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Development of Scientific Research Activity in University: A Position of the Experts

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Abstract

The formation of scientific research activity (SRA) abilities in comprehensive school is, undoubtedly, a very important sphere, having not received a proper attention yet. Moreover, it has been determined, that in all European Union, Lithuanian people are the ones who are, perhaps, the least interested in science and the least informed about scientific achievements (LMJS, 2008). Such situation stimulates into looking for reasons. The most likely one is, that in comprehensive schools and later on at the university level as well not enough attention is paid to SRA. Without putting the very concept in a frame, scientific research activity is the basic component of developing science education. Thus, constant awareness of this topic is a definitely important issue. Our time requires human curiosity, continuous adaptation to the ever-changing life and active involvement in changes taking place in the society. In this case, creativity, original thinking, self-sufficiency, etc. are the essential qualities (Lamanauskas, 2012).

SRA should be universally stimulated and developed. Scientific research activity is not an entertainment, but responsible, thorough work requiring a lot of self-reliance. During such an activity students' analytical thinking gets stronger, the abilities of searching for information and using it are formed; they learn how to analyse the gathered material, to prepare reports, to make research presentations and so on.

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Keywords: Delphi survey; expert evaluation; scientific research activity (SRA); university students

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1. Introduction

1.1. Global and national context

The 20th century science inventions are changing people's life and culture. Science helps the humanity to create a more comfortable life, prognosticate natural phenomena, foster humanistic traditions, educate the society, change the society's development and so on. The Internet, telecommunication and computers have turned the world into global, and Lithuania – the part of it. Chalmers A. F. (2005) accentuates, that three driving forces rule the world today: politics, economics and science. Politics and economics seek for the nearest goals, and the furthest goals – is the sphere of science and academic society. Human thought works in the science field most intensively now; the main part of the intellect's energy is devoted to science. Science knowledge forms a cultured man nowadays. Science becomes the basis of our century's culture and progress.

Science is perceived in a broad sense today. It is treated as a part of culture and a basis of trade, satisfying the man's material and spiritual demands. Today, it is universally acknowledged already, that in our modern world, technological progress, innovations, knowledge economy are the country's economy and culture development basis. An obvious relation is noticed between the country development level and knowledge economy part in general economics. The future of the countries, especially those, the natural resources of which are not abundant and the main product is created owing to the intellect, depends on the rapid development of science and technology. Rapid changes in labour market needs, and knowledge becoming the main condition of success in a competition based market economy, raise the new requirements for the abilities of its subjects as well: to obtain such knowledge, which would allow not only to survive, but also to defeat in a competitive struggle. Today, in a knowledge based society, research abilities, owing to which, fundamental and applied knowledge is gained, become the most essential (Lamanauskas, 2003; Hu, Kuh, Gayles, 2007). Therefore, every society today raises new educational goals, seeks to reconstruct its education system so that it could control the innovations influenced by globalization and could prepare the young generation to live in a globalized world and to act in a competition based market economy. In a modern world, the ability not only to master the knowledge, but also to create it yourself and to participate in the society and world change, becomes very important. Young people's interest in science - researches, achievements, new opportunities, has been particularly accentuated. In order to cognize the present world, and to make competent decisions, one must have scientific education and the ability to control the scientific world cognition method, the creation of science knowledge. Scientific education is necessary today for each and everybody (Pisano, Bussotti, 2013). Students' scientific research activity (SSRA) is an obligatory, integral part of training the specialists at university (Students' scientific research activity (SSRA), 2014)). Especially as some students have an early sense of proximity to and/or participation in the scientific research activity, while for others, research remains, through their undergraduate years, a remote phenomenon (Robertson, Blackler, 2006). One can claim that students' scientific research studies are not only an aim at a higher school, but also a device for intellectual, emotional and practical development. It is obvious, that the development of SRA provides challenges to the university staff, but, on the other hand, they may lead to finding new ways for staff and students to work together (Healey, 2005).

