The Examination of the Learning Variables of Students at Secondary Vocational Schools

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ABSTRACT

In the present paper an attempt is made to explore the learning characteristics of vocational school students in Budapest (Hungary), applying a former version of Kolb's Learning Style Inventory. First the theoretical backgrounds of the research, then the circumstances of the examination are formulated. Our four-year longitudinal examinations were performed between 2007 and 2011 in which about 5000 students took part. In our representative examination Kolb's Learning Style Inventory was used, specially adapted for students at secondary vocational schools in Hungary. An online version of the inventory was prepared. Instead of making a hypothesis test often applied in pedagogical research, questions were constructed because research focusing only on the verification or dismissal of hypotheses would have limited the recognition of deeper and more complex connections. The most important question to be answered by the present research is whether learning variable may be interpreted as an attitude of characteristically individual cognitive strategy, which, as a part of the personality, mostly expresses a relation to the acquisition and application of information that is learning in one word. Differences among students with respect to concrete information acquisition deepen in higher years. With respect to the other learning variables change is minimal or seems attitudinal.

Keywords: Adaptive model of learning, Learning style, Self-regulated learning

INTRODUCTION

As shown by the findings of PISA examinations (OECD, 2011), the success of public education in Hungary lags far behind its possibilities. Education is less able to balance the advantages and disadvantages arising from the family background, because the compensational possibility of the educational system is somewhat weak and rather selective, as, unfortunately, reflected by students' achievements, too. The individual success of students is determined mostly by the social status of the family, the frequency and quality of feedback on learning achievement, the relationship between teaching and learning strategies as well as the standards of self-regulated learning and motivation. These differences in achievement are already reflected by secondary school enrolment with students graded excellent continuing their studies at grammar schools mainly (the best ones at 8-year „elite grammar schools"), those graded good and fair at vocational schools, whereas those with a poor achievement and often of a disadvantage, suffering from difficulties in learning, behavior and integration, almost exclusively at trade schools. This fact foreshadows the possibility of differences in achievement at the primary school being deepened by

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secondary education. After that, it is not at all surprising that almost 50% of vocational school students and almost 80% of trade school students do not meet the standard requirements of competence in a modern society. This poses a serious challenge to Hungarian education policy and, most of all, to teachers in basic vocational education. The question arises as to what a practicing teacher might do to alleviate this situation?

One solution to the problem may by all means be a better understanding and consideration of students' characteristics in the course of processing the curriculum. Knowledge of the learning style is of assistance for the student to select the most suitable learning strategy and for the teacher to apply the most effective teaching strategy. Knowledge of the learning style also contributes to the development of self-regulated learning as ability.

BACKGROUND

A common feature of theories of learning style is that students are classified according to their cognitive characteristics along one- or multi-dimensional bipolar (usually cognitive) scales. Conclusions as to the efficient learning styles, forms and means of the student may be drawn from the preferred strategies related to learning style. Teaching strategies which produce the most preferred learning strategies can also be specified, and these in turn serve as a starting point for designing the learning environment.

The common feature of all learning style theories is that only certain cognitive individual characteristics are integrated into their system, which, however, reduces to a great extent the scope of validity of the given approach. From this it also obviously follows that neither theory is capable of typifying all the learning characteristics of the individual in the proper way and in proper detail. The existing 60-70 theories can be classified into five categories, according to which learning style

- is biologically determined, including for instance sense modalities and (cerebral hemisphere lateralization),
- reflects the characteristics of cognitive structures, including for instance certain patterns of abilities, too,
- is an element of the personality type,
- expresses the learning preferences of the individual,
- should be ignored and interest focused on learning attitudes, strategies and differences in comprehension instead (Coffield et al., 2004).

From the point of view of our research, theories examining the learning preferences of the individual are to be highlighted. The most significant theory in this group is associated with the name of David Kolb, who has been studying learning style for more than 40 years. His Learning Style Inventory (LSI) is one of the most widespread measuring instruments in the examination of learning styles. His experimental theory of learning successfully amalgamated the relevant and decisive movements of the 20th century (John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers, etc.), (Kolb, 1984)

According to his theory, learning is a cyclical process where the stages of gaining concrete experience, reflective observation, abstract conceptualization and active experimentation can be well distinguished. Transition through these stages of information acquisition demands various abilities, attitudes and behavior from students, who vary in these fields. Kolb's LSI is able to show the dominance of these characteristics. In his two-dimensional polynomial system he distinguished learning styles according to grasping experience (Concrete Experience – Abstract Conceptualization; Feeling – Thinking) and

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transforming experience (Reflective Observation – Active Experimentation; Watching – Doing). On the basis of preferences along axes he differentiated four kinds of learning style: Converging, Diverging, Assimilating and Accommodating (Kolb, 1984; Kolb, 1985; Kolb – Kolb, 2005a; Kolb – Kolb, 2005b).

