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VARIA

# Comparative study on the independent learning activity of young people in the bachelor's and master's programs

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**Abstract**: *During the late adolescence, it can be reached the highest level of mental operative functions and other intelligent human manifestations. Abstract mental operations can be done at this level: synthesis of syntheses, generalization of generalizations, abstraction of abstractions. Students go through many attempts to find which is their personal style of learning new materials, new contents. The study was conducted on a number of 31 participants. The group was divided into two subgroups: 16 students in the 5th year at Faculty of General Medicine and 15 master students in the second year at University of Sports, Sports Performance program. The used instrument consists of 21 questions (11 questions are about the individual studying process of the participants and 10 are about their beliefs about the teaching process of academics in courses), along with 4 more questions related to personal data. It is an opinion questionnaire. The teaching style of academics differs: those of Faculty of General Medicine are focusing on a lecture type style (75%), and University of Sports on an interactive style (67%). We discovered differences in the process of self-learning: between continuous and discontinuous style. For medical students, there was a longer distribution of the self-taught learning process; instead, University of Sports students organize their learning time in the last part of the semester. University of Sports students are more concerned with on the development and refinement of their personal practical skills, but also of the subjects they work with (kids or athletes), their goal being to accumulate their own experience as rich as possible from working with as many individuals and less to take from the experience of other colleagues. The coach-athlete/sports teacher-pupil relationship is more personalized and longer-lasting than the doctor-patient relationship.*

**Keywords**: *laser Doppler vibrometry, middle ear*

## INTRODUCTION

### 1. Learning activity and its role in summative assessment

*1.1. Learning activity for young people - generalities*

During the adolescence period (considered between 14/15 and 20 years), the individual seeks his own identity and begins the stage of abstract thinking. Hayford [1] highlights the student period of 18/20-24/25 years as a prolonged adolescence. The young adult age is between 20-40 years and assumes that the most important aspects are the intellectual skills that will be used in professional life and the foundation of intimate and personal life.

Around the age of 17-18, the highest level of mental functioning and the manifestation of human intelligence is reached. The operations of thinking are fully liberated from the informational contents to which they were initially applied, they are generalized, they are transferred and they become formal. Thus, the second-degree operations are

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successful: syntheses of syntheses, generalizations of generalizations, abstractions of abstractions.

Piaget describes the stage of concrete operations as ending around the age of 12-13 years old, when adolescents are able to perceive the constancy of objects in terms of transformations, regarding structure, volume, in a nutshell, the ability to understand the fact that objects are constant in relation to the notion of flexibility. After the age of 13, up to 17-18 years, the stage of formal operations is completed, when young people manage to think inferentially, including the possible, with the issuance of assumptions and the definition of specific pathways for each option seen separately. It defines the logic, the concepts of contradiction, certain grammatical structures of the "double negation" type, the detection of the grammatical concepts of circumstantiality and attributiveness and the optional-conditional, which could be seen differently. Also, an important role is played by the concept of "perceiving the absurd" or of the possibility to operate on the determinants, of the empty set, in the sense of superior mathematics.

During late adolescence, there is a strong conflict related to the balance between maturity and childhood, the balance between needs and how to meet them, due to the relationship between aspirations and possibilities and the conflict between dependence and independence.

Some authors [2] consider that adolescence is a period of confusion, but also a period of future projections that the adolescent makes. The desire for self-improvement appears, emotions and feelings are amplified, moral autonomy and self-awareness are developed, the adolescent has the feeling of independence. There are feelings of disagreement and rejection of ideas imposed by other people.

The period of youth, between 20-24 years [3] is considered a period of transition to adulthood. The acquisition of economic autonomy begins, leading to greater independence. Levinson [4] calls the period from 17 to 22 years - the period of young adulthood and considers that it is characterized by the coexistence of the adolescent and the young adult status. He considers that it is a period of transition dominated by the transition of the young man from the state of child-man to that of young man.

Young people begin to become autonomous, move away from the family environment, from the model imposed by their childhood, create their own social system and thus structure themselves as individuals and part of their generation. The aspirations, the ideal about the world and life, the value system begin to particularize and become constant, proper in the young person's life, giving coherence to his/her actions.

Learning is the main activity of young people. They have a very high capacity to assimilate information, to incorporate it. They also show an increased availability for this activity. The preoccupation for learning comes from an internal motive towards self-improvement, continuous development, search for existential meanings and senses. They are beginning to lose the importance of the school assessment, grading and ranking component, focusing on the activity of acquiring the necessary knowledge in the desired field. According to Erikson [5], the adult stage involves: amplifying social identity, employment and involvement in social life, intense feeling of love, the beginning of family life and the development of intimacy, the oscillation between isolation – intimacy - the tendency to link relationships with others groups.

