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## Analysing of the Learning Style of Medical Students and Physical Education Students

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### Abstract

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Knowledge of learning style can enhance the ability of teachers to build on student experiences and construct new learning opportunities. It is about how a person learns than what a person learn. This study examines the learning styles preferences in medical and physical education university students and the differences in their learning according to Learning Styles Kolb Questionnaire. This questionnaire is design to find out the preferred learning style and differs from other tests of learning style and personality used in education by being based on a comprehensive theory of learning and development. The group consist in 222 students. Six variables were asseses: four primary scores that measure an individual's relative emphasis on the four learning orientations: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE), and two combination scores that measure an individual's preference for abstractness over concreteness (AC-CE) and action over reflection (AE-RO). According to the results of the study after applied One Way Anova and Bonferoni with SPSS package program it was seen that are not significant differences between groups for three learning orientation. Only for Abstract Conceptualization (AC) were founded differences between groups. With the results, we bring out the inventory of students learning stylea and performance.

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**Keywords:** Learning style; students; questionnaire.

## 1. Introduction

Research studies on learning styles have shown that learning can be enhanced through consideration of personal characteristics in design. Because some learners tend to focus on facts, data, or procedures, engaging with theories and mathematical models is appropriate. Some learners use visual information like pictures, diagrams, and simulations to understand better, while others can get more from oral and written information. Researchers have argued that learning style also functions as a useful indicator for potential learning performance (Kolb & Kolb, 2005; Mainemelis, Boyatzis & Kolb, 2002; Engels & de Gara, 2010; Ventura & Moscoloni, 2015; Samarakoon et al, 2013).

In order to identify the learning styles, we have established that the most appropriate course of action is to identify them based on the EBL model (Experience Based on Learning System), conceived by David A. Kolb, professor of organizational development at Case Western Reserve University in Cleveland, Ohio. Kolb (1981) defines the learning styles as representing preferences for one mode of adaptation over the others; but these preferences do not operate to the exclusion of other adaptive modes and will vary from time to time and situation to situation.

Any attempt to describe learning starts from the characteristics of this process. The theory of experiential learning (TEL) proposed by Kolb (1984) defines learning: (1) as a holistic process of adaptation to the world; (2) involves transactions between the individual and the environment; is best conceived as a process; (3) is the process of creating knowledge; (4) is continuous and based on experience; (5) requires the resolving of conflicts between the individual and the environment, this occurring by choosing one out of four solutions: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC) and Active Experimentation (AE) – notions that we will elaborate on below.

The theory developed by David Kolb is all the more interesting as it invites us to follow the description of the *styles of learning* and of their main characteristics: **Concrete experience** (CE) (emotions and senses) – is a style of learning that indicates a perspective centered on the individual. **Reflexive observation** (RO) – is an approach on the learning process that is centered on observation and reflexive learning. **Conceptualization or generalization and abstraction** (AC) – is a style of learning that indicates an analytic and conceptual approach to learning. **Active experimentation** (AE) – this style of learning shows an active approach to learning (action-oriented), and it relies on experimentation.

Starting from these characteristics of the learning process, and keeping in mind that there cannot be only one dominant, we can describe four big categories of *learning styles*: Accommodating, Diverging, Assimilating and Converging (Kolb & Kolb, 2005).

The **Accommodating style** of learning combines the stages of Concrete Experience (CE) with Active Experimentation (AE). People with this learning style: assimilate information mostly through practical experiences, most of the time ignoring the theory; plan and get involved in new, provocative experiences; rely more on what they sense, on feelings, and not so much on logical analyses; rely on information obtained from others, and much less on their own work of selecting information – which can lead to activities that have no basis for argumentation; finish what they start; they take the risks of their own actions.

The **Diverging Style** is a combination between the Concrete Experience (CE) and Reflective Observation (RO). People with this style of learning: show a mostly intuitive capacity of assimilating information; have a great capacity for using their imaginative capabilities and the ability of seeing complex situations from more perspectives, but also for rebuilding the original whole from information pieces; have the capacity to understand others and to identify problems when they appear; can get stuck in the process of identifying options.

The **Assimilating Style** is a cross between Abstract Conceptualization (AC) and Reflective Observation (RO). People who are characterized by this learning style: are capable of creating theoretical and rational-inductive models, sometimes even ignoring the facts if they don't correspond to the theory they elaborated; are focused on learning through analysis, planning and reflection; lack practicality.