At the end of the 1980s, Hunt and his colleagues extended the four-region model to a nine-region one by identifying the Northerner, Easterner, Southerner and Westerner learning styles. (Abby – Hunt – Weiser, 1985; Hunt, 1987)

Later on Kolb and his colleagues determined the Balancing style of learning. Students of this type show a considerable degree of "balancedness" along both dimensions (Mainemelis – Boyatzis – Kolb, 2002).

Kolb's LSI served as a basis for the development of the measuring instruments of several further learning styles. Among them McCarthy's so-called 4MAT system may be distinguished ("teaching around the learning cycle"). The main objective was to create, taking students' characteristics into consideration, teaching situations which ensure the differentiated development of the individual. His theory combined Kolb's four learning styles with the cerebral hemisphere lateralization model. The stages of his learning process are the following: Connect, Attend, Image, Inform, Practice, Extend, Refine, Perform. (McCarthy, 1996; Coffield et al., 2004)

THE OBJECTIVE AND THE SAMPLE OF THE EXAMINATION

Our four-year longitudinal examinations were performed among secondary vocational school students in Budapest between 2007 and 2011. 1477 students from Year 9, 1206 from Year 10, 1242 from Year 11 and 989 from year 12 (students aged 14 to 18) took part in the horizontal and vertical examination (Table 1). Now the results of the 2009 and 2010 examinations are presented.

Table 1. *Participation of years in the phasing-out system longitudinal examination*

Starting secondary vocational school	—— Horizontal examination model →		– Vertical examination
	Date of examination		
	Oct – Nov 2009	Oct – Nov 2010	
September 2007	Year 11	Year 12	
September 2008	Year 10	Year 11	
September 2009	Year 9	Year 10	
September 2010	-	Year 9	

In the course of our representative (as for the gender and specialization of the student and the geographical position of the school) examinations Kolb's Learning Style Inventory was used, specially adapted for students at secondary vocational schools in Hungary. An online version of the measuring instrument was prepared where students could enter after registration. Examinations took place within the framework of a lesson and under the guidance of teachers. After the completion of the questionnaire it was immediately evaluated therefore students were provided with an assessment, interpretation and learning methodological advice on the basis of their established learning style. Teachers of the class had access to the results of the group, which contributed to the selection of teaching strategies to fit individual students.

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Instead of making a hypothesis test often applied in pedagogical research, research questions were constructed because research focusing only on the verification or dismissal of hypotheses would have limited the recognition of deeper and more complex connections.

On the basis of the above considerations, the present research sought the answer to the following open questions.

- What special preferences can be observed in secondary vocational school students' methods of grasping experience (perception continuum) and methods of transforming experience (processing continuum)?
- Can any change be observed in this respect with the progress of studies, in other words, to what extent can learning strategies be considered as attitudes?
- Is there any connection between the individual variables and, if yes, of what kind?
- Is the gender of students or their elected specialization related in any way to learning variables?

Through the abilities and experience of the individual, characteristics and preferences are formed which will have an influence firstly on learning, secondly on problem-solving, thirdly on professional development and even on career choice. The most important question to be answered by the present research is whether learning style may be interpreted as an attitude of characteristically individual cognitive style, which, as a part of the personality, mostly expresses a relation to the acquisition and application of information that is learning in one word.

THE RESULTS OF EMPIRICAL EXAMINATION

The comparison of the statistical data of learning variables was performed according to the horizontal examination model above. The preference for syllabus content based on a concrete and individual acquisition of experience (CE) and for the practical application of acquired information (AE) is typical of all years but to a different extent. With the progress of studies the role in the learning cycle of the former one increases to a lesser extent while that of the latter does so to a greater extent in comparison with the preference for abstract conceptualization and reflective observation (Figures 1-2). In both these preferences, the fact that the professional content of the syllabus and the practical quality of processing the material increase in higher years apparently has a part to play. In the case of certain students the strategy of information acquisition and processing changes compared with the one applied at the primary school and this can also be attributed to the effect of new learning situations.

This results in the growing deviation between the mean values of AE and RO as well as AC and CE with the progress of studies. The variables in the particular dimensions open „in a scissor action". Furthermore, it is to be mentioned that the standard deviations in CE and AE values well exceed those of RO and AC values, while their „scissors" also open largely with the progress of studies (Figures 1 and 2). In other words, higher year students tend to show significant deviations with respect to the preferred strategy of information acquisition and processing.

The distribution of learning variables was also compared in the horizontal examination model on related samples by a sign test (Table 2), whereas in the vertical examination model on unrelated samples by the Mann-Whitney and Kruskal-Wallis tests (Table 3). The preconditions of the tests were fulfilled in all cases. The results made it evident that at a 5% significance level with RO and AC variables there was not enough reason to discard the null hypothesis, that is with respect to two or three years there is no considerable difference in distribution at the significance level in question. However, in the case of AE and CE variables a significant difference was measured, which supports the above.

