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Original Article

Knowledge of the fundamentals necessary for the scientific research activity in the field of Physical Education and Sports Science

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Abstract
Purpose. Knowledge of the fundamentals needed for the activity of scientific research in the Physical Education and Sports Science. *Material.* The participants in the study were 94 students of the Department of Physical Education and Sports in the University of Pitesti, study programs: Physical Education and Sports (PES), n=40, Sport and Motor Performance (SMP), n=31 and Performance in Sport (PS), n=23. The experimental study monitored both teaching activity and evaluation of the subjects, in conformity with the requirements of the course syllabus (performance standard) and the instructions on the rules of evaluation in the credit system and the grade book filling in. The assessment of knowledge focused on: course activity, seminar activity, attendance and final evaluation. The seminar activity involved the preparation of 4 papers regarding the method of bibliographic study, the historical method, the survey method (questionnaire) and the test method. *Results.* The following matters are presented: comparison of the weight of fulfillment of the seminar activity requirements for each study program; weight of the assessment of the fundamentals in the Research Methods discipline in bachelor's and master's degree studies. The results of the differences between the groups investigated in the field of Research Methods and Methodology in the Physical Education and Sports Science highlight the comparative analysis of the median of the groups during the elective and mandatory activity and the final evaluation (colloquium and exam). It is also noticed that at least two means differ significantly at $p < 0.05$ in the seminar, elective and mandatory activity; insignificant differences are observed at $p>0.05$. *Conclusions.* The knowledge of the fundamentals necessary for the activity of scientific research in the field of Physical Education and Sports Science contributed, at the end of the course, to the outlining of a dynamic and integrative vision on the main theoretical perspectives and of some concepts concerning the applied scientific research.
Key Words: methods of research, teaching, evaluation, standards of performance, higher education

Introduction

The higher education institutions of Romania have a didactical and scientific research mission, by ensuring the transfer of specialized information, stimulating and supporting the creation and sports performance in the field of Physical Education, Sport and Human Motricity. In order to authorize, accredit and periodically assess the programs of bachelor's and master's degree studies in the process of academic evaluation, there will be applied the standards, reference standards and performance indicators provided in the External Evaluation Methodology developed by ARACIS. The study programs are differentiated by their curricular content. They are defined by their mission and the competencies supposed to be acquired by the graduates, in conformity with the curricula and the course syllabus. The professional master's degree programs are mainly oriented towards the development of the professional competencies, which represent the unitary and dynamic ensemble of the knowledge and abilities associated to the respective profession (Yakovleva & Yakovlev, 2014; ARACIS, 2018).

The knowledge of the fundamentals and the acquisition of the professional competencies needed by the scientific research activity in the field of Physical Education and Sport Science in the specialized higher education institutions of Romania can be achieved within the "Methods of research in the Physical Education and Sport Science" in bachelor's degree and the "Methodology of sports performance research" in master's degree. The contents of the course syllabus stipulate (course, seminar/project, bibliography) the correlation of the discipline contents with the expectations of the representatives of the epistemic communities, professional associations and important employers in the field related to the program and the evaluation (Smith, 2010; Andrew et al., 2019). The assessment of the basic elements required by the scientific research in the field of Physical Education and Sport Science involves the following methods used to teach the course: method of bibliographic study; historical method; survey method (questionnaire) and the test method (Biddle et al., 2001; Weinberg et al., 2009; Bazylyuk, 2013; Kraipetch et al., 2013). Teaching becomes a matter of providing

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appropriate frameworks, experiences and learning opportunities that allow the learners to build and test their understanding, knowledge and abilities (Peters, Jones & Peters, 2008).

The purpose of the research is the knowledge of the fundamentals necessary for the scientific research activity in the field of the Physical Education and Sport Science.

Material and methods

Participants.

In order to understand the fundamentals needed by the scientific research activity, an experimental study was conducted regarding the teaching and evaluation in the "Methodology of research" discipline –in the study programs of Physical Education and Sport (PES) and Sport and Motor Performance (SMP) for *bachelor's degree* and in Performance in Sport (PS) - for *master's degree*.

