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The Relationship Between Infomorphology of Graduate Students of Educational Sciences and their Learning Style

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Abstract. The present study has aimed to review the relationship between infomorphology of graduate students of educational sciences in the Islamic Azad University of Shiraz and their learning style. This study is an applied research in terms of its objectives and it is a descriptive – correlational research in terms of the process of the study. The statistical population of this study consists of graduate students majoring in educational management and educational technology in the Islamic Azad University of Shiraz in the academic year of 2016-2017 (200 students). 132 students were selected as the sample size through Morgan's table using accessible and simple randomized sampling method. Library sources such as articles, required books and internet have been used in order to collect the information associated with the theoretical principles and literature of the research. The tools used in this research were two questionnaires: an infomorphology questionnaire and a researcher-made learning style questionnaire. Validity of the questionnaires was confirmed by the professors specializing in relevant fields of study. A 0.78 reliability was calculated for the questionnaires using Cronbach's alpha. To analyze the research data, the Pearson correlation coefficient was used. The findings of this study suggested that there is a positive and significant relationship between the infomorphology of graduate students and their learning style.

Keywords. Infomorphology, Graduate Students, Learning Style.

1. Introduction

We constantly see students who make efforts to learn and take advantage of their educational condition, which is similar to others', but they fail and can't succeed despite their efforts and are constantly facing failure. Intelligence, personality, previous learnings, motivation, learning methods and many other factors associated with the learner affect their learning and recognizing each of these factors alone and in relation with others broaden our knowledge of learning. Students usually use different methods for studying and learning their materials. To some extent, these methods are indicative of their own approaches to learning. Although it is expected of the university students to remember all of the information they are given, but no effort is made for teaching them different methods of studying and improving their methods and their learning. It is actually essential to identify students' learning strategies in various fields of study and to select proper methods and strategies so that the subjects of the study and the learning techniques of the students would match. In addition, in order to be academically successful and to have a good job in the future, students need to purposefully control their studying and learning process and to make their learning strategy compatible with the subject of their study and their field of study so that they could experience success and to be more motivated to study and to learn. Therefore, conducting a research similar to this one that reviews the relationship between using learning strategies, academic improvement and academic field of study can quite valuable and useful so that planners, managers, professors and students would be provided with strategies that would lead to more profitability. The present study has aimed to discover the relationship between the infomorphology of graduate students of Islamic Azad University of Shiraz and their learning style.

2. Hypotheses

There is a positive and significant relationship between the infomorphology of graduate students of educational sciences and discovery learning style.

There is a positive and significant relationship between the infomorphology of graduate students of educational sciences and visual learning style.

There is a positive and significant relationship between the infomorphology of graduate students of educational sciences and structured learning style.

There is a positive and significant relationship between the infomorphology of graduate students of educational sciences and meaningful learning style.

3. Method

In order to determine the size of the statistical sample of the study, the Krejcie – Morgan table (1970) was used. Moreover, the accessible sampling method was used to select 132 of the graduate students of Islamic Azad University of Shiraz majoring in educational management and educational technology and four different learning styles were studied, namely: discovery learning, visual learning, structured learning and meaningful learning. In the present study, two questionnaires have been used: learning style questionnaire and infomorphology questionnaire. This questionnaire was made with the help of Dipboye& Towler (2003) learning styles questionnaire with 30 items and four dimensions. Firstly, a questionnaire which was indicative of the morphology of students' brain information (including their inner power, external strength, attitude towards themselves and others, likes and dislikes) was written. Then, according to these components and with the help of the questionnaire made by NEO-PI-R (1997). In order to measure the validity of the content of the questionnaires, the views and perspectives of experts, university professors and experts were used. The Cronbach's alpha coefficient for the factors under study has been presented in the table 1 which shows that the questionnaire is desirably reliable.

