

Prediction of Critical Thinking Based on Cognitive Processes and Moral Justice in Students of Universities

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Submitted: 16 March 2019

Accepted: 24 April 2019

Int J Behav Sci. 2019; 13(1): 20-25

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Abstract

Introduction: The purpose of this study was to investigate the prediction of critical thinking based on cognitive processes and moral justice in the students of universities.

Method: This descriptive-correlational study was performed on all the students in Shiraz who were selected using random multi-stage cluster sampling method in the academic year of 2018-2019. For collecting data, Ricketts' critical thinking scale, Nejadi's cognitive abilities, and Burger's moral justice were used. Data were analyzed using SPSS software version 23 by using simple correlation coefficients and multiple regressions.

Results: Findings showed that moral justice has a positive and significant effect on critical thinking, but cognitive abilities do not have the potential to influence critical thinking. It should be noted that the level of significance in this study was set at $0.05(\alpha = 0.05)$.

Conclusion: Generally, based on the results of this study, one can conclude that morality is one of the main factors of critical thinking, but cognitive abilities have no role in the tendency of individuals to think critically.

Keywords: Critical Thinking, Cognitive Abilities, Moral Justice

Introduction

Critical thinking is one of the skills assigned by UNESCO to the 21st-century man and the need to pay attention to it in the field of education is vital. This way of thinking makes people realize how different norms affect their thoughts [1]. Those people who have developed critical thinking will be able to analyze, evaluate and judge things, and will solve personal problems better in their lives. Nowadays, due to the rapid scientific progress and the increase in the amount of knowledge that learners need to learn, the importance of this skill becomes more and more evident. Despite all the above-mentioned points and the importance of paying attention to critical thinking, the results of various research indicate that the rate of critical thinking among students is extremely low [2] and this tendency is unstable in some studies [3]. Therefore, the factors affecting this structure are important to study and will lead to a more favorable performance of people in different situations and a higher level of intellectual development of a society.

According to Ennis, critical thinking is a tangible thought and focuses on decision-making about beliefs and actions. In his opinion, when thinking is critical, the thinker strives carefully for analyzing the topics, seeking valid evidence and reaching valid judgment [4]. The cases that Ennis describes in terms of the elements of the field of ability can be considered in a general view of cognitive factors, and in fact, can be considered as cognitive processes. The processes and cognitive abilities that are recognized as cognitive abstract maps are the guides for interpreting information and problem solving [5]. These cognitive processes are based on the experiences of personal life and include memory skills, control, and selective

attention, decision making, planning, sustained attention, social recognition and cognitive flexibility [6].

These skills help people to be well aware of information, then process them and make the right decision. Therefore, the higher the level of these cognitive abilities are the higher and the more desirable decision-making. The individual, in the face of different situations and information, makes a more correct processing and a more rational and consistent decision-making, and easily overcomes the situation and information provided by others. Therefore, one can expect that the level of cognitive abilities affect the tendency to critical thinking [7-8].

Much research has been conducted in relation to the tendency towards critical thinking. Some of these studies have investigated the relationship between motivational and personality variables. Some of these studies have investigated the relationship between motivational and personality variables with a tendency to critical thinking [9]. Furthermore, research indicate that self-esteem has a positive relationship with the tendency towards critical thinking [10] and as a result, critical thinking skills affects the creativity of the students [11]. Depending on the findings of previous research, it is suggested to take the levels of critical thinking into account in order to increase the levels of success in academic writing [12]. Some researchers have also investigated the relationship between some skills and the tendency to critical thinking. Their results showed that communication skills has a positive relationship with critical thinking tendency [13].

Some researchers have also investigated the relationship between social factors and the tendency to critical thinking. Their findings demonstrated a positive relationship between the student's education and the tendency to critical thinking [14]. However, so far, despite the importance of cognitive factors, no specific research has investigated the relationship between cognitive factors and the tendency to critical thinking. Only some studies have examined the relationship between epistemological beliefs and critical thinking tendencies [15].

Therefore, considering the theoretical relationship between these two variables and the lack of research in this field, the present study seeks to fill this gap and investigates the relationship between cognitive abilities and the tendency towards critical thinking. In terms of critical thinking, the other element that Ennis referred to is a tendency. The key elements of the field of tendency includes: the pursuit of truth, the justification of beliefs, the existence of honest and transparent tendencies, and value for all human beings [16].

As it is clear, these elements mostly refer to the ethical bias of the individual and his/her moral beliefs and practices that could be considered as moral justice. Traditional psychology research of ethical advancement recognizes two crucial standards as shaping the base for moral orientation: justice principle, situated towards the cognitive components of ethical awareness, and the care principle, arranged towards the sentiments of caring and sympathy towards others [17]. According to the idea of

Beugre, moral justice is the degree to which judgments and fair action comes from a sense of duty and moral obligation [18].

