

TESTING DUNN & DUNN'S AND HONEY & MUMFORD'S LEARNING STYLE THEORIES: THE CASE OF THE SLOVENIAN HIGHER EDUCATION SYSTEM

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The learning styles literature can be considered as going through a revival during the several past years. Although learning styles have been heavily researched, little is known about Slovenian students' learning styles, especially in the field of management education. The aim of the study is to explore the learning styles of students enrolled in the Economics of Education course at the FELU (University of Ljubljana, Faculty of Economics) The study method included both a descriptive and an exploratory perspective. A qualitative method was used to overview the literature background. Factor analysis, using the "Principle Axes Factoring" method, was used to extract learning styles. The adapted versions of Honey and Mumford's Learning Style Questionnaire and Dunn & Dunn's Learning Style Theory were used as research instruments in the questionnaire. The findings outline that for the educators in higher education, the challenge is to provide meta-cognitive support for students, enabling them to reflect not just on what they learn but also how and why.

1. INTRODUCTION

"One goal of management education is to help students organize experience in meaningful ways" (Kayes, 2007)

The aim of this study is to explore and validate the learning styles of students enrolled in the Economics of Education course during April 2008 at the University

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of Ljubljana, Faculty of Economics (FELU) - Department of Management and Organization. Another purpose is to better understand the different learning styles among management students in order to develop appropriate teaching strategies for improving management education at FELU. The concept of the learning style has a broad meaning. In this research, it is proposed and defined as an individual's preferential focus on different types of information, the different ways of perceiving the information, and the understanding of information (Li et al., 2008). Although learning styles have been heavily researched (Duff & Duffy, 2002; Lhori-Posey, 2003; Coffield et al., 2004; Reynold & Vince, 2007; Welsh et al., 2007; Hornyak et al., 2007; Herbert & Stenfors, 2007; Sievers, 2007; Hyde, 2007; Kayes, 2007; Garcia et al., 2007; Demirbas & Demirkan, 2007; Armstrong & Mahmud, 2008; Li et al., 2008), little is known about Slovenian students' learning styles, especially in the field of management education.

The purpose of this paper is to offer a better insight into the different learning styles among management students enrolled in the Economics of Education course in order to develop appropriate pedagogical strategies for improving management education at the FELU. The research intent of this study is also to develop a valid and reliable research questionnaire for further research processes and to set up research instruments as supportive mechanisms in management education and in the development curriculums and syllabuses of new courses.

According to Coffield et al. (2004), one of the most widely-known theories assessed is the learning styles model of Dunn and Dunn (1992, 1996). Honey and Mumford's theory has also been widely applied in the fields of management training and education (Duff & Duffy, 2002). Another research aim is to evaluate the implications of tested theories with factor analysis for pedagogy and pedagogical implications within a higher education institution in Slovenia. The research thesis of this study is that matching students' learning style preferences with the complementary course syllabus and instruction improved academic achievement and student attitudes toward learning. Based on the two selected learning theories - Honey and Mumford's (1992) Learning Style Questionnaire theory (LSQ) and Dunn & Dunn's (2003) VAK Learning Style theory, the research instrument in the form of a questionnaire that was developed intended to answer the research question indicating the development of a valid and reliable measurement instrument to determine students' learning styles preferences within a higher educational institution. The composition of this study method is both descriptive and exploratory. In the first part of the study, the qualitative research method was used to overview the literature background of the study. In the empirical part of the study, the factor analysis, using the Principle Axes Factoring method – PAF, was used to extract learning styles.

The Faculty of Economics, University of Ljubljana has a long tradition in research and education as it was founded in 1946. Today, it is the largest faculty of the University of Ljubljana with almost 10,000 full-time and part-time undergraduate and graduate students. Development and modernisation of teaching and research work have been priorities at the FELU from its very beginning. In autumn 2005, the study programme was changed from 4+1 study programmes into 3+2 programmes in line with the Bologna Declaration and the prevailing pattern of business studies in Europe. In line with school reorganisation and modernisation, the FELU was awarded EQUIS accreditation in 2006 which is the leading international system of quality assessment, improvement, and accreditation of higher education institutions in management and business administration. This study has four main parts. First, it outlines the literature review, summarizing learning styles taxonomy. Then it covers research framework and methodology, including data collection, sample characteristics, variables description and data analysis and tests the learning styles theories using factor analysis. Finally, it discusses the results by recognizing some limitations and by providing pedagogical implications and further research.