Knowledge and, in general, the intellect has a wider notional area than the psychic process of memory. In turn, memorization is only the first part that defines memory as a high psychic function, the other two aspects being the preservation of information and updating (which can be in the form of recognition or reproduction). The intellect is the superior form to which the definition of the personality of young people accesses, this including the peaks of the "iceberg" represented by each function or psychic process. In the absence of memory, life would be a "ball of sensory impressions", structuring the continuity of the psyche leaving "gaps" in the network in which students submit their information. If we refer strictly to the psychic process of memorization, we can describe the concept of "buffer", in which many students run, more or less information, depending on individual abilities, some being those who learn early and cope with information exams stored in long-term memory, others having as a favorite profile the loading of the buffer (this being a capacity, an ability in itself) and having remarkable results with the information stored here. The persistence over time and the effectiveness of this type of long-term learning in relation to valid and valuable expression in the future profession is to be discussed.

The overall mental operations are developed and many specific algorithms are formed. The motivation for vocational learning is strong, especially practical work-related learning. Another important aspect is that learning becomes strongly selective, conscious and voluntary. The formation of hypothetical-deductive thinking appears when the young person has the capacity to abstract, to separate the notion of object from a concrete reality and the possibility to analyze his own thoughts. He/she begins to understand and deduce the cause-effect, singular-particular-general connections. The ability to apply in practice with an individual character is also formed - the young person has

the tendency and ability not only to acquire new knowledge, but also to use it to create something new, integrates it much better [6].

Young people go through new challenges once they enter the university/vocational education system related to important exams, different classification system, different grading system, different type of examination, university structure and so on.

*1.2. Self-training*

Youth has an emphasis on the need and desire to learn more on their own, with autonomous effect. A style that focuses on the need for continuous renewal of one's knowledge through a constant personal effort is preferred, an effort that opens the perspective of developing the skills to learn alone, of autonomous and independent training. These self-taught systems will gain ground, because they respond better to self-motivations, an internal motivation for self-improvement and training, for self-completion, each individual having the opportunity to cultivate and better value their own abilities. and skills. Thus, the individual becomes his own "manager" of his intellectual, cultural and professional progress and plays an active role in the development of his cognitive function and his own training.

Self-training is defined as an integral part of self-education [7], which refers to the enrichment of knowledge and independent intellectual training. It involves a motivational impulse and the acquisition of tools of independent intellectual work. Individuals create their own self-training system, with personal, adapted techniques, which are based on his style. These involve: choosing the necessary information, systematizing it, processing the learning content, using the content to solve some learning tasks (exercises that help to integrate the learned content), self-control and so on.

Self-training is considered a form of manifestation of cognitive activism [8], a difficult and complex process that is not summarized only during university studies, but throughout the life of the individual. It is considered that the self-taught activity requires great efforts, ability to organize, to organize his/her own personal space, concentration on the task, developed motivational sphere, permanent control and self-improvement. This type of learning is common in high school. It is based on awareness and formation of personal appreciation of the domain taught. Metacognition is the theoretical foundation behind self-training. Self-regulated learning is based on self-responsibility.

The following question also arises: why a person cannot have a self-regulated learning throughout all learning experiences. Other theorists [9] believe that, when they are young, children cannot be self-regulators during learning in any formal way. In addition, comes Piaget's theory [10] that explains that against self-learning learning comes the egocentrism of the young child. And Vygotsky [11] emphasizes the importance of young children's inability to use inner language in guiding roles.

It is important to mention that the self-training activity must in turn be learned and repeated. Students go through many attempts in order to find out what is their personal style of deepening the teaching courses, their contents. Dordea [12] states that there are three sub-competencies that students must master in order to succeed in the process of self-teaching: self-appreciation of the personalized strategy, realization/implementation of that strategy, self-evaluation of results. Basically, the student has to "learn how to learn".

The individual learning project can be improved through two main ways: 1) indirectly, through experience; and 2) directly, through training. Thus, individual study can be encouraged through recurrent positive experiences (students notice that self-assessment is positive and that self-instruction increases the accuracy of learning), similar to the theory of positive reinforcement.

It is important that adolescents and young people acquire self-regulatory skills during their development. As the time passes, they need to process an ever-expanding volume of information and operate with knowledge at increasingly abstract levels. An essential feature of self-regulated learning is the dynamic approach of the topics to be learned. Thus, the student can analyze the teacher's comments and compare them with his own perceptions of the learning situation. Can self-learning lead to a burn-out syndrome due to the pressure and informational volume? Recent scientific research based on evidence-based medicine is highlighting the increased number of young people that are developing burn-out syndrome, sometimes due to medical conditions (neuroendocrine for example) that leads, in the severe form, up to depression [13].

The situation of students who become pregnant at a young age should also be discussed as a separate perspective (even if they have a lower frequency in the University of Medicine or Sports, given the specifics of learning or activities/ practical works). However, their number should not be neglected, especially in terms of pregnancy hormones, which cause mood swings, which can influence the ability of learning, given the motivational-volitional links with those of mnesic-prosexic processes and learning, especially in the amygdala area and the hippocampus area, brain areas significantly involved in both emotional motivational

regulation and superior gnostic functions, so that they are active at the optimal level in terms of supporting the effort to complete a university curriculum [14, 15].

