

## **Cognitive Skills and Mathematics Performance of CED Students in JRMSU-Tampilisan Campus**

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### **Abstract**

*The study determined the cognitive skills and mathematics performance level of the CED students of JRMU-Tampilisan Campus. There were 211 subjects of the study and classified according to gender, curricular year and course. The study showed that there was a slight difference between the cognitive skills means rating of the CED students when grouped according to gender and revealed no significant difference when treated using t-test, when grouped according to course the significant difference existed in the analysis skill only where BSED group performed better compared to BEED group, and when grouped according to curricular year the first year group got the lowest mean rating that caused the significant difference between year level. In terms of mathematics performance, the CED students were described as “good”. No significant difference existed when they were grouped according to gender but when grouped according to curricular year and course a significant difference was noted with the BSED group performing better compared to BEED group.*

**Keywords:** *cognitive skills, knowledge, comprehension, application, analysis, mathematics performance.*

### **Introduction**

Alarming observations of Filipino students reveal that they excel in knowledge acquisition but fair considerably low in lessons requiring higher thinking skills (Leongson and Limjap, 2003). It is evident by the result of National and International Mathematics achievement tests which resulted to very low achievements of the students.

Simple mathematical abilities and cognitive skills such as: knowledge, comprehension, application and analysis are acquired by the students from the start of their formal education and when they reach higher level of learning it is possible that these skills become complex.

Mathematics requires a full understanding of its operational concepts and applying these concepts to real life situation thus, making it enjoyable and challenging. But, as observed, many students dislike mathematics despite of all its importance and application to real life situations. The students of the College of Education in Jose Rizal Memorial State University-Tampilisan Campus (JRMSU-TC) likewise felt that Mathematics is complicated

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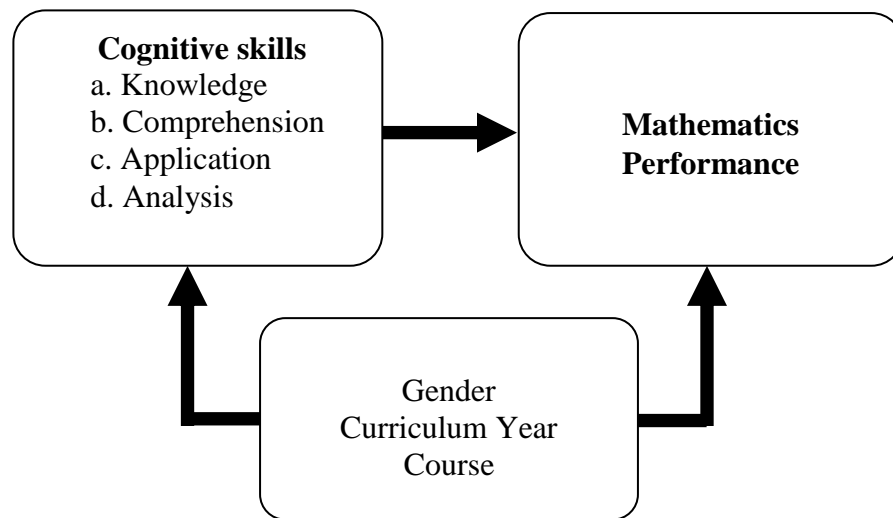
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and in many ways they dislike it. In an informal discussion with them, many CED students described their high school mathematics as poor in terms of foundation and concept acquisition, thus making them uncomfortable with the subject.

The assumptions of this study is based on the product of researches regarding gender differences in mathematics achievements and the Piaget's Theory of Cognitive Development where he believed that the development of a child occurs through continuous transformation of thought process. Weinert & Helmke as cited in Ojose (2008) stated that when students are usually grouped by chronological age, their development levels may differ significantly. Papila & Olds as cited by Ojose (2008) added that the difference may depend on maturity, experience, culture and the ability of the child.

### Conceptual Framework



**Figure 1 Schematic model of the study**

The study aims to determine the cognitive skills and mathematics performance of the JRMSU-TC College of Education students and if there is a significant difference between their cognitive skills and mathematics performance when classified according to gender, curricular year, and course.

### Research Methodology

The study utilized the descriptive method of research employing the mathematics ability test questionnaire as the main data gathering tool in determining the cognitive skills and mathematics performance of the CED Students as to: Comprehension, Knowledge, Application, and Analysis. The questionnaire is a validated instrument of Corpuz (1995) adopted by Balo (1999). The study utilized the statistical measures such as the mean and percentage to determine the cognitive skills and mathematics performance of the CED students. Analysis of Variance was also employed and further tested using Scheffe method to determine if there is a significant difference between their cognitive skills and mathematics performance when classified according to gender and curricular year.