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Variance analysis performed in the course of the vertical examination is also suitable for the comparison of means. Two preconditions for variance analysis are the normal distribution of the dependent variable and homogeneity of variance. The first condition is left unfulfilled in the strict sense of the word, but as distribution skewness has no significant influence on F statistics, only the question of skewness – kurtosis is taken rigorously (if its value is double the standard error's there is no symmetry). Variance homogeneity was performed by Levene's test, the null hypothesis of which declares standard deviations to be unequal, that is at a significance level higher than 5% the discarding of null hypothesis testifies the homogeneity of deviations. With the exception of CE values these two conditions are fulfilled on the other three variables, that is variance analysis was successfully performed on those. The results verify former statements declaring that the means of RO and AC variables do not significantly differ, while those of AE do, that is with the progress of studies the dominance of active experimentation in the learning process changes (increases). (Table 4)

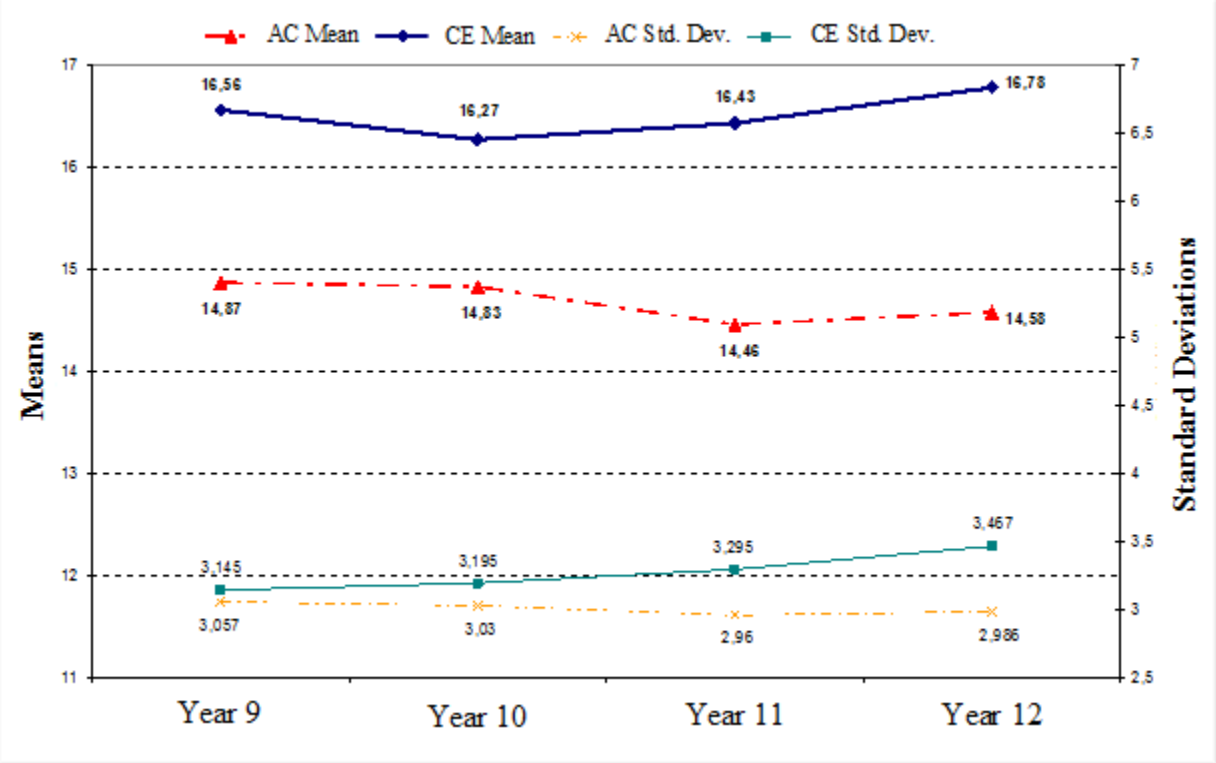

Figure. 1 Means and standard deviations of learning variables in the horizontal examination model, I

Scheffe's a priori contrast test also casts light upon the means of which years within a category show a significant deviation ($p<0.05$). The results prove that increase with respect to active experimentation is to be seen mostly in years 9 and 10.

In the horizontal examination model the correlation of particular learning variables was also explored. The values below the main diagonal of the tables show the inter-correlation coefficient of the results of the lower years at $p<0.01$ significance level in the given sample, whereas those above the main diagonal show that of higher years. (Table 5 and 6)

On account of the great number of sample elements (600 or over 700) it can be stated that in the dimension of individual learning strategies a stronger than medium negative correlation is to be noted among variable pairs, which indicates the polarizing effect of the questionnaire well. From this it follows that a definite number of students presented contrary preferences in the dimensions of the type of

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information to be learned, the mode of information acquisition and processing. High AE values are linked to low RO ones and high AC values are linked to low CE ones, and vice versa.

