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Increasing School Performance in Theoretical Sports Training Classes by Applying Students' Activation Strategies

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Abstract: The current paper summarizes the results of the study which carried out between September 2021 and January 2022, in order to determine to what extent, the use of interactive didactic strategies can achieve the cognitive performance of the target group, the students of the High School with Sports Program in Iași, Romania. The study included two groups of students from two parallel 10th school classes, A and B, aged 16-17. The number of subjects participating in our study was 56, of which 28 in each class. All subjects participating in the study passed the 9th school class at the same high school, having continuity, because the Theoretical Sports Training discipline is also taught in the previous school class. The methods used challenged and supported the students in the experimental group to successfully complete the learning tasks throughout the lessons. We observed that: acquisition facilitation was achieved; students were actively involved in their own learning, using their own intellectual and practical skills; students were less reluctant to present and argue their own opinions, capitalized on their prior knowledge experience, communicated efficiently; students cooperated within the group, obtaining benefits in the cognitive, motivational, social, affective plans.

Keywords: *interactive strategies; school performance; small groups; cooperation; critical thinking.*

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1. Literature review

Today's society is going through a process of real transformations regarding values, principles and attitude towards life and its quality. By default, to adapt in such a context, individuals need creativity, cooperation, collaboration and personal initiative. The school represents a basic pillar in building effective people, capable of understanding that they must be at the center of the learning process, in an active-creative partnership with the teaching staff.

Didactic strategies based on collaborative learning are flexible, dynamic and open. They successfully contribute to quality assurance in education, stimulate learning activism, build interdependent links between group members, encourage mutual learning, all of which ultimately lead to achieving school performance and the development of students' personality (Tiron & Stanciu, 2019).

Taking into account the main didactic function of each method, Oprea (2006, 182) proposes a classification of interactive group methods and techniques, which includes the Jigsaw Method and the Pyramid Method, which we used in the research.

The Jigsaw technique was first created in 1971 at the University of Texas, Austin. The author of this technique was Elliot Aronson, whose aim was to build a way for students in recently desegregated schools in Austin to interact in the classroom. The desired interaction was to be in a such manner that would reduce suspicion and distrust among students. Since written widely on the jigsaw technique, Aronson has focussed on the benefits of jigsaw for reducing hateful behaviour and increasing cooperation in the classroom (Teach the Earth the portal for Earth Education, accessed 2022, November)

Since the '70s, many educators have used and adapted Jigsaw for use in a wide variety of classroom, lab, and field situations at all levels from grade school to graduate education. The benefits of the technique clearly extend beyond more positive student interactions (Teach the Earth the portal for Earth Education, accessed 2022, November).

Goolsarran et al. (2020) show how as educators, it may be challenging to keep up and find active teaching strategies, in order to engage learners, outside of routine small group exercises. There are traditional small group activities, such as cased-based learning used by teachers. Although these traditional techniques allow for interactive and effective teaching, the Jigsaw technique may require the use of multiple faculty facilitators, which can be a difficult resource to find. The Jigsaw learning method is cooperative

learning that utilizes peer teaching and promotes collaborative learning, and additionally, only one facilitator is required of this type of learning technique

The Jigsaw method is explained by Tiron and Stanciu (2019), as the method that involves cooperative learning within a team. Thus, individual learning is combined with team learning, and the information acquired by each member of the group is later transmitted to another group.

This method has been used successfully in the last decades worldwide, in many fields and learning activities, regardless of the age of the learners or the biological gender.

The jigsaw technique, which focuses on development of peer cooperation and teamwork through division of tasks among students, takes place through each student's assuming responsibility (Torabi et al., 2022). "Jigsaw teaching strategy can be used for nursing student's theoretical education to improve the self-regulated learning and academic motivation" (Keramati et al., 2021).

Other findings on Jigsaw strategy revealed how it "had more positive effect on students' overall mathematics achievement than the control group students. Additionally, the findings also revealed that experimental group students also exhibited positive attitude towards the mathematics lessons. These overall findings have some implications on learning and teaching of mathematics in Iraq context" (Abed et al., 2020). On other related educational fields, a "cooperative learning process using Jigsaw technique is a valid and effective teaching strategy when handling novice programmers in an introductory programming course" (Garcia, 2021).