*1.3. Adult education*

The educational process of adults must respond to the challenges posed by today's society, which is changing its rhythm very quickly. Giddens [16] proposes a series of characteristics of late modernity, as typical elements for contemporary western society: industrial capitalism, reflexivity, individual responsibility. Modernization has accentuated digital education, with the help of digital technologies in many fields, from trade to education, medicine, teachers [17].

Adult education in Romania takes place in the context of another type of modernity than that of the western countries, namely tendentious modernity [18]. This concept refers to the fact that there are differences between the style in our country and the western one, due to some older concepts in our system, which makes the modernization to be partial and unfinished.

Adult education occurs only by virtue of personal own vision of the project of developing society, with all the implications of the coexistence of the old with the new, of progress with conservatism, of the modern with the traditional. It aims to improve existing skills and/or acquire new ones. It also aims to assimilate system values that have previously proven social performance and put them into practice. Adult education asserts itself in different forms of education: continuing education, non-school education, non-formal education.

There are a number of phenomena that prevent the formation of adults: inequality of opportunities in education, inequalities between levels of education (between educational units from the same area, between students), inequalities of access between faculties. In several cases these inequalities have a huge impact on the developing personality of an adult person even more if this personality closes the borderline type or reaches the psychiatric connotations [19]. There are several causes that are against unitary access to educational levels: poor material endowments, underfunding of educational units, differences between schools in urban and rural areas, problems related to human resources in schools, school dropout, repetition, the existence of a segment of the population that does not take advantage of the educational system. The higher the level of schooling, the higher the value of the additional costs of education that the family has to cover, discussing here for example: the fee for college, food expenses, textbooks, rent [20]. Nowadays, recent strategies involving the cost of education are trying to keep the step with full on-line education system, additional costs covered by the family have changed their levels: for example, a higher investment in modern communication devices. In the same time, the educational system redirects its costs based on this new on-line strategy.

Lifelong learning involves everything a person does throughout life to complete his/her knowledge, learn new things, acquire skills or develop his/her talents in formal, non-formal and informal contexts.

It is important to note that education, from one level onwards, is optional. Post-school training is often a personal choice. Unfortunately, there are no mechanisms in society to encourage adults to learn continuously. They may limit themselves to the knowledge gained in school due to routine, inability to cope with change, difficulty in economic and financial management, disinterest in performance.

It is observed that young people who have obtained a higher education have: information processing capacity that can be extended to other cognitive areas, the operability of thinking is kept at high levels, the young person's thinking is wide, deep, systematic, rigorous, very good mental adaptability to specific professional. Young people have critical thinking [21].

*1.4. Evaluation - types of evaluation*

Evaluation is a component part of the educational process. It informs us about the effectiveness of teaching-learning strategies and methods and appreciates the correct choice of operational objectives on lessons. The teaching-learning-evaluation relationship presupposes a cause-effect circle, in which each component conditions the other. If we are thinking at the western model, the evaluation should not be considered a control method that would punish those who fail it. Students must understand the learning content, not only memorize it, and the given task must be contextualized, in which the subject can express his/her learning style.

Evaluation can be of several types. It differs depending on the type of classification. According to the criterion of the moment at which it is performed, the evaluation can be:

- initial (in the initial phase of the instructive-educational process) - aims to see what is the level from which to start,
- continue (throughout the training program) - aims to observe the improvements along the way and to achieve the optimization of the educational process,
- summative (at the end of a session/module).

The evaluation can also be: formal and informal. The formal one presupposes well-defined criteria, previously outlined and it is associated with standardized tests, it presupposes a

certain level of expertise of the one who performs it (License type exams, Baccalaureate, National Assessment etc.). Informal assessment is based on intuitive criteria and involves tests created by the teacher.

There is another classification of evaluation: internal or external. The internal one is made by the internal teacher (the one who designed the learning content is the one who evaluates it). In this case, the evaluator knows the particularities of the students, is familiar with them, knows their progress along the way. The external evaluation is performed by a teacher who has not been involved in the instructional-educational process and has the advantage that it is objective.

The evaluation can also be of normative and criterion type. The normative one has the following characteristics: the performance of the subjects is related to the group norm, to the reference group (class, year, respective series) and compares the students, it ranks them. Criterion evaluation presupposes that performance is related to an absolute criterion, to a standard. Evaluate absolute success in evaluation.

According to some other authors [22-24], evaluation can be: comparative (has the role of classifying subjects, relating them to each other, according to their level of success), based on a criteria (has the role of providing functional information, allowing subjects to be in in relation to achieving the objectives common to all subjects), corrective (wants to provide the subject with additional information depending on the difficulties he encountered), conscious or formative (oscillates between cognition and metacognition and promotes active participation and autonomy of the subject so that he/she, subsequently, takes control of his/her own transformation, becoming aware of its shortcomings and difficulties).