Though students' scientific activity encouragement is an urgent problem, however, there is lack of research studies on this problem in Lithuania. A lot of research studies have been carried out, analysing various student preparation problems and urgent things. The research studies have been carried out seeking to ascertain students' attitude to active learning methods (Petružienė, Ruzgienė, 2003), to independent studies (Gudžinskienė, Šmitienė, 2003), to professional preparation obstacles (Navaitienė, 2004), to study programme realization quality (Sirtautienė, 2006). All of these studies more or less reflect SRA issues. Students' scientific research activity is determined by research activity competence, acquired during theoretical and practical studies: lecturers' active study methods' usage, preparation of a course paper or bachelor work and so on. However, there is lack of exhaustive research studies about bachelor study students' scientific research competence education in the study process. Despite the increased attention to students' scientific research activity development in recent years in Lithuanian universities, it is obvious, that the abilities of such an activity are insufficient. Students find most difficult to choose an optimal strategy of a concrete research, prepare research devices, generalise data analysis results and make a conclusion in a research paper and recommendations (Lasauskienė, 2013).

1.2. Political context

In the Bologna process Communique (2009), of the ministers Leuven and Louvain-la-Neuve, responsible for higher education, it was foreseen to seek education, research and innovation unity in higher schools up to the year 2020. It was accentuated in this document that all level higher education has to be based on modern scientific researches and their development, in this way promoting the society's innovativeness and creativity. The main attention in this document was drawn to people, having researcher competencies and to the attractiveness of the young researchers' career. The number of the inhabitants, able to carry out scientific research studies, has to increase. Besides, the state institutions and higher schools have to seek the career for the young science researchers to be more attractive. Therefore, more and more attention has to be paid to students' scientific research work ability, critical thinking, creativity and productive self-expression formation. However, it has been noticed lately, that the number of youth, wishing to relate their life and activity with the scientist's career is decreasing in Lithuania. It has to be mentioned, that it is sought to encourage and activate the students' interest in scientific research activity in Lithuania. Students' scientific associations – independent, scientific, public, voluntary organizations, uniting all scientific sections working at university, the members of which – students and lecturers actively participate in the sections' activity, scientific conferences, discussions and seminars, are being established in universities. Students' scientific conferences are organized at universities, during which the students present the results of their researches. In some universities, bachelor study students' scientific practices are organized.

One of the longest lasting devices, encouraging students' scientific activity is - the project "Students' scientific activity encouragement", carried out with the support of Lithuanian science council and EU structural funds. The main aim of the project is to encourage Lithuanian academic youth to be interested in scientific research works, to reveal the perspectives of the scientist's profession and the scientist's career and to create the possibility for the students of different Lithuanian regions and higher schools to get acquainted with the scientific research works carried out in the most famous scientist groups, associations, and centers. During the project, scientific research activity is performed in the course of the study semester; students' scientific practice is organized in the months of summer holidays. The project is for the 1st and 2nd study stage students (1st to 4th course bachelor and 1st course master study students) to carry out scientific research studies under the leadership of high qualification researchers, according to the individual research program. Scientific research practice significantly contributes to students' professional development, forming the possibilities to use the knowledge obtained at the university performing scientific research studies and to apply the results in a real professional environment, and more courageously step forward according to the chosen academic sphere. However, the mentioned activities embrace only a small part of motivated students.

Scientific research competence today is important for many professions and activities: it is necessary not only to creatively apply the obtained knowledge but also to create new knowledge, to carry out the applied researches. Therefore, during the bachelor studies already, the student has to obtain scientific research competence. Scientific research activity becomes the teacher's educational practice realia as well, allowing the analysis of concrete learning situations, forming the assumptions to think over one's actions, pedagogical interaction with pupils, allowing making sure of the effectiveness of the applied teaching methods. Constantly changing pedagogue's activity requires research activity competences. Teacher-researcher - is constantly thinking over his activity, organizing pedagogical activity researches, applying various research methods, creatively applying the research results (Caena, 2011). It is obvious that there is evidence that teacher researcher contributes to teachers´ professional dispositions, learning, and growth (Nezvalova, 2011). The goal, that the teacher has to develop research activity in his educational practice and to become a teacher researcher is especially accentuated lately in Lithuanian and foreign scientists (Lepeškienė, Butkienė, Steevens, Werkhoven, 2001; Pollard, 2006) works and in education strategist speeches and documents (*Teacher professional competence description, 2007; Common European Principles for Teacher Competences and Qualifications, 2010*). Pedagogue's scientific research competence has a double meaning and importance: the pedagogue not only himself has to master the scientific reality cognition method, to carry out the applied researches, but also has to be able to guide the learners' scientific cognitive activity, to make the learners interested and to encourage them to research (Pečiuliauskienė, 2008).