2. LITERATURE REVIEW

2.1. Taxonomy of recent research on learning styles

The chronological taxonomy (Table 1) outlines the most influential research studies and research construct within learning style categorization from 2000 until the present, 2008. Upon reviewing the literature on learning styles, the intense rate and growing interest is recognized (Coffield et al. 2004). The learning styles literature has had a revival during the past years, especially in the first decade of the 21st century (Alban & Metcalfe 2002; Duff & Duffy, 2002; Dunn & Griggs, 2003; Loo, 2004). Since 2007 and 2008, there has been an increasing interest in the potential of experiential learning (Reynolds & Vince, 2007; Argyris, 2007; Welsh et al., 2007; Hornyak et al., 2007; Herbert & Stenfors, 2007; Sievers, 2007; Hyde, 2007; Kayes, 2007 and Armstrong & Mahmud, 2008). The concept of learning styles is embedded in different academic literature and researched from different approaches, including intelligent learning systems (Laureano-Cruces et al., 2006), a genetic algorithm approach to students' learning styles (Yannibelli et al., 2006), a web-based education perspective on learning styles (Garcia et al., 2007), learning about and through aesthetic experience (Welsh et al., 2007), use of business case studies in the learning process (Duff et al., 2008), problem-solving strategies within learning styles (Metallidou & Platsidou, 2008), preferred learning styles (Peters et al., 2008) and an adaptive learning system perspective of learning styles (Tseng et al., 2008).

Table 1. Chronological taxonomy of recent research on learning styles

Chronological taxonomy of recent research into learning styles			
2000-2004	2005-2006	2007	2008
Alban & Metcalfe (2002) - disorder type behavior among undergraduates	Cuthbert - student learning process: learning styles or learning approaches; learning situation; teaching in higher education	Argyris - double loop learning in a classroom setting Champoux - experiential learning in the on-line environment	Armstrong & Mahmud - experiential learning and the acquisition of managerial tacit knowledge; Kolb's learning style inventory
Dart et al (2000) - students' conceptions of learning	Laureano-Cruces, Ramirez-Rodriguez, de Arriaga & Escarela-Perez - intelligent learning systems (ILSs)	Demirbas & Demirkan - learning styles and academic performance - using Kolb's experiential learning theory (ELT)	Alkhasawneh, Mrayyan, Docherty, Alashram & Yousef - problem-based learning (PBL): assessing students' learning preferences
Duff & Duffy (2002) - Kolb's learning style questionnaire, academic performance; Honey & Mumford's learning style questionnaire	Yannibelli, Godoy & Amandi - a genetic algorithm approach to recognize students' learning styles; computer-based educational systems	Garcia, Amandi, Schiaffino & Campo - detecting students' learning style; web-based education	Dimovski, Škerlavaj, Kimman & Hernaus - organizational learning processes, Slovenia, Croatia, Malaysia
Dunn & Griggs (2003) - Synthesis of the Dunn and Dunn learning style model research		Hornyak, Green & Heppard - implementing experiential learning	Duff, Dobie & Guo - the use of case studies and learning styles in accounting education in New Zealand; use of business case studies
Kayes (2002) - experiential learning theory and its critics: the role of experience in management learning and education		Herbert & Stenfors - management education and experiential learning methods	Graf, Lin & Kinshuk - relationship between learning styles and cognitive traits; Felder-Silverman model
Lhori-Posey (2003) - determining learning style preferences of students		Kayes - power and experience in management education - conversational learning	Li, Chen & Tsai - learning styles in Taiwan (higher education); using Myers-Briggs Type Indicator
Loo (2004) - Kolb's learning style and learning preferences		Reynolds & Vince - experiential learning and management education	Metallidou & Platsidou - the psychometric properties of Kolb's LSI-1985 in a Greek sample
		Škerlavaj & Dimovski - network perspective of intra-organizational learning	Peters, Jones & Peters - preferred learning styles and their relationship with grades for students undertaking
		Škerlavaj, Indihar-Štemberger, Škrinjar, & Dimovski - organizational learning culture in Slovenian companies	Tseng, Chu, Hwang, & Tsai - adaptive learning system - computer-assisted learning

Source: Authors; adapted from the research papers and publications indicated in the figure, 2008.

Accordingly, to the growing interests of learning styles theories in management education (Li et al., 2007; Lhori-Posey, 2003; Cuthbert, 2005; Garcia et al., 2007; Demirbas & Demirkan, 2007), the concept of organizational learning is emerging among business entities and learning companies (Škerlavaj et al., 2007; Škerlavaj & Dimovski, 2007; Dimovski et al., 2008). According to Škerlavaj & Dimovski (2007), organizational learning has emerged as one of the most researched phenomena in organizational sciences.

