

STRATEGIES FOR DEVELOPING A DEEP APPROACH OF LEARNING IN HIGHER EDUCATION

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Abstract: *Internationally there have been many studies on the effects of metacognitive intervention on learning approaches. We aimed to identify the learning approach of the students preparing to become teachers, enrolled at the „Aurel Vlaicu” University of Arad. We have conceived and implemented a formative experiment revealing the influence of the metacognitive regulation on the deep and strategic approach of learning. Instruments such as: reflexive diary, self-analysis protocols, peer evaluation, metacognition portofolio were very effective in developping a deep approach of learning.*

Key words: *Learning approaches: deep, strategic, surface, metacognitive regulation, expreiment*

1. Theoretical frame

The analysis of some of the learning approaches in higher education started from N. Entwistle' conception (1998) which affirmed that *the development of the conception regarding students' learning (from memorising to transforming)* and intellectual development (*from dualism to relativism*) are factors that influence the option for a certain approach to learning and they are based on the argument that a learner doesn't approach leaning in just one way. Other research emphasise the role of ***the educational environment as the third factor of influence regarding the approaches to learning***. This involves the nature of the working task, the circumstances in which performance will take place, providing the data concerning the task etc. (Bigss, J., 1987). Starting from the above we have identified three approaches to learning as noted in Table I :

	Deep learning	Surface Learning	Strategic learning
Definition	Examining new facts and ideas critically, and tying them into existing	Accepting new facts and ideas uncritically and attempting to store them as	Targeting the students' learning process

	cognitive structures and making numerous links between ideas.	isolated, unconnected, items.	towards achieving maximum academic performance, by the objective means of grading.
Characteristics	<p>Looking for meaning.</p> <p>Focussing on the central argument or concepts needed to solve a problem.</p> <p>Interacting actively. Distinguishing between argument and evidence.</p> <p>Making connections between different module/chapters/units.</p> <p>Relating new and previous knowledge.</p> <p>Linking course content to real life.</p>	<p>Relying on rote learning.</p> <p>Focussing on outwards signs and the formulae needed to solve a problem.</p> <p>Receiving information passively. Failing to distinguish principles from examples.</p> <p>Treating parts of modules and programmes as separate.</p> <p>Not recognising new material as building on previous work.</p> <p>Seeing course content simply as material to be learnt for the exam.</p>	<p>Relying on both rote leaning and meaningful learning, depending on the assessment task.</p> <p>Using systematic learning methods to receive the highest mark possible. Two focus points: the academic material and the requirements of the assessment.</p>
Encouraged by Students'	<p>Having an intrinsic curiosity in the subject.</p> <p>Being determined to do well and mentally engaging when doing academic work.</p> <p>Having the appropriate background knowledge for a sound foundation.</p> <p>Having time to pursue interests, through good time management.</p> <p>Positive experience of education leading to</p>	<p>Studying a degree for the qualification and not being interested in the subject.</p> <p>Not focussing on academic areas, but emphasising others (e.g. social, sport).</p> <p>Lacking background knowledge and understanding necessary to understand material.</p> <p>Not enough time / too high a workload.</p> <p>Cynical view of education, believing that factual recall is what is required.</p>	<p>Choosing the subjects/specialisations where they get highmarks easily.</p> <p>Extrinsic motivation.</p> <p>Wanting to receive high marks and other external rewards (scholarships)</p>