The **Converging Style** results from Abstract Conceptualization (AC) and Active Experimentation (AE). Convergent subjects: accumulate knowledge through analysis and then subsequently apply the new ideas or concepts in practice; systematize the information through hypothetical-deductive, logical reasoning; define problems and make decisions “cool-headed”.

In a dynamic society, in which the pieces of information follow one another in quick succession, and in which it becomes difficult – if not even impossible, sometimes – to keep up with the latest discoveries, the process of assimilating data – and consequently the learning process – becomes vital. The authors of this article are University teachers and have observed first-hand the changes that have occurred in the past years regarding the process of teaching and of remembering the information that is taught. In a desire to identify what would be the best methods of teaching in order to ensure that the information provided will be assimilated and acquired by students, we have started on the path of identifying learning styles, so that in an ulterior step we would also build the teaching methods that are appropriate and adapted to the requests of the subject being taught and to the needs of students at the same time.

The purpose of our study was to examine the preferences learning styles of medical students and physical education students, the differences in their learning according to Learning Styles Kolb Questionnaire and to show any differences between groups.

## **2. Material and methods**

### *1.1. Participants*

The study group consists of 222 students who study at “Alexandru Ioan Cuza” University from Iasi, and University of Medicine and Pharmacy from Iasi. The mean values of age of these students is  $21,42 \pm 2.37$  years. They study in different specialization as: General medicine - GM (53 subjects); General Nurse – GN (59 subjects); Kinetotherapy and Special Motricity - KSM (52 subjects); Kinetotherapy and Sports Traumatology – KST (58 subjects). The subjects were informed about the process of the study and them given an oral accord for participation voluntarily to the study. In the same time, we obtained the approval of the Ethics Commission from Faculty of Physical Education and Sports Faculty. The research took place during one week in month of October 2015, and consists in a self-administrated questionnaire.

### 1.2. Instrument

To evaluate the learning style of university students, we used the short questionnaire of Learning Style Inventory (LSI) and consist in 9 items (Kolb & Kolb, 2005). For each item, respondents gave points from 4 to 1. Four points were given to the word who characterized mostly and descending to one for others three words. The total higher score represent the learning style.

Six variables were assesses: four primary scores that measure an individual's relative emphasis on the four learning orientations: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE), and two combination scores that measure an individual's preference for abstractness over concreteness (AC-CE) and action over reflection (AE-RO).

### 1.3. Statistical analyses

Statistical analyses were performed using SPSS (version 17). Independent Sample *t* Test and Pearson correlation were initially used to find out if any differences between learning style in different specializations are.

## 3. Results and discussions

Table 1 shows the minimum and maximum values for every item and mean and standard deviation. The lowest score was 12 for learning style and the highest was 35. We can see that there is a higher preference for AE over RO in processing knowledge and for CE over AC in perceiving knowledge. For all group when plotted on the Kolb's learning style circle the average score of the AC-CE and the AE-RO dimensions, it shows that the most preferred learning style being Assimilators with 41.0%.

**Table 1.** Mean±SD of the components of the learning style for whole group.

|       | N   | Min | Max | Mean  | SD    |
|-------|-----|-----|-----|-------|-------|
| CE    | 222 | 15  | 33  | 23.89 | ±3.54 |
| RO    | 222 | 12  | 31  | 21.25 | ±3.37 |
| AC    | 222 | 13  | 32  | 21.58 | ±3.41 |
| AE    | 222 | 13  | 35  | 23.16 | ±3.87 |
| AC-CE | 222 | -2  | 16  | -2.32 | ±5.79 |
| AE-RO | 222 | 1   | 18  | 1.91  | ±6.22 |

**Table 2.** Correlation between learning style for whole group.

|       | RO       | AC      | AE      | AC-CE   | AE-RO   |
|-------|----------|---------|---------|---------|---------|
| CE    | -0.349** | -.399** | -.196** | .816**  | 0.062   |
| RO    |          | -.016   | -.464** | -.207** | -.827** |
| AC    |          |         | -.404** | -.803** | -.236** |
| AE    |          |         |         | .140    | .853**  |
| AC-CE |          |         |         |         | -.201** |
| AE-RO |          |         |         |         |         |

\*\*Correlation is significant at the 0.01 level

\*Correlation is significant at the 0.05 level

The correlation from the Table 2 shows that the AC scale was negatively medium correlated with CE scale at a significant level, as was between AE scale and RO scale. The dimensions AC-CE and

AE-RO are two bipolar dimensions with a negatively lower correlation. At the level of cross dimensional scales (CE/RO, CE/AC, CE/AE, AC/AE, RO/AE) were not obtained higher correlations as the within-dimensional scales.

