THE ROLE OF LEARNING STYLES OF STUDENTS IN ACADEMIC LEARNING AND SOLVING PROBLEMS

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Abstract: Experiential learning is the process whereby knowledge is created through direct experience. In this article we intend to identifying the predominant type of learning (visual, auditory, kinesthetic and its role in academic learning; analyzing the differences between the learning styles of students from Psychology and Economics universities and how they access their cerebral hemispheres. After analyzing the test subjects we found that they have different learning styles. Psychology students are auditory, tactile and kinesthetic style oriented and economics students focus primarily on visual style. This is explained by the fact that psychology students develop active listening skills through their professional activities that are done with people of different ages and from different social backgrounds.

Keywords: experiential learning, learning style, students

I. Introduction

Cognitive psychologists study the mental activity by which we process and communicate information. To think is to form concepts that organize our world, to solve problem and to make efficient decisions and judgements. One tribute to our rationality is our ability to form and use concepts. Another is our skill at solving problems as we cope with new situations. For other problems, we may follow an algorithm, a step by

step procedure that guarantees a solution. An algorithm is a methodical, logical rule or procedure that guarantees solving a particular problem. Contrasts with the usually speedier-but also more error-prone use of heuristics. Heuristic is a rule of thumb strategy that often allows us to make judgements and solve problems efficiently. The availability heuristic operates when we base our judgments on the availability of information in our memories.

Problem solving is a directed activity in which all steps are considered as they fit into the overall structure setup by the task. This structure is typically hierarchical, with goals, subordinate goals and so on. This hierarchical structure is not unique to problem solving of student, but may be a general characteristic of any directed activity.

In problem solving a goal is set that has to be reached by some as yet unknown means. The goals that constitute the problem can vary widely. Problem solving is not always successful. One reason may be a strong, interfering mental set, which makes the subject fixated and is especially hard to overcome under conditions of intense motivation.

Experiential learning is the process whereby knowledge is created through direct experience. (Itin, CM (1999). The experience can be based on a script or can be arbitrary. Since antiquity, Aristotle said: "The things that we must learn before we do them, we learn them by doing them." (Bynum, WF and Porter, R. (eds) (2005)

David A. Kolb helped popularize the idea of experiential learning by using the works of John Dewey, Kurt Lewin, and Jean Piaget. His work on experiential learning have contributed heavily to expand experiential education philosophy. Experiential learning is learning that takes place after reflection on what was done. Experiential learning is related to experiential education, learning through action, adventure, through free will, through cooperation and community service. Although there are connections and commonalities between these concepts, they should not be confused since they have different meanings.

Experiential learning emphasizes individual learning. Often used as a synonym for experiential education, though the latter include a wider spectrum of education. Thus, under the scope of experiential education fall issues such as the relationship between teacher and student, as well as broader topics such as the structure and objectives of education. (Itin, CM (1999). In college, working as an intern or job-shadowing in areas of interest for the student are valuable examples of experiential learning that contribute significantly to the overall understanding of the real environment. (McCarthy, PR , & McCarthy, HM (2006).

Kolb's proposed experiential learning model (ELM - Experiential Learning Model), is illustrated in Figure no.1.(http://www.simplypsychology.org/learning-kolb.html)

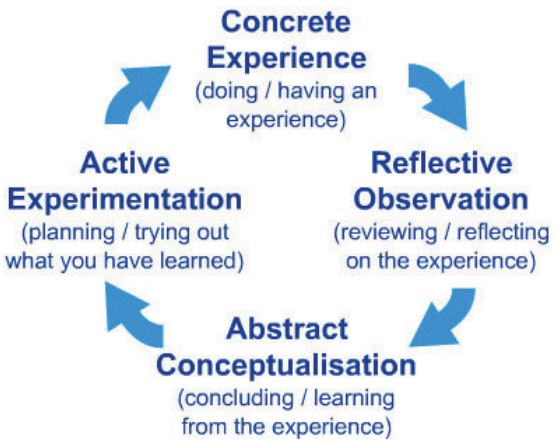


Figure no.1 Kolb's proposed experiential learning model

Experiential activities are among the most effective tools for teaching and learning. (McCarthy, P. R. & McCarthy, H. M. (2006). Experiential learning requires the student's initiative, an "intention of learning" and an "active learning phase". Experiential learning cycle developed by Kolb can be used for framing the stages involved.

