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SURVEY REGARDING THE COMPETENCE AND INTEREST TOWARDS RESEARCH OF ROMANIAN UNIVERSITY STUDENTS

Beátrix-Aletta Demjén, Liliana Ciascai

Abstract: The purpose of this study is to find out the respondents' opinion regarding their abilities and interest towards research. The survey was carried out on a sample of 51 respondents that are involved in research activities in the universities of origin. The participants are students from Faculties of Real and Applied Sciences. The results highlight the interest of respondents for their involvement in research activities, the need for support resources (other than the information in the university courses), the opinions concerning the possession of the main skills necessary to carry out research and the ability to communicate about the research in which they were involved.

Key words: students' scientific research activity (SSRA), abilities, motivation.

1. Introduction

Research in the field of natural sciences is of utmost importance for the development of technology and the improvement of life quality. At the same time, students' involvement in research positively influences their cognitive development (Erickson, 2001: 85). Being an active learning process, research challenges students to formulate questions, to develop strategies for testing hypothesis, to analyze information, to formulate and support arguments, and to disseminate the results. Engaged in research, students learn to doubt on their beliefs, to tolerate ambiguities, to seek evidence and to rely on them in making decisions and formulating arguments. Students also learn to work with other colleagues as members of a research team.

Lamanauskas & Augien (2016:746) and Csermely (2003:825) suggest that research activities should be intrinsic component of universities education. In reality, things are not like this at all (Lamanauskas & Augien, 2015:131; Sadnes, Jian & Hunag, 2006):

a) In the everyday teaching activities the easiest way to familiarize students with scientific thinking & method is neglected: the inductive teaching that means the use of strategies as are evidence-based learning, problem-based learning, project based learning, critical thinking or inquiry based learning (Lamanauskas & Amp; Augien, 2011: 368; Prince & Helder, 2007: 285-286).

b) The initial students' training in research activities and scientific method is done by laboratory activities that follow a theoretical lecture and by "research" lectures. The first type of activities are guided step by step, sometimes directly by the professor, sometimes indirectly via laboratory sheets. Students follow a protocol, learning how to use the laboratory equipment and how to process the experimental data. "Research lectures" are basically scientific methodology and history lectures, or applicative lectures of mentoring in scientific research. Even though these should be based on inductive strategies (Lamanauskas & Augien, 2011:368; Prince & Helder, 2007:285), they are mostly theoretical lectures and based on exposure methods.

c) Students get to be truly implied in research activities with teachers and researchers of their area only in theirs lasts year of study, too late for their research abilities to be developed and exercised in many contexts to become stable.

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Based on the reasons outlined above, the university students' training in research is a surface learning and most of students are not capable of leading research (Sadnes, Jian & Hunag, 2006).

In terms of students' participation in staff research project Walkington (2015:10) describes five levels of involvement of students. In the case of first three levels, students are closely supervised by research staff: they are assigned to research tasks, they are informed about the research and about the tasks and their job is to carry out routine research tasks, following established methods (first level); students involved in the research are informed and consulted about the research (second level); staff design the research project but students can make decisions, can revise methods, and can assume tasks and so on (third level). In case of the fourth level, students are working independently, without any supervision from university staff, taking decisions alone. The fifth level refers to the students that design and carry out the research themselves, in consultation with university staff at a level determined by the student. In fact, the situations that correspond to the last two levels are those when students have been working for a long time in a research group during their undergraduate studies and they are enrolled in a PhD program. Hunter et al. (2006:40) consider that the most efficient situation for undergraduate research activities happens when the student learn based on the mentors expertise, being encouraged to take primary responsibilities for the activities undertaken in the project and to contribute substantially to these activities.

In relation to the above considerations regarding the levels of student engagement in research activities, our investigation is based on the following research questions: "Why do students chose to take part in research activities during their university studies?", "What are the students′ abilities to research and communicate with regarding these investigations?" and "What are the resources students use in research activities?"

2. Material and Methods

The qualitative inquiry was carried out in the second semester of 2016-2017 academic year.

