in yielding first class human capital is to produce students who are capable of critical and creative thinking (Ministry of Education, 2006). This took a negative turn in the education system in Malaysia, because it left teachers thriving to bridge the gap where most students in schools were not capable of applying critical and creative thinking outside of the classroom and only minimally when in the classroom. This led the Ministry of Education to generate multiple suggestions on how to in cooperate critical and creative thinking in daily school subjects. This included, implementation of the Primary School Standard Curriculum in 2011 and the teaching of critical and creative thinking skills and strategic learning. Subsequently, the implementation of HOTS (Higher Order of thinking skills) was also in-cooperated into the classroom. With all these, it could be inferred that, students under this new education nourishment should be able to parade higher order thinking skills which embody both critical and creative thinking.

Having the ability to think clearly and reasonably in order to solve problems, evaluate information, and construct arguments has been widely acknowledge by many as the linchpin in tertiary education and beyond (Raj et al., 2022). Critical thinking is seen as a skill which needs to be exercised in order for a person to excel in it, the belief that one is inherently an excellent critical thinker simply by birth is a grave misconception (Ennis, 1996). Despite the normative value, ample of literature on critical thinking emphasizes either on pedagogical techniques or solely on quantitative assessment results. Studies investigating students' reasoning when formulating their arguments, is seen to be lacking in literature. This gap is obvious, given that gender related differences in verbal and analytical reasoning have been observed in various academic contexts (Ennis, 2018). Additionally, most critical thinking assessments rely heavily on objective scoring scales without thoroughly exploring the rhetorical structure through which students deliver their arguments.

Critical thinking and reasoning are skills that come in hand in hand. Critical thinking and reasoning skills are crucial for university graduates especially in the field of Information System. These skills are considered vital to not only ensure academic success but also for professional adaptability in real world situations (Thomas et al.,2004). One of the established frameworks used by researchers to analyse reasoning is the Aristotle's Rhetorical Appeals. Type of reasoning is characterised into three possible aspects which are Ethos (Credibility), Pathos (Emotion) and Logos (Logic). Through the lens of Aristotle's framework of rhetorical appeals, this study seeks to address the population gap in terms of how each gender articulate their reasoning through rhetorical means. Using The Ennis-Weir Critical Thinking Essay Test to elicit arguments through essay writing subsequently analysed using the Aristotle's Rhetorical Appeal, this research aims to identify two objectives, firstly to determine the most preferred Aristotle's Rhetorical Appeal according to gender and lastly to determine the least preferred Aristotle's Rhetorical Appeal according to gender. By doing so, this research aims to delve deeper into students' argumentative styles. This research also aims to aid the understanding on gendered rhetorical preferences to inform more nuanced learning strategies and feedback interventions.

Literature Review

Critical Thinking in Malaysia

The custom norm among Asian parents is to equip their children with the current trending skills deemed as an educational benefit in the long run. From learning a musical instrument to fluently mastering a third language, having these skills put the child's significance in the prospect of a successful future. In today's world, having children who are equipped with flexible minds which are capable to compute new information and respond to complex problems is considered as a useful skill in a world filled with exam-oriented children. In the real world, adults are frequently thrown into situations which are more complicated than a set of multiple-choice question test (Oshiro, 2019). This tends to put some adults at a dead end when it comes to forming an effective solution to overcome the complicated situation. This is due to the fact that, at a very young age, these adults were only nurtured to ask the "what" and not the "how's" and the "why's" of things. To be able to formulate questions in the "how" and they "why" spectrum, a child is considered to be thinking critically.