2.2. Dunn & Dunn's learning style theory

For more than 35 years, the Dunns, Rita and Kenneth, have developed an extensive research programme designed to improve the instruments that derive from their model of learning style preferences. Dunn and Dunn's VAK learning style model uses the three main sensory receivers: Visual, Auditory, and Kinesthetic to determine the dominant learning style (Figure 3). The model is also known as VAKT (Visual, Auditory, Kinesthetic, & Tactile; Coffield et al., 2004). According to the theory, one or two of these receiving styles is normally dominant. This dominant style defines the best way for a person to learn new information by filtering what is to be learned. This style may not always be the same for some tasks. The learner may prefer one style of learning for one task, and a combination of others for a different task. An important principle in Dunn and Dunn's model is the idea that students' achievements are heavily influenced by relatively fixed characteristics (Dunn, 2003; Dunn & Griggs, 2003). The recent overview of the model (Coffield et al., 2004) contains the claim that 'the learning styles of students changed substantially as they matured from adolescence into adulthood'.

Based on the two selected learning theories - Honey and Mumford's (1992) Learning Style Questionnaire (LSQ) and Dunn & Dunn's (2003) VAK Learning Style Theory, a research instrument was developed helping answer the research question indicating the development of a valid and reliable measurement instrument to match and determine students' learning styles preferences within a higher educational institution. In this study, two learning style theories were applied and explored in the questionnaire. The objective of the research was to test whether students from Ljubljana's Faculty of Economics follow theoretical assumptions of presented learning styles theories as they are conceptualized in Tables 2 and 3.

Table 2. Dunn & Dunn's learning style theory (VAK)

Perception	Description/Characteristics of Dunn & Dunn's learning style theory	
V: Visual - Seeing	<ul style="list-style-type: none"> • Mind sometimes strays during verbal activities • Observes, rather than talks or acts; may be quiet by nature • Organized in approach to tasks • Likes to read • Usually a good speller • Memorizes by creating mental images • Thinks in pictures • Easily put off by visual distractions • May focus on the 'big picture' and use advanced planning 	<ul style="list-style-type: none"> • Finds verbal instructions difficult • Remembers faces • Strong on first impressions • Likes drawing and doodling, may have good handwriting • Enjoys using color • Notices details • Often a quick thinker
A: Auditory - Hearing	<ul style="list-style-type: none"> • Talks to self aloud • Outgoing by nature • Whispers to self while reading, may hum or sing while working • Likes to be read to • May be particular about the exact choice of words • Memorizes by steps in a sequence • Very aware of rhythm • Easily distracted by noises • May have difficulty with written instructions 	<ul style="list-style-type: none"> • Remembers names • May assess people by the sound of their voice • Enjoys music and the sounds of words • Enjoys talking and listening • Can remember – and often mimic – speech by picking up rhythm of the sentence • May need time to think (i.e. discuss it with myself) • May assess a situation on 'how it sounds' to them
K: Kinaesthetic - Doing	<ul style="list-style-type: none"> • In motion most of the time/fidgety • Outgoing by nature; expresses emotions by physical means • Taps pencil or foot/fiddles with objects while studying • Reading is not a priority • May find spelling difficult • Likes to solve problems by physically working through them • Very good body control, good timing and reflexes • Is affected by touch or lack of it • May need time to think (i.e. process the actions involved) • Will try new things – likes to get involved 	<ul style="list-style-type: none"> • Likes physical rewards • Remembers what they have done rather than seen/heard • May assess people and situations by what 'feels right' • Enjoys handling objects • Enjoys doing activities • Likes to use gestures and touch people while talking to them

Source: Authors; Adapted from Coffield et al., 2004; Dunn & Griggs, 2003; Dunn, 2001; Dunn, 2003.

2.3. Honey and Mumford's learning style questionnaire (LSQ) theory

Honey and Mumford spent four years experimenting with different approaches to assessing individual differences in learning preferences before producing the Learning Styles Questionnaire in 1982 (see Table 3).

Table 3. Honey and Mumford's learning style questionnaire (LSQ)