In fact, moral justice implies that the individual adopts and enforces decisions and judgments based on an internal moral source. Justice implicates a type of moral evaluation and refers to matching to certain standards of ethical propriety [19]. These moral beliefs provide a motivational source for people and make it possible to deal with different situations based on truth and justice. It can be stated that moral justice can affect the tendency towards critical thinking.

Research have shown that in the field of psychology, research has not investigated ethical justice, and some researchers have found similar variables such as moral identity [20, 21] and moral judgment [22-24]. Thinking is one of the most important issues that has been considered in the field of education. Basically, paying attention to the subject of education according to the category of knowledge and thinking makes sense. One of the goals of any educational system is to drive people to think. Those who develop critical thinking in themselves will be able to analyze, evaluate and judge things, and will better solve individual and personal issues in their lives [22].

Despite all the above-mentioned points and the importance of paying attention to critical thinking, the results of various research indicate that the rate of critical thinking among students is incredibly low [23]. In some studies, this tendency between students is extremely insecure [3]. Therefore, it is important to study the factors affecting this structure and it will lead to a more favorable performance of people in different situations and a higher level of intellectual development of society. Moreover, due to the conceptual relationship between these structures and also with regard to the limited studies carried out in this field, the present study seeks to examine the predictive power of the tendency towards critical thinking based on cognitive abilities and moral justice in students.

Method

This research was a descriptive correlational. The statistical population of this study consisted of all undergraduate students of Shiraz universities who were studying at the academic year of 2017-18 at Shiraz, Iran. The participants were selected through multi-stage cluster random sampling. Among the six major universities in Shiraz, 2 universities were selected randomly and from each university 2 colleges and from each college, 2 faculties were randomly selected. A total of 8 classes and 258 students were selected as the research sample. After collecting questionnaires, incomplete questionnaires were excluded and were not used in the analysis. At the end, 250 subjects were evaluated for final analysis, of which 133 (55%) were girls and 109 (45%) were boys. The entrance

criterion of the research was the satisfaction of the students and professors and the exclusion criteria were the deficiency of the questionnaire. Subjects were also told that their responses were only for research purposes and were confidential to the researcher. Results indicated that the optimal fit of the factor analysis model and factor load significance were significant. The instruments used in this study are as follows:

Critical Thinking Disposition Inventory (CTDI): Ricketts Critical Thinking Dispositions Questionnaire [25] was developed based on Facione's [26] scale for measuring critical thinking. The Persian version of this questionnaire was used in this research. This questionnaire included 33 statements in a Likert 5-point scale ranging from 'Strongly Disagree' to 'Strongly Agree'. The minimum, median and maximum scores were 33, 99 and 145, respectively. Three subcomponents (subscales) of the questionnaire were entitled Innovation with 11 statements, Maturity with 9 statements and Engagement with 13 statements. The Cronbach's alpha coefficient for the subcomponents of innovation, maturity, and engagement were 0.75, 0.75 and 0.86, respectively. The reliability coefficient of this instrument was reported at about 0.76 [27]. In the present study, the reliability of the scale was obtained using Cronbach Alpha coefficient. Cronbach Alpha coefficient for creativity, gain, commitment were 0.73, 0.77, and 0.69 respectively. Also, Cronbach Alpha coefficient for the whole scale was calculated to be 0.44.

Cognitive Abilities Scale: The cognitive ability scale designed by Nejati [6] is a self-report scale to determine cognitive abilities consolidating many of the important cognitive functions including 50 elements that were responded by 5 points Likert scale with the following subscales: memory, inhibitory control, selective attention, decision making, planning, sustained attention, social cognition, and cognitive flexibility. There is strong support for quite a strong Cronbach's alpha (0.834) and Pearson correlation test that showed a significant correlation in the test-retest analysis

($p < 0.01$) [6]. Thirty items of this scale involving memory (6 items), inhibitory control (3 items), selective attention (3 items), decision making (5 items), planning (3 items), sustained attention (3 items), social cognition (3 items), and cognitive flexibility (4 items) were used in this study [28]. The reliability of this scale using Cronbach Alpha coefficient was obtained 0.87.