1.3. Research object and aim

The object (the focus of the research) is the development of students' scientific research activity in the university. The purpose of the research is to describe the current situation of organization and realization of scientific research activity, to define essential factors promoting and hindering students' interest in scientific research activity, to determine lecturers' competence peculiarities in the sphere of organization and realization of SRA.

2. Methodology of research

2.1. General characteristics of the research

The study employed expert inquiry. The type of expert inquiry is 'Delphi study', containing several experts' inquiries (stages). The data of every round are generalized and repeatedly submitted to the experts. Such procedure is repeated several times, most often 3-4 times. The research went on from October 2013 to April 2014. From preliminary formed 25 expert groups, 16 participated in the research. M. Turoff and H. Linstone's (2002) recommendations were followed while forming the group. The experts were selected in the group by the random – objective way. The most important criterion was the competence of experts and current research activities (scientific publications, participation in the national and international projects etc.).

2.2. Research stages and data analysis

First round involved preparing a questionnaire, which consisted of eight open (in some cases mixed with close-ended) questions:

- How do you evaluate the current situation of university students' interest in developing research activities in the study process?
- Do you think the Lithuanian universities have favourable conditions for students to develop scientific research activities?
- Are students interested in scientific research activity? (in addition a closed-ended sub-question was added using the scale: *interested very much, interested, slightly interested, not interested*)
- Do you think that current study process is favourable orientating students to scientists, (researchers) career? (in addition a closed-ended sub-question was added using the scale: *very favourable, favourable, slightly favourable, not favourable*)
- What factors, in your opinion, hinder educating students' interest in scientific research activity?
- What factors, in your opinion, promote students' interest in scientific research activity?
- How would you evaluate lecturers' competence forming and developing students' scientific research abilities in the study process? in addition a closed-ended sub-question was added using the scale: *significant, only average, poor*)
- What would you recommend to change (organize) in the study process seeking to strengthen students' interest in scientific research activity?

After the first round of data analysis, the second stage questionnaire was prepared which comprised closed questions. The experts were asked to distinguish 5 essential factors each- hindering and stimulating students' interest in scientific research activity (SRA), and to evaluate the statements describing current situation (on a rank scale: agree, partly agree, don't agree). Analogically, the experts were asked to distinguish five most important suggestions.

The data of the second stage were processed applying mathematical statistics (ranks were given). Seeking deeper analysis of the data, statistic rank scale rates were transferred into ratio scale and the index of significance (SI)/popularity index which could vary from 1 ("agree") to 0 ("don't agree) was calculated for each statement ($0 \leq PI/SI \leq 1$). The closer is SI value to 1, the more important, more significant is the statement to the respondent, or respondent better approves of it. Qualitative analysis of the second stage was carried out.

The third stage questionnaire was prepared according to generalized results of the second stage.

Limiting/hindering factors were ranked and once again submitted to the experts to assess and comment upon. They did the same with suggestions. Each of five limiting/stimulating factors and suggestions, experts could comment upon once again.

Communication with experts was by e-mail. Taking into consideration research ethical requirements, the experts were asked to express consent to announce their names in the study report. The majority of experts agreed to this.

3. Results of research

Generalized results of the three research stages are presented here. Generalizing the expert opinions, 21 statements have been distinguished for the analysis of the situation (Table 1). Seeking for more exhaustive situation revelation, the data were transferred into ratio scale and for each statement significance index was calculated. SI is arranged in the decreasing order in the table.

Table 1. The evaluation of the current situation in the university, enhancing the 1st study stage students' interest in scientific research activity in the study process (N/%/SI).