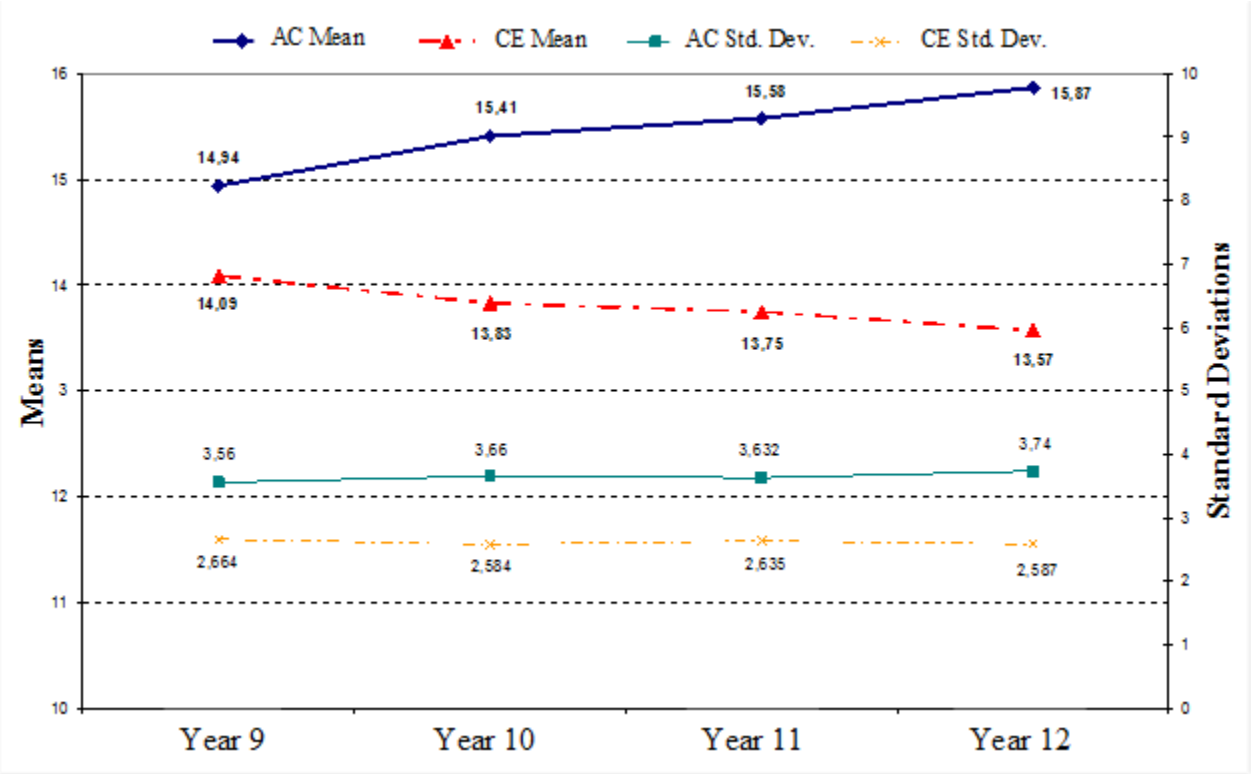

Figure. 2 Means and standard deviations of learning variables in the horizontal examination model, II

Table 2. *The comparison by sign test of two related samples*

		AE	RO	AC	CE
Year 9-10	Z value	-1.402	-1.819	-1.283	-2.857
	Asymptotic significance	***0.161***	***0.069***	***0.200***	0.004
Year 10-11	Z value	-3.520	-0.210	-1.196	-1.983
	Asymptotic significance	0.000	***0.834***	***0.232***	0.047
Year 11-12	Z value	-2.953	-1.878	-1.376	-3.579
	Asymptotic significance	0.003	***0.060***	***0.177***	0.000

Note: Bold italics indicate the variables of identical distribution; p=0.05

Table 3. *The comparison by Kruskal-Wallis test of three unrelated samples*

		AE	RO	AC	CE
Exam. Year 2009*	χ^2	5.415	4.897	3.825	8.777
	Asymp. sig.	***0.067***	***0.086***	***0.148***	0.012
Exam. Year 2010**	χ^2	12.991	1.595	0.189	6.950
	Asymp. sig.	0.002	***0.450***	***0.910***	0.031

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Note: * refers to the results of years 9 to 11, while ** refers to those of years 10 to 12. Bold italics indicate the variables of identical distribution; p=0.05