Table 1. Cronbach's alpha coefficient for the factors under study

Variable		Cronbach's alpha coefficient	Total
Learning styles	Discovery learning style	0.79	0.78
	Visual learning style	0.77	
	Structured learning style	0.74	
	Meaningful learning style	0.79	
Infomorphology			0.78

4. Findings

In this section, at first mean, median, standard deviation, skewness and kurtosis of the variables under study have been calculated. The discovery learning style variable has the lowest mean among all of the learning style variables (3.68). The lowest median for this variable is 3.71. The mean of visual learning style variable is 4.20 which is the highest mean among the variables. The highest median is that of the visual learning style variable among learning style variables. It can be seen that discovery learning style, with the standard deviation of 0.61 has the lowest standard deviation or data dispersion from the mean compared to other dependent variables and the structured learning style variable, with the standard deviation of 0.72, has the highest standard deviation among the variables under study. All of the research variables are skewed to the left. According to the kurtosis calculated for the learning style variables, variables with positive kurtosis have long heavier tails and variables with negative kurtosis have lighter tails. The mean of the dependent variable is 3.98. The median of this variable is 4.13. Standard deviations of 0.56 and skewness of -2.15 indicate that the variable is left-skewed. Standard of deviation of 1.48 is indicative of long tails.The mean of the independent variable (infomorphology) is 3.48 and the median of this variable is 3.46. Standard deviations of 0.42 and skewness of -0.43 indicate that the variable is left-skewed. Standard of deviation of 1.39 is indicative of long tails.

Table 2. Descriptive information about the existing variables

Variable		Mean	Median	Standard deviation	Skewness	Kurtosis
Learning styles	Discovery learning style	3.68	3.71	0.61	-1.73	0.41
	Visual learning style	4.20	4.33	0.63	-1.28	1.04
	Structured learning style	4.16	4.33	0.72	-0.99	0.91
	Meaningful learning style	3.96	4.09	0.71	-1.18	1.00
Infomorphology		3.48	3.46	0.42	-0.43	1.39

The Kolmogorov-Smirnov test (KS) is a test that is used for reviewing the normality of variables. If the significance level of this test is higher than 0.05, the normality of the data would be accepted.

Table 3. Testing the normality

Variables		Kolmogorov-Smirnov	Sig	Status
Learning styles	Discovery learning style	1.120	0.162	It is normal
	Visual learning style	1.489	0.064	It is normal
	Structured learning style	1.862	0.092	It is normal
	Meaningful learning style	1.002	0.247	It is normal
Infomorphology			0.192	It is normal

Values of the Kolmogorov-Smirnov test and the sig value for the variables in the hypotheses under study have been displayed in the table above and as it can be observed, the sig for the variables under study is higher than 0.05 and therefore, the variables under study are normal. To review the primary hypothesis of the research, at first the presumptions of the multiples regression are reviewed and then, the meaningfulness of the regression model is examined and a proper and acceptable model is written based on the meaningful regression coefficients. The

presumptions of multiple regression are reviewed using independent variable (infomorphology) and dependent variable.

Table 4. Testing the normality of residuals

	Kolmogorov-Smirnov test	
	Value of the test statistic	Significance level
Standardized residuals	0.898	0.395

In order to review the independence of errors, the Durbin-Watson test has been used. To this end, in order for the residuals to not be correlated, the value of this test statistic must be between 1.5 and 2.5 and since this value is equal to 1.68 for the hypothesis above, thus the residuals are independent from one another.

Table 5. Durbin-Watson test

Model	Standard error of estimation	Durbin-Watson statistic
1	0.58	1.68

In order to examine the lack of correlation between the dependent variables, the VIF and Tolerance values have been used. As it can be seen in the table below, the values of these two indexes are all close to 1 and the closer they are to 1, the lesser the probability of collinearity will be. Therefore, by using the existing data, lack of co linearity between the dependent variables can be guaranteed.

Table 6. The VIF and Tolerance values

Variables	VIF	Tolerance
Discovery learning style	1.09	0.92
Visual learning style	1.08	0.89
Structured learning style	1.10	0.90
Meaningful learning style	1.02	0.95

In order to review the meaningfulness of the regression the ANOVA test has been used by considering the Fisher statistic.

Table 7. Multiple regression ANOVA

Multiple correlation coefficient	Determination coefficient	Adjusted determination coefficient	Estimated standard error
0.589	0.347	0.335	0.58

As it can be seen, the multiple correlation coefficient is 0.589 for the fitted regression which is indicative of an average correlation between the four dependent variables and the independent variable. The value of the adjusted determination coefficient (0.338) shows that 34% of the total variance of the infomorphology variable depends on the dependent variables.