With the existence of the Malaysia Education Blueprint 2013-2025 and the Malaysia Education Blueprint 2015-2025, Malaysia is on a positive note, moving away from an exam oriented robotic batch of younglings to a much more complex and curious batch who are allowed to question and ponder on things. Students are no longer fed the answer in a teacher centred classroom, instead they are placed in a problem-based learning classroom where a situation is thrown to them which required the students to come up with various effective solution. Teachers on the other hand, throughout the lesson functions as a facilitator in this student-centred classroom (Malaysia Education Blueprint 2013-2025, 2013). This is seen as a means by the government to foster critical and creative thinking skill in the students, a skill deemed crucial in order for students to formulate rational and more objective decisions (Abdul Rahim, 1999; Maimunah, 2004). This move is also to cater to the formation of a holistic, balanced, and entrepreneurial graduate who is capable to adapt and fill jobs (Edward, 2018).

Critical Thinking and Essay Writing

Critical thinking as defined by Paul and Elder (2019) is a structured process that requires analysing, evaluating and improving one's own thinking using universal standards. Critical thinking is the disciplined art of warranting that an individual uses the best thinking he or she is capable of in any given predicament. To achieve such circumstances, critical thinking often involves actively and skilfully conceptualizing, applying, analysing, synthesising and evaluating content gathered via observation, experience, reflection, reasoning or through communication which will serve as a guide to belief and action (Barseghyan, 2022). Reasoning and evaluation were agreed upon as one of the 5 key elements of critical thinking. Critical thinking comprises reasoning at the highest levels by evaluating and arbitrating information and ideas significant to alternative explanation or solutions. To achieve such process, one is required to assess the weight of available information and evidence presented (Stéphan Vincent-Lancrin, 2024).

Zhao et al. (2024) found that gender difference were significant in critical thinking abilities in writing. Female students were found to employ writing strategies more frequently and were less inclined towards thinking within the box, suggesting greater openness and reflective thinking. These patterns were linked to higher motivation, stronger English proficiency, and a deeper learning approach. Although no gender differences were found in systematic analysis or thinking outside the box, females showed a more robust connection between critical thinking

and writing strategies, especially in evaluation and synthesis. Interestingly, systematic analysis was a stronger predictor of planning among male students, due to cognitive differences in spatial organisation. Overall, the study highlights how critical thinking influences writing performance and how gender-specific cognitive and motivational factors play a role.

The Ennis-Weir Critical Thinking Essay Test is a common tool used to assess critical thinking skill, largely in educational context. The purpose and structure of this tool is designed to assess an individual's ability to analyse, evaluate, and construct arguments in written form. Test takers are presented with a scenario and are required to write a response which in turn will be scored based on specific critical thinking criteria ranging from identifying assumptions, evaluating evidence to making logical references (Amrous & Nejmaoui, 2017). Test takers are scored based on a rubric that assesses various aspects of critical thinking which includes argument evaluation, logical coherence and the ability to address counterarguments (Shahani et al., 2022). Hence, those were the reasons why The Ennis-Weir Critical Thinking Essay test was seen suitable for this research. It was also important to note that the test required no form of payment, easily available and comes with a clear scoring rubric to guide researchers in evaluating test takers' responses. However, for this research purpose, the Ennis-Weir Critical Thinking Essay Test was used only as an instrument for respondents to generate their reasoning.

Aristotle's Rhetorical Appeal
The use of Aristotle's rhetorical appeals of ethos, pathos and logos serve as vital components to analyse reasoning across numerous contexts, specifically in professional communication, education and legal argumentation. These rhetorical modes not only enhance persuasive effectiveness but also facilitates a deeper comprehension of audience engagement and message delivery.

The first vital component used to analyse reasoning is ethos which heavily focuses on credibility and character. Ethos refers to the speaker's credibility in the crucial role of persuasion. There are times when issues cannot be solved due to lack of definitive evidence hence, audiences will opt to rely in opinions instead. When clear criteria are non-comprehendible or lacking, audiences will have the tendency to trust and accept suggestions from a speaker whom is perceived as trustworthy. In such manner, the speaker's apparent character and credibility can significantly influence the audiences' judgement. In order to seem credible Aristotle states three critical attributes, the speaker must facilitate through their discourse which are practical intelligent, a virtuous moral character and finally good will towards the audience. If the speaker were to elude any of these three critical attributes it will result in the audiences second guessing the speaker's credibility namely ability, motives and sincerity (Rapp, 2022). Hence, any form of knowledgeable presentation, just perspective or morally sound displayed by the test takers were marked as ethos.