	confidence in ability to understand and succeed.	High anxiety.	<p>etc.)</p> <p>Driving to succeed.</p> <p>Paying attention to the teacher's requirement and to their own assessment.</p> <p>Good time management.</p> <p>Using efficient learning techniques.</p> <p>Pragmatic view of education and learning</p> <p>Results oriented.</p>
Encouraged by Teachers'	<p>Showing personal interest in the subject.</p> <p>Bringing out the structure of the subject.</p> <p>Concentrating on and ensuring plenty of time for key concepts.</p> <p>Confronting students' misconceptions. Engaging students in active learning.</p> <p>Using assessments that require thought, and requires ideas to be used together.</p> <p>Relating new material to what students already know and understand.</p> <p>Allowing students to make mistakes without penalty and rewarding effort.</p> <p>Being consistent and fair in assessing declared</p>	<p>Conveying disinterest or even a negative attitude to the material.</p> <p>Presenting material so that it can be perceived as a series of unrelated facts and ideas.</p> <p>Allowing students to be passive.</p> <p>Assessing for independent facts (short answer questions).</p> <p>Rushing to cover too much material.</p> <p>Emphasizing coverage at the expense of depth.</p> <p>Creating undue anxiety or low expectations of success by discouraging statements or excessive workload.</p> <p>Having a short assessment cycle.</p>	<p>Providing feedback only by means of marks.</p> <p>Not being aware that the educational environment which they created and coordinate leads to a certain students' approach to learning.</p> <p>Creating a competitive educational environment.</p> <p>Appreciating the students who receive the highest grades.</p>

	intended learning outcomes, and hence establishing trust		
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Deep approach to learning and especially strategic approach to learning involve students' good knowledge of the task, and of the ways of solving them efficiently. They also mean good planning skills, the monitoring and assessment of the resources and processes involved in learning. The premises for metacognition are thus created.

1. The design of the formative experiment

In order to identify the learning approaches of the students attending the pedagogical module at the "Aurel Vlaicu" University of Arad, we have developed an experimental design among subjects using the technique of equivalent samples (Bocoş, M., 2003). The stages of formative experiment were as follows: stage I Implementation and analysis of the results and conclusions of pretesting, September-January 2008; stage II conducting the formative experiment on a period of 14 weeks in the academic year 2007-2008, February-June 2008; stage III **post-experimental** involves applying AIIAS questionnaire which evaluates the impact of formative experiment on both students from the experimental sample and the ones from the controlled sample; *June 2008*; stage IV - analysis, processing and interpretation of data *July-September 2008*; stage V- **retesting or distance checking** was done after a longer period of time – October 2008; stage VI drawing the final conclusions of the research November-December 2008; stage VII evaluating the research – rendering the experience acquired in the pedagogical practice.

Table 1: Sample of subjects

Types of courses specific to pedagogical module	Faculty	Number	Percentage %	Experimental group	Control group
Optional	Engineering	112	26,67	60	52
	Economic Sciences	104	24,77	60	44
Compulsory	Human Sciences	142	33,81	60	82
	Exact Sciences	62	14,75	30	32
	Total	210	100%	210	210

The instrument used was the questionnaire "Approach to Learning and Study Skills Inventory" (ALSSI). This is an adaptation of the questionnaire "Approaches and Study Skills Inventory for Students" (ASSIST). ASSIST is based on ASI questionnaire (Approaches to Studying Inventory) developed by Entwistle, Ramsden N. and , PR, in 1981, for approaches to students' learning. The questionnaire has three sections. Section A- *Students' conception on learning*. In this section there are 6 items that describe a particular conception about learning, items a, c, e describe the rote learning, and items b, d, f refer to learning as understanding and development. Section B-The learning approach contains 52 items in Assist variant, and in the proposed variant 53 items, which when interpreted will be grouped into three categories: deep approach, surface approach and strategic approach. For each approach, items can be grouped into

several subscales some are major, defining that category, and others are complementary which can be modified according to the purpose of research. Section C- *preference for different types of courses and teaching styles* contains 5 items grouped in the scale for "promoting understanding" - items b, c, f, g and four items which may be included in the scale "transmission of information" - items a, d, e, h..