Table 4. *ANOVA table for the vertical examination*

ANOVA

Learning variables		Sum of Squares	df	Mean Square	F	Sig.
AE (2009)	Between Groups	88.646	2	44.323	3.463	***0.031***
	Within Groups	27540.535	2152	12.798		
	Total	27629.181	2154			
RO (2009)	Between Groups	32.883	2	16.442	2.389	0.092
	Within Groups	14810.938	2152	6.882		
	Total	14843.822	2154			
AC (2009)	Between Groups	9.567	2	4.784	0.889	0.127
	Within Groups	11586.457	2152	5.384		
	Total	11592.024	2154			
AE (2010)	Between Groups	179.220	2	89.610	6.695	***0.001***
	Within Groups	25924.831	1937	13.384		
	Total	26104.051	1939			
RO (2010)	Between Groups	11.753	2	5.877	0.843	0.430
	Within Groups	13498.234	1937	6.969		
	Total	13509.988	1939			
AC (2010)	Between Groups	2.549	2	1.275	0.139	0.870
	Within Groups	17714.797	1937	9.145		
	Total	17717.346	1939			

Note: Years 9-11 in 2009 and years 10-12 in 1010 form 3-3 groups, and this is expressed by df (degree of freedom) in 'Between Groups' lines.

Correlation stronger than moderate is to be observed between AE and CE values, that is several students with a preference for gaining experience through tangible, „ "lifelike" syllabus contents do not so much prefer the productive application of skills in new situations, and vice versa. This connection becomes more emphasized in higher years. Creative application in the preferred new situation may serve as a starting point for experience acquisition if new skills were to be related to the students' already existing knowledge, in other words it would become understood. This phenomenon may obviously be affected by the fact that the standard deviation of these variables is quite high, and it even increases in the case of CE values with the progress of studies (Fig. 1 and 2). On the basis of Table 5 is can also be established that the values of correlation coefficients in the year pairs of the longitudinal examination model hardly differ, which means a certain kind of stability.

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Table 5. *Correlation between variables of learning stages*

Year 10 / Year 9	2009 - 2010 AE	RO	AC	CE
AE	***0.236***	-0.394*	-	-0.464*
RO	-0.387*	***0.223***	-0.135	-0.108
AC	-0.144	-0.144	***0.226***	-0.311
CE	-0.385*	-	-0.232	***0.246***

Year 11 / Year 10	2009 - 2010 AE	RO	AC	CE
AE	***0.283***	-0.400*	-	-0.630*
RO	-0.410*	***0.203***	-0.205	-
AC	-0.132	-0.191	***0.251***	-0.345*
CE	-0.450*	-	-0.251	***0.255***

Year 12 / Year 11	2009 - 2010 AE	RO	AC	CE
AE	***0.218***	-0.424*	-	-0.538*
RO	-0.341*	***0.262***	-0.201	-
AC	-	-0.159	***0.224***	-0.413*
CE	-0.448*	-	-0.291	***0.284***

Note: Absolute value low correlation values are not given. Values lower than the estimated values of average correlation are marked *.

Correlation coefficients along the main diagonal in Table 5 were determined on the basis of students' results in two consecutive years (2009 and 2010) (vertical examination model). This shows weaker correlations than expected. Since a year passed between the two completions of the questionnaire, test-retest reliability cannot be judged on these grounds. The great number of sample elements as well as higher or lesser degree changes in preference during one year may also be connected with it.

In the horizontal examination model internal (within a year – bold typed value in the chart) and external (using the results of the same students in two consecutive years) correlation was examined with respect to difference variables, too. Correlation between the learning variables of 9- and 10-year students is shown by Table 6. Correlation is similar in higher years therefore those factors are not presented here.

On the basis of internal correlation it is to be established that the two difference variables show weak correlation with each other but a very strong one with their two components. The former is not surprising since a dominance in one dimension may be related to two different preferences in the other dimension. Weak, low correlation is to be seen among the values in two consecutive years of AE-RO and AC-CE difference variables. These correlations would be acceptable at a minimum 1% significance level.

In order to justify the existence of the two difference variables in the horizontal examination model factor analysis on learning variables was performed as a control to see how many factor variables the initial variables may be reduced into. First we had to be convinced whether learning variables were fit for factor analysis. Bartlett' test and Kaiser-Meyer-Olkin measure were used for this purpose. The null hypothesis of Bartlett's test, that there is no correlation between learning variables, is to be discarded mostly. Significance levels were lower than 0.05, that is initial variables are suitable for factor analysis. KMO values turned out to be greater than 0.5 in all the cases, which is regarded acceptable with such a

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great number of sample elements. The rotated factor weight matrix justified in all years the existence of the two difference variables (AE-RO, AC-CE).

Table 6. *Correlation between difference variables*

		Year 9						Year 10					
		AE-RO	AC-CE	AE	RO	AC	CE	AE-RO	AC-CE	AE	RO	AC	CE
Year 9	AE-RO	**1**	**.158**	**.880**	**-.779**	**-**	**-.277**	.239	-	.225	.169	-	-
	AC-CE	**.158**	**1**	**.147**	**-.113**	**.795**	**-.775**	-	.263	-	-	.227	-.200
Year 10	AE-RO	.239	-	.201	-.199	-	-	**1**	**.256**	**.884**	**.777**	**-**	**-.371**
	AC-CE	-	.263	-	-	.198	-.215	**.256**	**1**	**.265**	**.150**	**.792**	**-.827**

Note: Absolute value low correlation values are not given.