Statements	Agree	Partly agree	Don't agree	SI
Active cognitive processes are stimulated in the study process: information search, creative result interpretation, reflexion	11/69	4/26	1/5	0.81
Students are being acquainted with the possibilities of participating in scientific research activity	8/50	7/44	1/6	0.72
Study organization form determines students' interest in scientific research activity	7/44	8/50	1/6	0.68
It is complicated to motivate the students to participate in scientific research activity	7/44	7/44	2/12	0.66
Interest in scientific research activity is, in fact, related only with compulsory tasks (e.g., course paper or bachelor work)	8/50	5/32	3/18	0.65
More often the researches are carried out more qualitatively by "the geeks", however, there are less of them every year	7/44	6/38	3/18	0.63
Students are not very much interested in scientific research activity	8/50	4/25	4/25	0.63
Students still are rather poorly involved in scientific research activity	7/44	6/38	3/18	0.62
The majority of lecturers have a formal attitude to students' scientific research activity	7/43	5/31	4/26	0.60
Interest in scientific research activity is limited, fragmentary	5/32	8/50	3/18	0.56
Students study the subjects as researchers, searching for the answers to the questions arising in reality	5/31	6/38	5/31	0.5
Students' scientific research activity receives a lot of attention in the study process	4/25	7/44	5/31	0.46
Students are involved in research projects	3/18	8/50	5/32	0.44
Universities promote and support students' scientific research activity	2/12	10/62	4/26	0.43
Students' interest in research activity is weakened by overloaded study programmes because very little time is left for developing skills, carrying out researches	5/31	4/25	7/44	0.43
Students' scientific research activity is developed very actively in the study process	2/12	7/44	7/44	0.34
The majority of students are interested in researches, in their accomplishment and results	2/12	6/38	8/50	0.31
Students have weak orientation, almost are not eager to study, therefore research activity in the study process is only a goal	2/12	6/38	8/50	0.31
Students' interest in research activity is sufficient	2/12	4/25	10/63	0.25
Students consistently are interested in scientific research activity in the study process	0/0	8/50	8/50	0.25
Students actively involve themselves in research activities at the beginning of studies already	1/6	4/25	11/69	0.18

In this table one can see, that experts very constructively value the current situation, each expert accentuates certain peculiarities. The statements cover a very broad spectrum of the situation: the peculiarities of the study

process, students' motivation and involvement/inclusion in research projects, university lecturers' attitude to students' scientific research activity and so on. The experts expressed the position, that students start getting interested in scientific research activity when: the teacher himself is interested in it; proper conditions are formed; certain methods are applied (problem based learning, research based learning, cooperative studies and other) in the study process. The experts' position is evident, that conditions are certainly very favourable for the mentioned activities in the universities; however, it is not enough of time for showing the sense and persuading the students for independent search.

Having carried out the evaluation of the current conditions for bachelor students' scientific research activity development in Lithuanian universities, 12 statements have been distinguished. They have also been ranked according to significance index (Table2).

Table 2. The evaluation of the current conditions in Lithuanian universities for bachelor students' scientific research activity development (N/%/SI)*.

Statements	Agree	Partly agree	Don't agree	SI
Lecturers willingly help the students to choose the research subject that interests them	10/62	4/24	2/14	0.75
Students have the possibilities to take part in seminars, projects, conferences	10/62	4/24	2/14	0.75
There is a suitable base for scientific research activity	7/44	6/38	3/18	0.63
Students are constantly promoted to participate in scientific researches	6/38	7/44	3/18	0.60
Students' scientific research activity is more "paper" than real	7/44	5/32	4/24	0.59
Conditions are suitable, favourable	5/32	8/50	3/18	0.56
Suitable conditions are not created for students' scientific research activity	5/32	6/38	5/30	0.5
Lecturers actively promote the bachelors to get interested in scientific research activity	3/18	9/58	4/24	0.46
Universities value lecture attendance more than scientific research activity	3/18	8/50	5/32	0.44
Conditions for scientific research activity are not favourable	3/18	6/38	7/44	0.37
Students' scientific research work is well organised	2/12	6/38	8/50	0.31
Universities allocate finances for students' scientific research activity	0	6/38	10/62	.18

*- based on second question

The results presented in the second table show, that students have possibilities to participate in seminars, projects, conferences, that lecturers willingly help the students to choose the research subject that interests them. However, the results are not very positive. One can claim, that two main factors have a negative influence, i.e., insufficient science and study financing, and inadequate society's attitude to science. In other words, students' scientific research activity is not related (or slightly related) with material recourses, it is sought "to make" science without money.

Having analysed the experts' positions about bachelor students' interest in SRA, such distribution has been received (Table 3).

Table 3. Bachelor students' interest in scientific research activity.

