

# The Effects of Enneagram Personality Types in the Robot Programming Classes-Centering Around the Robot Department Students of a Technical High School -

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## Abstract

*In this study, the Enneagram test was done for the technical high school students, and the personality types of those students were categorized as the following three types: head, breast, and belly, which are three main types of the Enneagram test. Through the discussion between expert course tutors and an Enneagram professional, respective effective teaching-learning methods were chosen for each type of student groups, and the three groups began to study the robot programming course. Students were advised to study with VPL and TPL, and the results of their learning were examined using robots. The results showed that learners of respective personality types preferred VPL and TPL differently.*

*Learners' achievement was found remarkably different according to their preference of VPL and TPL (programming tool). When not considering the Enneagram personality type factor, it could happen that part of personality type learners could not get desirable results.*

**Keywords:** Robot Education, the Enneagram, Programming, Physical Computing

## 1. Introduction

Today, software technology has permeated every field of industry. Thus, it would not be wrong to say Korea has entered into the 'software-oriented society' in which software determines the competence of individuals, companies, and even countries. Automobile engines, life science, and even the discovery of DNA structure have been possible thanks to computer softwares with which enormous volume of genes could be put together. In the world financial market, they make their investment decision with the help of computer software rather than analysts. As this kind of software-oriented phenomenon will get much more intensified in the future, and the whole society, or the world could be controlled based on digital data, it is predicted that creative and comprehensive talents equipped with software technology will decide the national competitiveness to lead the future of the world. Thus, to actively respond to this trend, leading countries of the world have tried to increase students' computational thinking ability through software classes such as Coding courses in the elementary and secondary schools [1-3].

In accordance with this global trend, software education is planned to begin from 2016 in middle schools, 2017 in elementary schools, and 2018 in high schools in Korea [4-6].

Recently, several teaching methods such as computer science unplugged, learning of algorithms, physical computing and so on have been studied as the main software education methods. Especially, in the technical high schools which have to produce well trained technicians for the industry, they have used robots actively to enhance their students' practical programming ability.

This study focuses on the motivation in the programming learning, preference of programming tools, and learning effects through the programming classes using educational robots in robot programming courses of the technical high schools.

However, in the education field, owing to several unsatisfactory conditions, uniform education often has been done even though each personality type of learners is different. Thus, it is inevitable that interest and motivation of each student has to be shown differently in the uniform educational field, and many previous studies have indicated that the results could be different. This study focuses on the teaching according to the learners' personality types disregarding the unsatisfactory conditions [7].

In this study, the personality types of learners are divided into three central types using Enneagram. And through VPL and TPL learning of each central type of learners, the effects of learning and the selection types of preferred programming tools of the learners were determined.

## 2. Theoretical Background

### 2.1. Enneagram

According to Kim Kyeong-su's study (2007), the viewpoint of the whole man as an educational goal and that of Enneagram are almost the same. Thus, it is likely that these two can be connected in teaching-learning methods and education courses [8].

A study done by Yoon Un-sung and others (2000) suggests that the value through which people seek specific careers and the preference of careers can be differentiated by the characteristics of Enneagram personality types which are decided by its type [9].

In this study, only three central types like head, breast, and belly were selected [10-11]. The characteristics of Enneagram personality types to be referred in this study are shown in Table 1.

**Table 1. 9. Enneagram Personality Types and of Characteristics of Each Type**

Central Domain	Type No.	Alias	Characteristics of types	Avoidance	Temptation	Vice	Virtue
Feeling (breast)	2	Helper	protective, motherly type: considerate, helpful, possessive, and manipulatory character	Desire	Service	Pride	Humility
	3	Achiever	success-oriented and practical type: self-assured, ambitious, narcissistic, and hostile character	Failure	Effectiveness	Deceit	Honesty
	4	Artist	contemplative, shy type: creative, individualistic, shy, and depressed character	Mediocrity	Uniqueness	Envy	Peace
Thought (head)	5	Investigator	intellectual, analytical type: insightful, original, eccentric, abnormal, fearful character	Emptiness	Knowledge	Avarice	Detachment
	6	Loyalist	dutiful, traditional type: favourable, responsible, dependent, and masochistic character	Escape	Safety	Cowardice	Courage
	7	Optimist	extremely active and open type: passionate and perfectly	Pain	Ideal	Avarice	Moderation