As far as learning variables according to gender are concerned it is to be seen that the most significant deviation between girls and boys is observed in the field of generalization and conceptualization. It has a more decisive role to play in the boys' learning process, while girls prefer the acquisition through experience of concrete syllabus contents. However, it is to be noted that the results of girls in this area show a more significant deviation. Reflection on preliminary skills and experience as well as active application in a new situation shift towards higher preferences in the case of both genders, with no significant deviation between them.

With the progress of studies, difference between AE and RO slightly increases in the case of boys and girls alike, whereas AC-CE take opposite turns for the two genders with boys' decreasing and girls' increasing (Fig. 3). It indicates that the difference in preference between thought and experience acquisition decreases with boys and increases with girls and this causes the greater affinity of girls for concrete syllabus contents regarding the entirety of the sample. The syllabus of professions favoured by girls (health care, light industry, accountancy) seems to have a greater influence on this learning stage or variable with the progress of studies.

With the help of the Shapiro-Wilk normality test the examination of the two variables was performed with the finding that in the case of AE-RO and girls' alone there is not enough reason to discard the null hypothesis, but in the other cases the null hypothesis has to be accepted. In other words, normal distribution is followed by girls in AE-RO and by both genders in AC-CE. From this it follows that in the case (vertical examination) of the two related samples (the results of measurement in 2009 and 2010) in the first case the one-sample t-test, whereas in the latter cases the Wilcoxon's test is to be applied to decide whether the results of difference variables in two consecutive years differ or not.

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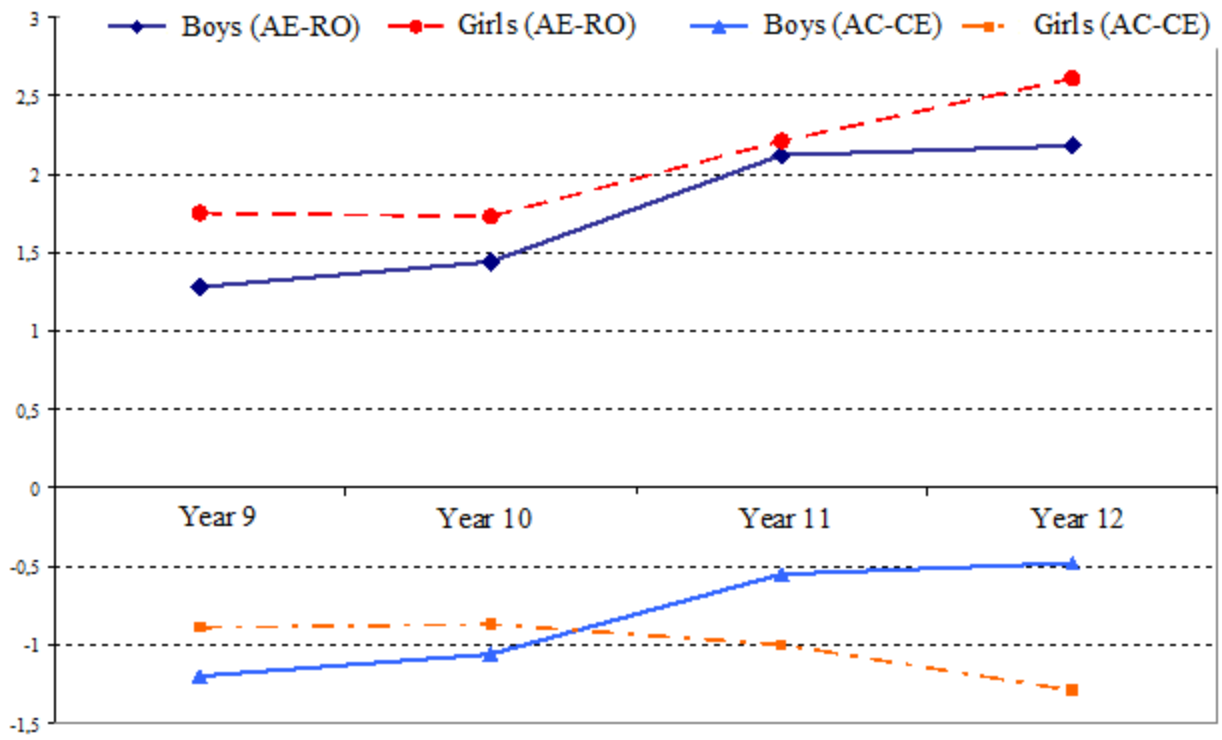

