

## THE RELATIONSHIP BETWEEN FORESTRY STUDENTS'S MULTIPLE INTELLIGENCES AND THEIR EDUCATIONAL ACHIEVEMENTS

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### *Abstract*

*The main objective of this study was to investigate the relationship between forestry students' multiple intelligences and their educational achievements (passing the exams). Thirty four-year students from Forestry Specialization within Faculty of Agriculture from Bucharest participated in this research. The Multiple Intelligence Inventory proposed by Walter McKenzie in 1999 was used. The data set was analyzed through descriptive statistics. Moreover, correlations between the marks obtained by the students and their dominant intelligences types were done. The study provided preliminary and usefulness results which should be taken into consideration in teaching and learning activities, both by the teaching staff and the students.*

*Key words:* forestry students, multiple intelligences, educational achievements

### INTRODUCTION

In spite of many debates regarding a general definition for the term "intelligence", no standard or globally accepted one has been found until now. As a consequence, intelligence was defined in many ways, such as a mental ability for reasoning, problem solving and learning [6], the capacity for knowledge [12], or the ability to create products [11]. Furthermore, intelligence was regarded as the ability to think in an abstract manner [19]. It was also stated that the "intelligence is what is measured by intelligence tests" [5].

According to the latter definition, intelligence can be measured by several tests and their results can predict many social outcomes, such as job performance or educational achievements [6]. Even so, there are a few dissatisfactions among psychologists regarding the intelligence assessment instruments [1].

Three decades earlier, in 1983, Howard Gardner, psychologist and professor at Harvard University's Graduate School of Education, proposed the theory of multiple intelligences [10]. This theory was considered a very important contribution to cognitive science among psychologists [3] and it was

successfully used in several fields of education [9].

According to this theory, all humans have more types of intelligences located in different areas of their brains. Every person possesses two or three dominant intelligences which he or she uses predominantly [20].

It is also well known that every person has the ability to develop several types of intelligences if he or she is encouraged and has the chance to follow an adequate and personal learning style [4]. In order to do this, the first step should be that both the students and the professors understand their own multiple intelligences and use the dominant ones during the learning and teaching processes. Moreover, the multiple intelligences can be grouped in three main domains, as follows: the interactive, introspective and analytical. The interactive domain consists of the kinesthetic, interpersonal and linguistic intelligences. In the introspective domain the visual, intrapersonal and existential intelligences are included, while the analytic domain consists of the naturalist, musical and logical intelligences [15].

Recently, due to the increasing scholarly and practical interests in the application of Multiple Intelligences Theory, an online environment

(Web-Ob application) especially for teachers and experts was developed [17].

However, during the last thirty years, there were many scholars who criticized Gardner's theory, but it must be admitted that it represents an important theory which influenced the education in the recent years [2] and challenged the traditional view on intelligence [14].

The main objective of this study was to highlight the types of intelligences of thirty forestry students. Secondly, correlations between the students' multiple intelligences and their educational achievements were made.

## MATERIALS AND METHODS

Thirty fourth-year students from Forestry Specialization within the Faculty of Agriculture, University of Agronomic Sciences and Veterinary Medicine of Bucharest participated in this study during the beginning of October 2012. Most of them (83%) were between 21-23 years old.

In order to determine the students' types of intelligences the questionnaire proposed by Walter McKenzie in 1999 and available online, was used [24]. This test is divided into nine sections, as follows: Section 1 reflects the **Naturalist** strength, Section 2 suggests the **Musical** strength, Section 3 indicates the **Logical** strength, Section 4 illustrates the **Existential** strength, Section 5 shows the **Interpersonal** strength, Section 6 reflects the **Kinesthetic** strength, Section 7 indicates the **Verbal** strength, Section 8 reflects the **Intrapersonal** strength and Section 9 suggests the **Visual** strength [15]. Each section consisted of ten specific statements. The students completed each section by placing the value "1" next to the statement that exactly described them. Then they made the total for every section, ranging from 0 to 10 [24].

Regarding these nine intelligences it is well known from the literature that none of them is considered the most or the less important. They are considered personal tools and an individual can be more talented in some of them [16].

Basic statistics, such as mean, standard deviation (SD), minimum and maximum

values and coefficient of variation were calculated by the aid of Microsoft Office Excel software package. In addition, correlations between the students' types of intelligences and their educational achievements were made with STATISTICA software, version 8.0. More precise, correlations between the marks obtained by the thirty students at two disciplines, namely Torrents' Control (**TC**) and Forest Land Reclamation (**FLR**) and their nine types of intelligences were performed. For both disciplines the written examination form was preferred thanks to its advantages in comparison to oral examinations. Firstly, it provides the possibility to examine a higher number of students in a limited period of time and, secondly, it helps the shy students [7, 21, 22]. The examination scale ranged from 1 (the lowest mark) to 10 (the highest mark).