Table 8. Analysis of variance (ANOVA)

Source of variations	Sum of squares	Degree of freedom	Mean squares	f-value	Sig
Regression	55.539	4	13.884	16.890	0.000
Residuals	104.504	127	0.822		
Total	160.043	131			

The table 8 shows the Fisher or F-value, significance level of this test and review of the meaningfulness of multiple regression and since the significance level of this test is lower than 0.05, the multiple linear regression model is proper.

Table 9. Standard and nonstandard coefficients for the independent variables

Model	unstandardized coefficients		Standardized coefficients	t-statistic	Sig
	Estimation of the coefficient	Standard error	Coefficient		
Constant value	5.520	0.331	-	16.673	0.0001
Discovery learning style	0.230	0.063	0.189	3.651	0.0001
Visual learning style	0.163	0.082	0.151	1.982	0.005
Structured learning style	0.148	0.036	0.208	4.066	0.0001
Meaningful learning style	0.634	0.072	0.426	8.858	0.0001

The table 9 shows the values of the regression coefficients of the dependent variables. Given the t-statistic and significance level of this test, it becomes clear that the significance level of the variables is lower than 0.05; therefore, they are in the regression model.

Table 10. Pearson correlation test between infomorphology and students' discovery learning style

Test statistics	Value
Correlation coefficient	0.299
Significance level	0.0001

According to the table 10, the Pearson correlation between two variables is 0.299 in the whole sample of the study and the significance level of the Pearson correlation test is 0.0001 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and discovery learning style of students. Moreover, since the value of this correlation coefficient is positive, thus this relationship is positive and significant.

Table 11. Pearson correlation test between infomorphology and students' visual learning style

Test statistics	Value
Correlation coefficient	0.163
Significance level	0.004

According to the table 11, the Pearson correlation between two variables is 0.163 in the whole sample of the study and the significance level of the Pearson correlation test is 0.004 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and visual learning style of students. Moreover, since the value of this correlation coefficient is positive, thus the relationship between infomorphology and visual learning style of students is positive and significant.

Table 12. Pearson correlation test between infomorphology and students' structured learning style

Test statistics	Value
Correlation coefficient	0.379
Significance level	0.0001

According to the table 12, the Pearson correlation between two variables is 0.379 in the whole sample of the study and the significance level of the Pearson correlation test is 0.0001 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and structured learning style of students. Moreover, since the value of this correlation coefficient is positive, thus this relationship is positive and significant.

Table 13. Pearson correlation test between infomorphology and students' meaningful learning style

Test statistics	Value
Correlation coefficient	0.459
Significance level	0.0001

According to the table 13, the Pearson correlation between two variables is 0.459 in the whole sample of the study and the significance level of the Pearson correlation test is 0.0001 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and meaningful learning style of students. Moreover, since the value of this correlation coefficient is positive, thus the relationship between infomorphology and meaningful learning style of students is positive and significant.

5. Discussion and Conclusion

The findings showed that there is a direct and significant relationship between the infomorphology of graduate students of educational sciences of Islamic Azad University of Shiraz and their learning style. The results obtained for the reviewed hypothesis comply with the results obtained by Karami (2008), Adams and Shah Nazari Daracheh (2014), Riasat et al. (2010), Seyfi et al. (2010), Mohammadzadeh (2005), Doman (2010), Gathercole et al. (2004), Alloway et al. (2009), Leung, Mok and Wong (2008). About this assumption, the statistical method Pearson correlation coefficient has been used. The discovery, visual, structured and meaningful learning styles are lower than 0.05 and the relationship between them and infomorphology is significant. the multiple regression model shows that the coefficient of the infomorphology variable is equal to 5.520 without being affected by the dependent variables. With a