The traditional assessment methods are: oral tests, written tests and practical tests. There are also complementary, more modern methods, among which: systematic observation of behavior, investigation, project, portfolio, self-assessment [25].

Sometimes the psychological and physical overload based on a frail personality structure could lead to an interpretative phenomenon of key components of an evaluation, that, for the student, seems to be debatable. Risks will lead later on to anxiety and depression sometime at psychiatric levels [26, 27].

*1.5. Summative evaluation*

It is also called cumulative evaluation. The act of evaluation involves three stages: measurement, assessment of results and adoption of improvement measures [28]. It is performed at the end of a session/module. It has the purpose of accreditation/decision to improve future activities. It is performed by an internal or external evaluator, is done at long intervals and aims to see the final results of the students. It tries to test the final and accumulated knowledge that the students have acquired. It is important because of its dual role. It is useful for the trainer, to see if the chosen means and methods are useful, effective, if the information has arrived correctly and as quantitatively as possible. It is the feedback he receives from students. It is also useful for students to objectify what information they understood, what should have been clarified in more detail, etc.

It is a type of balance sheet assessment, global, at the end of relatively large activity segments. The disadvantage of this type of evaluation is that it does not allow the regulation/improvement of the didactic process; it is possible only after relatively long periods or never. Thus, trainers cannot change the teaching-training style to improve the results of their students, because they cannot make a second summative evaluation. However, it highlights the level at which the activity took place and its results, recognizes the efforts made by the subjects and the interest shown by them. It also offers the satisfaction of the social recognition of the subjects' competencies. At the level of society, these cumulative assessments certify that subjects are able to cope with certain tasks and requirements and that they can play certain roles in social life.

It is well known that grades, often, do not exactly reflect the true level of performance of the subjects and as a result, are not stimulating and do not provide sufficient data on the effectiveness of the training program. It is advisable to use it together with other types of assessment, such as continuous assessment, to rely on continuous feedback to cooperate the teacher with the students [29].

**MATERIALS AND METHODS**

The present research aimed to highlight some differences in the learning-teaching process of young people at the level of students at the Faculty of General Medicine, compared to those at the National University of Physical Education and Sports. We tried to observe what is the time that young people aged 18-25 allocate for individual study in their preparation for the summative assessment and the level of awareness of the need to be involved in the self-taught process. We highlighted the perception of students in relation to the teaching style of academics. We also sought to highlight possible psychological motivational explanations for interpreting the results.

The tool used was a questionnaire that consists of 21 questions (11 questions are related to the individual study process of young people in the group, and 10 are about the teaching process sustained by the professors at courses), along with four more questions to highlight the factual data. It is an opinion questionnaire. The participants received the appropriate training to complete the answers and were assured of the confidentiality of the data, their results being used only for the purpose of this research. The questionnaire took about two minutes to complete.

The tool was uploaded in google forms and sent to the participants to form the database. The data were collected between April 15-25, 2020.

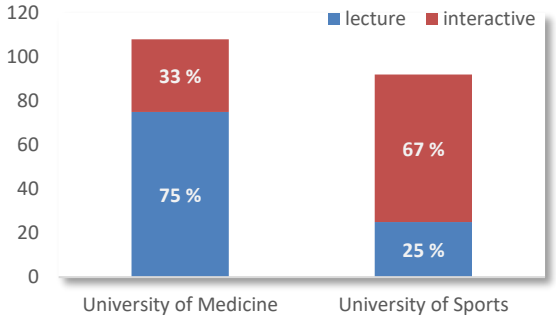
The study was performed on a number of 31 participants. The group was divided into two groups: 16 students in the 5th year at the University of Medicine and Pharmacy- Faculty of General Medicine and 15 master students in the second year at The National University of Physical Education and Sports, the Motor Performance program.

The ages of the participants ranged from 22 to 26 years. There was female (18) and male (13) participants.

**RESULTS**

Regarding the methods of education and training in young people, we highlighted the teaching style of the university staff from the two faculties and we noticed differences between the style of them, one activating in the field of health and the other one in the field of sports (Figure 1).

**Figure 1**: Teaching style of academics (percentage of teachers)

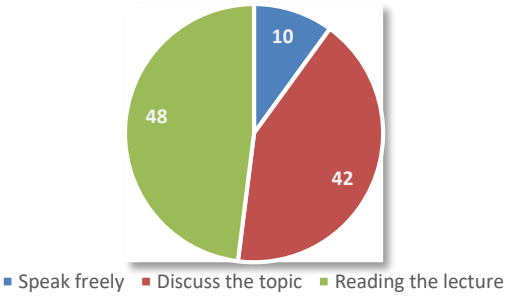



Although, currently, the teachers from the medical university are increasingly open to a more interactive teaching style, it is important that a well-structured lecture is based on a diagnostic tree, and the mastery of logical thinking by the medical student implies, in for the most part, the acquisition of diagnostic tree-type thinking. This is the reason why many medical teachers prefer a lecture style because it is better suited to the large learning content, compared to those in the field of sports that emphasize the practical part of the theorized content.