Learning style	Description of Honey and Mumford's learning style theory	Characteristics
Reflectors	Reflectors like to stand back to ponder experiences and observe them from many different perspectives. They collect data, both first hand and from others, and prefer to think about it thoroughly before coming to any conclusion. The thorough collection and analysis of data about experiences and events is what counts so they tend to postpone reaching definitive conclusions for as long as possible. Their philosophy is to be cautious. They are thoughtful people who like to consider all possible angles and implications before making a move.	<ul style="list-style-type: none"> • Careful • Good listener • Holds back from participation • Methodical • Does not jump to conclusions • Slow to decide • Thorough and thoughtful
Theorists	Theorists adapt and integrate observations into complex but logically sound theories. They think problems through in a vertical, step-by-step logical way. They assimilate disparate facts into coherent theories. They tend to be perfectionists who won't rest easy until things are tidy and fit into a rational scheme. They like to analyze and synthesize. They are keen on basic assumptions, principles, theories models and systems thinking. Their philosophy poses rationality and logic. "If it's logical, it's good". Questions they frequently ask are: "Does it make sense?" "How does this fit with that?" "What are the basic assumptions?" They tend to be analytical.	<ul style="list-style-type: none"> • Disciplined • Intolerant of subjective, intuitive ideas • Logical • Low tolerance of uncertainty, ambiguity • Objective • Parental in approach • Rational
Activists	Activists involve themselves fully and without bias in new experiences. They are open-minded, not skeptical, and this tends to make them enthusiastic about anything new. Their philosophy is "I'll try anything once". They tend to act first and consider the consequences afterwards. Their days are filled with activity. They tackle problems by brainstorming. As soon as the excitement from one activity has died down, they are busy looking for the next. They tend to thrive on the challenge of new experiences but are bored with implementation and longer term consolidation.	<ul style="list-style-type: none"> • Flexible • Gets bored with consolidation • Happy to give things a try • Open-minded • Optimistic about change • Rushes into action without preparation • Takes immediate obvious action • Takes unnecessary risks
Pragmatists	Pragmatists are keen on trying out ideas, theories and techniques to see if they work in practice. They positively search out new ideas and take the first opportunity to experiment with applications. They are the sort of people who return from management courses brimming with new ideas that they want to try out in practice. They like to get on with things and act quickly and confidently on ideas that attract them. They are essentially practical, down-to-earth people who like making practical decisions and solving problems.	<ul style="list-style-type: none"> • Business-like – gets to the point • Does not like theory • Impatient with waffle • Keen to test things out in practice • Practical, down to earth, realistic • Rejects ideas without clear application • Task and technique focused

Source: Authors. Adapted from Honey & Mumford, 1992; Coffield et al., 2004.

Honey and Mumford's (1992) LSQ model was developed to report management trainees' learning style preferences and has subsequently been applied to a wide range of subjects, including students in higher education (Duff & Duffy, 2002). Honey and Mumford's learning style questionnaire, known as Learning Style Questionnaire (LSQ) Theory has been widely used as an instrument of detecting students' learning style in higher education (Duff & Duffy, 2002; Coffield et al., 2004) and management practices (Allinson & Hayes, 1990).

Honey and Mumford's Learning Style Questionnaire (LSQ) has been proposed as an alternative for Kolb's Experiential Learning Style Model (ELM) and a later refined version (LSI-1985) (Duff & Duffy, 2002). The LSQ is designed to probe the relative strengths of four different learning styles (Honey & Mumford, 1992): Activist, Reflector, Theorist and Pragmatist. The authors' intention is that learners should become proficient in all four stages of the learning cycle. The authors are keen to emphasize that 'no single style has an overwhelming advantage over any other. Each has strengths and weaknesses, but the strengths may be especially important in one situation, but not in another'. These four styles correspond approximately to those suggested by Kolb's (1999) Experiential Learning Model (ELM): active experimentation (Activist), reflective observation (Reflector), abstract conceptualization (Theorist), and concrete experience (Pragmatist).

3. RESEARCH METHODOLOGY

In this research, data were analyzed using the Statistical Package for the Social Sciences (SPSS 16.0). An alpha level of 0.05 was used as a margin of statistical significance (Coakes & Steed, 2003). The factor analysis using the Principle Axes Factoring method - PAF was used to extract learning approaches (Miller et al., 2002; Coakes & Steed, 2003). The essential purpose of factor analysis is to describe the variation among many variables in terms of a few underlying, but unobservable, random variables called factors. The underlying assumption of factor analysis is that there exists a number of unobserved latent variables (or "factors") that account for the correlations among observed variables, such that if the latent variables are partialled out or held constant, the partial correlations among observed variables all become zero. In other words, the latent factors determine the values of the observed variables. One of the most frequently used techniques for factor extraction is the Principal Factor Method, where factors are extracted in such a way that each factor accounts for the maximum possible amount of the variance contained in the set of variables being factored (Miller et al., 2002).

3.1. Data collection and sample characteristics

The interviewed students attend the second and third year study ending with a Bachelor's Degree. Data were collected in April 2008 at the Faculty of Economics, University of Ljubljana during the course Economics of Education. The study sample included 63 students in a three-year undergraduate program at the Faculty of Economics, University of Ljubljana. The instrument was administered to all course participants at the end of the Economics of Education course on April 2nd, 2008. Students were anonymously interviewed using paper questionnaires. The convenience sampling was used for this purpose; as this being the first such research in the national higher educational system, this was to a certain level an exploratory research, setting a base for further research in this field. The questionnaire consisted of 27 questions/variables, of which two were socio-demographic variables (gender and year of study) and the remaining 25 variables described interviewees' learning attitudes. The two most influential theories on the learning style that were integrated into this research are (1) Dunn & Dunn's (2003) learning style theory, which defines the classification according to the use of distinct senses when learning, and (2) Honey and Mumford's (1992) learning style questionnaire (LSQ) theory. According to these two theories, two groups of variables were used that are supposed to measure the learning styles used among the interviewed students. All variables measuring learning styles were measured using the following ordinal scale (see Appendix 1): (1) disagree strongly; (2) disagree; (3) neutral; (4) agree; (5) agree strongly.