The second component used to analyse reasoning in Aristotle's rhetorical appeals is pathos which heavily centralises around emotional engagement. Pathos appeals to the viewers' emotions which aims to make arguments more relatable and impactful. Pathos is frequently exercised in a classroom among learners at a very young age with the aim to connect their personal experiences with broader themes and indirectly strengthening their persuasive writing overtime (Tiner, 2001). Pathos is seen as a vital component in persuasion for Aristotle argued that viewers do not evaluate the same way when they are influenced by emotions. However, it is crucial to highlight that Aristotle does not regard emotional appeal as a form of manipulation,

instead as a rhetorical method specifically when judgement and evaluation is based on opinions instead of facts (Rapp, 2022). In short, any use of emotional language, personal stories or empathy shown by the test takers were marked as pathos.

Logos or better known as the logical appeal, is the final component in Aristotle's rhetorical appeals. Logos in-cooperates the use of logical arguments and evidence to persuade the viewers. Among the three components, logos is understood as the most substantiative, evidence-based form as logos attempts to prove a claim through structured reasoning. However, when logos come into play, it is important to acknowledge that some arguments may only seem to refute a claim where fallacies may seep through. When such situation was to occur and the viewers were unable to detect the deception, it will result in a rhetorical manipulation (Rapp, 2022). Based on the explanation given above in relation to logos, any use of evidence, facts, logical sequence, cause-effect reasoning by the test takers were marked down as logos.

As a conclusion, based on the three vital components discussed above, the Aristotle's Rhetorical Appeals framework as shown in Figure 1 was formulated to evaluate both the research objectives which were to determine the most preferred Aristotle's Rhetorical Appeal according to gender and finally to determine the least preferred Aristotle's Rhetorical Appeal according to gender.

Table 1: Aristotle's Rhetorical Appeals Framework Used to Analyse Respondents'
Writing

Appeal	Definition	Indicators in Writing
Ethos	Appeal to credibility and character	Authors present themselves as knowledgeable, fair or morally sound.
Pathos	Appeal to emotion	Use of emotional language, personal stories or empathy.
Logos	Appeal to logic or reason	Use of evidence, facts logical sequence, cause – effect reasoning or structured arguments.

(Rapp, 2022)

Aristotle's Rhetorical Appeals across Gender
Golzar and Yousofi (2021) highlight subtle but important gender differences in students' argumentative writing. While both male and female students employed all three appeals, their use of ethos varied, with females demonstrating slightly higher credibility through personal anecdotes and authenticity. Logos was used actively by both genders, though males showed deeper analytical engagement. Pathos, however was used conservatively by both groups, with females using emotionally weighted language but avoiding vivid imagery, and males exhibiting slightly stronger emotional tone without using storytelling techniques.

In contrast, Hoang and Thuy (2025), found stark gender differences in rhetorical strategies during entrepreneurial negotiations. Male entrepreneurs relied predominantly on logos, crafting structured, evidence-based arguments. Female entrepreneurs, however, leaned heavily on pathos, utilizing empathy and emotional engagement to persuade. Interestingly, both genders demonstrated a consistent, though balanced, use of ethos to establish credibility in high-stakes settings. This suggest that context and audience may influence which appeal is emphasised, with negotiations bringing out clearer gender preferences than student writing.

Verma et al. (2022) explored rhetorical effectiveness in online purchasing behaviour within the Indian context and found that pathos had a greater influence on female consumers, who were more emotionally responsive to marketing stimuli. Male consumers, in contrast, responded more to logos, basing decisions on logical evaluations of value and product quality. While both genders showed some cross-influence between pathos and logos, statistical models confirmed a gendered pathway which were pathos-driven for females and logos-driven for males.

