

## Gender, Cognitive Style and Its Relationship with Critical Thinking

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**Abstract:** *Critical thinking skills are cognitive processes carried out as guidelines for thinking using reasoning according to evidence, context, standards, methods, and conceptual structures by making concepts, implementing, synthesizing and or evaluating information obtained from observation, experience, reflection, thought, or communication as a basis for believing and taking action and focusing on deciding what to do. Gender is a different role in the social, mental, and level of thinking based on male and female sex which influences the cognitive style of students. Cognitive style is the tendency of individuals to consistently use preferred methods when organizing and processing information and experiences that are influenced by the ability to monitor and evaluate knowledge possessed both consciously and unconsciously. Students' critical thinking skills are closely related to gender and cognitive style. Gender plays an important role in shaping the character of students and cognitive styles that are closely related to the main indicators of students' critical thinking such as analysis, self-regulation, evaluation, the ability of students to defend opinions to make good decisions. The ability of critical thinking of students should be identified through the cognitive style of students.*

**Keywords:** *Gender, Cognitive Style, Critical Thinking Skills*

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### I. Introduction

Try to understand how the thinking process cannot be separated from how one tries to understand how life (Muller & Thoring, 2010). Evans et al., (2003) assume thinking as someone's unique facility that distinguishes a person's character and intelligence. Stanovich (1999) and Reber (1993) argue there are two mechanisms of cognitive processes in thinking that are implicit and explicit thinking. Implicit thinking gives direct input to one's cognition in forming pragmatic processes that tend to contextualize the environment that lies behind trust and knowledge. Explicit thinking is the uniqueness of a person, related to language and reflective awareness and is the basis for one's rationality (Reber, 1993; Stanovich, 1999).

According to Brand and Markowitsch (2010), thinking consists of several cognitive components including problem solving, assessment, and decision making, self-reflection, and considering the possibilities that will occur based on experience, this greatly influences a person's memory ability, representation of knowledge, and how to view nature based on the learning processes experienced by someone. So that thinking can be generalized as any mental activity that helps in formulating or solving problems, evaluating, and making decisions, or fulfilling the desire to understand something. Gagne (1985) argues that learning conditions need to be directed at problem solving which is the highest capability in thinking skills. Learning must be done not only towards achieving understanding but also improving critical thinking skills.

Critical thinking is reflective and reasonable thinking focused on deciding what must be done (Ennis, 1991) which has a standard set of intellectual thinking (Paul, 1995). Halpern (1996) critical thinking is defined as the use of cognitive skills or strategies that increase the likelihood of desired outcomes. Other definitions include: the formation of logical conclusions (Simon & Kaplan, 1989), developing careful and logical reasoning (Stall & Stahl, 1991), deciding what actions to take or what to believe through reasonable reflective thinking (Ennis, 1991), and objectives determine whether to accept, reject or suspend judgment (Moore & Parker, 1994).

Gender is a general term that refers to men and women (Fin & Ishak, 2012) that shape psychology and one's social role (Fuad et al., 2012) so that it affects how individuals think, behave, and feel a phenomenon within themselves (Santrock, 2011). The research findings of Fitriani et al. (2018) found that the critical thinking dispositions of male and female student teacher candidates differed in several components, namely inquisitiveness, maturity, self-confidence, and open-mindedness. Analyticity disposition component has a dominant correlation in all components of critical thinking dispositions of men and women so that it is important to be taught or integrated in the learning process in the classroom.

Understand what is shown and emphasized by the teacher and students about how thinking can be used as an alternative approach to understanding the nature of the teaching and learning process. One way that can be done is to understand the cognitive style of the teacher and students and their relation to teaching and learning. Their cognitive style influences their response to different situations (Moreno, 2010). This article aims to describe the relationship between gender and cognitive style with critical thinking skills based on literature reviews to get a different perspective in doing better learning in the classroom.

## **II. Discussion**

### **Gender**

Gender refers to the characteristics and behavior that is right for men and women that specifically relates to beliefs in culture, and sex words that refer to biological differences in men and women (Brannon, 2002). Differences in sex and gender will influence the way teachers teach students without ignoring other factors such as age, culture, and much more. The differences in sex we can know clearly and are controlled by nature or occur naturally. Gender differences are related and shaped by the psychological and social domains that are related to how one shows or expresses their biological sex in their behavior. Gender bias occurs when a person has an inappropriate view of the competencies of men versus women and considers that one gender is better than the other (Moreno, 2010).