## Results and Discussions

Table 1 shows that males excel in three cognitive skills such as knowledge, comprehension, and application while females only excel in analysis. The result implies that in terms of mean rating the male subjects perform better than female subject.

**Table 1 Cognitive Skills of CED Students Classified According to Gender**

Gender	Cognitive Skills							
	K	Des	C	Des	Ap	Des	An	Des
Male	87.65	VG	83.44	G	79.95	G	76.12	F
Female	86.80	VG	82.70	G	78.36	F	77.16	F
<b>K-Knowledge, C-Comprehension, Ap-Application, An-Analysis</b>								

Table 2 shows that 4<sup>th</sup> year CED students excel in all levels of cognitive skills such as knowledge, comprehension, application and analysis, followed by 3<sup>rd</sup> year, and 2<sup>nd</sup> year, and then followed by the first year. The result of the study implies that Education students are performing averagely well in knowledge and comprehension skills but fair in application and analysis.

**Table 2 Cognitive Skills of CED Students Classified According to Curricular Year**

Curricular Year	Cognitive Skills							
	K	Des	C	Des	Ap	Des	An	Des
1st Yr	83.91	G	81.19	G	77.06	F	75.14	F
2nd Yr	89.58	S	83.98	G	79.17	F	78.13	F
3rd Yr	89.40	VG	83.40	G	79.87	G	78.63	F
4th Yr	90.34	S	86.00	VG	82.17	G	79.31	F
<b>K-Knowledge, C-Comprehension, Ap-Application, An-Analysis</b>								

Table 3 shows that the BSEd students performed better compared to the BEEd students in all levels of cognitive skills as to knowledge, comprehension, application, and analysis compared to the BEEd students for knowledge, comprehension, application and analysis. The result of the study is in consonance with the statement of Leongson and Limjap (2003) that Filipino students excel in knowledge acquisition but fair considerably low in lesson requiring higher order thinking skills. Another study that supports the findings of the study is that of Tanday (1997) as cited by Balo (1999) which states that students are not exposed adequately to word problems and situations which demand higher- order thinking skills.

**Table 3 The Cognitive Skills of CED Students Classified According to Course**

Course	Cognitive Skills							
	K	Des	C	Des	Ap	Des	An	Des
BEEED	86.61	VG	82.51	G	78.32	F	76.58	F
BSEED	88.37	VG	84.21	G	80.09	G	78.4	F
<b>K-Knowledge, C-Comprehension, Ap-Application, An-Analysis</b>								

Table 4 reveals that males and females have minimal difference and both of them fall on “good” description. The study of Guiso, et al (2003) supports the findings of the study. Their study refuted the conventional wisdom in education that, on average, boys do better in mathematics and girls do better in reading for biological reasons.

**Table 4 Mathematics Performance of CED Students Classified According to Gender**

Gender	Mathematics Performance	Description
Male	81.91	Good
Female	81.23	Good

Table 5 shows that fourth year CED students outperformed the other year level respondents. The better mathematics performance of students in higher curricular year can be attributed to the long span of their experience in the subject.

**Table 5 Mathematics Performance of CED Students Classified According to Curricular Year**

Curricular Year	Mathematics Performance	Description
1 <sup>st</sup> Year	79.33	Fair
2 <sup>nd</sup> Year	82.72	Good
3 <sup>rd</sup> Year	82.83	Good
4 <sup>th</sup> Year	84.46	Good

**Table 6 Difference Between Cognitive Skills When Classified by Gender**

Cognitive Skills	Gender	N	Mean	df	t-value	Sig	Interpretation
Knowledge	Male	42	87.81	209	0.919	0.359	NS
	Female	169	86.76				
Comprehension	Male	42	83.60	209	0.771	0.441	NS
	Female	169	82.67				
Application	Male	42	80.07	209	1.669	0.097	NS
	Female	169	78.38				
Analysis	Male	42	76.17	209	-1.23	0.22	NS
	Female	169	77.14				

Table 6 shows that there is a slight difference between the means of the cognitive skills when classified by gender. The result implies that there is no gender difference between the CED student’s cognitive skills. The finding of the study coincide with the statement of Hyde (1995) as cited by Fisher (2008) which states that there are no gender difference anymore in mathematical performance though some critics argues that even when average performance is equal, gender disparities may still exist at the highest levels of mathematical performance.