The Deontic Justice Scale (DJS): This scale has 18 points in which three factors are ethical (with 8 items including items 1 to 8), ethical responsibility (with 6 items and 9 items up to 14), and ethical disgust (with 4 items and includes items 15 to 18). The subject's response is categorized into a Likert 5-point scale from 1 (completely disagree) to 5 (I completely agree). Beugre has mentioned the content validity of the questionnaire appropriately and has obtained the reliability by Cronbach's alpha to be 0.85 [18]. In Iran, Sadeghi has obtained the reliability of the questionnaire components of ethical obligation (0.77), moral responsibility (0.73) and moral disgust (0.71), and moral justice (0.83) respectively [29]. The reliability of this scale using Cronbach Alpha coefficient was obtained to be 0.86, 0.93 and 0.79 for ethical obligation, moral responsibility and moral disgust respectively.

Data were analyzed using descriptive and inferential tests. Version 23 of the SPSS software was used to analyze the collected data through descriptive statistics, simple correlation coefficients, and multiple regressions. Furthermore, the significance level was set at 0.05.

Results

As shown in Table 1, almost all correlation coefficients between moral justice, critical thinking, and cognitive abilities were significant ($p < 0.05$). Therefore, it is possible to use regression analysis.

The results of Table 3 show that among the ethical justice dimensions, moral responsibility ($P = 0.04$, $P = 2.2$, $\beta = 0.49$) had a significant effect on critical thinking, but the two other dimensions had no significant effect. In addition, these dimensions of moral justice were able to explain 51% of the variance of critical thinking.

Table1. Demographic Variables

	Variable	Mean	SD	Max	Min
Moral Justice	Moral obligation	30.8	9.17	40	8
	Moral Responsibility	22.73	6.77	30	6
	Moral Disgust	15	4.87	20	5
Cognitive Abilities	Memory	13.86	6.15	28	6
	Inhibition Control	15.56	5.56	29	7
	Decision Making	12.90	4.77	22	6
	Cognitive Planning	7.56	3.20	14	3
	Sustained Attention	8.30	3.54	15	3
	Social Recognition	9.30	3.62	14	3
	Cognitive Flexibility	10.20	3.96	16	4
Critical Thinking	Creativity	38.70	9.94	51	11
	Maturity	28.86	6.21	40	16
	Engagement	41	9.20	53	12

Table2. The Correlation between the Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
Moral Obligation	1												
Moral Responsibility	0.85**	1											
Moral Disgust	0.51	**0.55	1										
Total Scores of Justice	0.94**	0.93**	0.72**	1									
Memory	-0.06	-0.02	-0.04	0.05	1								
Inhibition Control	-0.03	-0.07	-0.19	-0.12	**0.65	1							
Decision Making	-0.10	-0.06	-0.17	-0.14	**0.72	**0.79	1						
Cognitive Planning	0.03	-0.02	-0.10	-0.02	**0.70	**0.78	**0.76	1					
Sustained Attention	0.11	0.07	-0.15	0.04	**0.59	**0.79	**0.76	**0.84	1				
Social Recognition	**0.42	**0.40	**0.31	**0.44	**0.44	**0.53	**0.47	**0.58	**0.63	1			
Cognitive Flexibility	-0.01	0.02	-0.07	-0.01	**0.77	**0.75	**0.79	**0.76	**0.76	**0.66	1		
Total Scores of Cognitive Abilities	0.04	0.03	-0.12	0.0001	**0.84	**0.89	**0.89	**0.89	**0.88	**0.89	**0.91	1	
Creativity	**0.67	**0.67	**0.53	**0.72	0.12	0.06	-0.07	0.14	0.12	0.16	0.06	0.11	1
Maturity	**0.56	**0.63	**0.30	**0.59	0.19	0.09	0.14	0.17	0.17	0.16	0.10	0.18	**0.72
Engagement	**0.58	**0.64	**0.36	**0.61	0.11	0.02	0.10	0.15	0.18	0.18	0.09	**0.82	0.14

The significance of correlation coefficients was statistically significant ** (p <0.01), * (p <0.05).

Table 3. Regression Coefficients of Critical Thinking Based on the Dimensions of Ethical Justice

Criteria variable	R	R2	F	Sig	β	T	Sig
Moral Obligation					0.20	0.78	0.43
Moral Responsibility	0.71	0.51	9.04	0.0001	0.49	2.2	0.04
Moral Disgust					0.08	0.48	0.63

The results presented in Table 4 show that cognitive processes do not have a significant effect on critical

thinking, and they were able to explain only 15% of the variance of critical thinking.

Table 4. Regression Coefficients of Critical Thinking Based on Cognitive Processes

Criteria variable	R	R ²	F	Sig	β	T	Sig
Memory					0.16	0.92	0.36
Inhibition Control					0.14	0.76	0.45
Decision Making					0.06	0.29	0.77
Cognitive Planning	0.38	0.15	0.56	0.79	0.09	0.34	0.74
Sustained Attention					0.11	0.59	0.56
Social Recognition					0.17	0.98	0.33
Cognitive Flexibility					0.16	0.92	0.36

The results of Table 5 show that moral justice (P = 0.0001, β = 0.70, t=5.26) has a significant effect on the tendency towards critical thinking, but cognitive processes (P

<0.22, t=1.23, β=0.16) have no significant effect on critical thinking. In addition, both variables were able to simultaneously explain 52% of the variance of critical thinking.