Relatively current findings revealed how the teachers manifested interest toward Jigsaw learning and enjoyed the group spirit (M. van Wyk 2015). More than that, the teachers also shown how the "Jigsaw pedagogy provided opportunities to exchange and share knowledge in groups" (Sawyer, & Obeid, 2017). These opportunities contributed to their learning. Moreover, it was drawn the fact that Jigsaw strategy promotes mutual concern among Economics teachers. (Sawyer, & Obeid, 2017)

Baena-Morales and collaborators (2020) consider that "both genders value Aronson's Jigsaw as a good method for developing social competences, although they are more neutral when considering it effective at improving academic performance. These findings help to generate a gender-cooperation profile that will enable future research to discuss results more accurately" (Goolsarran et al. 2020). The Jigsaw technique "may encourage the practice of cooperative learning for the secondary school level. To make the learning of students more enjoyable, effective, and sustained at

secondary level, schools and teachers need to use the cooperative learning technique in the classrooms" (Jony, 2019).

Another common instrument that helps educators to prioritize classroom strategies and best teach students is *learning pyramid*. Worldwide, educators use this instrument in order to better understand how the learning process develops and bring new acquisitions to the students, and which techniques benefit students the most (Indeed, 2021).

The Learning Pyramid model was created by the National Training Laboratory in the early 60s. This model comes to show what types of teaching or learning are most likely to be retained by students and involves practices such as lecture, reading, audio-visual activities, demonstrations, discussions, practice doing and most important after all these skills are developed – teaching others. (Letrud, 2012).

The method is focussed on solving a work task, being based on the incorporation of individual activity within a collective effort (Lalley & Miller, 2007; Tiron & Stanciu, 2019).

In common educational practice, practitioners discovered 7 central elements of the learning pyramid:

1) *Lecturing* – refers to getting prepared the educational speech for students, who take notes about the information they receive (students retain about 5% of information) (Indeed, 2021);

2) *Reading* – based on this technique, students accumulate 10% of the information they read in an academic text. In direct connection with lectures, learning pyramid technique also sees reading as a passive learning method, therefore students can perceive information in a text without engaging in it (Indeed, 2021); 3). *Audio-visual instruments* – bring together all learning methods that use different media forms (videos, pictures or photos, graphs and sounds) - in this approach students may accumulate about 20% of information; 4). *Demonstration* – involves exposing students an activity or project step in a course curriculum and starts from the premise that students retain 30% of the information they observe; 5). *Discussions* – invite students talk about materials with each other as a full class or in smaller groups – in such activities students may accumulate 50% of the information they receive (Indeed, 2021); 6). *Practicing* – this element helps students performing tasks or activities in the classroom that involve information they recently learned, so they can retain 75% of the information they receive (Indeed, 2021); 7). *Teaching others (peers)* – according to the learning pyramid, students who can teach course materials to their peers can retain 90% of the information. At this level, students can assume the role of instructor too, which helps them become more responsible. (Demarle-Meusel et al. 2020; Indeed, 2021)

The Learning Pyramid technique shows how some methods of study are in practice more effective than others. This variety of methods conducts to an in-depth learning process and longer-term retention of knowledge. To maximize the effectiveness of their studying, students have to discover their learning style.

The Theoretical Sports Training discipline represents for high school students (vocational education, sports profile) a new field that will lead them to scientific knowledge in the sports area. This is a compulsory discipline in the curricula of the vocational sports school. Also, we can note that there are links between this discipline and the others. There are developed interrelationships both vertically and horizontally and the interdisciplinary approach which contributes to the formation of children competences.

The formation of specific skills in the discipline of theoretical sports training through concrete learning actions will take into account various teaching-learning-evaluation strategies, monitoring the level of acquisition of concepts in sports field, careful monitoring of students' progress both in theory classes and in sports training sessions, and the benefits and quality of the interpersonal relationships within the team.

2. Material and methods

The purpose of these researches is to determine to what extent the use of interactive didactic strategies can achieve the cognitive performance of the target group, the students of the High School with Sports Program in Iași, Romania. The study was carried out between September 2021 and January 2022. It included two groups of students from two parallel 10^{th} school classes, A and B, aged 16-17. The number of subjects participating in our study was 56, of which 28 in each class. All subjects participating in the study passed the 9^{th} school class at the same high school, having continuity, because the *Theoretical Sports Training* discipline is also taught in the previous grade.