Participants in the research were the undergraduate students and the master's students of the Physical Education and Sport Department of the Faculty of Sciences, Physical Education and Informatics within the University of Pitești. The total number of participants was n=94 subjects, divided as follows: 71 in bachelor's degree (40 in PES; 31 in SMP) and 23 in master's degree – PS. All subjects were informed on this research and agreed to participate voluntarily according to the Declaration of Helsinki and the Department Ethics Committee.

Experimental design

The research was carried out during a semester in the COVID-19 pandemic period. The research lasted 14 weeks, distributed as follows: *bachelor's degree* - 14 hours of course and 28 hours of seminar; *master's degree* – 14 hours of course and 14 hours of seminar (a lesson = 2 clock hours).

The content of the Research Methodology discipline was monitored by means of the university e-learning platform. The teaching and assessment activity were done online, using the Zoom program (Kirbas, 2020).

In order to evaluate the fundamental knowledge of the discipline, the course syllabus requirements for each study program and the instructions regarding the evaluation rules in the credit system and the grade book filling in were respected:

- number of credits: 4 in all programs;
- form of evaluation: Colloquium (PES and SMP) and examination (PS);
- in PES and PS: A1 – course activity 30%, A2 –seminar activity (Project – 4 papers) 30%, A3 – Attendance – 10%, S1 – sum A1-4 (mandatory and elective activity), Final Evaluation (F. E.) Colloquium 30% and S2 – (S1 + F. E.);
- in PS: A1 –course + seminar (attendance) activity – 20%, A2 –seminar activity (Project – 4 papers) 40%, S1 – sum A1-4 – mandatory and elective activity, F. E. (Examination) 40% and S2 – (S1 + F. E.).

Note: periodic activities evaluated and percentages awarded are consistent with the course syllabus.

The activity in seminar (A) involved the writing of 4 papers: Paper 1 – method of bibliographic study; Paper 2 –historical method; Paper 3 – survey method (questionnaire) and Paper 4 – test method.

The periodic evaluation was performed by grading the contents of the papers from 1 to 10 points and the weight in the final grade was determined by multiplying the grade by % according to the requirements.

Statistical analysis

The calculation of the statistical indicators was performed using the KyPlot 5.0 program (©1997-2017, KyensLab Inc), concerning the mean, standard deviation and the coefficient of variation. The nonparametric Kruskal-Wallis Test was used to calculate the means difference between several irregular samples. Statistical significance was set at $p < 0.05$.

Results

The evaluation of the basic fundamental elements in the "Methods of research in the Physical Education and Sport Science" was carried out respecting the requirements of the course syllabus and the instructions regarding the evaluation rules in the credit system and the instructions about the grade book filling in.

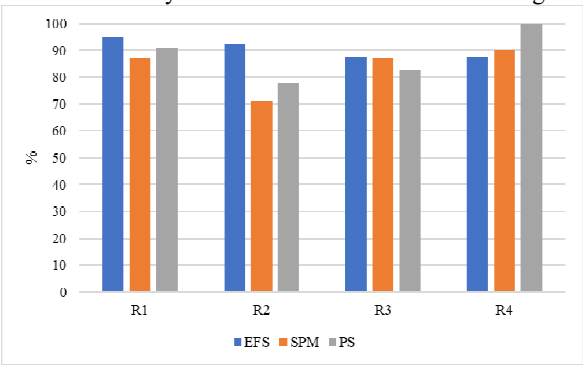

Fig. 1. The weight of the fulfillment of seminar activity requirements in MCSSEF and MCPS discipline,
Notes. R1- paper 1, R2 – paper 2, R3 – paper 3 and R4 – paper 4.