The results show that in the **pretest** the approach most used by students is **the surface approach (42.4%), followed by the strategic approach (29%) and deep approach (28.1%)**. We have realised that we get different results depending on the compulsory or optional character of the courses in the module teaching. Thus, if the students are required to do the course *compulsory*, results are similar to those outlined above, surface approach is used at length, followed by the strategic approach. Deep approach is not much used. Even if the students who have the pedagogical module as an optional course, mostly use the surface approach it is followed by deep approach. The least used is strategic approach. The results for approaching learning from the point of view of the **specialisation of the faculty** show that a surface approach is predominantly used, with the exception of *students from the Human Sciences, for whom strategic approach prevails, followed by surface approach and finally deep approach*. For the students from other faculties surface approach prevails, followed by deep approach and strategic approach.

Inferential processing regarding the equivalence of the two groups show that during **the pretest stage we do not have significant differences statistically speaking at a threshold $p < .05$ between the control group and experimental group in terms of investigated dimensions**.

The identification of the purpose and objectives of formative experiment was followed by establishing general and specific hypothesis.

The general Hypothesis tested in the experiment was "**Consistent and systematic using of methods, techniques and instruments for planning, monitoring and evaluation of learning process (metacognitive regulation), within the methodological frame of problem solving, role play and case study, promotes deep approach of learning by students; learning as transformation and increasing performance**" and specific hypotheses derived from this are:

Is1: "*Behaviours of search meaning, establishing connections between knowledge, reasoning and curiosity towards the thematic study are influenced by the existence / absence of clear goals for subjects attending the courses of psycho-pedagogy module.*

Is2: "*Changing learning management is possible through the use of techniques for organizing, planning the time for study, monitoring and*

evaluation of learning and has the effect of increasing the level of self-evaluating performance in a specific subject. ”

The sample of subjects was the same as in the pretest and the sample content was presented in connection with the subject-specific competencies "The Didactics of Specialty", the methodological framework of metacognitive reflection, and working tools used by students for metacognitive training.

3. Methods and instruments used for pedagogical intervention

Among the methods and instruments used for the training of the processes of planning, metacognitive monitoring and evaluation (in addition to problem solving, role playing and case studying) we have mentioned:

- **The self-observation method** of the process of solving problems by students, through the working tool designed to facilitate students' self-observation on the process of solving problems – working sheet with the process of resolving problems; it was used throughout the formative experiment. With this tool we have wanted to render the students' metacognitive processes involved in solving problems. Metacognition involves feelings about the difficulty of assessing the problem and solution, metacognitive knowledge about the problem and strategies held by the subject that can be used to resolve, plan and monitor the process of thinking and self-regulation. (According to Bakracevic Vukman, K., 2005)

- **Checklist of regulating cognition (RC) aimed to provide a comprehensive Heuristic approach to facilitate cognitive regulation. Best applied in the process of problem-solving, RC allows students who are less experts in metacognition to implement a regulating sequence by which to control their performance. RC comprises three categories of regulation: planning, monitoring and evaluation.**

- **The reflection diary.** This was written by each student at the beginning, throughout and at the end of the case study, students having the opportunity to develop in the process of reflection, open responses relating to planning, monitoring and evaluation of their learning activities.

- **Peer assessment** is an alternative method of assessment in which students' behaviours are evaluated by colleagues. To carry out peer assessment in the formative program we have proposed two formative working tools: "Sheet analysis / the self-assessment sheet of the lesson" and "peer evaluation sheet of the quality of presenting the case studies"

- **The traffic light - accounting for their own activities** is a tool that facilitates the complex process of self-analysis, of learning processes, solving problems or tasks, of estimating successful and unsuccessful aspects and anticipating opportunities of further improvement.

- **Metacognitive portfolio** is a portfolio of progress and at the same time of evaluating the students' activity at the pedagogical disciplines

included in the sample content. All strategies, methods and instruments described in this chapter apply to the disciplines 'specialty didactics', were personalized by each student, and were included in the portfolio together with other products developed by students on the way.

- **Semi-structured Individual Interview** derived from clinical interview, whose purpose is to reveal deep information about the subject under investigation; the interview, in the psycho-pedagogical experiment proposed by us aims at finding some in depth information about progress in approaching learning by developing metacognitive skills achieved by subjects included in the experimental sample.