Hypothesis 1. The premise from which we started in our study was that: The school performance of the group included in the study can be positively influenced with significant differences in the discipline of *Theoretical Sports Training*, by using interactive methods, the *Jigsaw method* and the *Pyramid method*, which have basis collaboration and cooperation in the group. During the study in the parallel, control group, the lessons were conducted in the classic version.

Hypothesis 2. Respecting the scientific approach, for this study we aimed, after applying the variables, to obtain significant differences between the experimental and control groups in the second test, the final test.

Hypothesis 3. The third premise followed the level of performance in the same, experimental group, with the prediction of significant differences between the initial and final testing after the application of the variables, as well as the lack of significant differences in the control group after the initial and final testing.

Hypothesis 4. The last premise assumes that there are no significant differences for the results of the control group between the initial testing and the final testing.

The study began with the registration of the A 10^{th} school class as the experimental group and the B 10^{th} school class, the control group and the application of the initial docimological test in September. All students from the designated group participated in the test. The application of learning methods through collaboration and cooperation lasted 12 weeks, a total of 24 hours, of which 6 hours were used for recapitulation/consolidation and for evaluation, equally distributed. Final testing took place in the third week of January 2022.

The topics addressed in the Theoretical Sports Training discipline during the study were: Arguments for the role of the Olympic Games in the development of the sports phenomenon; The characterization of Olympism as a complex social movement; Use of contents specific to sports training components; Identifying the general methodical requirements of contemporary sports training.

The pedagogical guidelines followed had in mind the student-oriented activity, in order to offer equal opportunities to the entire team. The experiment tried to highlight whether interactive didactic methods, through cooperation, Jigsaw and Pyramid, can positively influence the performance of students in the experimental group in the discipline of Theoretical Sports Training, the impact on learning efficiency, but also the outline of the limits of these methods in practice.

The first stage took place after two weeks of recapitulation and the application of a test that clearly emphasized the level of knowledge from which we started in our approach. The test was conducted on the following contents: *Motor capacity, Performance capacity, Effort in sports training, Means of sports training, Hygiene and individual protection, Theory and methodology of motor quality development-Speed.*

The docimological test included 4 items: the first item was a multiple-choice objective type, the second item was a dual-choice objective

(of the A/F type), the third was a semi-objective completion type item, and the last item was also semi-objective, with a short answer.

In the second stage, we introduced the forms of the mentioned activities as independent variables, the methods of collaborative learning, in the experimental class (A 10^{th} school class) and in the control class we kept the classic method of individual learning (B 10^{th} school class) without changes.

The experiment lasted 12 school weeks and included four learning units, structuring on 18 hours of teaching learning, 3 hours of consolidation-recapitulation and 3 hours of assessment. The contents were those included in the 10^{th} school class curricula in four directions as follows:

1. The ancient Olympic Games: The origin of the ancient Olympic Games; Olympic Athletes; Games.

2. The Modern Olympics: The Renaissance of the Olympic Games.

3. Olympism.

4. Content elements of sports training: Technical preparation; Tactical training; Physical training; Psychological preparation; Theoretical-methodical training; Common and differential scores of content elements specific to sports training.

The teaching methods alternated so that we used the *Pyramid* method in 10 lessons and the *Jigsaw* method in 8 lessons.

In the third stage of the final evaluation, we applied the final testing to both groups using a docimological test that included 3 objective items (one with dual choice, one with association and one with multiple choice) and 1 semi-objective item, of the type of structured questions.

During the course of the study, we noticed a normal openness of the students towards the new form of teaching, new for them, an openness that faded along the way because it also involved independent activities and work with the book.

3. Results and data analysis

The analysis of the recorded results was processed through the SPSS program. For comparison we used t-tests as follows: t-Test for two independent samples (Independent-Samples T-Test) and t-Test for two paired samples (Paired-Samples T-Test).

To use the T-test for two independent samples (Independent-Samples T-Test) we respected the conditions: independence of groups (independent groups, each subject was part of only one group) and homogeneity of the group (groups are part of populations with variances) equals). Thus, on the two independent samples, the T test was applied to

compare the average of the experimental group with the average of the control group, the averages subject to the independent variable to record if there are significant differences between the two groups at the initial test and at the final test in relation to school performance.