Collectively, the reviewed studies affirm that gender plays a pivotal role in shaping both the use and reception of rhetorical appeals. However, while prior research has predominantly focused on spoken discourse or professional communication, limited attention has been given to how these dynamics manifest in students' writing. This study addresses this gap with the objective of identifying the most and least appeal preferred across gender. By doing so, it seeks to contribute to a more nuanced comprehension of gendered reasoning in written argumentation.

Methodology

This study adopted the quantitative descriptive study design where a descriptive study was useful for describing the desired characteristics of the sample being studies (Aamir, 2015). This was in line with both objectives which were to determine the most preferred Aristotle's Rhetorical Appeal according to gender and finally to determine the least preferred Aristotle's Rhetorical Appeal according to gender, this method was deemed suitable for the focus was solely based on understanding critical thinking in relation to gender through discourse analysis (Villamin et al., 2024). To ensure code saturation was achieved in conveying the second research objective, a purposive sampling method was conducted on a class of second semester Language Studies Diploma Program students from a local public university. This method resulted in a selection of five male and five female test takers. The number of test takers were sufficient to achieve code saturation which refers to the point where data is sufficient to formulate and uncover a range of thematic issues (Hennink et al. 2017).

Respondents were given 10 minutes to read the instruction given and raise any question regarding the execution of the test. Respondents were also given 10 minutes to read the text and were allowed to ask meaning of certain words which the respondents found unfamiliar. As soon as their doubts were cleared, respondents were given 40 minutes to generate their response. The Ennis-Weir Critical Thinking Essay Test: An Instrument for Testing and Teaching took the form of a letter to the editor which required the writer to make a proposal and offer a variety of arguments in support of their views. Each argument appeared in a separate numbered paragraph. There were eight paragraphs in total. Examiners were encouraged to use judgement in applying criteria and to add or subtract points for unspecified insights or errors. Frequency distribution was used to answer both the research questions in this study. This allowed the data to be summarised and compressed by placing it in groups which recorded how many data fell into each group or class. For the purpose of this study, the results of the frequency distribution were reported in raw scores.

Results And Discussion

Summary of Appeal Preferences by Gender

The purpose of this study was to examine the rhetorical appeals (Logos, Ethos and Pathos) exercised by male and female students in responding to the Ennis-Weir Critical Thinking Essay

Test, and subsequently, to determine the most and least preferred appeal according to gender. The findings provide nuanced insights into gendered tendencies in critical thinking and reasoning styles within an academic setting. For this research purpose, respondents are named as M1 as Male 1 and F1 for Female 1, hence there are M1 to M5 and F1 to F5 seen in the following discussion. The most preferred appeal by both genders was logos, while the least preferred appeal was ethos by both genders as seen in Table 2. It was also discovered that female respondents had the tendency of blending logos with pathos which resulted in empathetic reasoning pattern while male respondents favoured a more rigid, analytical use of logos seen in structured rebuttals and critique.

Table 2: Summary of Appeal Preferences by Gender

Appeal	Male Frequency	Female Frequency
Logos	20	21
Pathos	12	18
Ethos	7	4

Predominance of Logical Appeals Across Genders

Both male and female respondents demonstrated a strong preference for logos, indicating that logical reasoning formed the solid foundation for most responses presented. Male respondents employed logos with 20 occurrences, while female respondents did so 21 times. This is likely influenced by the nature of the Ennis-Weir test, which explicitly demands argumentative responses and encourages evidence-based reasoning from test takers. These findings were seen to be in line with Golzar and Yousofi (2021), where logos or the logical appeal was actively exercised by both genders. Examples of reasoning from male respondents include the use of statistical references as seen below:

"Your argument is too far-fetched into the realm of possibilities, ignoring the reality of real life. When we searched briefly, you will learn that only 3% of road accidents can be attributed to overnight street parking." (M1)

Refutation based on practical realities such as the role of employers in providing a mode of transportation for the factory workers as a solution the congestion were also exercised by the male respondents as shown below:

"For the matter of bad traffic on some streets in the early morning, I urge for the factory companies of the city Municipality to consider providing specific commercial transport for the factory workers. As mentioned before, there are people living by the streets' buildings, and their shifts often start at 9 am or 10 am, so it is unfair to prohibit overnight parking on the city streets for these citizens. In contrast, an allocated public transport for the factory workers early in the morning would solve the problem as less cars driven on the street equates to a more fluid and smooth traffic" (M2)

Female respondents similarly provided reasoned counterarguments such as proposing a "smart lane" alternative or questioning the causal relationship between overnight parking and accidents as provided in the excerpt below:

"There really isn't room for the heavy traffic that passes over there in the afternoon rush hour and if there were no cars parked on the side of these streets, they could handle considerably

more traffic because the space that have been used for parking can be used as another lane or "'smart lane' which will reduce the traffic." (F2)

"Although, I agree with the heavy traffic, I do not agree to the statement the park accidents between parked and moving vehicle will be nearly eliminated because the accidents might happened anywhere for different reasons so to push all the blame toward overnight parking is unreasonable." (F2)

Gender Differences in the use of Emotional Appeal (Pathos)

While logical appeals were dominant in both genders, a distinct contrast emerged in the frequency of pathos between male and female respondents which echoed similar findings with Hoang and Thuy (2025) and Verma et al. (2022). Female respondents used emotional appeals 18 times compared to the male respondents who only exercised pathos 12 times in total. The female respondents were more inclined to express concerns about safety, empathy for residents and social responsibility. Their reasoning often includes scenarios involving family safety, emergency response and the emotional stress of navigating traffic, which in short signals a stronger reliance on emotional resonance to reinforce their points. This can be seen from the excerpts below:

"I also agree to your claim saying that parked cars on the streets can cause a longer time to arrive at your destination because if some people are having emergencies like given birth or a critical patient that need to be rescued, they might die due to the delay from the traffic" (F3)

"With cars parked overnight, the addition of cars from factory workers and others' can drag out the time to arrive to your destination. Plus, you might feel stressed when you are late to work" (F5)

Male respondents on the contrary were more retrained in its application, often invoking emotional appeal to bolster a logical point. Respondents were seen to use the emotional appeal to invoke fear and danger if the said logic failed to be executed. While another echoed the same usage where he used an emotional scenario to support the logical danger posed by reduced visibility.

"the editor claims that the conditions are not safe if there's even the slightest possible chance for an accident. I agree with the editor that if overnight parking still happens, there will be no safety" (M5)

"if there is no cars parked on the streets for a few hours, there would be no traffic and the factory workers can go to their work safely. Usually people who have early shifts, the road or streets are still dark and they must rely on their cars light or street's light to see." (M4)

Strategic Use of Ethos and Credibility

The least utilised rhetorical strategy among both genders was ethos, with the male respondents who exercised it 7 times while female respondents with only 4 which was in contrast with Golzar and Yousofi (2021). The relatively low frequency suggested that both genders find it unnecessary to establish credibility in a task that does not invite personal positioning or authority. As the nature of the essay test only require respondents to respond to a fictional editor rather than speak from personal expertise, hence opportunity to display credibility were limited. Female respondents particularly lack the use of ethos in their reasoning due to their greater emphasis on collective reasoning and social harmony, while males used ethos slightly more

often, mostly when referencing public responsibility or legal consideration. However, whenever ethos was executed by the female respondents it was done so to challenge the writer's credibility in terms of fairness. While male respondents, ethos was exercised when respondents evaluated the authority figures' intent while positioning himself as rational and measured.