Instinct (belly)	8	Leader	fanatic character strong and dominant type: faithful, dictatorial, destructive character carefree and cold type: acceptive, passive, and oppressive character	decisive, and	Weakness	Justice	Lust	Power Control
	9	Coordinator	rational and idealistic type: rational, basic, regulatory, and perfectionistic, and narrow-minded character	reliable, and	Conflict	Degradation	Self Oblivion	Caution of Behavior
	1	Reformer			Anger	Perfection	Fury	Composure

## 2.2. Physical Computing & Robot Using Class for Programming

Various learning methods are being researched for programming courses. Robot using classes mean computing or physical computing by receiving information in physical way from the users through a digital technique or outputting the results of processed information in the same way.

Learners can check the results of their programming from the actions of educational robots or sensor boards with short distance communications immediately after their experiments, because of which this programming class can make learners interested in the programming class, and thus, their higher learning effects can be expected. For robot using classes, wired communications media includes ethernet, and wireless ones include smart phones, wifi, zigbee, bluetooth, and so on [12-13].

## 3. Research Methods

### 3.1. Research Process and Environments

Subjects of this study were 39 junior students of robot department of K Technical High School, 22 of whom were male and the other 17 were female students.

Enneagram analysis was performed using the test sheets made by Susan Rose, and the learners' personality types were classified into following three categories: head, breast, and belly types. The curriculum of the class included completing projects every week and the programming classes using robots were given after the Enneagram analysis. Thus, when the Enneagram results were out, they were consulted by professionals in order to find the best way to teach each type of students.

As this class is performance-based one, individual tutorship is important in the classes. During the first semester a uniform teaching was given regardless of Enneagram test, and during the second semester the lecture was given for respective types with the results, and two course tutors and one Enneagram professional discussed them to find effective course tutoring methods according to Enneagram personality types.

Research process of this study is shown in Figure 1, and the professionals involved are shown in Table 2.

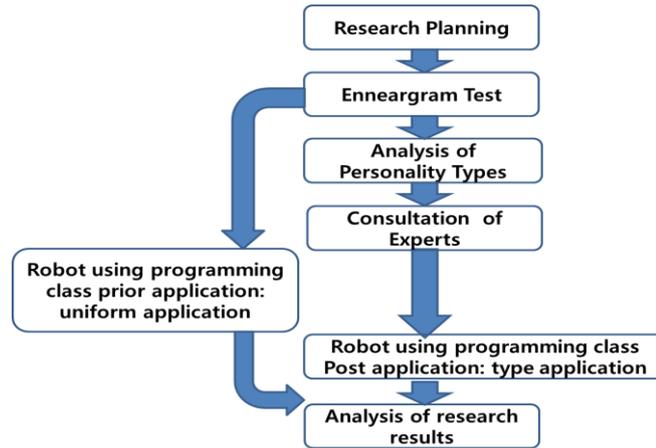


Figure 1. Research Process

Table 2. Professionals Involved

No.	Members	Role	Education
1	Teacher K	Course Tutor	Finished Doctoral Course of Pedagogics(Computer Education)
2	Teacher L	Course Director	Master of Education(Computer Education)
3	Reverend J	Enneagram Professional	Master of Divinity(Pastoral Theology) License of Enneagram Leader Education

### 3.2. Learning Contents

In this study, they used a robot is shown in Figure 2. As this TPL of this study is shown in Figure 3. As this VPL of this study is shown in Figure 4.