In the second situation, we applied the t-Test for two paired samples (Paired-Samples T-Test) respecting the specific conditions for this situation, the independent variable is dichotomous and the groups are related in a certain way (pretest/post-test) and the dependent variable registers a normal distribution, both in the pre-test and in the post-test (the difference in grades of each subject is normally distributed).

Under these conditions, the recorded results were centralized in tables 1 and 2.

Table 1. The results obtained by the students in the initial testing

Subjects	Total no.	Students no.	Grade 10	Grade 9	Grade 8	Grade 7	Grade 6	Grade 5	Grade 4
Experimental Group	28	28	1	4	2	3	7	7	4
		100%	3,57%	14,29%	7,14%	10,71%	25%	25%	14,29%
Control Group	28	28	1	1	5	8	3	7	3
		100%	3,57%	3,57%	17,87%	28,57%	10,71%	25%	10,71%

At a first analysis of the initial tests, we notice that the grade 10 was obtained by an equal percentage of students from both groups, 3.57%. Grade 9 of 14.29% from the experimental group and 3.57% from the control group. Grade 8 was 7.14% for the experimental group and 17.87% for the control group. Grade 7 of 10.17% from the experimental group and 28.57% from the control group. Grade 6 of 25% from the experimental group and 10.71% from the control group. Grade 5 of 25% from the experimental group and 25% from the control group. Grade 4 of 14.29% from the experimental group and 10.71% from the control group.

The results obtained by the students at the end of the period allocated for the final testing were recorded in table 2.

Table 2. The results obtained by the students in the final test

Subjects	Total no.	Students no.	Grade 10	Grade 9	Grade 8	Grade 7	Grade 6	Grade 5	Grade 4
Experimental Group	28	28	4	5	6	8	4	1	0
		100%	14,29%	17,87%	21,41%	28,57%	14,29%	3,57%	-
Control Group	28	28	2	1	7	8	3	6	1
		100%	7,14%	3,57%	25%	28,57%	10,71%	21,41%	3,57%

At the final tests we note that the grade 10 was obtained by 14.29% of the experimental group and 7.14% of the control group. Grade 9 of 17.87% from the experimental group and 3.57% from the control group. Grade 8 was in percentage of 21.41% for the experiment group and 25% from the control group. Grade 7 of 28.57% from both groups. Grade 6 of 14.29% from the experimental group and 10.71% from the control group. Grade 5 of 3.57% from the experimental group and 21.41% from the control group. Grade 4 of 0% from the experiment group and 3.57% from the control group.

Starting from the first hypothesis: The school performance of the group included in the study can be positively influenced with significant differences in the discipline of Theoretical Sports Training, by using interactive methods in relation to the control group, we used t-tests for independent samples.

Table 3. Differences between participants of the two groups at baseline testing

	N	M	SD	t-test	P
Control Group	28	6,42	1,57	.320	.750
Experimental Group	28	6,28	1,76		

The data show that the experimental group mean at baseline is M = 6.28 and the class mean for the control group is M = 6.28 (Table 1). There were no significant differences between the participants in the experimental group and the participants in the control group at the first test (t=.320, p=.750>0.05). Initial testing revealed similar results, close in terms of averages.

The second hypothesis predicts the existence of significant differences between the results of the experimental group and the control

group at the final test. To highlight these results, we used independent sample t-tests.

Table 4. Differences between the participants of the two groups at the final testing

	N	M	SD	t-test	P
Control Group	28	6,89	1,54	-2,266	.027
Experimental Group	28	7,78	1,39		

After applying the variables, the final testing recorded significant differences between the experimental group and the control group (t=-2.266, p=.027<0.05), a fact that emphasizes that the students in the experimental class obtained higher values in the two tests in relation to colleagues from the control group. (Table 4). The mean values between the two groups were obviously different, in the experimental group it was M = 7.78 and in the control group it was M = 6.89, in favour of the experimental group. If at the initial test the mean values were 0.14 points in favour of the control group, at the final test the mean values were 0.89 points in favour of the experimental group.

