Some Investigations regarding the Academic Performance of Students related to the Various Learning Activities

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Abstract: - Self-regulated learning concerns the application of general models of regulation and self-regulation to issues of learning that takes places in classroom contexts. The aim of this research is to investigate to what extent the academic performance of the first year students is related with the various learning activities that students employ and to investigate some of the psychometric properties of the Romanian version of ILS (Inventory of Learning Style). The analyses concluded that students' learning patterns are associated with personal and contextual factors, such as the type of academic discipline, academic achievement and age.

Key-Words: - academic performance, psychometric properties, learning patterns, contextual factors

1 Theoretical background

Self-regulated learning concerns the application of general models of regulation and self-regulation to issues of learning, in particular, academic learning that takes places in school or classroom contexts. There are a number of different models of self-regulated learning that propose different constructs and different conceptualizations.

A general working definition of self-regulated learning is that it is an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment [1].

One author [9] offers an overview of the characteristics of the students' self-regulation processes, presenting eight skills, which are important to self regulation processes:

- setting specific proximal goals for oneself;
- adopting powerful strategies for attaining these goals;
- monitoring one's performance;
- restructuring one's learning environment to make it compatible with one's goals;
- managing one's time effectively;
- self-evaluating one's methods;
- attributing results to causation;
- adapting future methods.

This paper focuses on relations between student learning styles and performance variables. A student learning pattern is defined as a students' position on four learning components: cognitive processing strategies, metacognitive regulation strategies, conceptions of learning, and learning orientations [6].

In research using the Inventory of Learning Styles (ILS), researchers [7] found four learning patterns: meaning directed learning, reproduction directed learning, application directed learning, and undirected learning:

- meaning-directed learning is defined by relating, structuring, and processing the subject matter critically, self-regulation of learning processes and contents, construction of knowledge as learning conception, and personal interest as learning orientation;
- reproduction directed learning comprises memorising and rehearsing, analysing, external regulation of learning, certificate and self-test-directed learning orientations, a learning conception in which learning is viewed as the intake of existing knowledge;
- application-directed learning is characterized by concrete processing, vocational learning orientation, and a learning conception stressing the use of knowledge;
- undirected learning is defined by lack of regulation, an ambivalent learning orientation, and a learning conception in which great value is attached to cooperation with fellow students and to stimulating education [6], [7].

The author of ILS [5] defines learning styles as consisting of four aspects: processing strategies, regulation strategies, mental models of learning and learning orientations. *Processing strategies* are thinking activities used to process information in order to obtain certain learning results such as knowing the most important points in the study material.

Regulation strategies are activities used to monitor, to plan and to control the processing strategies and their own learning processes. Mental models of learning are conceptions and misconceptions students have about learning processes.

Learning orientations are personal aims, intentions, expectations, doubts, students may experience during their educational career.

To measure these learning styles, the Inventory of Learning Styles (ILS) was developed, a diagnostic instrument intended to measure aspects of study method, study motives and mental models about studying in higher education.

Concerning the relation between self regulated learning and academic performance, the results reported in recent research are controversial. Undirected learning was negatively related to academic performance. Meaning-directed learning showed a positive association with performance and the other two patterns (reproduction-directed and application-directed learning) showed no relation [2].

Other researchers obtained weak correlations between self regulated learning skills and academic performances, they sustain the fact that between the two variables there is an indirect relation, which is mediated by other variables such as intelligence [4] motivation [8] and prior achievement [3].

2 Research questions

The aim of this research is to investigate to what extent the academic performance in the first years of higher education is related with the various learning activities that students employ.

Therefore, the present study aimed to answer the following question: How student learning patterns are related to different indicators for academic performance, such as:

- mean of exam scores at the end of the first semester and
- mean of exam scores for one fundamental subject matter: educational psychology.

Another important aim was to investigate some of the psychometric properties of ILS (Inventory of Learning Style).

3 Method

The study was conducted on a sample of 172 first year students, enrolled at the Faculty of psychology and Education Sciences.

The general exam scores and the score for educational psychology exam were obtained for all the participants in order to investigate their relation with the self regulated learning strategies.

ILS - *Inventory of Learning Styles* [5] was administered to all participants. We used the ILS version published by the author in 1998, which we translated and adapted for the Romanian population.

The ILS consists of 120 statements that cover 4 learning components: cognitive processing strategies, metacognitive regulation strategies, conceptions of learning, and learning orientations. These 120 items generates 20 scale variables: five processing strategies, five regulation strategies, five conceptions of learning, and five learning orientations.

