

## PREDICTIVE MODELS OF CRITICAL THINKING

Andreea Buzduga

PhD Student, "Alexandru Ioan Cuza" University of Iași

*Abstract: Critical Thinking (CT), a desideratum in education, is often associated with IQ and other psychological attributes. The aim of this study is to identify the predictors of CT into three categories of variables such as: personality, age and general cognitive aptitudes. A sample of 705 participants, with the mean age of 19,61 years ( $SD= 4,73$ ) of which 463 university students and 242 school students, participated at this study. Data were collected using a set of tests that included the measures for general cognitive aptitudes (East-West IQ - EVIQ), a critical thinking appraisal (Watson Glaser Critical Thinking Appraisal - WGCTA) and a personality inventory (Eysenck's Personality Inventory - EPI). The obtained results suggest that a high level of age and IQ associated with a low level of neuroticism and extroversion (introversion) predicts a high level of CT. The study highlights the predictive role of age, IQ and personality in CT.*

*Keywords: critical thinking, general cognitive aptitudes, personality, WGCTA, EVIQ, EPI*

### 1. Introduction:

Critical thinking (CT), a desideratum in 21-st century education, can be defined at a basic level, as the possession of a certain sort of skills as reasoning, recognition of assumptions, inference making, evaluation of arguments and so on. A traditional philosophical definition of CT cannot match to the wider areas of CT scholarship applied to disciplines in Higher Education because it is an entire interdisciplinary field (Paulsen, 2014). Therefore, CT can be defined as a skill involving the ability of identifying, evaluating and analyzing propositions and arguments (Paulsen, 2014). In this 21st century or "knowledge era" (Weberg, Porter-O'Grady & Malloch, 2016) educators and employers expect from the students to have CT because it allows to define problems and find good solution (Tsui, 2000). Hence, CT skills are important for the academic achievement of the students, and for their future work performance, but also for the social context, where the decisions are made independently based on a good understanding the context (Ku, 2009; Gunn, Grigg & Pamahac, 2007). Research showed that higher education is doing poorly in improving students' CT. About a half of assessed undergraduates from twenty-four US institutions, revealed no significantly improved skills as complex reasoning or CT, during their two years of college (Arum, Roska, 2011).

The scientific literature about the components or predictors of CT is poor (Yoost & Crawford, 2015). Our study wants to investigate if age, personality factors and the general cognitive aptitudes can predict the CT.

### 2. Method

#### 2.1. Participants and procedures

In this research were involved university students and learners ( $n = 705$ , 34% learners, 66% students). The participants' average age was  $M = 19.61$  years ( $SD = 4.73$ ). The learners were recruited from a public college and received participation credit as compensation for their

implication in the research. The university students were recruited from a public university and they also received participation credit as compensation. Both groups were specializing in social sciences.

## 2.2. Instruments and procedures

Participants completed with the help of online technology (via internet), a CT test, a cognitive aptitude test, and a personality assessment inventory. The instruction they received slightly differ. Students had been instructed to fill in all the instruments in one day while learners had to fill in two steps, first the cognitive aptitudes test and then the personality assessment inventory.

### 2.2.1. Personality assessment inventory

In order to measure the two broad dimensions of personality, Extraversion-Introversion and Neuroticism-Stability The Eysenck's Personality Inventory (EPI) was used, with an additional Lie scale. The inventory was developed by H. J. Eysenck in 57 dichotomous ("yes" or "no") items.

### 2.2.2. Cognitive Aptitude Test

The short version of East-West IQ test (Sava, Constantin, Maricutoiu, Rusu, 2014) was used to measure the fluid and crystalized intelligence, and visual processing. Based on the Cattell-Horn-Carroll hierarchical intelligence model, EVIQ-S has 30 items with multiple choice questions. The test range was assigned from lower, low, medium, high, higher to very higher IQ.

### 2.2.3. Critical Thinking Test

For measuring the critical thinking skills, we used a Romanian version of Watson-Glaser Critical Thinking Appraisal (WGCTA). The test has 81 items adapted for the Romanian cultural specificity, divided into five sections, each measuring a particular skill as inference, recognize assumptions, deduction, interpretation and evaluation of arguments. WGCTA has multiple choice questions and dichotomous ("yes" or "no") items.

## 3. Results

The purpose of this research was to identify the predictors of CT among personality, age and general cognitive aptitudes.

We used hierarchical multiple regression and we statistically controlled the gender (Frost, 1991) and the environment origin of our participants. There were four blocks each one for age, extraversion, neuroticism and the general cognitive aptitudes. The regression analysis revealed the predictive variables of CT (Table 1).

The significant ( $p < 0.05$ ) unique contributions (*Beta*) of each variable are: -0.098 for environment origin, 0.092 for gender, 0.188 for age, -0.165 for extraversion, -0.126 for neuroticism and 0.26 for IQ (general cognitive aptitudes). The final models, containing gender,

environment origin, age, extraversion, neuroticism and IQ, explains 20% of CT variance ( $R^2$  Adj = 0.207).

Table 1. Summary off the results for the hierarchical regression analysis of CT

Models	variables	R <sup>2</sup> Change	Part Correlations
Model 1 (controlled variable)	gender environment origin		
Final model	environment origin	.034*	-.095*
	gender	.034*	.088*
	age	.074*	.174*
	extraversion	.028*	-.160*
	neuroticism	.014*	-.118*
	IQ	.065*	.254*

\* $p < 0.05$

#### 4. Discussion

Our main purpose of the study was to discover the CT significant predictors. The results shows that age and IQ are related. Adding the age, the predictive model (gender, environment origin) increased from 3% to 10% (gender, environment origin and age). Extraversion brings the model to 13%, neuroticism at 14% and the last predictor IQ completes the final model and explains 20% of the CT variance.

Overall, our study adds to the literature that age, extraversion, neuroticism and general cognitive aptitudes (IQ) are significant predictors for CT. Moreover, it was expected for the emotionally stable students, with more interest in reading and learning than in socializing to develop the CT skill.

Finally, several limitation should be mentioned: this research is exploratory and the results don't lend to any deeper interpretations. Despite these limitations, the current results advance the CT literature on exploring what psychological characteristics critical thinker would have. Future studies can explore the possibility of predictive models where CT predicts other psychological variables, such as academic challenge (Paulsen, 2014), involved in the education field.

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