The posttest was given at the end of the formative experiment in June 2008. The aim of the posttest was to measure the effects of formative experiment on way of approaching learning in the experimental group and compare them with the control group. The sample of subjects (both in the experimental and in the control group) were reapplied the AIIAS questionnaire on ways of approaching learning (described in Chapter IV) and the '**posttest questionnaire**' tool. Structurally, the questions in the questionnaire are closed and they are questions opinion reflecting the inner world of subjects (Rotariu, Tr, Iluț, P., 2001) their attitude towards changes, in the formative experiment in learning. The questionnaire seeks to identify the difficulties students had to cope with in carrying out the activities proposed in the experiment and to highlight students' opinion on the effectiveness of working tools used for the training of metacognitive regulation. Though the proposed tool (the last item), we want to highlight students' intention to transfer instruments used in the experiment, in learning from other disciplines of study.

The retest was done after a longer period of time, in October 2008 to check durability, strength of students' acquisitions. And at this stage the same tool will be applied as for the post-experimental stage, i.e. the AIIAS on learning approach.

Collecting data provided by the instruments above was followed by a statistical processing and a qualitative and quantitative analysis to see if the proposed assumptions are confirmed or refuted.

4. Analysis and interpretation of the data received through the formative experiment.

In contemporary pedagogy where the stress moves from the learning outcomes of an activity to the process which generated them we considered appropriate and relevant training for the experiment, the analysis of the metacognitive regulation of training involved in students' leaning from the experimental group. Thus, the results that will ensue posttest and retest, will rely on the data related to the characteristics of the formative process.

Interpretation of the self-analysing sheets of the process of problem solving. Primary processing of the data provided by this working tool work shows that scores cumulated by each student by processing the three sheets are distributed normally and symmetrically, i.e. the lower and higher than average results are relatively equal. The level of metacognitive awareness of the students involved in solving problems is on average higher by 17.68 compared with the average expected. (Significant for $p < .01$). Comparing the scores obtained by students after reflection on the process of annual planning, on the units of learning and lesson plans, we can see that they do not differ significantly from one type of problem to another. We notice that in all three cases, the scores are close; the value of standard deviation is low. There is a significant difference between scores obtained by girls and by those of boys, girls tend to get a higher score in metacognitive reflection on project done on units of learning and on the lesson plans than boys. Girls think they can solve the task and they consider that the task is not difficult and that they have achieved the expected result. The strategies preferred by students in solving tasks were (in order of preference, calculating the average percentage for the three categories of problems) step by step approach (41.91%), solving by analogy (21.9%), updating information out of memory (13.33%), and trial and error (11.43%), modeling (7.62%), and testing hypotheses (3.81%). The outcomes of processing the results of this working tool prove the formative function of the self-observation sheet on training the metacognitive regulation processes of students. From one task to another students showed a higher confidence in their forces and have become more aware of the resolution strategies used and they have appreciated the outcome in connection to the planned objectives.

Interpretation of analysis sheets presenting case studies and simulations. The scores obtained are distributed according to a normal curve and approximately symmetrically, the average being equal to the median and that of the module. The average of the score obtained differs significantly from the value at the middle range of data points, between theoretical minimum and maximum score, being significantly higher than the anticipated average. *There is a significant distinction between expected frequencies and the ones observed obtained by subjects boys and girls. Girls tend to have higher score in assessing their colleagues.* (Hi Square = 59.48, significant for $p < .01$). The observations that come with the assessment of supporting case studies and simulations are relatively small, most subjects in the formative experiment giving the items on the analysis scale only the rank considered adequate. We can see that both positive and negative feedback relate to the scientific / educational content which was transmitted, and to the didactic approach, to the teaching strategies used, etc. The feedbacks on para- and non-verbal communication given while presenting the case / supporting

simulation have a high frequency and show the participants' receptivity to the educational situation in this type of communication and emphasize the need for initial and continuous teacher training from the point of view of developing communication competencies.