Figure 3. The means of difference variables in the horizontal examination model

The null hypothesis of the one-sample t-test is fulfilled, that is the distribution of the values of AE-RO variables measured in two consecutive years does not significantly differ with girls ($p<0.05$). In the other cases the Wilcoxon's test was applied, the preconditions for the application of which are also fulfilled. It was established that the distribution of AC-CE variables with girls and that of AE-RO and AC-CE variables with boys in two consecutive years significantly differs ($p<0.05$), in other words it can be established that with the progress of studies there is usually a change to be seen in the values of difference variables, the nature of which having already been shown by *Figure 3.*

Table 7. *Correlation between difference variables according to gender*

girls / boys	2009 AE	2009 RO	2009 AC	2009 CE
AE		-0.366	-	-0.424
RO	-0.354		-	-
AC	-0.103	-		-0.264
CE	-0.440	-	-0.283	

girls / boys	2010 AE	2010 RO	2010 AC	2010 CE
AE		-0.404	-	-0.557
RO	-0.412		-0.148	-
AC	-	-0.174		-0.390
CE	-0.599	-	-0.383	

Note: Absolute value low correlation values are not given. $p<0.01$

The examination of correlation between differences variables according to gender was also performed (Table 7). Values below the main diagonal show the correlation coefficient of boys' results at significance level $p<0.01$, while those above it show that of girls. On the basis of the chart it can be seen that there is no substantial difference between boys and girls regarding the correlation between learning variables. In connection with AE and RO as well as AC and CE a negative correlation slightly stronger and weaker

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than the average was measured. The strongest negative correlation was measured with respect to AE and CE, which is a little more significant in the case of boys than girls, in other words boy students with a preference for concrete and „lifelike" syllabus contents prefer less productive syllabus application in greater numbers than girls do.

Finally the distribution of learning variables and difference variables according to profession were examined, too. AE-RO values in both years' measurement fluctuate within a relatively narrow band, which is a lot wider domain with AC-CE, that is in this respect students show a significant deviation according to profession. Considering the preference for the productive application of acquired skills students specializing in environment protection – water management (14), catering trade – tourism (18) and agriculture (20) prove to be the strongest. Considering the experimentation with acquired skills in a new situation as well as observation students specializing in architecture (9), wood industry (11) and other services show the most well balanced picture. With respect to abstract conceptualization and the acquisition of concrete experience students specializing in wood industry (11), printing industry (12), environment protection – water management (14) and other services are the most well-balanced. Regarding the preference for learning through concrete experience, students specializing in health care (1), education (3), light industry (10), agriculture (20) and food industry (21) (Fig. 4) are the strongest.