Figure 1 shows the weight of the fulfillment of seminar activity requirements by the subjects in each study program, comparatively. It can be noticed that they performed between 87-95% in R1 (bibliographic study); in R2 (historical method) between 71-92.5%; in R3 (questionnaire) between 82.6%-87.5% and in R4 (test method): 87.5 – 100%.

Table no. 1. Results of the evaluation of the fundamentals in the "Research methods in the Physical Education and Sport Science"

Statistical indicators	Studies program	A1 (Course) 30%		A2 (Sem.) 30%		A3 (Attend) 10%		S1	F. E. (C) 30%		S2	Final grade
		grade	pts	grade	pts	grade	pts	pts	grade	pts	pts	grade
mean	PES	8.03	2.41	8.05	2.42	11.25	0.79	5.6	8.1	2.42	8.03	8.03
	SMP	7.48	2.25	7.39	2.22	10.32	0.76	5.22	7.65	2.29	7.52	7.68
SD	PES	1.07	0.32	1.13	0.34	2.13	0.16	0.76	1.01	0.31	1.05	1.07
	SMP	1.26	0.38	1.33	0.40	2.48	17.09	0.90	0.91	0.27	1.14	1.11
CV%	PES	13.38	13.38	14.05	14.05	18.96	19.75	13.63	12.44	12.66	13.11	13.38
	SMP	16.86	16.86	18.05	18.05	24.04	22.65	17.31	11.96	11.96	15.17	14.42

Note: PES: n=40, n=7 (abs) - 14.9%; SMP: n=31, n=12 (abs) - 38.7%; Sem. – seminar; F. E. –final evaluation; C – colloquium; abs – absences; Attend – attendance; Pts – points; SD – standard deviation, CV% – coefficient of variation.

Table no. 1 presents the results after assessing the fundamentals of the research methods in PESS and PES of the students in Bachelor's degree studies. The analysis of the calculations was made according to the requirements of the course syllabus in each study program and of the instructions on the evaluation rules in the credit system and the filling in of the grade book. The comparison of the data shows that the students in the PES studies program have a better level of success at each one of the indicators evaluated.

Table no. 2. Results of the evaluation of the fundamental knowledge in the „Research methodology of sports performance" discipline

Statistical indicators	A1 (Course) 20%		A2 (Sem) 40%		S1	F. E. (E) 40%		S2	Final grade
	grade	pts	grade	pts	pts	grade	pts	pts	grades
mean	8.74	1.74	8.35	3.34	5.08	8.26	3.30	8.38	8.43
SD	1.89	0.19	1.23	0.49	0.66	1.05	0.42	1.06	1.12
CV%	21.7	11.2	14.7	14.7	13.02	12.7	12.7	12.6	13.3

Note: n=23, n=7 (abs) – 23.3%; Sem – seminar; F. E. –final evaluation; SD – standard deviation, CV% – coefficient of variation.

Table no. 2 shows the results of the evaluation of the fundamental knowledge in the „Research methodology of sports performance" discipline in the Master's degree students, the study program "Performance in sport". The analysis of the calculations was achieved in conformity with the requirements of the course syllabus and of the instructions on the evaluation rules in the credit system and the grade book filling in. Comparing the activity at seminar and the final evaluation at the exam, there is a difference of 0.09 points between activities and an increase of the final grade by 0.17 points.

Table no. 3. Results of the differences between the investigated groups in the Research methods and methodology in the Physical Education and Sports Science

Statistical indicators	Study Program	A2 (grades)	S1 (points)	E.F. (points)	S2 (points)	Final grade (grades)
Median	EFS	8	5.7	8.05	8	8
	SPM	8	5.5	7.9	8	8
	PS	8	5.0	8.2	8	8
	Total	8	5.4	8.0	8	8
Chi-Square	EFS SPM PS	7.589*	7.536*	4.641	7.597*	5.087
P-Value	EFS SPM PS	0.0225	0.0231	0.0982	0.0224	0.0786

Note: df = 2, Nonparametric Kruskal-Wallis Test; *p<0.05; PES – Physical Education and Sport; SMP – Sport and Motor Performance; PS – Performance in Sport.