Based on this cycle, Jennifer A. Moon, argued that ***experiential learning is most effective if it involves***:

1) a phase of "reflective learning“

2) a learning phase resulting from the actions inherent to experiential learning and

3) "learning phase from feedback". (Moon, J. (2004).

This learning process can cause "changes in judgment, feelings or abilities" for the individual and can provide indications for "adoption of judgment as a guide in decision making and action." (Hutton, M. (1980)). Most teachers understand the role that experience plays in the learning process. The role of emotions and feelings in learning from experience was recognized as important in experiential learning. (Moon, J. (2004)). Although these factors may improve the likelihood that experiential learning takes place, learning can happen without them. In experiential learning, it is essential that the individual be encouraged to engage directly in experience, then to think about it, using their analytical skills, so that the knowledge is better understood and retained for a longer period.

Reflection plays a crucial role in experiential learning and as experiential learning itself, it can be facilitated or independent. Dewey wrote that "the successive sequences of reflective thinking develop from each other and reinforce each other", creating a scaffold for further learning and allowing for the continuity of experience and reflection. (Kompf, M., & Bond, R. (2001)) This reinforces the fact that experiential learning and reflective learning are iterative processes, and the learning is achieved through reflection and experience.

Facilitating experiential learning and reflection presents challenges but "a skillful teacher, using the correct questions and guiding the reflective conversation before, during and after the experience, can help open some significant ways of thinking and learning." (Jacobson, M. & Ruddy, M. (2004)).

Based on Kolb's "Model of experiential learning in 4 stages" and on Pfeiffer and Jones' "Cycle of experiential learning in 5 stages", Jacobson and Ruddy, took theoretical frameworks and created a model questionnaire simple and practical to be use in promoting critical reflection in the experiential learning. ***Their model questionnaire "5 Questions" is as follows: Did you notice...?, Why did that happen?, Does that happen in life?, Why does that happen?, How can you use that? (Jacobson, M. & Ruddy, M. (2004)).*** These questions are put after the experience have taken place and, gradually, they guide the group to reflect on their experience and to thinking towards an understanding of how they can apply what they have learned in their lives. Although the questions are simple, they allow the application of Kolb, Pfeiffer and Jones' theories, and deepen learning within the group.

David Kolb established the following principles of learning styles, conceptualizing them as a continuum:

1. Concrete experience - to be involved in a unique experiential situation

2. Reflective observation - to observe others or oneself

3. Abstract Conceptualization - creating theories to explain the observed things

4. Active experimentation - using these theories to solve problems, make decisions

The styles described by the author are:

Convergent learning style (pragmatic) - abstract conceptualization and active experimentation

- they accumulate knowledge through analysis and then they apply new ideas / concepts into practice
- the ability to apply new ideas is their strength
- they systematize information through hypothetical-deductive

reasoning
- they put particular emphasis on rational and concrete thinking, remaining relatively "cold"
- instead of "wasting" time with people, they prefer to meditate, to invent something.

Divergent Learning Style (reflective) - concrete experience and reflective observation:

- they accumulate knowledge using intuition
- they use at maximum their imagination and their ability to see complex situations from different perspectives to achieve through synergy a significant gestalt
- they also have the ability to effectively integrate information in a whole
- the divergers strength is their imaginative ability, being considered opposites of convergers
- the subjects are emotional and they excel in art and literature

Assimilating learning style (theoretical) - abstract conceptualization and reflective observation:

- the ability to create theoretical and rational-inductive models is their strength
- they learn through analysis, planning and reflection
- they don't focus on practical application, but they focuses on the development of theories, often ignoring the facts if they don't matched a theory.

Accommodative learning style (actives) - concrete experience and active experimentation:

- the style subjects excel in situations where they have to apply known theories to specific circumstances
- their strength is their ability to achieve something and to get involved in a new experience
- they address problems in an intuitive way, going via trial and error. They would rather obtain knowledge from other people than through their analytical skills
- the accommodators are risk takers

All our senses contribute to receiving and processing information from our environment. However, each individual tends to specialize a certain sense in receiving information from the environment. Which is why we develop a preference in this sense, and we are therefore developing a specific learning style based on that sense. When we want to learn something fast, efficient or at an accelerated pace, then that material must be submitted on the optimal path to the brain. Therefor there are four main learning styles: visual, auditory, tactile, kinesthetic.