3.2. Data analysis – factor analysis

The applicability of factor analysis was tested using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO measure) and Bartlett's Test of Sphericity. Both tests confirmed the applicability of factor analysis¹ for both groups of variables (see Table 4). The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. Another indicator of the strength of the relationship among variables is Bartlett's test of sphericity. Bartlett's test of sphericity is used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. The observed significance level is .0000. It is small enough to reject the hypothesis. It is concluded that the strength of the relationship among variables is strong. In both factor analyses, the varimax rotation was performed. This is the most common rotation option (Coakes & Steed, 2003).

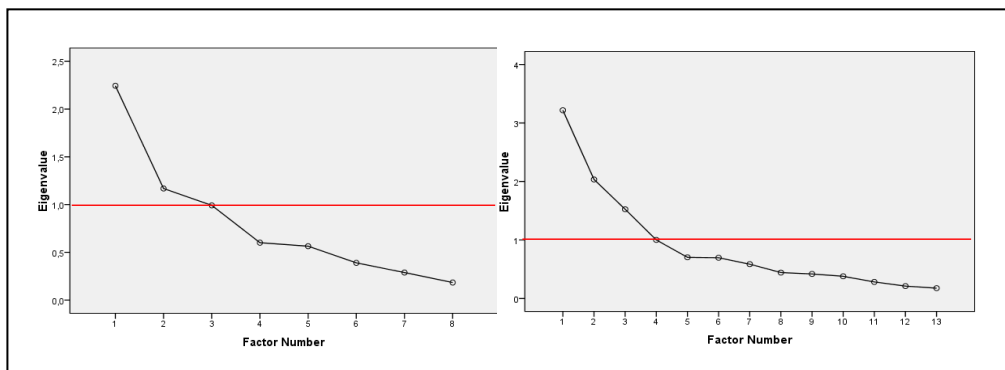
¹ The applicability criteria were the KMO measure being > 0.6 and χ^2 test statistically significant (Miller et al., 2002).

Table 4. KMO and Bartlett's Test

Measure of factor analysis applicability		Group 1: Dunn & Dunn's learning style theory	Group 2: Honey and Mumford's learning style theory
Kaiser-Meyer-Olkin measure of sampling adequacy		0.618	0.675
Bartlett's test of sphericity (χ^2 test)	Approx. Chi-Square	91,332	259,572
	df	28,000	78,000
	Sig.	0.000	0.000

4. ANALYSES AND FINDINGS

The scree plots (Figure 1a and Figure 1b) shown below for both analyses confirm, using the eigenvalues-greater-than-one rule, the extraction of three factors for the first analysis of Dunn & Dunn's learning style theory and four factors for the second analysis of Honey and Mumford's learning style theory. The factors extracted from the first group of variables were labelled as visual (best explaining two variables Vp1, Vp6), auditory (best explaining two variables Vp2, Vp7) and kinaesthetic (best explaining four variables Vp8, Vp9, Vp3 and Vp10), confirming Dunn & Dunn's learning style theory (VAK).



Figures 1a(b): Scree plot for the first factor analysis - Dunn & Dunn's theory (left);
Scree plot for the second factor analysis - Honey and Mumford's theory (right)

The factors extracted from the second group of variables were labeled reflectors (best explaining three variables Vs3, Vs6, Vs11), theorists (best explaining three variables Vs10, Vs4, Vs1), activists (best explaining two variables

Vs5, Vs9), and pragmatists (best explaining five variables Vs7, Vs12, Vs13, Vs14, Vs15), confirming the applicability of Honey and Mumford’s learning style questionnaire theory (LSQ). The factor numeric definition of individual variables is indicated in tables (Figures 2 and 3). In both factor analyses, individual factors have significant loadings (greater than ± 0.30) on all variables². Variables defined by individual factors are indicated with red frames for both factor analyses.