The word gender can be interpreted as a visible difference between men and women in terms of values and behavior (Neufeldt, 1984). Terminologically, 'gender' can be defined as cultural expectations of men and women (Lips, 1993). Showalter (1989) argues that gender is a distinction between men and women seen from socio-cultural constructs (Showalter, 1989). Gender can also be used as an analytical concept that can be used to explain something (Umar, 1999). More explicitly mentioned in the Women's Encyclopedia Studies that gender is a cultural concept that is used to distinguish roles, behaviors, mentalities, and emotional characteristics between men and women that develop in society (Mulia, 2004).

Women are more social and trustworthy but have lower assertiveness and self-confidence than men of the same age (Halpern & LaMay, 2000). Women are more emotional than men, better at regulating emotions and behavior than men (Eisenberg et al., 2004). Women are more easily mingled in the social system than men, such as showing friendliness, empathy, and attention to others (Eisenberg et al., 2006). In the classroom, men tend to be active, asking questions, and aggressive in verbal activities than women (Altermatt et al., 1998; Brophy, 2004). Culture and age perspective, physically men tend to be aggressive than women (Ostrov et al., 2004). This difference can be distinguished by hormones and social demands, it shows that men have a higher tendency in rough games, competitive games, and dare to take risks in activities (Lippa, 2002; Maccoby, 2002; Pellegrini et al., 2002). Men also tend to be less in reading, doing homework, attending pre-school activities, and completing school than women and tend to ignore classes, take part-time jobs outside of school, and more men are expelled from school than women (NCES, 2001; Riordan, 1996).

In terms of cognitive, women generally get higher scores than men on verbal ability tests, such as assessing reading, vocabulary, writing, grammar, and comprehension (Hyde & McKinley, 1997; Smedler & Torestad, 1996). Men get greater scores from women on visuospatial tests such as tasks that require them to change mental activity, assess the speed of moving objects, the movement of three-dimensional space objects, succeed in moving or moving immovable objects (Gurian & Stevens, 2005; Halpern, 2004; Nordvik & Amponsah, 1998; Ruble et al., 2006). Based on this description it can be concluded that gender is a role difference in social, mental, and level of thinking based on male and female sex.

### **Cognitive Style**

Cognitive style is a difference in cognitive behavior, thinking, and memory that will affect individual behavior and activities both directly and indirectly (Keefe, 1986). Cognitive style is a typical way for students to learn, both related to the way of receiving and processing information, attitudes toward information, and habits related to the learning environment. Cognitive style is one of the variable learning conditions which is one of the considerations in designing learning (Joyce et al., 2009). Knowledge of cognitive style is needed to design or modify learning material, learning goals, and learning methods. It is expected that with the interaction of cognitive style factors, goals, material, and learning methods, student learning outcomes can be achieved as much as possible. This is in accordance with the opinion of some experts who state that certain types of learning strategies require certain learning styles.

Woolfolk (2009) states that a person's cognitive style can show individual variations in terms of attention, acceptance of information, remembering, and thinking that arise or differ between cognition and personality. Cognitive style is a pattern that is formed by the way they process information, tends to be stable even though it may not change. The cognitive style variations that are of great interest to educators, and they distinguish cognitive styles based on dimensions, namely (a) differences in psychological aspects, which consist

of field independence (FI) and field dependence (FD), (b) time of conceptual understanding, which consists of impulsive style and reflective style.

According to Witkin (1971), the dimensions of cognitive style consist of Field Independent (FI) and Field Dependent (FD). Witkin (1977) Field Dependent has characteristics including: (1) tend to have global thinking; (2) the tendency to accept existing structures, due to lack of restructuring capabilities; (3) having a social orientation so that they appear good, friendly, wise, kind and loving towards others; (4) tend to choose professions that emphasize social skills; (5) tend to follow existing goals; (6) tend to work with an emphasis on external motivation and are more interested in external reinforcement such as praise, gifts, or external death from others. The Field Independent dimension is generally dominant leaning towards independent, competitive, and confident. While individuals with Field Dependent are more inclined to socialize, unite themselves with the people around them, and usually empathize and understand the feelings and thoughts of others.