Table 5: Results of Regression Analysis of Predictive Variables

Criteria variable	R	R ²	F	Sig	β	T	Sig
Moral Justice	0.72	0.52	14.62	0.0001	0.70	5.26	0.0001
Cognitive Processes					0.16	1.23	0.22

Discussion

The results of this study showed that moral justice is a significant predictor of critical thinking. Since there was no similar research, no results could be found to its alignment.

Overall, this study showed that the development of anticipated moral emotions is not limited to childhood. Furthermore, these findings suggest that moral emotions serve as an important link between moral personality development and decision-making processes that are more proximal to everyday moral behavior [30]. In a research entitled "moral decision-making in adolescents", Malcolano found that the context of communication and interaction in the decision of ethical dilemmas does not play a role [17].

To explain the findings according to Paul et al., it should be noted that to have critical thinking, the individuals must have reinforced some of the following important features: Different perspectives (in order to have unbiased thinking about an issue, it has to identify the related perspectives and enter into a sense of empathy), Subjective Justice (it requires to have a similar approach with all the views regardless of emotions or personal interests or group), Intellectual Humility (i.e., the growth of one's awareness of his ignorance), Intellectual Courageous (confronting and discovering false beliefs), Intellectual Stability(commitment to compliance with the standards that expect others to comply with them), and Dominance to Self-centering[31]. These elements are also components of moral justice, believing that human

behavior should lead to the well-being of others, in addition to leading to the promotion of critical thinking. This is because moral justice, which is like a moral identity, is a set of heterodox tendencies, such as empathy, social responsibility, and ethical reasoning that motivates sociable behavior and reduces anti-social behavior. Based on the mentioned points, it can be argued that moral justice and cognitive abilities are certainly predictive of critical thinking [31].

The results of this study show that cognitive ability is not a significant predictor of critical thinking. It has also been revealed that only social cognitive dimension had a significant effect on critical thinking. Previous researchers have identified a wide range of cognitive reasoning strategies that can promote critical thinking [26, 32-34].

Definitions of critical thinking also include a skill component, which is the ability to interpret, analyze, evaluate, and infer, even when meanings and significance are not immediately apparent, as well as the ability to stay focused on the task at hand [32,26]. For example, to analyze the quality of an argument, one must make inferences about its author, and evaluate not only the logic of a proposed argument but also the evidence supporting it, the credibility of its information sources, and various counterarguments [33]. In sum, people must have the skill to think critically, as well as the will or disposition to do so [34].

According to Halpern, critical thinking is the use of cognitive skills which increases desirable results and is used to describe a deliberate, reasoned, and guided thought [35]. It is further suggested that such moral justice requires access to complex cognitive processes [36, 37].

In a study regarding the status of ethics and moral justice in the field of Islamic social justice, Brenjkar et al. found that one could raise the issue of justice in the social sphere and its extension, which itself has the character of moral justice [38]. Garrigan et al. showed that moral decision-making can take place in the form of a social information-processing model [39]. In a study, the most striking finding was that metacognitive self-regulation plays a key role in critical thinking. Accordingly, those students higher in metacognitive self-regulation monitor and evaluate their learning process and as a result are able to observe their progress. This process helps them think critically. There are empirical findings supporting this claim in literature [40]. According to Scriven and Paul, critical thinking is the process of mental activity and subtle understanding, analysis, composition and evaluation of information collected or derived from observation, experience, reflection, reasoning or communication that leads to belief for action [41].

Conclusion

The results of this research revealed that moral justice is a significant predictor of critical thinking, while cognitive abilities are not a significant predictor of it. Therefore, it can be argued that for the development of critical thinking ability, emphasis should be placed on the structures and dimensions that focus on the abilities,

manners, and attitudes of individuals as well as their skills in their knowledge and environment. Regarding these statements, cognitive process and moral justice are required for critical thinking. Some limitations to this study deserve mentioning. Given the fact that this research was carried out on undergraduate students in Shiraz, the generalization of the results of this study should be avoided in similar groups.

It is suggested that this title in future studies be compared in two groups of male and female students, which will probably have interesting results. As this research was only conducted on undergraduate students, it is suggested that future studies consider in other sections. It is also suggested that this research be conducted in different cities and provinces with different cultures so that the results can be more generalized.

Acknowledgment

The authors would like to thank all those who participated in this study.

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