	Raw Factor			Rescaled Factor		
	1	2	3	Kinaesthetic	Visual	Auditory
Vp1	-.053	.690	.000	-.069	.906	.000
Vp6	.031	.401	.065	.033	.426	.069
Vp2	-.072	.132	.570	-.100	.183	.790
Vp7	.169	-.032	.559	.180	-.034	.597
Vp8	.283	-.064	.077	.532	-.119	.144
Vp9	.655	.211	.091	.649	.209	.090
Vp3	.827	.048	-.030	.760	.044	-.028
Vp10	.692	-.094	-.030	.664	-.090	-.029

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 4 iterations.

Figure 2. Factor loadings before and after rotation - Dunn & Dunn’s learning style theory

	Raw Factor				Rescaled Factor			
	1	2	3	4	Pragmatist	Reflector	Activist	Theorist
Vs3	-.227	.766	.053	-.078	-.229	.773	.053	-.079
Vs6	.060	.621	-.193	.073	.063	.645	-.200	.076
Vs11	.126	.694	.135	.110	.133	.732	.143	.116
Vs10	.072	.162	.242	.510	.077	.174	.260	.548
Vs4	.299	.029	.087	.737	.274	.027	.080	.677
Vs1	.258	-.145	.271	.306	.329	-.185	.346	.390
Vs5	.069	-.067	.816	.272	.068	-.066	.805	.268
Vs9	.031	.117	.673	.029	.029	.110	.632	.027
Vs7	.296	-.120	.415	.200	.307	-.124	.430	.208
Vs12	.572	-.180	.102	.011	.635	-.200	.113	.012
Vs13	.545	-.054	.336	.185	.640	-.063	.394	.217
Vs15	.611	.069	.020	.218	.686	.077	.022	.245
Vs14	.542	.195	-.012	.131	.618	.223	-.014	.149

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

Figure 7: Factor loadings before and after rotation - Honey and Mumford’s learning style theory (LSQ)

² This rule of thumb is cited in Schneider (2003). Accordingly, variables that have absolute loadings of at least 0.32 were considered significant, extracted and interpreted under three main principal components. He indicated that factor loadings greater than 0.30 or less than -0.30 are considered significant, loadings greater than 0.40 or less than -0.40 are considered more important and loadings greater than 0.50 or less than -0.50 are considered very significant.

In order to assess the reliability of compound scales (the extracted factors) measuring applied learning styles concepts, the Cronbach Alpha Coefficient was calculated for the sample as a whole and for both factor analyses (see Figure 8).

Figure 8: Reliability (Cronbach Alpha Coefficient)

Factor analysis	Factors	Cronbach Alpha
Dunn & Dunn's learning style theory	Kinaesthetic	0.729
	Visual	0.545
	Auditory	0.603
Honey and Mumford's learning style theory	Pragmatist	0.744
	Reflector	0.743
	Activist	0.688
	Theorist	0.630

Cronbach's Alpha measures how well a set of items (or variables) measures a single unidimensional latent construct. Cronbach's Alpha is not a statistical test, rather it is a coefficient of reliability (or consistency), the reliability coefficient α of 0.7 or higher is considered "acceptable" in most social science research situations (Coakes & Steed, 2003). As indicated, the results of both factor analyses are close to satisfactory: Factors extracted from the first factor analysis have Cronbach Alpha values from 0.603 to 0.729. Factors for the second factor analysis have Cronbach Alpha values from 0.630 to 0.744. These results indicate that the extracted factors appropriately characterize the dimensionality of the data.

5. DISCUSSION OF RESULTS

5.1. Discussion

The aim of this study is to compare and explore two widely used learning styles theories in the higher education system at the University of Ljubljana, Faculty of Economics in Slovenia. By analyzing the second and third year Faculty of Economics students' learning approaches, typical patterns have been discovered. The research confirmed the results through qualitative meta-analysis and quantitative factor analysis. Analyses resulted in a clear extraction of three theoretically expected learning styles dimensions according to Dunn and Dunn's learning style theory (factors - visual, auditory and kinaesthetic) in the first factor analysis which confirmed the logic/applicability of Dunn and Dunn's learning style

theory. Furthermore, the study resulted in a clear extraction of four theoretically expected learning styles dimensions (factors - reflectors, theorists, activists, pragmatists) in the second factor analysis which confirmed the logic/applicability of Honey and Mumford's learning style theory. The analysis of the correlation between extracted factors of both learning styles theories indicates that both theories are independent of each other.

The supplementary objective of the study, to develop a valid and reliable research questionnaire for further research, has been reached only partially. The questionnaire was developed to get the first of the learning styles in the national higher education system and was significantly influenced by (1) the small sample size and (2) its focus on probing the validity of two chosen learning style theories.