Figure 2. Educational Robot

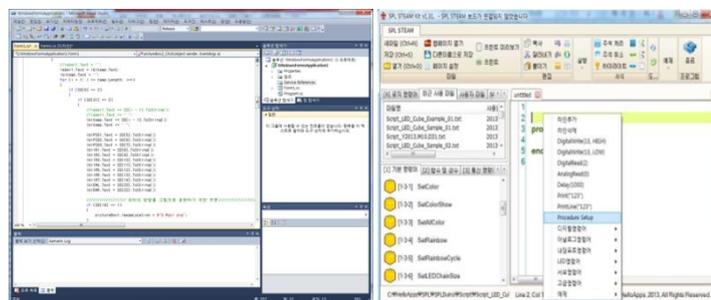
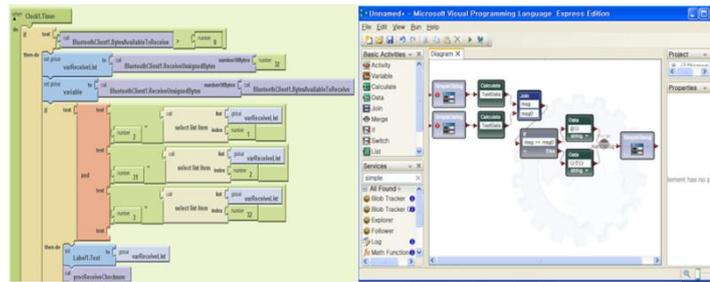


Figure 3. TPL (Text Programming Language)



**Figure 4. VPL(Visual Programming Language)**

### 3.3. Research Limits

As this study was done and analysed by the researcher of this paper only, there were some limits like the small number of subjects and the unsatisfactory research conditions. The limitations of this research are as follows.

First, the number of learners of the class was 39, so it was difficult to divide the same number of subjects into each personality type. Thus, the number of belly personality type learners is relatively small than the other two, breast and head types.

Second, because of the limits mentioned above, just three central ranges of personality types rather than nine were chosen in this study.

### 4. Research Results

As for preference of each programming tool, breast and head types preferred VPL, and belly type preferred TPL.

In particular, in the TPL preference survey, the results were revealed differently according to sexes. Breast type male learners preferred TPL, while belly type female learners preferred TPL. Table 3, is the results of programming tool preference of central type learners, and Table 4, is the results of learning achievement.

**Table 2. Programming Tool Preference of Enneagram Central Types (Plural Answered Allowed)**

Select Type	Total	VPL		Total	TPL		Total	Both	
		Boy	Girl		Boy	Girl		Boy	Girl
Head	6	5 83.3%	1 16.7%	1	1 100.0%	0 0.0%	7	4 57.1%	3 42.9%
Belly	3	1 33.3%	2 66.7%	5	1 20.0%	4 80.0%	3	2 66.7%	1 33.3%
Breast	7	2 28.6%	5 71.4%	4	4 100.0%	0 0.0%	3	2 66.7%	1 33.3%
Total	16	8 50.0%	8 50.0%	10	6 60.0%	4 40.0%	13	8 61.5%	5 38.5%

Among the learning achievement results of each type, types of increased performance are analyzed. Breast type male students who preferred TPL only and those who preferred VPL showed enhancement in VPL test, but the score difference in TPL was not significant. Male students who preferred both TPL and VPL gained high achievement in both tests.

Breast and head types of female students got high achievement in general regardless of preference of programming tools.

Among the head type male students, those who preferred VPL got improvement regardless of TPL and VPL, and especially got remarkable improvement in VPL test. Male students who preferred both got high improvement in VPL test.

Belly type students got improvement regardless of sexes and types, but female students were better than male students.

Among male students, those who preferred VPL got improvement in both tests, but particularly better in VPL test, and those who preferred both got higher achievement in VPL test.