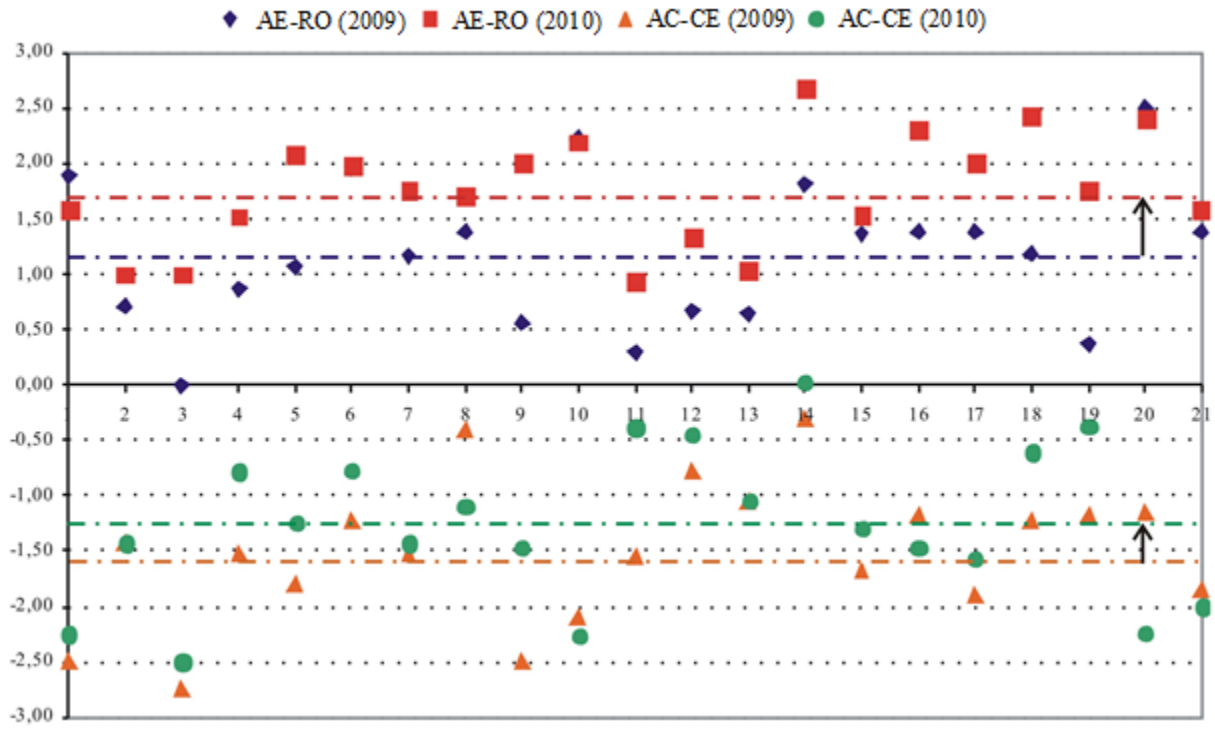

Figure 4. The means of difference variables according to profession

Another kind of phenomenon is to be observed in the case of AC-CE difference variables. Three types are differentiated here. One comprises professions (e.g. humane professions – 1,2,3; informatics – 7, light industry – 10, economics – 15) that preserve a strong KT dominance, the second one comprises professions with a reduced degree of the same (e.g. arts, public education, communication – 4, mechanical engineering – 5, transport – 13), while the third one comprises professions (e.g. architecture – 9, wood industry – 11, printing industry – 12, transport – 13) where a change of preference has taken place in favour of abstract conceptualization.

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The One-Way ANOVA examination was meant to demonstrate the effect that belonging to a profession makes on the two difference variables. According to the null hypothesis of the examination the means of the different professions do not differ. The preconditions necessary for performing the examination (skewness-kurtosis, variance homogeneity) are fulfilled on the AE-RO variable only, therefore ANOVA analysis can be performed in this case only. On the basis of Table 8 it is to be established that the significance level of probability connected to the f-test is greater than 0.05, so the null hypothesis is acceptable, therefore the expected values of the AE-RO variable calculated according to profession in both years of the examination do not differ.

However, the same cannot be said about the AC-CE variable, the expected values of which calculated according to profession do differ, that is belonging to a profession makes a more significant effect on the dominance of information acquisition realized through abstract conceptualization and concrete experience acquisition.

In other words it is to be established that in the dimensions of the type of information and the mode of its acquisition there is a more significant deviation among students, which is mostly attributable to the gender and profession of the students. On account of the existence of „ “men’s jobs” and „ "women’s jobs” it is to be declared that these two factors are related, that is the most important influencing factor under examination in this respect is the gender of the student.

Table 8. *The variance analysis of the AE-RO variable in the two years of the examination*

Difference variables		Sum of Squares	df	Mean Square	F	Sig.
AE-RO (2009)	Between Groups	508.706	20	25.435	0.946	***0.528***
	Within Groups	57404.002	2134	26.900		
	Total	57912.708	2154			
AE-RO (2010)	Between Groups	550.701	20	27.535	0.963	***0.505***
	Within Groups	76837.702	2687	28.596		
	Total	77388.403	2707			

Table 9. *Test-retest reliability factors among learning variables*

	Learning variables – difference variables					
	AE	RO	AC	CE	AE – RO	AC – CE
Year 9-10	0.582	0.565	0.568	0.554	0.586	0.616
Year 10-11	0.509	0.487	0.462	0.604	0.420	0.505
Year 11-12	0.557	0.479	0.566	0.636	0.535	0.634

In the longitudinal model the reliability test of Kolb’s learning variables was performed, too. A considerable period of time, that is a year, passed between the two measurements, which lapse is long enough for the changes in the scope of subjects and their related requirements to interfere with the

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reliability coefficient of the measuring instrument. This is fairly conspicuous in the mediocrity of the test-retest reliability values of both the learning variables and the difference variables (Table 9).

CONCLUSION

Learning and teaching strategies are to be regarded as the fundamental variables of our adaptive and holistic examination model. Strategy is regarded as a complex system of procedures where in order to achieve a certain objective method, form and means are combined into an organic relationship and which is founded on a particular learning theory.

Self-regulated learning strategy means that the student is capable of independently selecting the method, form and means most suitable for him.

An awareness of the preferred learning strategy is helpful for the teacher as well, since it enables him to select the optimum teaching method, form and means.

The preferred patterns of teaching and learning strategies typical of the individual yield the teaching and learning style.

Our representative online examination focused on the determination of learning styles and Kolb's learning variables. On the basis of the results the following statements are to be made.

- Students most of all prefer information acquisition founded on gaining manifold experience in concrete forms as well as the productive and practical application of acquired information. With the progress of studies the significance of the former does not change, while that of the latter is continuously increasing, in which fact the growing number of practical classes apparently has a role to play.
- Differences among students with respect to concrete information acquisition deepen in higher years. With respect to the other learning variables change is minimal or seems attitudinal.
- By means of correlation, the polarizing effect of the questionnaire can be concluded. The most negative relationship was measured between concrete experience acquisition and active experimentation.
- Boys prefer generalization and conceptualization, whereas girls prefer experience acquisition.
- Considering the type of information and the mode of its acquisition a significant difference is to be observed among individual students, which fact is mostly attributable to the gender and specialization of the students.

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