Recent thinking in this area suggests that unlike cognitive personality styles, learning styles can be modified to a degree through learning and training strategies. Instead of matching training to the styles of the learners, it could be more rewarding to expose learners to a mismatched learning environment in order to help them develop a wider repertoire of coping behaviours and learning strategies. Those that can learn to use a variety of problem-solving and learning strategies, and apply them in situations that do not match with their natural learning style, may be more able to perform effectively across a wider range of situations than those who have limited stylistic versatility (Hayes & Allinson, 1996).

According to the research thesis of this study, we can summarize that matching students' learning-style preferences with the complementary course syllabus and instruction improved academic achievement and student attitudes toward learning. The mission of management education is to create and disseminate knowledge to enable students' successful entry into the business world and offer a rewarding investment opportunity to the business community. Lecturers in higher education need an awareness of the learning style preferences of students in order to develop and utilize effective and efficient teaching and pedagogical strategies and methods. A significant number of researchers (Honey & Mumford, 1992; Armstrong & Mahmud, 2008) have argued that learning styles are not determined by inherited characteristics, but are developed through experience. Styles are therefore not necessarily fixed, but can change over time, even from one situation to the next. The implications regarding the learning strategies implementation in management education suggest that students who are aware of a range of learning strategies are more likely to select the correct one for a particular task. The approach of the flexible learning style strategy is best suited to the case-study method of teaching. For the educators in a higher education institution, the challenge is to provide meta-

cognitive support for students, enabling them to reflect not just on what they learn but also how and why.

The mission of management education is to create and disseminate knowledge to enable students' successful entry into the business world and offer a rewarding investment opportunity to the business community. The development of these new skills and knowledge requires a variety of teaching methods and learning strategies in order to match students' learning style preferences. Therefore, management teachers/lectures need an awareness of the learning style preferences of students in order to develop and utilize effective and efficient teaching and pedagogical strategies and methods. Recognizing students' learning styles allows educators to effectively lecture to a diverse population of students with different learning style preferences. Being an effective teacher implies matching individual learning style preferences among students with a collective course syllabus in teaching strategies.

5.2. Limitations

The research, here, is subject to a few limitations. (1) It is based on one educational program at one university, and it should be generalized by having data from several institutions. Data should be collected from multiple institutions with a larger sample size. (2) In addition, the sample is based on only second and third year students and it should cover all four years of study in order to have a general view of education. (3) The most prominent deficiency of the research is that it does not recognize the dimension of time. Namely, the concept of this research is inherently static. Therefore, further analysis should focus on determining those developments - styles are not necessarily fixed, but can change over time. As well, from the methodological perspective of the research process, regarding the employment of the construct reliability, the average variance extracted and composite reliability index should be engaged too.

6. CONCLUSIONS AND IMPLICATIONS

Although learning styles have been heavily researched, little is known about Slovenian students' learning styles, especially in the field of management education.

The aim of this study was to present and explore the learning styles of students enrolled in the Economics of Education course during April 2008 at the University of Ljubljana, Faculty of Economics. Additionally, the intention of this research was to develop a valid and reliable research questionnaire for further research processes and to set up research instruments as supportive mechanisms in management education and in the development curriculums and syllabuses of new courses. The

adapted version of Honey and Mumford's (1992) Learning Style Questionnaire (LSQ) and Dunn & Dunn's (2003) VAK Learning Style Theory (Coffield et al., 2004) were used as an instrument in the questionnaire to determine Slovenian students' learning style. Researchers have pointed out that students learn effectively in a harmonic environment and by using teaching aids which match the students' learning style preferences (Li et al., 2008).

The concept of the learning style has a broad meaning. In this research, it is proposed and defined as an individual's preferential focus on different types of information, the different ways of perceiving the information, and understanding the information (Li et al., 2008). The learning styles literature has had a revival during the past years, especially in the first decade of the 21st century (Alban & Metcalfe 2002; Duff & Duffy, 2002; Dunn & Griggs, 2003; Loo, 2004). Upon reviewing the literature on learning styles, the intense rate and growing interest is involved.

The research generated the results through qualitative meta-analysis and quantitative factor analysis. By analyzing the second and third year Faculty of Economics students' learning approaches, typical patterns have been confirmed: analyses resulted in a clear extraction of three theoretically expected learning styles dimensions according to Dunn and Dunn's learning style theory (factors - visual, auditory and kinaesthetic) in the first factor analysis which confirmed the logic/applicability of Dunn and Dunn's learning styles theory. Analyses resulted in four theoretically expected learning styles dimensions (factors - reflectors, theorists, activists, pragmatists) in the second factor analysis which confirmed the applicability of Honey and Mumford's learning style theory.