## RESULTS AND DISCUSSIONS

It can be seen in Table 1 that the highest mean values were obtained for sections 8, 6 and 1, namely the Intrapersonal, Kinesthetic and Naturalist Sections, respectively. This means that most of the students are very intuitive, they can learn through practical activities and they prefer the outdoor activities.

The benefits resulted from the latter activities consist of several useful field examples and a better understanding of how things work in a very dynamic and practical domain, such as Forestry.

On the contrary, the lowest mean values were obtained for sections 2 and 7, followed by sections 5 and 9, respectively. This means that the majority of the students does not possess or use very often the musical, verbal, interpersonal or visual abilities.

Among the nine sections, only for section 2 (Musical) the maximum score (10) was not recorded. Moreover, for this section the minimum value was observed (0).

The lowest value for the amplitude of variation (*i.e.* the difference between the maximum and the minimum values) was recorded for Naturalist Section. This could represent a huge benefit for a professor both in the teaching and evaluation processes because it is easier to

work with a homogenous group of students than with a heterogeneous one.

Table 1. Statistical parameters

Section	Mean	SD	Minimum	Maximum	CV [%]
1	8	1	6	10	14
2	5	2	0	8	38
3	7	1	4	10	20
4	7	2	4	10	25
5	6	2	2	10	34
6	8	2	4	10	23
7	5	2	1	10	42
8	9	1	5	10	16
9	6	2	2	10	38

The low values of standard deviation (SD) indicate that the data tend to be very close to the arithmetic mean [18]. In addition, the values of the coefficient of variation (CV), which were below 30-40%, indicate the homogeneity of the sample set and a normal (Gaussian) distribution. This means that the

average (mean) values are representative for the data set [23]. The normal distribution was also reported in a recently published similar paper [8].

Regarding the values of Pearson’s correlation coefficient (Table 2), which shows the strength and direction of the relationship between two variables [13], positive correlations (0.09 and 0.25, respectively) were recorded between the marks obtained by the students at both exams, namely **FLR** (Forest Land Reclamation) and **TC** (Torrents’ Control) and their Intrapersonal strengths (Section 8). Actually, only for this section positive correlations with the marks from both exams were obtained.

Contrary to expectations, relatively low negative correlations (-0.12 and -0.02, respectively) were recorded between the marks obtained by the students and their Naturalist strengths (Section 1). This could be because of the fact that no outdoor activities, such as visits to degraded lands (*e.g.* terrains degraded by water or wind erosion or by extreme drought) or to torrential drainage basins, were provided during the teaching process.

Table 2. Correlations between variables

Var.	Section									FLR	TC	
	1	2	3	4	5	6	7	8	9			
Section	1	1.00	0.41	0.50	0.61	0.04	0.34	0.48	0.31	0.63	<b>-0.12</b>	<b>-0.02</b>
	2		1.00	0.60	0.53	0.39	0.43	0.51	0.24	0.55	-0.19	-0.07
	3			1.00	0.54	0.27	0.61	0.49	0.36	0.70	-0.20	-0.06
	4				1.00	0.27	0.49	0.68	0.49	0.76	-0.08	0.04
	5					1.00	0.27	0.43	0.07	0.30	-0.46	-0.28
	6						1.00	0.45	0.62	0.68	-0.13	0.22
	7							1.00	0.30	0.73	-0.11	0.14
	8								1.00	0.36	<b>0.09</b>	<b>0.25</b>
	9									1.00	-0.24	0.06
<b>FLR</b>										1.00	0.64	
<b>TC</b>											1.00	

## CONCLUSIONS

These preliminary results provided a precious clue regarding the dominant types of students’ intelligences and their relationship to passing the exams. Better results were obtained especially by the students who possess

intuitive skills and are able to make connections in order to solve different problems.

From a practical point of view, by taking into consideration the specific of the activities related to Forestry in general, and the distinctive practices involved by the two

disciplines, in particular, outdoor activities should be done. These will contribute to a better understanding by the students of the specific phenomena related with the two disciplines.

The usefulness of the written examination form in comparison with the oral one was demonstrated by the lowest mean value for section 7, which indicates the Verbal strengths. This means that the majority of the participants in this survey do not prefer to demonstrate or share their knowledge by using the verbal way. In conclusion, as it resulted from this study, in order to obtain a higher percentage of students who will pass the exams, both professors and students should be aware of their dominant intelligences types and use them in the teaching and learning activities. Also, these results should be interpreted with precaution because of their relatively low representativeness.

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