Medical professors focus more on teaching "thick materials" in a lecture-style method when they are addressing to a homogeneous group of young people, with preliminary and extensive concepts from the pre-clinical years and for whom the information presented makes sense and it is easy to understand. For more difficult subjects, students prefer a direct teaching method, in which they manage to write down the information as accurately as possible, in order to have the chance of a second or third passage through the materials represented by their own notes, in the idea that the information it was so abundant that the student (less familiar with information gaps from previous years) could not be assimilated. For such students, who have become more accustomed to the learning required to go to the University of Medicine, the lecture-method makes it less difficult for students to be less thorough, as they need accurate exposure of information and at a slower pace, so that the lesson can be more easily assimilated.

Regarding the presentation style of the information in the courses, the total distribution at the level of both faculties is presented in Figure 2 – presentation style. We consider that it is a too high percentage of teachers who read the presentations in the courses, being more a monologue type course, than a bidirectional one in which the information is incorporated by the student. It is true that of this 48%, 66% of respondents were medical students. This suggests, again, that the need for knowledge, the dictionary that future doctors must master, is much greater than that of sports specialists. Thus, it is absolutely necessary for health teachers to exhaustively expose, perhaps sometimes arid and dull, medical terms that students must master.

**Figure 2:** Presentation style



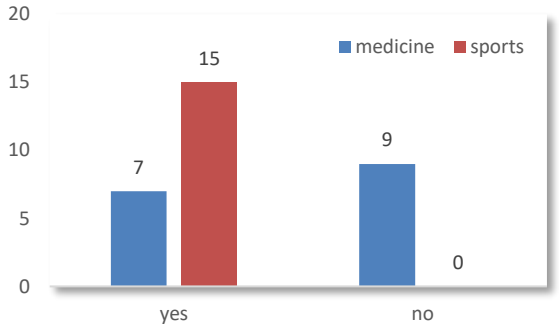

This research can show the need for certain teaching materials that must be presented in a readable and slow tempo. This need is related to a psychological concept regarding the teacher's ability to establish a connection between the unconscious mind of the students (who

gradually enter in a learning state) and the unconscious mind of the teacher (the later having a more systematized information). The slow tempo prepares the student to enter the scientific atmosphere in a preliminary psychic state, kind of an awaiting state of mind for the "key" information, which comes gradually. The student must receive the information with the same curiosity, interest and respect for the simple information. These will represent clues for the future job, because the causal links cannot be understood exactly if the students expect only interesting and spectacular information and they pay attention only when these are exposed.

Most students (81%) of both groups estimated that a course has about 10-20 pages. All subjects accepted that they reopened the materials for the information taught in their practice.

To the question that probed the need to individually read and understand the content of the courses, the students from the sports university answered, in a percentage of 100%, yes. On the other hand, in the group of medicine students, the distribution was uneven. This shows us that at the university of medicine is a much more detailed and exhaustive content that requires explanations from teachers, while at the sports university is more emphasis on the practical side, students having the necessary knowledge to understand the content of the courses. The explanation can be seen in the Figure 3.

**Figure 3:** The need to extract the main information individually from the course content (number of students)




Regarding the information presented at either of the two faculties, if we refer to the high-level learning, more exactly, the preparation for master's or doctorate for UNEFS students versus the preparation for bachelor's or residency for medical students, it is necessary to explain the detailed information in time, for longer periods in terms of dosing effort. It is well known that for grade 7, students must go through the subject once, for grade 9, twice, and for grade 10, three times. This is especially important for difficult materials, which include arid parts (and less practical demonstrations), the preclinical subjects in the first years of the Faculty of Medicine or the theoretical parts of some less publicized sports. Also, the preparation of any important exam involves dosing the effort, thus, in the first days one learns about four-five hours a day, and in the last ten to fourteen days, in the memory has to run for the last time the whole subject, with the intelligence to focus on the key concepts and logical causal links.

The results showed that most medical students' courses have more than 7 pages, which makes them spend more time learning the content needed for summative assessment. It should be noted that the material to be learned from the Faculty of General Medicine follows a general pattern that involves a predetermined order: prevalence and incidence of the phenomenon/disease, etiological aspects, pathophysiological aspects, characteristic symptoms, their grouping in syndromes, main diagnosis, differential diagnoses, evolution and prognosis (positive factors, negative factors), treatment options. It is known that most of the time is spent understanding the pathophysiological mechanisms behind the diseases, but in the field of health it is absolutely necessary to go through these arid mini-chapters to understand the phenomenon in full, compared to specialists in sports, where the accent is on practical application. In addition to changing/developing learning skills in relation to the age and experience in student years, learning styles also change in relation to the years spent in a particular faculty, with the involvement in adapting to the specifics of that faculty. This capacity of adapting involves flexibility of thought and intellect and, of course, experience. Once familiarized with the most important concepts in the field of activity, after about five years in a faculty, students, master students, doctoral students or residents achieve the performance of reading about 20-30 pages of scientific content with which they are familiar, without feeling the effort, with pleasure, interest and the possibility of thinking in parallel for developing their own opinions. In the last category, the teaching-learning mechanism is reversed, starting from practice to conceptualization, which is more attractive for students because they enjoy the results of concrete work faster (Figure 4 – the learning processes).