The implications for pedagogy indicate that instead of fixed learning styles strategies, adapting content to the learner, management educators should rather implement flexible learning strategies. The implications regarding the learning strategies implementation in management education suggests that students who are aware of a range of learning strategies are more likely to select the correct one for a particular task. The mission of management education is to create and disseminate knowledge to enable students' successful entry into the business world and to offer a rewarding investment opportunity to the business community. The ultimate goal for the educators in a higher education institution is to provide meta-cognitive support for students, enabling them to reflect not just on what they learn but also how and why, thereby helping them to 'learn how to learn'. Further studies are expected to follow this objective and the appropriate research instrument would be developed for this purpose. This introductory research could be an appropriate starting point. Also, future studies should be extended to the whole Bolonian program at the faculty. This would provide some crucial feedback evidence for the faculty

regarding the fulfillment of the higher education process mission which is to create and disseminate knowledge to enable students' successful entry into the business world.

According to the results, we can argue that awareness of learning styles may help students to adapt better to different situations. The implications regarding the learning strategies implementation in management education suggest that students who are aware of a range of learning strategies are more likely to select the correct strategy for a particular task. The logic of lifelong learning suggests that students will become more motivated to learn by knowing more about their own strengths and weaknesses as learners. Consequently, if teachers can respond to individuals' learning style preferences, then the achievement rate is likely to rise and "learning to learn" skills of students may provide the foundation for the lifelong learning concept.

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TESTIRANJE DUNNOVE & DUNNOVE TE HONEYEVE & MUMFORDOVE TEORIJE O STILOVIMA UČENJA: SLUČAJ SLOVENSKEG SUSTAVA VISOKOG OBRAZOVANJA

Sažetak

Literatura iz područja stilova učenja u posljednjih nekoliko godina sve je brojnija. Iako su se stilovi učenja do sada intenzivno proučavali, malo se zna o stilovima učenja slovenskih studenata, posebno u obrazovanju iz područja menadžmenta. Cilj ovog rada je utvrditi stilove učenja studenata upisanih na predmet Ekonomika obrazovanja na Ekonomskom fakultetu u Ljubljani. Metodologija istraživanja temeljila se na deskriptivnim i eksploratornim perspektivama. Prilikom izrade pregleda literature korišten je kvalitativni pristup. Za utvrđivanje stilova učenja korištena je faktorska analiza, temeljena na pristupu *Principle Axes Factoring*, dok su za prikupljanje podataka korišteni anketni upitnici izrađeni prilagodbom Honeyovog i Mumfordovog anketnog upitnika o stilu učenja, te Dunnove i Dunnove teorije stila učenja. Rezultati istraživanja pokazuje da bi nastavnici u visokom obrazovanju trebali pružiti meta-kognitivnu podršku studentima, omogućujući im promišljanje ne samo o tome što uče, već i kako i zašto uče.

APPENDIX I. GROUP OF VARIABLES

Group of variables measuring Dunn & Dunn's learning style theory	
Variables	Description of Variables
Vp1	I prefer written instructions given by the lecturer.
Vp2	I prefer spoken instructions given by the lecturer.
Vp3	Asking questions and discussing are the most effective way to learn the topic.
Vp4*	Reading instructions can best help me learn the topic.
Vp5*	I prefer using electronic media (Internet, e-mail, etc.).
Vp6	I can easily find the solution when given the spoken instructions.
Vp7	Topics are best explained when presented on paper/transparency/blackboard.
Vp8	Practical examples are the most effective learning tool.
Vp9	I learn most when doing practical simulation of presented topics.
Vp10	I learn more easily when the lecturer has practical experiences.
Group of variables measuring Honey and Mumford's learning style theory	
Variables	Description of Variables
Vs1	My way of thinking is very flexible; I am open-minded and always ready to experiment.
Vs2*	<i>I usually observe the problem from many different perspectives.</i>
Vs3	I work and study thoroughly and thoughtfully.
Vs4	I learn using basic assumptions, principles, theories models and systems thinking.
Vs5	I like involving myself with others and being where the centre of activities is.
Vs6	The thorough collection and analysis of data about experiences and events is what counts when reaching definitive conclusions.
Vs7	I like to work in groups so I can bounce ideas around and try out as many ideas as possible.
Vs8*	<i>I am bored with implementation and longer term consolidation.</i>
Vs9	I seek to centre all activities around myself.
Vs10	I like to analyse and synthesise, I like to adapt and integrate observations into theories and frameworks.
Vs11	The precondition for reaching a conclusion is the meticulous collection of data and its analysis.
Vs12	I like to immerse myself in as many experiences and activities as possible.
Vs13	I am practical, down to earth, realistic.
Vs14	I am a practical, down-to-earth person who likes making practical decisions and solving problems.
Vs15	I like to get on with things and act quickly and confidently on ideas that attract me.

Source: Authors. *Variables that are in italic style were excluded from further analysis because of inconsistency with other variables measuring a similar learning approach.