Sensory data received by sight, sound, touch or through body muscles can go toward the left or right cerebral hemisphere. Each hemisphere processes and stores data in different way. Therefor the data processing can be either symbolic or sensory. Combining learning style with cerebral hemisphere preference promotes the development of accelerated learning skills.

Experiential learning can take place without a teacher based on acquiring knowledge from the direct experience of the individual. Although the accumulation of knowledge is inherently a process that occurs naturally for the authentic learning to take place certain conditions must be fulfilled. (Itin, CM (1999). According to David A. Kolb, an education theorist of American origin, the knowledge is constantly accumulate from both personal experience and the environment. Merriam, SB, Caffarella, RS, & Baumgartner, LM (2007). He says that it is necessary to fulfill certain conditions so that learning takes place:

- ***The student must be willing to play an active role in the experience;***
- ***The student must be capable of reflecting on the experience;***
- ***The student must have, and use, analytical skills to conceptualize the experience;***
- ***The student must have decision-making and problem solving skills, so he can use the new ideas acquired through experience.***

II. Experimental Research

a) Purpose of article. Research Objectives

O1: identifying the predominant type of learning (visual, auditory, kinesthetic and its role in academic learning;

O2: analyzing the differences between the learning styles of students from Psychology and Economics universities and how they access their cerebral hemispheres

b) Test subjects. It consists of two groups of students, years II and III at the universities of Psychology and Economics. Each group consists of 30 participants.

c) Methods:

1. Kolb learning styles test (1984)
2. Preference learning style questionnaire created by Ricki Linksman (1999)

d) Results of research. Hypothesis testing research

Hypothesis no. 1

After analyzing the test subjects we found that they have different learning styles. ***Psychology students are auditory, tactile and kinesthetic***

style oriented and economics students focus primarily on visual style. This is explained by the fact that psychology students develop active listening skills through their professional activities that are done with people of different ages and from different social backgrounds. Active listening is a conversation technique which shows the other party the significance we attach to its message. It is very useful in solving ones interpersonal conflicts, and in conflict mediation. ***Active listening*** optimizes communication. It can be used for three purposes:

- Information (to get from the other party a clear picture of the problem that needs to be address, sometimes by correcting erroneous perception that the listener has of the conflict - this is needed to solve the conflict)
- Emotional support, counseling, reassuring the other party
- Response to verbal attacks, to the other's irritation

In the curriculum of Psychology specialization there is a class on communication psychology, here students learn to use a specific language to improve their empathy skills. They will use these skills later in the professional life in areas where they will work as psychologists: in clinical care, psychologist – client communication and educational, teacher - student communication. To optimize their professional behavior, we recommend the development of communication skills with customers for the students from Economics.

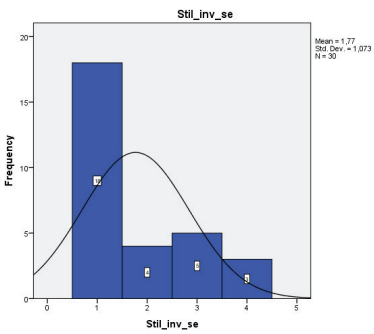
The visual learning style - corresponds to subjects who learn mainly by seeing. They have specialized functional neural pathways from the eye to the part of the brain that interprets visual stimuli.

The auditory learning style - corresponds to subjects who learn by listening to others or even to themselves while talking about the subject to be learned. These subjects have specialized neural pathways from the ear to the brain part that interprets the auditory stimuli.

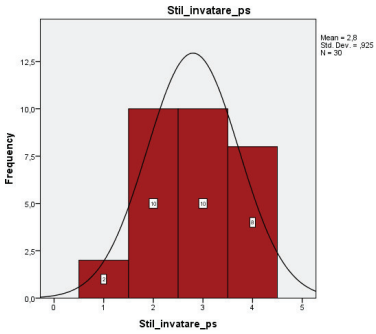
The tactile learning style (technical, understanding the mechanics of "cause - effect") - corresponds to subjects who learn by touching, perceiving sensations of the skin, using their fingers and hands having the act of learning accompanied by the emotional-affective register. These subjects have neural pathways from the sensory neurons of the hands, fingers, skin, physical or neuro-vegetative reactions associated to emotions to the part of the brain that process sensory information.