"I don't agree with his way of thinking that overnight parking on the streets is undesirable. This is because his claim is not backed with any proper reasoning or logic, its purely biased"
(F4)

"not everyone have the luxuries of owning a garage in the streets, besides his statements contradicts the law of having a garage in the city streets is illegal "(F4)

"Finally, testimonies from director O. Taylor and the national of police Chiefs did not suggest the prohibition of overnight parking from 2 am to 6 am. Out of sheer public safety interest, but heavily leaning into law concerns. However, I agree to the prohibitions to some extent, not as it is." (M2)

Strategic Combinations of Appeals

An important observation from the analysis is how appeals were often strategically combined to express valid reasoning. Female respondents were seen to frequently pair logos with pathos, producing arguments that were both rational and empathetic. This integration reflected a more nuanced rhetorical approach that considered both factual reasoning and audience sensitivity (Zhao et al., 2024).

"To begin with, overnight parking should not be practiced as a carpark is for anyone and is not reserved. To show you what I mean, imagine if a car is parked for too long, but there are other people that really need to use that parking slot in such busy streets, that would be inconvenient for them." (F1)

"Lincoln Avenue, Marquand Avenue and West Main Street are indeed very narrow. Therefore, overnight parking should not be allowed as it will cause inconvenience for the other users of these streets. Not only does it make the trip longer, it is also make a busy street busier especially during peaked hour. The possibilities of other bad consequences is also enlarged. Imagine the environment of a busy street, the longer the car is in usage the more of petroleum gas been released. This is not good for the earth." (F3)

On the other hand, male respondents tended to employ logos in isolation or with limited emotional support. Their arguments were typically focused on legality, urban planning and traffic systems. These patterns suggest that while both genders favour logic, female respondents were more likely to integrate emotional and ethical layers enriching their reasoning with multidimensional appeals.

Implications for Gender-Based Reasoning Styles

These findings contribute to the growing literature on gendered reasoning strategies. The dominance of logos in both groups underscores the role of educational culture in shaping how argumentation is framed and performed in written context. However, the greater reliance on pathos by female respondents suggests that gendered communication styles are still influential in how reasoning is expressed despite it being in an academic setting. This reinforces the argument by Zhao et al. (2024) that while educational settings promote logic as the dominant appeal, female Students often seek to balance it with emotional and relational awareness.

Understanding these differences is critical for educators in designing assessments that aim to evaluate critical thinking holistically.

Conclusion

This qualitative study explored gender-based preferences in using Aristotle's Rhetorical Appeals which are Logos, Ethos and Pathos. The respondents of this study were five male and female first year second semester diploma-level students who were tasked to sit for the Ennis-Weir Critical Thinking Essay Test. Through a detailed analysis of the argumentative structures presented by the respondents, several meaningful patterns emerged. The findings of this study indicates that logical reasoning (logos) is the predominant rhetorical strategy employed by both male and female respondents, likely influenced by the formal, evidence-based nature of the Ennis-Weir Critical Thinking Essay Test. The frequent use of counterarguments, examples, analogies, and cause-effect reasoning across gender underscores the effectiveness of structured logic in academic settings. Gender-based patterns were also established where female respondents showed a greater inclination toward emotional appeal then the male respondents. Female respondents were seen to invoke empathy, fairness and social concerns. In contrast, male respondents more frequently employed credibility-based appeals (Ethos), referencing authority and legality to bolster their arguments. Although ethos was the least used appeal overall, its targeted use among male respondents suggests a preference for institutional and normative frames of persuasion. Crucially, this study highlights that while gender influences rhetorical preferences, contextual factors such as test structure can mitigate these differences by prioritising logical rigor. These insights carry pedagogical significance, suggesting that critical thinking instruction should emphasise logical argumentation while also recognising and integrating the distinct rhetorical strengths that diverse students bring to the academic discourse.

In terms of limitations and challenges it was discovered that the structured nature of the Ennis-Weir Critical Thinking Essay Test may inherently privilege logical reasoning, which reduces the opportunities for respondents to demonstrate ethos. Future research should integrate larger, more diverse samples across multiple disciplines and cultural settings to confirm these gendered trends. Using varied writing assessment instruments which allow for explicit projection of credibility and personal stance yielding richer insights on the use of ethos, while longitudinal studies could track how rhetorical preferences develop over time.

Acknowledgement

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