Instrument

The investigation was carried out by applying an online anonymous questionnaire to students who are enrolled in higher studies at natural sciences universities. The questionnaire was adapted from a paper that investigates the necessity of laboratory classes in higher education (Kirschner & Meester 1988:81). The items of the questionnaire are oriented towards the next aspects: motivation to take part in research activities (4 items), students ability to carry out the research tasks they are assigned and the resources they use for that purpose (3 items), possession of the skills necessary to carry out experiments (5 items) and the abilities necessary to communicate regarding the research they carried out (3 items). The responses assumed the agreement on the questionnaire items on a Likert-type scale with 5 variants of response (1-Total Disagreement and 5-Total Agreement). Descriptive statistical analysis (percent, frequency, average) was performd using Excel.

Participants

At this study attended 51 subjects, including 1 graduate and 50 students. Respondents are studying at natural sciences and technical faculties in Romania, most of them coming from the Polytechnic University of Bucharest (UPB), Babes-Bolyai University of Cluj-Napoca (UBB) and "Alexandru Ioan Cuza" University (UAIC). 38 of the participants are female and 13 male. The age varies between 19 and 32, the average being 22 years.

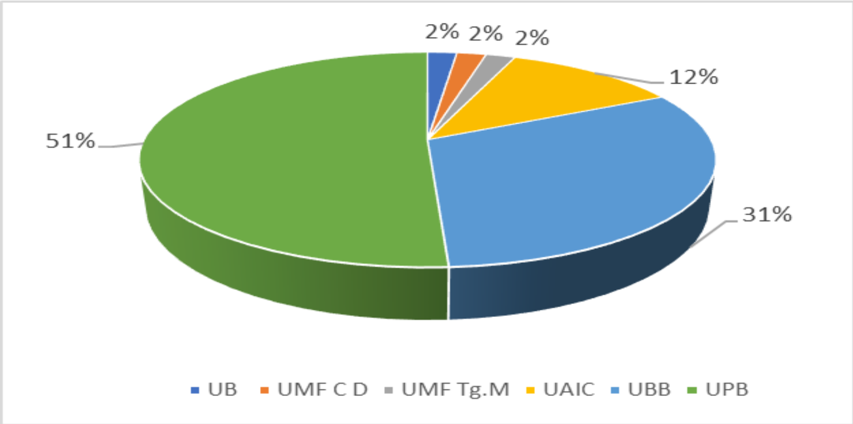

Figure 1. *Universities where participants are enrolled*

74% of the participants are students enrolled in bachelor's degree studies, 24% are studying for a master's degree and only one participant is attending doctoral studies.

The distribution of students according to their level of studies is represented in **Figure 2.** This gives light to the fact that the percentage of students who participated are students in the first two years, roughly the same percentage of students attending last two years of bachelor's degree studies. Regarding master degree students, there are 3 times more master degree students participating from the second year, than the first.