variation of 1 in the standard deviation of discovery learning style changes, a variation equal to 0.230 is caused in the standard deviation of the infomorphology variable. Also, with a variation of 1 in the value of the standard deviation of visual learning style changes, a variation equal to 0.163 is caused in the standard deviation of the infomorphology variable. Furthermore, a variation of 1 in the value of the standard deviation of structured learning style changes, a variation equal to 0.148 is caused in the standard deviation of the infomorphology variable. Ultimately, a variation of 1 in the value of the standard deviation of meaningful learning style changes, a variation equal to 0.634 is caused in the standard deviation of the infomorphology variable. The variable that has been the most affected (positively) by the independent variable is the meaningful learning style variable with the standard coefficient of 0.426. Also, the variable that has been the least affected (positively) by the infomorphology variable is the visual learning style variable with the standard coefficient of 0.151 which means that a variation is observed in this learning style variable following a variation in the infomorphology variable. The weakest positive relationship is observed between the visual learning style and the infomorphology variable and the meaningful learning style has been the most affected (positively) by the infomorphology variable. The findings showed that there is a direct and significant relationship between the infomorphology of graduate students of educational sciences of Islamic Azad University of Shiraz and the discovery learning style. The results of reviewing this hypothesis are compatible with the results obtained by Riasat et al. (2010), Shokri et al. (2007), Kapadia (2013), Doman (2010), Chamorro – Premuzic (2007). The first step that should be taken by learners who adopt the discovery learning style is to create inquiries so that they could find answers by doing some research. In this style, there is no special dictated guideline or instruction for student activities and also, the intervention of the teacher in the conduction of research and the amount of guidance learners are provided with is at minimum and the learners are actually walking the scientific discoveries and research path. The Pearson correlation coefficient has been used for this hypothesis. The Pearson correlation between two variables is 0.299 in the whole sample of the study and the significance level of the Pearson correlation test is 0.0001

(lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and discovery learning style of students. Moreover, since the value of this correlation coefficient is positive, thus this relationship is positive and significant. The findings showed that there is a direct and significant relationship between infomorphology and visual learning style.

The results of reviewing this hypothesis are compatible with the results obtained by Karami (2008), Adamz and Shah Nazari Daracheh (2014), Karami Noori (2006), Duman (2010), Eric Jensen (2008) Chamorro – Premuzic (2007). The belief that human beings learn by observing others can be at least traced back to ancient Greece and the scholars of that time such as Plato and Aristotle. Learners use their vision and observe in order to learn. When the observer sees a behavior for which the person is praised or rewarded, he/she tries to learn that particular behavior. Bandura believes that from a socio-cognitive perspective, visual learning is trying to imitate a voluntary and cautious action that is taken through cognitive processing. The Pearson correlation between two variables is 0.163 in the whole sample of the study and the significance level of the Pearson correlation test is 0.004 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and visual learning style of students. Moreover, since the value of this correlation coefficient is positive, thus the relationship between infomorphology and visual learning style of graduate students of educational sciences of Islamic Azad University of Shiraz is positive and significant. The findings showed that there is a direct and significant relationship between infomorphology and structured learning style. The results of reviewing this hypothesis are compatible with the results obtained by Riasat et al. (2010), Seyfi et al. (2010), Doman (2010), Eric Jensen (2008) Chamoro – Premuzic(2007). This style is based on the assumption that in order to find meaning, one must look at the systematic features of a phenomenon. The learners build their knowledge for themselves and by themselves, sometimes individually and sometimes collectively. They classify not only the major elements but the relationships between them, or to put it more accurately, the rules and regulations governing them. The Pearson correlation between two variables is 0.379 in the whole sample of the

study and the significance level of the Pearson correlation test is 0.0001 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and structured learning style of students. Moreover, since the value of this correlation coefficient is positive, thus the relationship between the structured learning style and infomorphology of graduate students of educational sciences of Islamic Azad University of Shiraz is positive and significant. The findings showed that there is a direct and significant relationship between infomorphology and the meaningful learning style. The results of reviewing this hypothesis are compatible with the results obtained by Riasat et al. (2010), Shokri et al. (2009), Seyf (2006), Karami Noori (2006), Haj Hosseini and Akhavan Tafti (2007), Eric Jensen (2008), Leung, Mock and Wang (2008). One of the things that makes learning easier and more pleasant is "context". If there is a context, learning comes easy and the learnt materials won't be forgotten soon. In addition, "experience" or paying attention to "previous experiences" makes learning more pleasant, desirable and easier. Certainly, understanding something that is related to one's past experiences is way easier than understanding something that is not related to the previous information of the learner. The same point has forced the professors to create a connection between the new materials and past experiences of the learners to the extent possible. The Pearson correlation between two variables is 0.459 in the whole sample of the study and the significance level of the Pearson correlation test is 0.0001 (lower than 0.05); therefore, there is a significant relationship (significant correlation) between infomorphology and meaningful learning style of students. Moreover, since the value of this correlation coefficient is positive, thus the relationship between infomorphology and meaningful learning style of students is positive and significant.

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