Table no. 3 highlights the results of the differences between the groups investigated at the "Research methods and methodology in the Physical Education and Sports Science". The comparative analysis of the median of the groups focuses on the mandatory and elective activity (S1) and the final evaluation (colloquium

and examination). It can be noticed that at least two means differ significantly at $p<0.05$ in A2, S1 and S2 and that insignificant differences are found out at the significance threshold $p > 0.05$.

Discussion

The forms of evaluation provided in the curriculum are: examination, colloquium and verification. The education institution has a regulation regarding the evaluation and grading of the students, which is applied rigorously and consistently. Each didactic, research or practical activity included in the curriculum of a study program ends with a final evaluation. The results obtained by the students during their education are recorded in conformity with the legislation in force, in forms homologated for this purpose (grade books, centralizers, enrollment registers, academic transcripts) (ARACIS, 2018).

In this sense, the seminar activity was evaluated based on the elaboration of 4 papers with themes taken from the content of the research methods: bibliographic study, historical method, survey method (questionnaire) and test method (Potop, Manolachi & Kulbaev, 2020). Regarding the bibliographic study method, the students searched bibliographic sources with the help of Google Academic as follows: for PES program, sources referring to the concepts of school physical education, lesson of physical education or even purely theoretical topics; for SMP program, the students preferred topics from the chosen sports branch, namely from the sports games (basketball, football, volleyball and handball) (Popovych et al., 2020). Among these, research directions in handball are presented, for example the fact that the development of the coordination capacities could influence the improvement of the technical-tactical potential at the level of handball teams junior III (Postelnicu, & Mihăilă, 2018); the optimization of the technical and tactical training on the basis of the research regarding the efficiency of results of the nine-meter free throw in women's teams (Kulbayev et al., 2020); relationship between quality of life and shoulder trauma in professional handball players (Mihăilă, Simion, & Breha, 2019); gender differences in competitive anxiety and coping strategies within junior handball national team (Ivaskevych et al., 2019) ; identification of particularities related to the creation and application of training programs for the goalkeepers specialized in the elite handball (Popescu et al., 2018). As for using the survey method, some students tried to create a questionnaire, by means of Google forms, and they addressed it either to teachers/coaches or to athletes/pupils. They were instructed to analyze the responses received and to draw conclusions based on the results obtained (Capella, 2002). Concerning the historical method, it was recommended to make a comparative analysis of new and old specialized documents, such as the Curriculum of Physical Education and Sport, the competition regulation in a sports branch etc. (Andrew et al., 2019). In the case of the test method, the students tried to present the fitness tests listed in the curriculum for the PES field, while for the SMP and PS fields the students exemplified the physical fitness tests and the technical tests specific to the practiced sport (Farrow et al., 2013; Kraipetch et al., 2013).

The content of the discipline is consistent with the international theoretical and practical concepts and it develops new contents compared to other university centers of Romania (Meier, 2021). In terms of adaptation to the labor market, this content complies totally with the fast development of the modern concepts of scientific research in the physical activity and with their forms of application.

Conclusions

The knowledge of the fundamentals needed for the activity of scientific research in the field of Physical Education and Sports Science was acquired by observing the requirements of the course syllabus in each study program and the instructions regarding the evaluation rules in the credit system and the instructions for filling in the grade book. At the end of the course, the student was able to acquire a dynamic and integrative vision on the core theoretical perspectives and on some concepts concerning the applied scientific research.

Also, the Methodology of Research offered the students an integrative global vision on the activity of intervention. It contributed to the development of the capacity for operationalization of the scientific research concepts and their instrumentalization in the field of Physical Education and Sport Science, in order to implement them in the practical and professional life.

According to the course syllabus, the minimum standard of performance aimed at knowing the fundamental elements of theory related to the scientific research, regarding the definition of the basic notions, general classifications and systematizations and limited operationalization.

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