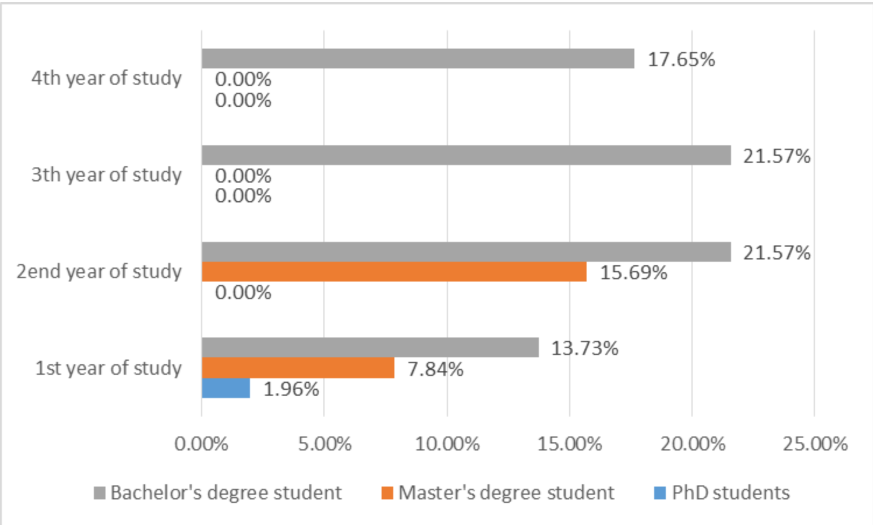

Figure 2. *Students' distribution by years of study*

3. Results and Discussion

Participants' responses to the items referring to their motivation for engaging in research activities are presented in Table 1. As can be seen from the **Table 1**, the main source of motivation for students' involvement in research activities is curiosity, while the preoccupation for the graduation thesis is on the last place.

Table 1. Students' motivation regarding their implying in research activities

Item	Strongly disagree	Partially disagree	Undecided	Partially agree	Strongly agree
Item 1. I do research to finish my bachelor's/master's degree thesis	27.45%	1.96%	17.65%	15.69%	37.25%
Item 2. I do research because I want to bring a contribution to science	9.80%	9.80%	15.69%	25.49%	39.22%
Item 3. I do research because I am curious to discover new things	11.76%	3.92%	1.96%	21.57%	60.78%
Item 4. I do research because I think it will help me in the future to get a job	7.84%	3.92%	23.53%	19.61%	45.10%

The next 3 items are shedding a light to the ability of students to complete de research tasks they are assigned and the resources they use. The most widely used resources are: the knowledge from the lectures (item 5), information and protocols from science papers or internet (item 6) and the help of the teacher (item 7). Most of the participants agreed that they can complete a research in the laboratory with the guidance of a professor (82.35%) and with the information from books, science papers and internet (76.47%). Only a little over half of the respondents are using their theoretical knowledge from lectures to complete laboratory tasks (54.90%). The fact that student's don't rely on theoretical knowledge can also be seen when comparing the percentage of students who answered with "undecided" (item 5: 35.29%, item 6:19.62%, item 7: 13.73%).

In **Figure 3** are represented participants answers regarding the skills they need for a research: the method proposal based on students' knowledge (item 8), recording the data of an experiment (item 10), processing scientific data to graphs and presentations (item 10), analyzing the results of a scientific experiment even if not the student carried it out (item 13), use of the scientific results to answer questions (item 15). Except for item 8 (m=3.65) for the rest of items) the average is in the range [4.02-4.42].