In our attempt to support hypothesis 3, we applied paired sampling from t-tests to highlight significant differences for the level of performance in the experimental group between the initial test and the final test.

Test 5. The differences obtained by the students of the experimental group in the two tests

	N	M	SD	t-test	P
Initial Testing	28	6,28	1,76	12,87	.000
Final Testing	28	7,78	1,39	21,91	.000

The results obtained by the experimental group record significant performance differences between the initial testing (t = 12.87, p=.000<0.05) and the final testing (t=21.91, p=.000<0.05). The mean at pretest was M = 6.28 and at posttest was M = 7.78 (Table 5).

For hypothesis 4 we followed the same steps, using paired samples t-tests for the control group.

Table 6. The differences obtained by the students of the control group in the two tests

	N	M	SD	t-test	P
Initial Testing	28	6,42	1,57	18,25	.000
Final Testing	28	6,89	1,54	20,14	.000

Significant differences were also found in the control group between the first test (t = 18.25, p=.000<0.05) and the last test (t = 20.147, p =.000 <0.05). The performance obtained was positive at the final test, initially the average was M=6.42 and at the end the average was M = 6.89.

4. Discussions

Summarizing, at the initial testing the results of the classes constituted in the form of the groups included in the pedagogical experiment (experimental group: A 10th school class and control group: B 10th school class) show relatively close values, in terms of averages.

It can be appreciated that, in the pre-experimental stage, the level of knowledge development mastered by the subjects of the tested classes is relatively appropriate. In A 10th school class and B 10th school class, there are some similarities in that the number of grades 4 and 5 is very close, 11 students taking these grades in this interval for the experimental group, respectively 10 students in the control group. We observe the same thing in the case of grades 6 and 7, in the experimental group 10 students obtaining these grades and 11 students in the control group.

We observe the same thing in the case of grades 6 and 7, the 10 students in the experimental group obtaining these grades and 11 students in the control groups. For the next interval, the one in which the students who obtained grades of 8 and 9, we notice that a number of 6 students fall into this category, regardless of which group we refer to, and the maximum grade of 10 was obtained by only one student, from both the experimental and control groups.

After these clarifications, we can say that in both groups there is a percentage of about 35-40% of the total number of subjects who obtained grades of 4 and 5, which makes us state that a large number of students started the 10th school class with a minimum level of knowledge formed in the previous school year. At the same time, we notice that the averages in the upper part of the grid are quite small in number, about a quarter of the total subjects possess knowledge, capabilities, attitudes that they will use to

train the skills specific to the 10th school class in the discipline of Theoretical Sports Training.

Quantitative analysis led to the validation of the specific hypotheses of the experiment. The school performance recorded by the subjects of the experimental group in the theoretical sports training discipline was significantly influenced by the use of interactive didactic strategies based on cooperative and collaborative learning, mainly by the use of the Jigsaw method and the Pyramid method.

The efficiency of these methods was validated in the didactic approach of training and developing students' skills in using concepts specific to sport theory. From this perspective, we believe that the methods based on cooperative learning can be successfully incorporated into the didactic activity, according to the objectives and content of the educational discipline, the particularities of school groups and individual students.

The methods used challenged and supported the students in the experimental group to successfully complete the learning tasks throughout the lessons. We observed that: acquisition facilitation was achieved; students were actively involved in their own learning, using their own intellectual and practical skills; students were less reluctant to present and argue their own opinions, capitalized on their prior knowledge experience, communicated efficiently; students cooperated within the group, obtaining benefits in the cognitive, motivational, social, affective plans.

Related to the research ethics, the research participants participated voluntarily and were previously informed of the withdrawing possibility, with no other consequences on their status etc. The study developed in accordance with the international guidelines in research ethics.

5. Conclusions

Therefore, the Jigsaw method is based on team learning, it requires each student to become an expert who takes responsibility for transmitting the assimilated informational content to the other peers. Students' abilities to communicate, to think, to solve problematic situations, to explore and apply ways of conveying colleagues what they have understood from individual study and in small groups of experts are developed.

The disadvantages of the method can be felt if the teacher fails to carefully monitor the students' activity. These limits refer to the fact that some students can work superficially, they can misunderstand some notions, they can cause conflicts within the group due to „gaps" between members, and the general work ambiance can sometimes seem disorderly in nature.

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