

The Influence of Psycho-Social Factors on the Metacognition of College Students

Aldwin M. Teves, Kerwin F. Tantiado, and Karen Luz Y. Teves

Abstract— The study investigated the interactive effects of attitude, motivation, personality trait and emotional intelligence on the metacognition of college students in four selected private and government universities/colleges in the province of Negros Occidental, Philippines. T-test for independent samples, ANOVA, Canonical correlation analysis and Log linear analysis were used to determine test of difference, relationship and association. Results showed that students' personality trait from the four selected universities/colleges was positive along the areas of openness, conscientiousness, extraversion and agreeableness, while moderately positive in the area of neuroticism. Students were positively motivated along the areas of physiological, safety/security, social and self esteem needs and highly motivated along the area of self-actualization needs. Moreover, students have positive affective and behavioral attitudes and highly positive cognitive attitude. Students have high emotional intelligence along the areas of self-awareness, emotional resilience, inter-personal sensitivity, influence, self-expression and problem solving, while average along the area of intuitiveness. As to their metacognitive skill in mathematics problem solving they were rated as satisfactory. Significant differences were noted both in the psycho-social factors and metacognition. Similarly, there were significant correlations among psycho-social factors and metacognition and that affective attitude, behavioral attitude and emotional resilience were found to be significant predictors of the metacognition index.

Keywords—Attitude, motivation, personality, metacognitions.

I. INTRODUCTION

THE study examines intertwined effects of attitude, motivation, personality trait and emotional intelligence on the metacognition level of the first year teacher-education students of selected Colleges in Southern Negros which are key aspects of providing students, wider avenue to harness their problem solving skills. Attitudes are determinants of behavior because they are linked to perception, personality and motivation [1]. Attitude is a positive or negative feeling or mental state of readiness, learned and organized through experience [2]. It exerts specific influence on person's

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response to people, objects and situations which are predetermined by one's emotional intelligence.

Metacognition, on the other hand, is a concept that is most associated with the theory of developmental psychologist John Flavell. Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them [3]. In other words metacognition deals with thinking about thinking and learning. Thus, learners conscientiously recognize wholesome understanding of what they know and what they don't know. As a result it allows one to consider strategies to learn more effectively, and make predictions about their performance.

High academic performance is associated with higher metacognition in almost all ability levels [4]. This study determined the the significant difference in the personality trait, motivation, attitude, emotional intelligence, and metacognition level of the First Year Teacher-Education Students when they are grouped and compared according to school affiliation as well as school sector. In addition, the study finds out the existence of significant relationship among the selected variables such as personality trait, motivation, attitude, emotional intelligence and metacognition level.

II. METHODOLOGY

A. Data Gathering

To determine student's personality trait, motivation, attitude, and emotional intelligence a self-made questionnaire were used. The questionnaire consists of two major parts. The first part has to do with personal information such as gender (male and female), parents' average monthly income (low, average and high), and degree program (BEED and BSED). The second part deals with personality trait, motivation, attitude, emotional intelligence and metacognition tests.

Using factor analysis the psycho-social factors components were reduced to the following number of items; as to the personality trait, the questionnaire of 60 items divided into five components; openness, conscientiousness, agreeableness, extraversion, and neuroticism, were reduced to; 4 items each for openness, conscientiousness, extraversion and agreeableness and 3 items for neuroticism.

As to the extent of motivation, the questionnaire of 60 items, divided into five components; namely physiological needs, safe and security needs, social needs, self-esteem needs and self-actualization needs were reduced to; 3 items for physiological needs, 4 items each for safety/security and social needs, 2 items for self-esteem needs, and 3 items for self-actualization needs.

As to the attitude component, the questionnaire of 60 items and divided into 3 major components; the affective, behavioral, and cognitive were reduced to; 6 items for affective, 5 items for both behavioral and cognitive components.

The responses range from; strongly disagree to strongly agree, with a continuum of 1 (strongly disagree), 2 (disagree), 3 (moderately agree), 4 (agree) and 5 (strongly agree).

Concerning the emotional intelligence test, the questionnaire has 35 items and divided into 7 major components; self-awareness, emotional resilience, inter-personal sensitivity, influence, intuitiveness, self-expression and problem solving each has 5 items correspondingly. The responses range from; not at all to a very great extent, with a continuum of 1 (not at all), 2 (to a little extent), 3 (to some extent), 4 (to great extent) and 5 (to a very great extent).