The five processing strategies are: deep processing comprising relating and structuring, and critical processing, stepwise processing comprising memorizing and rehearsing, and analyzing, and concrete processing.

The regulation strategies are: self regulation comprising self regulation of learning process and results, self regulation of learning content, external regulation of learning process and external regulation of learning results and lack of regulation.

The five conceptions of learning are the following: construction of knowledge, intake of knowledge, use ok knowledge, stimulating education, and co-operative learning.

Finally, the five learning orientations are the following: personally interested, certificate oriented, self-test oriented, vocation oriented, and ambivalent.

An example of a processing strategy statement, belonging to the subscale “relating and structuring” is: *I try to combine the subjects that are dealt with separately in a course into one whole*. An example of a regulation strategy statement, belonging to the subscale “self-regulation of learning processes and results” is: *to test my learning progress, I try to answer questions about the subject matter which I make up myself*. An example of a learning orientations statement, belonging to the scale “certificate directed” is: *the main goal I pursue in my studies is to pass exams*. An example of mental models of learning statement, belonging to the scale “stimulating education” is: *the teacher should motivate and encourage me* [5]. The Alfa Cronbach coefficients for the Romanian version are presented in the following section.

4 Results

One of the aims of this study was to investigate the psychometric properties of ILS, after the translation and the adaptation for the Romanian population.

Table 1. Alfa Cronbach coefficients for the Romanian version of ILS

Scale	Number of item	Alfa
Processing strategies		
Deep processing	**11**	**.85**
Relating and structuring	7	.81
Critical processing	4	.70
Stepwise processing	**11**	**.73**
Memorizing and rehearsing	5	.72
Analyzing	6	.70
Concrete processing.	**5**	**.72**
Regulation strategies		
Self regulation	**11**	**.77**
Learning process and results	7	.73
Learning content	4	.66
External regulation	**11**	**.75**
Learning process	6	.64
Learning results	5	.58
Lack of regulation.	6	**.66**
Conceptions of learning		
Construction of knowledge	9	.75
Intake of knowledge	9	.76
Use ok knowledge	6	.76
Stimulating education	8	.82
Co-operative learning	8	.89
Learning orientations		
Personally interested	5	.54
Certificate oriented	5	.64
Self-test oriented	5	.65
Vocation oriented	5	.72
Ambivalent	5	.73

These results confirmed the fact that ILS is a highly consistent and a reliable instrument and its psychometric properties are acceptable even after the Romanian translation. The Alfa Cronbach coefficients are high, as showed in table 1, comparable to those obtained for the original version.

Another important aim was to identify to what extent student learning patterns are related to different indicators for academic performance. The response to these questions could be also considered an indicator of the predictive validity for ILS, considering mean scores as an external criterion of analysis, mainly for the self regulation scale.

The Pearson correlation showed weak but statistically significant coefficients between academic performances and ILS scales, especially for the processing strategies and for the regulation strategies (Table 2). Regulating one's own learning processes through regulation activities like planning learning activities, monitoring progress, diagnosing problems, testing one's results, adjusting, and reflecting, consulting literature and sources outside the syllabus are characteristics of a high academic adjustment. As expected, the correlations are not high, results that are sustained by previous research. These results can be explained by the lack of other important variables not included in the study, which can mediate this relation, namely the academic motivation and the orientation of learning goals.

Table 2. Pearson correlation between ILS scales and academic performance

ILS scales	General Mean score	Educ. Psych
Deep processing	.10	.08
Relating and structuring	.13	.01
Critical processing	**.23***	.05
Stepwise processing	.04	**-10***
Memorizing and rehearsing	**-.11***	**-.27****
Analyzing	**.20***	**.12***
Concrete processing.	**.22***	.13
Self regulation	**.21***	**.15***
Learning process/results	**.19***	**.10***
Learning content	**.21***	**.24***
External regulation	.08	.03
Learning process	.01	-.02
Learning results	.10	.16
Lack of regulation.	.00	-.02
Conceptions of learning		
Construction of knowledge	.02	.11
Intake of knowledge	-.10	-.07
Use ok knowledge	.09	.15
Stimulating education	.06	**.24****
Co-operative learning	**-.29****	**-.28****
Learning orientations		
Personally interested	.16	**.20***
Certificate oriented	.03	.08
Self-test oriented	.09	.02
Vocation oriented	**.19***	**.22***
Ambivalent	**-.27****	**-.30****

* p < .05, ** p< .01

Strategies such as memorizing and rehearsing showed a negative correlation with mean exam score, results which confirm the fact that high academic performance is sustained mostly by the

use of complex learning strategies, or deep learning strategies. Rehearsing and memorizing assure only a surface learning not efficient for obtaining good grades.