Belly type learners, in general, showed improvement regardless of sexes and types, and female students' achievement was better than male students.

Though there were some cases in which some students did not get improvement, the results of improvement were larger than those who failed to improve their ability.

Generally, according to sexes and preferred programming tool types, there was difference of learning achievement existing.

The results of students' learning achievement of the 1st and the 2nd semesters are shown in Table 4, & Table 5, and the change of learning achievement is shown in Table 6.

**Table 4. Learning Achievement of Preferred Programming Tools (1 Semester)**

1 Semester		Breast type		Head type		Belly type	
Preference	Gender	VPL Achieve- -ment	TPL Achieve- -ment	VPL Achieve- -ment	TPL Achieve- -ment	VPL Achieve- -ment	TPL Achieve- -ment
VPL	Boy	86.25	87.75	76.90	85.60	82.00	86.25
	Girl	81.38	86.75	65.50	83.50	75.00	83.00
TPL	Boy	85.88	91.63	76.00	76.50	66.50	76.00
	Girl	-	-	-	-	84.75	90.63
Both	Boy	88.75	85.75	79.63	90.63	81.50	80.25
	Girl	76.50	87.00	79.00	88.83	78.50	85.50
Average of prior evaluation	Boy	86.96	88.38	77.51	84.24	76.67	80.83
	Girl	78.94	86.88	72.25	86.17	79.42	86.38

**Table 5. Learning Achievement of Preferred Programming Tools (2 Semester)**

2 Semester		Breast type		Head type		Belly type	
Preference	Gender	VPL Achieve- -ment	TPL Achieve- -ment	VPL Achieve- -ment	TPL Achieve- -ment	VPL Achieve- -ment	TPL Achieve- -ment
VPL	Boy	96.50	83.50	93.40	92.30	85.25	91.25
	Girl	91.78	94.38	78.00	79.50	89.00	98.50
TPL	Boy	94.13	91.25	76.60	76.60	82.00	87.50
	Girl	-	-	-	-	96.63	93.63
Both	Boy	97.10	98.00	94.38	89.75	85.50	81.50
	Girl	82.00	92.50	93.83	93.00	96.00	100.00
Average of prior evaluation	Boy	95.91	90.92	88.13	86.22	84.25	86.75
	Girl	86.89	93.44	85.92	86.25	93.88	97.38

**Table 6. Change of Learning Achievement After Applying Personality Types**

2 Semester		Breast type		Head type		Belly type	
Preference	Gender	VPL Achieve- -ment	TPL Achieve- -ment	VPL Achieve- -ment	TPL Achieve- -ment	VPL Achieve- -ment	TPL Achieve- -ment
VPL	Boy	10.25	-4.25	16.50	6.70	3.25	5.00
	Girl	10.40	7.63	12.50	-4.00	14.00	15.50
TPL	Boy	8.25	-0.38	0.60	0.10	15.50	11.50
	Girl	-	-	-	-	11.88	3.00
Both	Boy	8.35	12.24	14.75	-0.88	4.00	1.25
	Girl	5.50	5.50	14.83	4.17	17.50	14.50

Average of prior evaluation	Boy	8.95	2.54	10.62	1.97	7.58	5.92
	Girl	7.95	6.57	13.67	0.09	14.46	11.00

## 5. Discussion and Conclusion

The conclusions and suggestions of this study are as follows.

First, in most types, each student's achievement of preferred programming tools was turned out to be higher, but among the belly type students, sex was found to be a critical factor that decided the difference of learning achievement. Female students got higher results. Thus, studies on the relationship between Enneagram and gender are necessary.

Second, there was the difference of learning achievement existing according to preferred programming tools regardless of Enneagram personality types.

Lastly, learning achievement of VPL is shown to be improved in general, and it indicates that programming work with VPL is easier for students to understand what the programming is. However, there is one thing to be considered that there were some students who got improved much with TPL.

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