Furthermore, results for the motivation, personality trait and attitude components were interpreted using the 5-point Likert Scale, the degree of agreement or disagreement were given a numerical value ranging from one to five, and thus a total numerical value can be calculated from all the responses. Moreover, as to the scale of interpretation, the class size of the succeeding class interval was statistically computed to ensure equal distribution of the data as regards to the responses given by the subject-respondents with equivalent weights for the answers (Table I).

TABLE I
EQUIVALENT WEIGHTS AND INTERPRETATION

Scale	Qualitative Interpretation
4.34 – 5.00	Highly positive
3.43 – 4.33	Positive
2.62 – 3.42	Moderately positive
1.81 – 2.61	Negative
1.00 – 1.80	Highly Negative

Likewise, result for emotional intelligence test was interpreted using the same 5-point Likert Scale with equivalent weights for the answers (Table II).

TABLE II
EQUIVALENT WEIGHTS AND INTERPRETATION

Scale	Qualitative Interpretation
4.34 – 5.00	High
3.43 – 4.33	Above Average
2.62 – 3.42	Average
1.81 – 2.61	Low
1.00 – 1.80	Very low

To determine student's metacognitive skill, a questionnaire consist of 60 items which is divided into three areas; namely, on knowledge/ comprehension, analysis/interpretation and manipulation/application, each has 20 items and scores were interpreted using the scale found in Table 3.

TABLE III
EQUIVALENT WEIGHTS AND INTERPRETATION

Mean	Interpretation
16.50 – 20.00	Excellent
12.50 – 16.49	Very Satisfactory
8.50 – 12.49	Satisfactory
4.50 - 8.49	Fair
1.00 - 4.49	Poor

Likewise, to ensure equal distribution of the data as to the scores of the subject-respondents, the class size of the succeeding class interval given above was statistically computed.

III. RESULTS AND DISCUSSION

----Difference on metacognition with respect to school affiliation and School Sector

Table IV presents results concerning significant difference in the metacognition of the teacher-education students in the areas of knowledge/comprehension, analysis/ interpretation and application/manipulation when they are grouped and compared according to the selected demographic variables.

Results in Table 4 revealed that when they are compared according to school affiliation and school category there were significant differences in the metacognition of the group respondents in all three areas namely knowledge/comprehension, analysis/interpretation and application/ manipulation since their corresponding p-values are less than the level of significance of 0.05. Thus, in terms of school affiliation and categories, metacognition level as to the aforementioned three areas are significantly different.

TABLE 4
DIFFERENCE IN THE METACOGNITION OF STUDENTS ACCORDING TO SELECTED DEMOGRAPHIC VARIABLES.

DEMOGRAPHIC VARIABLES	METACOGNITION			
	Known ge/ Comprehsion	Analysi s/ Interpre tation	Applica tion/ Manipu lation	
School A	12.09 ^{b*c}	11.01 ^{b*c}	10.28 ^a	
School B	12.25 ^c	11.63 ^c	11.48 ^b	
School C	11.49 ^{a*b}	10.50 ^b	10.04 ^a	
School D	11.14 ^a	9.06 ^a	9.55 ^a	
p-value	.001** (s)	.000** (s)	.000** (s)	
F-value	5.705	13.189	8.170	
School Sector	Non-sectarian	12.15	11.24	10.73
School Sector	Sectarian	11.36	9.95	9.85
p-value	.000** (s)	.000** (s)	.001** (s)	
t-value	3.958	3.958	3.242	

Furthermore, using post hoc analysis by Waller-Duncan, only two from among four Higher Education Institutions were significantly different namely school A and school B along the area of knowledge, schools B, C and D, were significantly different along the area of analysis and only school B was significantly different among the four HEI's along the area of comprehension. This result implies that generally in terms of students' metacognition across the four selected colleges and universities they have significantly different level of

metacognitive skills in mathematics problem solving as reflected in the results of their individual scores.

With respect to school sector, non-sectarian schools exhibited significantly higher metacognition skills at 5% alpha level.