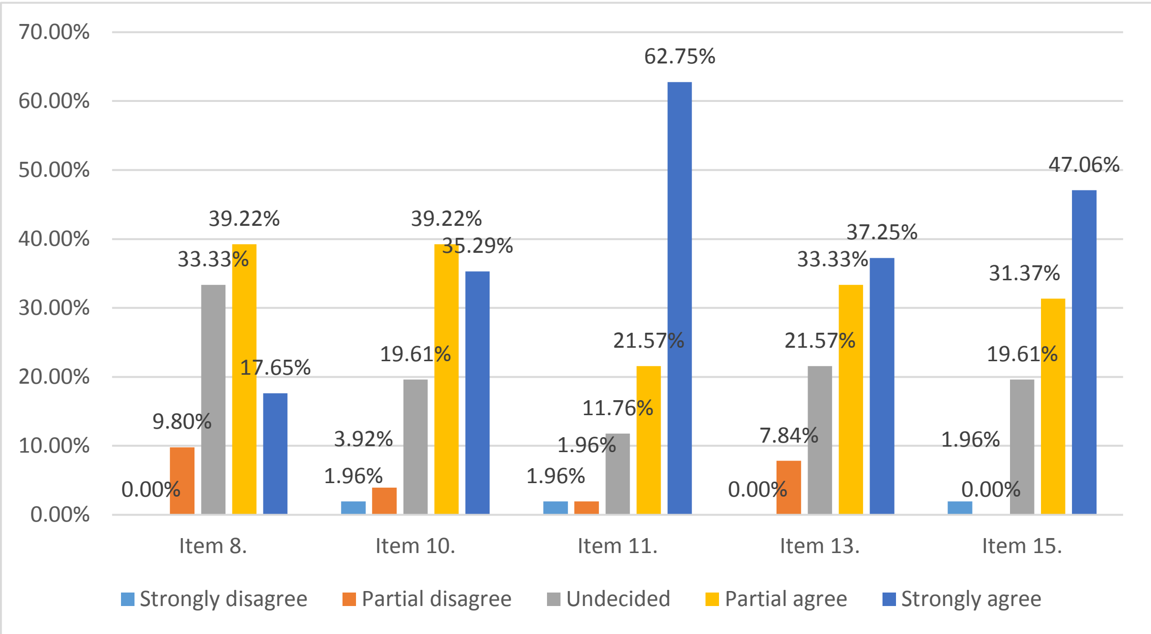

Figure 3. *Respondents answers regarding their abilities to conduct a research*

As can be seen in the **Figure 3**, the percentage of respondents who express their disagreement (total and partially) regarding these items sits below 10%. Instead, the percentage of subjects who answered with "undecided" is between 12%-33%, the highest one being recorded regarding item 8. The lowest level of agreement is reached at item 8 (56.87%) and the highest at item 11 (84.31%). Deducing from this that respondents are less confident in their ability to propose the scientific method appropriate to the research task, but agree that they can graphically process experimental data, even if not necessarily they are the authors of the experiment. Also, they can use the experimental results they obtained to answer questions (78.43%), the can record scientific data (74.51%), they can analyze the results of an experiment even if they weren't the ones who carried it out (70.58%). The explanation is found in the fact that most of the time the research activities are closely guided by professors or protocols, and during the study, most of the laboratory hours exercise the student's ability to record and process scientific data.

The last set of items refers to the students' ability to communicate about the process they applied, data they obtained and the results of their research.

Table 2. Participants' opinion regarding their abilities to communicate about their research activities

Item	Strongly disagree	Partial disagree	Undecided	Partial agree	Strongly agree
Item 9. I can talk about the scientific methods I used with other people familiar with my area	3.92%	1.96%	9.80%	47.06%	37.25%
Item 12. I can use the scientific data of an experiment cu create graphs/presentations	1.96%	1.96%	11.76%	21.57%	62.75%
Item 14. I can use correctly scientific terms to describe the scientific investigation I have done	0.00%	3.92%	15.69%	43.14%	37.25%

The percentage of students who express their agreement to the above statements is over 80% (item 9: 84.31%, item 14: 80.39%). The explanation for this can be found in the fact that students are encouraged during laboratory workshops to practice these abilities.

4. Conclusion

The responses recorded for this questionnaire shed light on a few aspects highlighted by the high percentage of approval:

a) The existence of intrinsic motivation to take part in research activities (curiosity and the need to bring contribution to science)

b) Participants' need to be guided throughout the research and the necessity to have available other resources than the information that is studied in theoretical lectures.

c) Respondents' ability to conduct a scientific investigation

d) Participants' ability to communicate and discuss with reference to their research. Also, the answers on the questionnaire fit the respondent to the first two levels of Walkington hierarchy (2005:10)

We consider important that the teacher who coordinates a laboratory class to be more implied in understanding by students of how a research is carried out, to let students take a higher grade of decisions and to harness more the importance for itself, for society and for the scientific world the research activity carried out by students. This way, students can be ready to take part in research projects, they can integrate easier in research groups and even conduct their own research. Implying students in research, requirement of the technological society we live in should constitute an important objective of university education.

University and policy decision-makers should understand that in the professional training of students, regardless of their specialization, increased attention should be paid to the development of research competences, scientific creativity and critical thinking of students (Lamanauskas & Augien, 2017: 224).

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Authors

Demjén Beátrix-Aletta, Faculty of Chemistry and Chemical Engineering, Masters'degree in Advanced Chemistry, Babeș-Bolyai University, Cluj-Napoca, e-mail: d_beatrix93@yahoo.com

Ciascai Liliana, Faculty of Psychology and Sciences of Education, Babeș-Bolyai University, Cluj-Napoca, e-mail: liliana.ciascai@ubbcluj.ro (corresponding author)

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