**Table 7 Difference Between Cognitive Skills When Classified by Curricular Year**

Variables		Sum of Squares	df	Mean Square	F	Sig.	Interpretation
Knowledge	Between Groups	1797.195	3	599.065	16.889	.000	Significant
	Within Groups	7342.634	207	35.472			
	Total	9139.829	210				
Comprehension	Between Groups	638.875	3	212.958	4.621	.004	Significant
	Within Groups	9539.571	207	46.085			
	Total	10178.445	210				
Application	Between Groups	671.038	3	223.679	6.599	.000	Significant
	Within Groups	7016.687	207	33.897			
	Total	7687.725	210				
Analysis	Between Groups	647.155	3	215.718	11.722	.000	Significant
	Within Groups	3809.271	207	18.402			
	Total	4456.427	210				

Table 7 shows the presence of significant difference between the cognitive skills of CED students in terms of knowledge, comprehension, application, and analysis when classified according to curricular year. Using Scheffe, it further revealed that the difference existed in the 1<sup>st</sup> year group that has the lowest mean in all cognitive skills rating. The result implies that maturity matters in mathematical ability. Papila & Olds (as cited by Ojose, 2008) stated that the difference may depend on maturity, experience, culture, and the ability of the child.

**Table 8 Difference Between Cognitive Skills When Classified by Course**

Cognitive Skills	Course	N	Mean	df	t-value	Sig	Interpretation
Knowledge	BEED	168	86.61	209	-1.565	0.119	Not Significant
	BSED	43	88.37				
Comprehension	BEED	168	82.51	209	-1.435	0.153	Not Significant
	BSED	43	84.21				
Application	BEED	168	78.32	209	-1.721	0.087	Not Significant
	BSED	43	80.09				
Analysis	BEED	168	76.58	209	-2.333	0.021	Significant
	BSED	43	78.40				

Table 8 shows that there is no significant difference between the cognitive skills of CED students as to knowledge, comprehension and application when classified by course. The table reveals that the significant difference only exists in the Analysis skills where the BSED group outperformed the BEED group. This is probably because the mathematics subjects of the BSED group is more specific and complex compared to the mathematics subjects reflected in BEED curriculum considering the fact that mathematics majors are included as subject of the study.

**Table 9 Difference Between Mathematics Performance When Classified by Gender**

	Gender	N	Mean	df	t-value	Sig	Interpretation
Math Performance	Male	42	81.91	209	0.791	0.43	Not significant
	Female	169	81.23				

Table 9 shows that there is no significant difference between the mathematics performance of the CED students when classified according to gender. The result implies that no gender difference existed in the College of Education of JRMSU-TC.

**Table 10 Difference Between Mathematics Performance When Classified by Curricular Year**

Mathematics Performance	Sum of Squares	df	Mean Square	F	Sig.	Interpretation
Between Groups	852.302	3	284.101	13.339	0.000	Significant
Within Groups	4408.718	207	21.298			
Total	5261.020	210				

Table 10 reveals that there exists a significant difference between the mathematics performance of CED students when classified according to curricular year. Using Scheffe, the results further reveal that the difference existed only in the first year group.

**Table 11 Difference Between Mathematics Performance When Classified by Course**

	Course	N	Mean	df	t-value	Sig	Interpretation
Math performance	BEED	168	81.00	209	-2.077	0.039	Significant
	BSED	43	82.78				

Table 11 reveals significant results that rejected the hypothesis stating that there is no significant difference between the mathematics performance of CED students when classified by course. The result implies that BSED group performed better compared to BEED group.

## Conclusion

Based on the findings of the study, it is safe to conclude that in terms of mean rating of both cognitive skills and mathematics performance the male students is performing better compared to female students, the BSED students is performing better compared to BEED students, and the 4<sup>th</sup> year students outperformed other year level and the prevalent cognitive skill is knowledge followed by comprehension. It is further concluded that there is no significant difference between the cognitive skills and mathematics performance of male and female CED students. There is a significant difference between the cognitive skills and Mathematics performance of the CED students when grouped according to curricular year, in which the first year group made the difference to all year level as well as on the analysis skills and mathematics performance of CED students when grouped according to course.

## Recommendations

Based on the conclusion, the following measures are hereby recommended:

1. Teachers should conduct remedial teaching for the slow learners and enrichment activities for the fast learners. Test construction should focus on application and analysis to encourage the students to think critically and analytically.

2. Students should be encouraged to study harder to improve their mathematics performance, most specially those in lower years in both courses.
3. Students are encouraged to improve the level of their cognitive skills and it is likewise recommended that faculty teaching mathematics should take essential steps to improve the cognitive skills of the students. They should be encouraged to teach mathematics in simplest manner to be appreciated by their students.
4. Students should be encouraged to improve the level of their mathematics performance by understanding its basic concepts and applications to real life situation.
5. Administrators of schools should consider the results of this study. They must find ways and means to improve the cognitive skills most especially the application and the analysis skills of the CED students by improving the teacher's competencies particularly in the teaching methods, principles and techniques used, and in the content knowledge of mathematics teachers by sending them to seminars and workshops that would also enhance their capabilities in teaching mathematics.
6. The dean and faculty members of the College of Education should produce a mathematics manual to be used by the College based on the findings of the study.

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