----Canonical Correlation between Metacognition and Attitude

TABLE V
CANONICAL CORRELATIONS SECTION

Var #	Canonical Correlation	R ²	F-Value	Num DF	Den DF	Prob Level
1	0.25	0.06	3.74	12	1500	0.00
2	0.09	0.00	0.92	6	1136	0.48

Canonical analysis in Table V revealed that there is only one significant canonical correlation from two sets of data; students' metacognition and attitude since, the first correlation of 0.2569 has an associated p-value of 0.00. In the metacognition, the first correlation is loaded on manipulation/application. On the part of attitude, the first canonical correlation is loaded more on behavioral attitude. Generally, the significant correlation between metacognition and attitude is attributed to manipulation/application in the metacognition while behavior in the attitude.

This finding emphasizes that metacognition of the students is significantly associated with their behavioral attitude. This implies that students' metacognition skill to problem solving specifically in the area of manipulation and application is influenced by their behavioral attitude. Such attitude would be driving force to developing students' metacognitive skill in problem solving.

TABLE VI
STANDARDIZED X AND Y CANONICAL COEFFICIENTS SECTION

Metacognition	X1	X2
Knowledge/Comprehension	1.21	-1.41
Analysis/Interpretation	1.51	-1.14
Manipulation/Application	1.53	-2.89
Attitude	Y1	Y2
Affective	0.46	1.08
Behavioral	0.61	-0.70
Cognitive	0.10	-0.50

----Canonical Correlation Between Metacognition and Emotional Intelligence

Canonical correlation showed that there is only one significant canonical correlation from two sets of data on the students' metacognition and emotional intelligence. This is indicated in table 7 indicating the first correlation of 0.20 with an associated p-value of 0.00.

TABLE VII
CANONICAL CORRELATIONS SECTION

Var #	Canonical Correlation	R ²	F-Value	Num DF	Den DF	Prob Level
1	0.20	0.04	2.06	20	1875	0.00
2	0.13	0.01	1.41	12	1498	0.15

In students' metacognition, the significant correlation is loaded on analysis/interpretation. On the part of emotional intelligence, the canonical correlation is loaded more of the emotional resiliency. In general, the significant correlation between lies on analysis/interpretation emotional resiliency.

TABLE VIII
STANDARDIZED X AND Y CANONICAL COEFFICIENTS SECTION

Metacognition	X1	X2
Knowledge/Comprehension	-0.55	-0.30
Analysis/Interpretation	-0.73	0.79
Manipulation/Application	-0.25	-1.24
Emotional Intelligence	Y1	Y2
Self-awareness	0.29	-0.16
Emotional Resiliency	0.37	-0.33
Interpersonal Sensitivity	0.19	-0.55
Influence	0.16	1.03
Intuitiveness	-0.01	0.55
Self-expression	0.05	-0.25
Problem Solving	0.34	-0.13

Moreover, this finding highlights that students' problem solving ability to analyze and interpret the problem is significantly associated with their emotional resiliency. This is supported by findings that metacognition is associated with management of affective states [5]. Likewise, metacognitive is enhanced through persistence and motivation in the face of challenging tasks like engaging to problem solving.

IV. THE METACOGNITION MODEL

Table IX presents the estimated models for metacognition using the stepwise regression method. It presents the beta coefficients, t-value and the associated p-value.

TABLE 9
ESTIMATED MODEL OF METACOGNITION

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error			
(Constant)	9.014	.624		14.450	.000
Behavioral Attitude	.464	.149	.152	3.113	.002
Affective Attitude	.512	.164	.153	3.119	.002
Emotional Resiliency	-.392	.138	-.122	-2.856	.002

a. Dependent Variable: Metacognition

Table IX shows the regression equation with three predictors significantly attributing to the metacognition index. The coefficient of determination (R²) is 0.067**. This speaks to mean that metacognition is significantly influenced by attitude and emotional quotient by about 6.7%, and the rest are other factors not included in the model. Behavioral attitude, affective attitude and emotional resilience showed significant contribution to metacognition.

This concord findings that beliefs and attitudes affect the development of cognitive and metacognitive skills [6].

Furthermore, young children's emotion-related self-regulation, predicts their future reading and math abilities [7].

The model is of the form

Metacognition = 0.464Behavioral Attitude + 0.512Affective Attitude -0.395Emotional Resilience + 9.014.

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