### **Critical Thinking**

The definition of critical thinking varies greatly from simple to complex. Ennis (1991) defines critical thinking as a reflective and reasonable thinking focused on deciding what to do. Paul (1995) writes that critical thinking uses a set of standards of intellectual thought. This standard guides the process of thinking and helps people improve their ability to think critically. Thinking about thinking in order to improve the thought process is at the heart of critical thinking (Paul, 1995). Halpern (1996) critical thinking is defined as the use of cognitive skills or strategies that increase the likelihood of desired outcomes. Other definitions include: the formation of logical conclusions (Simon & Kaplan, 1989), developing careful and logical reasoning (Stall & Stahl, 1991), deciding what actions to take or what to believe through reasonable reflective thinking (Ennis, 1991), and objectives determine whether to accept, reject or suspend judgment (Moore & Parker, 1994). Burden and Byrd (1994) categorize critical thinking as a high-level thinking activity that requires a set of cognitive skills. Pascarella and Terezini (1991) state that: "Critical thinking has been defined and measured in a number of ways, but usually involves the individual's ability to do some or all of the following: identify central issues and assumptions in arguments, recognize important relationships, make conclusions that right from the data, conclude the conclusions from the information or data provided, interpret whether the conclusions are guaranteed based on the data provided, and evaluate the evidence or authority.

Facione and Facione (1996) based on The APA Concensus Definition, declaring critical thinking as a decision accompanied by goals and done by themselves, is the result of interpretation, analysis, evaluation, and inference, as well as explanations of considerations based on evidence, concepts, methodologies, criteriology and contextual. The process underlies the decisions that will be made by someone. Next Facione (2004) explains that critical thinking as a cognitive skill, in which there are activities of interpretation, analysis, evaluation, inference, explanation, and self-management.

- a. Interpretation is the ability to understand and explain the understanding of situations, experiences, events, data, decisions, conventions, beliefs, rules, procedures and criteria.
- b. Analysis is identifying relationships from several statements of questions, concepts, descriptions, and various models used to reflect thoughts, views, beliefs, decisions, reasons, information and opinions. Evaluating other people's ideas and opinions, detecting arguments and analyzing arguments are part of the analysis.
- c. Evaluation is the ability to test the truth of statements used to convey thoughts, perceptions, views, decisions, reasons, and opinions. Evaluation is also the ability to examine the relationships of various statements, descriptions, questions, and other forms used in reflecting thoughts.
- d. Inference is the ability to identify and select the elements needed to draw conclusions that have reasons, to predict and enforce a diagnosis, to consider what information is needed and to decide the consequences that must be taken from data, information, statements, events, principles, opinions, concepts and so on.
- e. The ability to explain is the ability to express the results of thoughts, explanation of reasons based on evidence, concepts of methodology, criteriology and context. Included in these skills are the ability to convey results, explain procedures, and present arguments.
- f. Self-regulation is the ability of a person to organize themselves in thinking. With this capability, someone will always double-check the results of their thinking and then improve so that they produce better decisions.

So it can be concluded that critical thinking skills are cognitive processes carried out as guidelines for thinking using reasoning considerations of evidence, context, standards, methods, and conceptual structures by making concepts, implementing, synthesizing and or evaluating information obtained from observation, experience, reflection, thought, or communication as a basis for believing and taking action and focusing on deciding what to do.

Paul and Elder (2006), further explained that critical thinkers can be well developed through: 1) submitting important questions and problems, formulating questions and problems clearly and precisely; 2)

collecting and evaluating relevant information, using abstract ideas to interpret that information effectively; 3) arrive at conclusions and solutions that are well-finalized, test conclusions and solutions based on relevant criteria and standards; 4) think openly with various alternatives, pay attention and do care, assumptions, implications, and their practical consequences, as needed, and; 5) effectively communicate with others in finding solutions to complex problems.

Based on the description of the concept of critical thinking above, then the following indicators are presented in critical thinking skills based on the main indicators in critical thinking.