At the level of both educational structures, students similarly reported the need to take notes during the courses, but two respondents from the medicine university noted that most courses receive written support which made them not need to take notes. We emphasize here the importance of distributing written course support to students.

**Figure 4:** The learning processes.

We consider that the educational instructional process is much more effective in the case of the existence of written materials after which the student can be guided later, during the individual study process. The main activity of the student during the course should be to focus attention on the topic of the course, on the information that the teacher has to offer. We are trying to adhere to a western education system, in which the modernization of the process with the help of technologies is desirable. We consider it appropriate to emphasize the link between taking notes and the facilitation of the active memorization, later learning and reproduction the material. There are students who manage to go through large materials (hundreds or thousands of pages) through active learning and using a specified type memory, the one from which the information drains unconsciously in a passive way. Others are focused on compiling their own notes, on taking notes, failing to store information if it is not processed and systematized in their personal way. We do not comment on the superiority of any of these techniques, but we want to emphasize different ways of how the mind function. The personal notes, as the individual dedicates himself to the profession, can become more and more schematic, becoming understandable only by the one who writes them. These personal notes can exclusively define causalities, "key" concepts, inferences, connections and fewer mnemonic formulas (these being typical for an earlier stage learning).

Another aspect to note is the desire for the lecture not to be completely similar to the course support and it proved to be more efficient to listen to the lecture, when the student does not focus on finding those notions in the written material, but on understanding the explanations given by the teacher and following the logical thread of the lecture, proving much more effective than the situation in which the student reads the learning content beforehand. The notions described in medical courses are difficult, imply new and unknown terms to the student, which makes it important to lecture and especially to be accompanied by explanations, examples that make the learning content more accessible. That said, the lecture is a material more understandable to the student than some course notes in medical terminology. In this case, the role of the lecture is to lower the level of understanding from abstract to concrete, from general to particular. Instead, in the sports environment, the provision of specialized materials is more easily accessible at first reading even to an audience unfamiliar with the field, but the difficulty lies in the practical applicability of the theoretical content.

In both Universities, students rated similarly on a Likert scale from 1 to 10 the "weight" – the difficulty of a course, somewhere at a grade of 7-8. This suggests that the teaching content is reported to the type of students taking part in the course. Thus, the participants do not have a comparison model, all the courses are of the same similar level within his university. At the both faculties we suggest the need to introduce courses with graded difficulty, thus the difficult subject is exposed at the, approximately, seventh-eighth meeting with students, after they have acquired interest in the studied information and have sufficient knowledge to be interested in deepening the subject.

We wanted to probe the students' conscientiousness about the self-instruction process for summative assessment. The Figure 5 shows the difference between continuous learning (throughout the year) and discontinuous learning (exhaustive period during the session, in which they only prepare for assessments). For medical students, there was a longer distribution of the self-taught learning process, instead, the sport university students organize their learning time in the last part of the semester.

**Figure 5:** Distribution of the self-training process over a longer period of time (number of students)

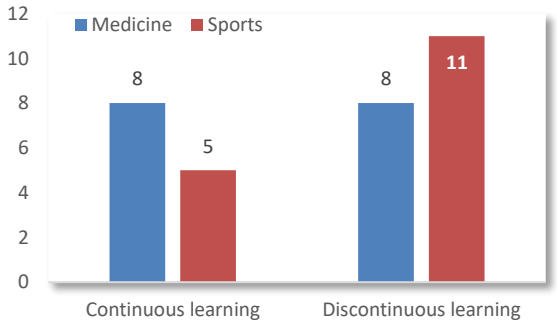



Figure 5 shows that the distribution of medical students' conscientiousness is divided equally between those who study continuously and discontinuously, while in the category of students at sports university, most of them learn the theory for the exam shortly before it.

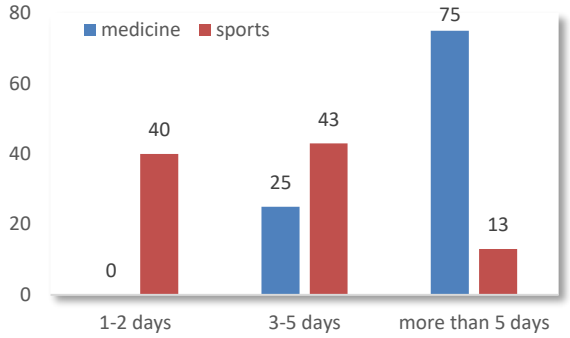
Among the explanations, we thought about the aspect that, in both situations, the practice of that profession has two components: the practical part (working with patients versus working with students) and the conceptualization part which

involves talking and theorizing what you do. For the doctor, we refer to the composition of the observation sheet, the possibility to explain the case and the scientific research; and for sport coaches and teachers, it involves the lesson plan, the training plan, the monitoring through observational feedback. Medical students, from year 3, go to hospitals, see clinical cases that arouse their interest, receive partial or incomplete explanations from their seminarians about solving the case. Thus, the interest to learn more is aroused, and with the help of modern forms of learning (internet, for example), their curiosity makes them look for information and learn more constantly through the challenges from practice to theory. This learning is not necessarily a systematized one, but it puts the student in a greater contact with the learning content.