The kinesthetic learning style - corresponds to subjects who learn by manipulating (in space) the main, most massive, muscle groups and who get involved in learning through simulation, transposition into the roles of others, exploration and participating in real life, practical experiential learning. This involves specialized neural pathways from the respective

muscles to the part of the brain which processes information coming from them.



Learning styles of students from Economics



Learning styles of students from Psychology

Figure 2. Learning styles of students participating in research: visual, auditory, tactile, kinesthetic

Hypothesis no. 2

In regard of experiential learning styles the research results revealed that there are significant differences between students. By applying inventory learning styles of Kolb, it showed that psychology students were predominantly convergent style while students of economics are more active accommodators style.

Students of psychology have a converging oriented style that involves:

- accumulate knowledge through analysis and then apply new ideas / concepts into practice
- the ability to apply new ideas is their strength
- systematize information through hypothetical-deductive reasoning
- they put particular emphasis on rational and concrete thinking, remaining relatively "cold"

Students of Economics have a more accomodating style which involves:

- they excels in situations where they have to apply known theories to specific circumstances
-their strength is the ability to achieve something and to get involved in a new experience
- address the problem in an intuitive way, going via trial and error. They obtain knowledge from other people than through their analytical skills
- the accommodators are risk takers

The data complies with the normality and homogeneity conditions which allowed us to apply the t-test for independent samples. After the calculations we observed significant differences in terms of learning style of students from psychology and economics as t = -6.347 at a significance level p <0.000. Regarding the analysis of the brain hemisphere involved in learning we observed in the data analysis that students in Psychology use mainly the left hemisphere and those from economics are focused equally on using the right hemisphere and by using both brain hemispheres in solving problems. These data were obtained using inventory determining the cerebral hemispheres of Rick L. In the sample analyzed the results of the research show that:

- through specific activities that take place predominantly in the left hemisphere, students processes the data as symbols in the form of letters, numbers, words and abstract ideas. Specialized studies confirm that for most people, the area responsible for language is in the left hemisphere.
- through specific activities that take place predominantly in the right hemisphere the students processes the data globally, simultaneously. Analyzing the table above we notice that in this case too we have significant difference between samples with a threshold of significance level p = 0.019.

Findings and Conclusions

Experiential learning is most often compared to academic learning, the accumulation of knowledge through the study of the subject, without requiring direct sensory experience for the information to be transferred. While the experiential learning is done through analysis, initiative and immersion, academic learning is based on constructive learning and reproductive learning. (Stavenga de Jong, JA, Wierstra, RFA and Hermanussen, J. (2006))

Although both methods aim to train the students, academic learning is using more abstract methods, which are adapted for classrooms while experiential learning actively involves the student in concrete experience.

Our cognitive system receives, perceives and retrieves information, which we then use to think and communicate, sometimes wisely, sometimes foolishly. When faced with a novel situation for which well-learned response they do, students may use any of several strategies, such as trial and error, algorithms and rule-of-thumb heuristics. Sometimes the solution comes in a flash of insight. They do, however, face obstacles to successful problem solving. The experiential learning is useful in problem solving and in development students' creativity.

Only reflecting on their activities can teachers realize their strengths and weaknesses, can adjust their own teaching style in order to achieve their objectives. In doing so, teachers can lead their students to reflect on how they carry out the learning process so they can improve it and help them form and develop metacognitive skills over time.

The concept of "reflective teaching" derives from Dewey (1933, as cited. Pollard, 2008), which puts in opposition "the routine action" with "reflective action". Following Dewey's studies, many researchers were interested in the issue of "reflection" in the educational process. They made various approaches to this problem, as showed by the many terms used "reflective practice", "reflective teaching", "critical thinking", "reflective thinking" etc. The teacher's reflective practice represents a cognitive and metacognitive approach of deliberate examination of educational practices, which aims to gain a deep understanding of the entire educational process in order to optimize it. It involves the adoption of informed and logical decisions and analyzing the consequences of those decisions (Weir and Tilney, 2004).

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