### III. Figures and Tables

**Table 1.** Indicators of Critical Thinking Skills in Research.

<b>Critical Thinking Skills</b>	<b>Description</b>
1. Think deeply and focus on problems	Students are able to identify or formulate problems, formulate criteria to assess solutions that may be possible, and try to remember the conditions of the problems faced in depth.
2. Analyze the argument	Students are able to identify conclusions, reasons or points of thought, guess or identify simple assumptions, identify or overcome nonconformities (information that is not relevant to the problem at hand), know the structure of the argument (deduction or induction), and summarize.
3. Make a plan	Students have knowledge of inquiry methods and logical reasoning and the skill of conceptualizing the problem solving steps that are faced by considering the condition of the problem including making inference.
4. Evaluation	Students are able to assess the proficiency of the information obtained by considering the possibilities that will occur if they follow the source of the information, consider alternatives, balance them and make decisions.
5. Deduction, induction and assessment	Students are able to make deduction and assess deduction logically according to the problem at hand, harmonize and expand conclusions including making hypotheses.
6. Integration	Students are able to integrate the abilities and other characteristics in making and maintaining decisions.
7. Sort correctly according to the situation	Students are able to follow the steps of problem solving through monitoring the thinking process (metacognition) and using the critical thinking check-list
8. Explanation	Students are able to express the results of reasoning, justifying that reasoning based on evidence considerations, concepts, methodologies, criteria and contexts; and presents reasoning in the form of convincing arguments shown in the prepared report, the truth of the problem solving steps.
9. Self-regulation	Consciously monitor the cognitive activities of yourself, the elements involved in the activity, the results obtained, especially by applying the skills of analyzing and evaluating self-performance.

### **The Relationship between Critical Thinking, Cognitive Style, and Gender**

Critical thinking is the art of thinking (Paul & Elder, 2006) which is shown through a reflective analysis and evaluation process to determine what is believed and done (Ennis, 1991). Critical thinking is not only remembering and applying, but in critical thinking it is required to be able to make the right decisions after information processing through analytic and evaluative activities. The important process that is most emphasized in critical thinking is that all the processes that go through in determining these decisions should be reflective. Reflective processes can be taught to students through problem solving. The same thing was also conveyed by Bailin et al. (1999) that critical thinking is a product that is produced through problem solving processes. Giving problems to students should be ill defined (Schoenfeld, 1992) and pay attention to the level of student cognition so that the problems presented can teach students critical thinking but still can be solved.

Problem solving as a process (Bailin et al, 1999) can help students train their critical thinking because it emphasizes processes such as 1) identifying problems that can train students to be able to focus on the problems faced, analyze, and evaluate factors that can affect the problems faced; 2) planning to solve problems can help students to come up with alternative solutions to problems faced by considering the information they already have; 3) implementation of planning can help students through the activities of integrating knowledge that is owned to maintain decisions taken in solving problems faced; 4) looking back is an activity that emphasizes the ability of students to express the results of the implementation of planning, justify the results based on the consideration of evidence, concepts, criteria, and contexts, as well as problem solving steps, in which the activities can be shown through explanations delivered by students. In addition to explaining logically, students are also emphasized to consciously monitor and or carry out these activities through reflective mental processes. If critical thinking is associated with cognitive style, then this will be seen through the tendency to accept information or decisions. Students with independent field cognitive styles tend to receive analytical information, meaning that a student who has a new independent field of cognitive style will receive an information if the information can be proved anallitically which is one of the important components in critical thinking. In contrast to cognitive field dependent styles that are more impulsive and receive information globally which is a

component in creative thinking skills. Based on these characteristics, it can be said that critical thinking of these two cognitive styles has differences.

Men and women can have different cognitive styles. Dagon (1992) states that men think more analytically and flexibly than women, while women are less capable of abstract and logical thinking (Stern in Krutetzki, 1976). Critical thinking is a higher level of logical thinking that requires reasoning (Wasis, 2016). Men are better at logical thinking than women but are better at controlling emotions (Lippa, 2005). Critical thinking that requires attributes of accuracy, objectivity, and reflective requires good emotional control to be able to make good decisions.

Men are more likely to be able to think critically than women because critical thinking activities are logical, analytical, evaluative and reflective, but the importance of good emotional control in carrying out these activities carefully makes women also have the possibility to be superior to men in things critical thinking.

#### IV. Conclusion

Based on the description that has been delivered, the ability of students to think critically is closely related to gender and cognitive style. Gender plays an important role in shaping the character of students and cognitive styles that are closely related to the main indicators of students' critical thinking such as analysis, self-regulation, evaluation, the ability of students to defend opinions to make good decisions. The critical thinking skills of students should be identified through the cognitive style of students.

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