The students at the sport University are concerned with everything related to the development and refinement of personal practical skills, but also of the subjects they work with, their goal being to accumulate their own experience as rich as possible from working with as many individuals and less to take from the experience of other colleagues, because the coach-athlete/teacher-student relationship is more personalized and longer lasting than the doctor-patient one (especially in the emergency medical branches and not in chronic diseases). However, there are also some long-term doctor-patient relationships, such as these in chronic diseases (such as psychosomatic, rheumatological, oncological diseases, which require time dosing the treatment regimens and proper management, both somatic and psychological). Such relationships are of the adult to adult type (when the patient is responsible for dose adjustment depending on the acute symptoms present), parent to child relationships (which are sometimes necessary when the patient himself is a doctor and such an attitude becomes useful for making the patient in question listen), friendship-type relationships (where the doctor goes from being an “enemy of the disease” to being a friend of the patient, a counselor, a trusted person who helps the patient not feeling the limitations imposed by disease). Similarly, the athlete-coach relationship can: define the coach’s domination (in terms of his personality and executive function) or transform the coach into an advisor of training, shifting the responsibility to the athlete. In the later type of relationship, the coach becomes guide for optimal and efficient development of his athlete. The coach can be a mentor, a friend, an advisor, an authoritarian superego, who controls the desires and objectives of his athlete and the dosage of efforts, but always maintains the high-performance standard.

We objectified that most medical students give for the learning process over 5 days before an exam, while those at the sports University give 1-5 days. The uneven distribution can be seen in the Figure 6.

**Figure 6:** Distribution of days granted for learning process, compared between the two universities (percentage of the students)



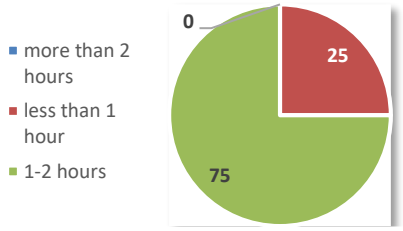

An explanation of the phenomenon could be that those medical students who give more than 5 days are those who, over time, have formed a structured thinking, to learn in steps, from micro aspects, to macroscopic aspects, from pathophysiology and etiology towards the logical understanding of the formation of the symptoms characteristic of the respective disease. In another category are those medical students who believe that diseases should be acquired from the clinic to understand the etiology and thus, they intentionally omit the arid part of the learning content, believing that it operationalizes learning. Many of these "more efficient" students can get high grades in practical exams, maybe even at oral ones, where the teacher requires only the clinical conceptualization of the case, but still a deeper approach will reveal the gaps in understanding the etiopathogenic phenomenon

We sought to probe the maximum time a young person can stay focused in a learning activity in late adolescence and whether there are differences between the training and the profession they choose, differences that will influence their ability to concentrate. From the collected data, we did not discover significant differences, which leads us to think that this capacity depends on certain internal factors and on the stage of personal development. This can be seen in the Figure 7.

The psychological explanation of this phenomenon can be in the concept of endurance and the development of long-term endurance in terms of staying longer and longer in contact with notions, concerns, problems, conceptualizations of the chosen profession. The faculty and the acquisition of information during it are only the preamble, endurance itself is obtained with the practice of the profession, important roles having curiosity, self-improvement, desire to be up to

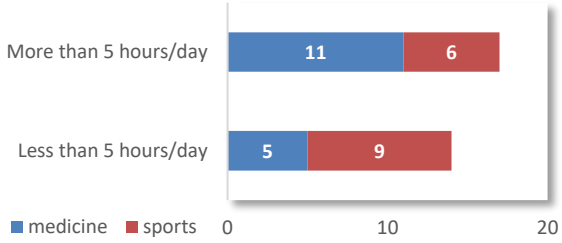
date with news, desire to interact and exchange information with other professionals. We consider that the age range of 18-25 years is the one in which the foundations of endurance are barely laid and still different students are looking for the right techniques for acquiring information, sweeping between what would be easy from theory to practice or to practice in theory ("learning to learn").