Regarding the conceptions of learning, we obtained negative correlation between academic performance and co-operative learning; thus, attaching a lot of value to learning in co-operation with fellow students and sharing the tasks of learning with them is not associated with high academic performance. An explanation can be the individualistic orientation of Romanian educational assessment system which encourages mostly competition between students and performance orientated goals rather than collaborative learning and mastery oriented goals.

Also, the doubtful, uncertain attitude toward the studies or toward one's own capabilities is negatively correlated with academic achievement. Thus ambivalent learning orientation is stronger for those students with low academic achievement. Contrarily, studying to acquire professional skill predicts a high level of academic performance.

There are also some differences between the coefficients correlations regarding the exam scores obtained for the overall academic performance or for the educational psychology subject matter. Variables such as stimulating education, personally interested, and vocation interested are positively associated with the academic performance at educational psychology, revealing the fact that these variables are more relevant if they are analyzed in a specific context of learning rather than in a general context. Being one of the fundamental subject matter for the first year students, educational psychology sustain an orientation of studying out of interest in the course subjects but to develop oneself as a person.

Regarding the learning styles, meaning directed learning was positively associated with academic performance: $r(147) = .19$, $p= .05$. Reproduction directed learning showed no relation with exam performance: $r(146) = .01$, $p= .96$. Application directed learning was weakly correlated with exam performance: $r(147) = .12$, $p= .05$. Finally, undirected learning was negatively and consistently associated with academic performance: $r(146) = -.21$, $p= .03$.

Personal factors that could affect learning are also included in the analysis: specialization and age.

The independent t test showed no significant differences between the two categories of students (Psychology students and Education Sciences students) regarding the processing strategies and the self regulation strategies. Although, we found two significant differences: for the vocational orientation scale and for the ambivalent learning orientation. Thus, education sciences students have a higher level of vocation orientation $t(149) = 1,98$, $p = .04$. Psychology students have higher level of ambivalent learning orientation - $t(148) = 2,42$, $p = .01$. We can conclude that psychology students have a higher level of incertitude regarding their academic choice and their vocation.

Given the high amplitude for the age of the participants in the study, ($R = 29$, $min = 19$, $max = 48$), with a mean age of 22, we formulate a second hypothesis regarding the association between age and self regulation of learning. We found interesting results showing that age is positively associated with the increase of self regulation strategies. The significant Pearson coefficients are given below:

- Deep processing – $r(144) = .38$, $p < .001$;
- Analyzing - $r(146) = .24$, $p = .003$;
- Concrete processing – $r(147) = .25$, $p = .003$;
- Self regulation of learning – $r(146) = .23$, $p = .005$;
- Certificate oriented – $r(144) = -.27$, $p = .001$;
- Vocation oriented – $r(144) = .18$, $p = .03$;
- Ambivalent - $r(144) = -.32$, $p < .001$;
- Construction of knowledge – $r(144) =.23$, $p = .005$.

These results show that self regulated learning and deep processing strategies increase with age. The negative correlation between age and certificate orientation is an indicator of the increase of intrinsic motivation. Studying to pass examinations and to obtain certificates, credit points, and a degree becomes less important than studying to test one's own capabilities. Also, the uncertain attitude toward the studies decreases with age while learning viewed as constructing one's own knowledge and insights increases.

5 Conclusions

An important conclusion refers to the extent to which ILS can be considered a valid instrument for assessing self regulated learning. The results showed that the Romanian version of ILS has good psychometric properties. Further research is needed in order to tests the factorial structure of the inventory.

From the analyses reported above it can be concluded that students' learning patterns are associated with personal and contextual factors, such as the type of academic discipline, academic achievement and age.

Concordant with previous research [5], [7], we found that the way students regulated their learning processes, showed relative little direct relations with academic performance. Self-regulation strategies

showed some positive relations. External regulation strategies showed no relations. It seems that for exam achievements, it was less important whether learning processes were regulated internally or externally, as long as they were regulated in some way [5], [7].

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