Table 3 shows the results of learning style for two specializations: Medicine with General Medicine (GM) and General Nurse (GN) and Physical Education (PE) with Kinetotherapy and Sports Traumatology (KST) and Kinetotherapy and Special Motricity (KSM). Between groups from medicine specialization obtained no statistical differences, but between groups from PE obtained differences for AC and AC-CE dimensions.

**Table 3.** Components of learning dimensions by specialisations (Medicine vs. PE)

|       |         | GM<br>N=53 | GN<br>N=59 | <i>t</i> | KST<br>N=58 | KSM<br>N=52 | <i>t</i> |
|-------|---------|------------|------------|----------|-------------|-------------|----------|
| CE    | Mean±SD | 23.26±3.78 | 24.69±3.84 | -1.98    | 23.31±3.30  | 24.28±3.01  | -1.61    |
| RO    | Mean±SD | 22.13±3.55 | 20.50±3.27 | 2.51     | 21.32±2.94  | 21.13±3.64  | 0.30     |
| AC    | Mean±SD | 21.58±3.05 | 21.37±3.62 | 0.33     | 22.75±3.41  | 20.50±3.17  | 3.57*    |
| AE    | Mean±SD | 22.92±4.67 | 23.03±3.57 | -0.14    | 22.93±3.22  | 23.80±4.00  | -1.27    |
| AC-CE | Mean±SD | -2.47±5.27 | -3.20±6.59 | 1.52     | -0.65±5.76  | 1.55±5.18   | 2.90*    |
| AE-RO | Mean±SD | 0.33±7.06  | 2.52±5.87  | -1.78    | -3.63±5.18  | 2.67±6.64   | -0.97    |

\*p<0.05

After plotted on the Kolb's learning style circle the average score of the AC-CE and the AE-RO dimensions, we obtained the Table 4 who shows the percent of learning style for all four specializations, and we can categorize as assimilator the majority of subjects. The GN group obtained the highest score from assimilators. Assimilators possess the dominant learning abilities of AC and RO (Kolb, 1981). The results it is similar with Borracci & Arribalzaga (2015) where the learning style were assimilator in 60.3% of cases, accommodator 6.9%, convergent 6.0% and undefined in 12,1%.

**Table 4.** Percent of Learning styles by specialization

|              | GM<br>N=53 | GN<br>N=59 | KST<br>N=58 | KSM<br>N=52 |
|--------------|------------|------------|-------------|-------------|
| Diverger     | 17.0       | 11.9       | 24.1        | 7.7         |
| Assimilator  | 37.7       | 49.2       | 32.8        | 44.2        |
| Converger    | 28.3       | 25.4       | 24.1        | 21.2        |
| Accommodator | 5.7        | 6.8        | 12.1        | 9.6         |
| Missing      | 11.3       | 6.8        | 6.9         | 17.3        |

The Assimilator learning style includes abstract conceptualization and reflective observation. Individuals bearing the characteristics of this type of learning are capable of grasping a large scale of information scattered over a wide discipline and convert it to a logical whole. Instead of dealing with other individuals, they prefer to deal with abstract concepts and issues. They generally focus on the logical validity of theories instead of their applicability. It is stated that the characteristics of these individuals could be developed through conducting research on the organization of information, establishing conceptual models, testing and confronting the ideas and theories, designing tests, conducting quantitative data analysis (Ugur et al., 2009; Kolb & Kolb, 2005). This study is useful to do some changes in medical and PE education, where teachers to use different type of learning methods, as interactive, problem-based or student-centred learning (Samarakoon et. al, 2013; Coker, 1996).

#### 4. Conclusions

The knowledge of learning styles can be useful to both teachers and students, where teachers can adapt pedagogy to correlate with learning styles of students. Our aim was to explore learning style in order to suggest academic performance from students by adopting the proper style in the teachers teaching programme, influenced by learning abilities.

In our study, statistical differences between MG and MN not observed. Only for PE specialization found statistical differences in Ac and AC-CE dimensions. All groups were characterized as assimilator and General Nurse Specialisation obtained the highest score from assimilators.

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