The analysis and interpretation of the self-regulating metacognitive simulation tools: reflection diary, the traffic light – accounting own their own activities. Analyzing in terms of quality, the reflection diaries we can identify statements on the processes of cognitive regulation specific to the cognitive approaches of the discipline "Specialty Didactics" and less reflective statements, with a real metacognitive character. This can be explained by the students' previous insufficient training, starting in the lower cycles of schooling, in managing their own learning. This results in students' awareness of the aspects related to identifying the objectives of the task, evaluating it and the existing resources needed to resolve it and, and a low awareness of the processes linking these resources and drawing up a detailed plan of action to achieve the objectives. Subjects show high confidence in their action and are aware of the effort needed to work through the plan, but often underestimate the effort as indicators of performance in achieving the task and the steps to go in this direction are poorly identified by the students. Regarding the scores in the assessment process, the obtained average is higher than the theoretical one and it shows a medium to high level of students' evaluative capabilities from a metacognitive perspective. We can notice an overestimation of the activity and the achieved results. The prove lies in the high frequency of answers like: "everything worked, everything was perfect." Students are pleased with the product developed and propose few actional alternatives to optimize future activities.

Processing data from semistructural essay "How I made my learning more efficient. Following participation in Specialty Didactic courses, subjects identified a changing process being aware of the limitations of the surface approach to learning, based on memorising concepts and deciding to change the approach to learning to deep approach to learning. ".. The most effective way is learning logically, finding correspondences, and analogy with similar life situations"(C.R.)

Subjects showed the role of their own effort in achieving thorough, deep learning. Following formative experiment "I have discovered another very effective way of learning and that is learning through practice" (CR) It is noted that the subject does not only refer to the classical method of exercising, but to a different way of organizing learning through discovery, cooperation and implementation in practice of the things learned. "The preformed cognitive exercises led to the development of knowledge and improving the capacity of assimilating new information, students reacting in a positive way and being directly involved" (MD). Subjects were aware of

the importance of learning through discovery, of using activating teaching strategies.

The Assessment of the metacognitive portfolio of each student was made on the basis of the portfolio evaluation grid taking into account the following criteria: diversity of products included in the portfolio; scientific accuracy of the documents produced (annual, semestrially, unit of learning planning, lesson plans) bibliographic references; the aesthetics of the portfolio Originality and creativity. The observed average is significantly higher than the theoretical one (based on t test for one sample) which shows subjects' concern in preparing the portfolio. As a conclusion, it may be said that the results of quantitative and qualitative processing of the products of subjects included in the formative experiment shows an average level of metacognitive self-regulating processes involved in the processes of learning discipline "Specialty Didactics". There has been a trend in reconsidering the students' way of approaching learning, some of them moving from mechanical learning, based on passive methods, to assuming their own learning and intensifying the efforts to achieve understanding and integrate knowledge into their own cognitive system. Post-test and retest results and will highlight the extent to which these changes have occurred and will confirm or refute the effectiveness of the instruments used in the training program.

Comparing the descriptive results of the experimental and control groups in posttest, we found that students undergoing formative intervention conceive learning more as a changing process, comparing to those included in the control group. The control group shows lower values of learning as transformation and higher values for learning as reproduction compared to those in the experimental group. The experimental group has a significantly higher level of deep approach to learning and strategic approach to learning than the control group in the posttest stage. Also, the level of surface approach to learning is significantly higher in the posttest stage for the control group.

We can conclude that the main assumption *"constant and systematic use by university teachers of some strategies (methods, techniques, working tools, forms of organisation) of exercising planning activities, monitoring and metacognitive evaluation (metacognitive self-regulation), in the methodological framework of problem solving, role playing, and of case study, promotes the use of deep approach to learning by students, learning as transformation and increasing performance"* is valid and the intervention program was efficient.

At the end of the investigative-formative approach we have done, we emphasize the need for training the students to manage their own learning on the basis of academic performance and effectiveness (achieving learning

objectives with an optimum consumption of resources regarding activities and procedures appropriate to their own learning needs.

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