**Figure 7:** Concentration endurance



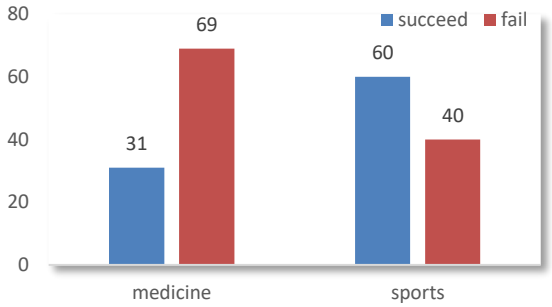

We found that there are significant differences between group samples in terms of the maximum number of hours per day spent for individual study. The percentage of those who spend more than 5 hours a day for individual study is in medical students' area. This demonstrates that they make greater efforts to self-train, have a greater ability to organize, focus on the task, a higher motivational motive, but also the desire for self-improvement more developed than in the field of physical education. The distribution can be seen in the Figure 8.

**Figure 8:** The maximum number of hours per day spent for self-training (percentage of the students)




We also probed the importance of the self-taught process, by asking the need to study at home the material presented in the course to pass the final exam. We wanted to emphasize that medical students need a period of self-improvement, a period of in-depth assimilation of the information presented to the course or practical work, compared to those from a sports University, who managed to pass the exams based only on the knowledge assimilated to the courses (Figure 9).

**Figure 9:** The process of passing the exams based only on the knowledge assimilated to the course (percentage of students)




**DISCUSSION**

There is a major difference between the style of teaching knowledge for students in the two faculties - the mechanism for medical students is from theory to practice; while for students in the field of physical education, the learning mechanism is reversed, from practice to the formulation of theories.

The field of medicine has been developed for thousands of years, and during all this time, specialists have learned to work simultaneously: in one plan to diagnose and treat, and in the other to make explicit, theorize, generalize, argue, and develops an inferential and dichotomous thinking. They have developed their own style of communication between specialists to convey key information in operationalized and synthetic concepts. Thus, 66% of medical students perceive that the teaching style of teachers regarding the medical dictionary must be mastered as being much focused on the presentation of information and less on practical applicability. Instead, sports coaches or teachers have recently started to focus on the conceptualization of their work, on quantification, on operationalization, on ways of exchanging information (to external sources such as: psychologist, athlete's family, school leader, etc. or between them as specialists).

100% of the students from the sports University consider that they need to inspect the learning material themselves, but it is very important that they have the necessary information to understand it individually. In the field of coaches and sport teachers, the emphasis was on the practical side, on streamlining the educational-instructional process, on refining personal skills, on developing the means and methods of teaching the learning content.

Teachers in both faculties should focus on lecture-type teaching, but not identical to the written material; they have to include examples, follow a red thread (message to take home) and ensure that it has been passed on to the student.

Along these lines, students should be considered active partners in the teaching process even if their level of instruction is much lower than the teacher's one and even if there are significant differences between participating students in terms of previous level of knowledge, involvement, curiosity and motivation. The teacher's role is to modulate the "global intelligence of the audience", encouraging the obviously participatory students and stimulating the less interested ones. It would be a didactic mistake to have the preconception that the overall intelligence of the audience is low, which may lead the teacher to lower the level of the lecture or consider that it is no longer necessary to provide complete information, omitting examples and features or not presenting parts considered more difficult. Students similarly rate the weight of the courses on grades 7-8, which demonstrates that the learning material is hard enough to keep them focused and grasp in their understanding, but easy enough not to lose them and to be at their level of knowledge.

Among the teacher's tasks should be to increase the student's endurance (making him forget how time passes), involving him in active listening in which the student's thinking becomes a partner of the teacher's thinking in understanding the chain of information explained (even if it not perceived). We notice that in young people aged 18-25, endurance is limited to 1-2 hours mostly, but it is acquired by stimulating logical thinking, memorization through vivid representations with reference to clinical cases and practical applications. It is also known that during this period, students are still learning how to improve themselves, how to learn information more effectively, learn how to learn. At the end of the lecture, the student must remain in a still active state, with the desire and curiosity to look for a minimum of personally discovered information regarding the topic of the course presented. Also, the student's thinking must remain during the lecture able to compare the newly received information with a previous knowledge database, which helps him to make his entire previous notional system richer and supported on a more solid basis.

According to the scientific literature, the period of late adolescence is considered a maximum in terms of the ability to assimilate new information, as well as curiosity and openness to it, the desire to filter and systematize it according to personal experience. Therefore, the teacher must teach them a material appealing to the maximum capacity that he intuits as being present in these young people, crediting them with motivation, life choices, determination for the profession, the belief that they will never give up self-improvement.

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**Authors' contribution**:

AIT and RTB contributed in all the stages of the article, they designed the article and revised the manuscript for important intellectual content. AIT acquired the data and AIT and RVC drafted the work. RVC contributed to the conception of the work and revised the language.

All authors read and approved the final manuscript.

**Ethics approval and consent to participate**:

For this study, the agreement was obtained from the Ethics Committee of Teaching Staff Training Department of The National University of Physical Education and Sports. The subject data were completely confidential and they approved the publication of data.

Patient consent for publication: Not applicable.

**Competing interests**:

The authors declare that they have no competing interests.

**Availability of data and materials**:

The information generated and analyzed during the current study is available from the corresponding author on reasonable request.

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