/the situation according to generalized expert group's first and second stage evaluation (based on close-ended question)/

Interested very much	Interested	Slightly interested	Not interested
5 %	35 %	40 %	20 %

Distribution shows, that students' interest in scientific research activity is insufficient. 60 percent of students are practically not interested in such an activity. The majority of experts agree that students are interested in SRA only for the reason that they must complete the tasks (pragmatic attitude). The experts draw attention to the fact, that

these are first stage studies. The majority of bachelors are orientated to practice but not to scientist's career. On the other hand, the student has the right to foresee the pursued learning result priorities, therefore this distribution, in many experts' opinion, is positive.

It is important to evaluate how much favourable is the current study process for scientific research activity development. The results are presented in table 4.

Table 4. The evaluation of the current study process favourableness, enhancing bachelor students for scientist's (researcher's) career.
/the situation according to generalized expert group's first and second stage evaluation (based on close-ended question)/

Very favourable	Favourable	Slightly favourable	Not favourable
10 %	40 %	35 %	15 %

The results show, that the experts favourably value the study process, the situation is valued more favourably. However, it is partly contrary to the experts' position claiming, that the students are slightly interested in this activity. This might be related to different experts' experience, it depends on which study program students the experts work with, how the studies are organized according to these programmes.

Having analysed hindering and promoting factors, 5 factors have been distinguished in each case. The results are presented in table 5.

Table 5. The factors hindering / promoting bachelor students' interest in scientific research activity*.
/ 5 most important factors, having received most of the experts votes /

Hindering factors	Promoting factors
Students' weak motivation (1)	Students' motivation (1)
Improper science and study policy (2)	Modern studies, encouraging problem search and solution (2)
Weak orientation in seeking for scientist's career (3)	The perspective of studies in Master's course (3)
Students do not spend enough time on their studies, because many of them work (4)	Constant lecturers' encouragement and support (4)
Student scientific association inactivity (5)	Students' activity and a wish to try new activities (5)

In the brackets the rank is marked, where 1 corresponds to the highest rank.

In the table, one can see that one of the main hindering factors is students' motivation. All experts agree with such a position, however, it remains unclear, what determines the weak motivation of the students and for this, deeper researches are necessary. It is without doubt, that student's understanding and willingness are necessary to take part in this activity; a bigger responsibility for one's learning results. Lecturers' role is great, in this case. On the other hand, it is obvious, that the main subject in scientific research activity is the student and sufficient lecturer's contribution promoting this activity. Study programme is only a device to obtain analytical research skills. Scientific research activity requires consistency, diligence, creativity. Having generalized the experts' positions, the opinion was approved, that nowadays students (even not working) do not possess these qualities. They choose an easier and simpler way to get a diploma. The experts emphasize, that already in the first study years, the students should create reports, present works, raise problems and propose various problem solution variants. Most of the lecturers actively work in SRA sphere, seek to involve the students, however, the students' themselves initiative is poor. When the students "get infected with" the desire to research from each other is much more effective, comparing to, when the idea is forced by the lecturers themselves. From managerial point of view, it has to be sought for the studies to encourage problem search and solution, develop research abilities, assure successful person's action in the labour market and in a public life.

The lecturers' contribution, developing students' scientific research abilities, is very significant. In the experts' opinion, such contribution is, in fact, positive (Table 6).

Table 6. The evaluation of lecturers' contribution, forming and developing bachelor students' scientific research abilities in the study process.
/the situation according to generalized expert group's first and second stage evaluation (based on close-ended question)/

Significant	Only average	Poor
35 %	45 %	20 %

However, the lecturers should motivate the students more, because the research works performed by them are rather fragmentary, they cannot see practical applicability of the research results. Very often the research works are not continued, which would end with the bachelor thesis. The students hardly accept that a professional specialist, having university education will have to be able not only to work well with children, but also to diagnose, to value education quality and to scientifically ground it. It makes no sense for them to seek such a level, therefore the lecturer's role motivating the students has to be much more expressed. The lecturer himself has to be an active researcher and a searcher (i.e., a scientist).

The obtained results show, that students' scientific research activity has to be developed more effectively. Having generalized the experts' positions, 5 main recommendations have been distinguished to improve the condition (Table 7).

Table 7. Recommendations for the study process organization/changes, seeking to strengthen/make more effective bachelor students' interest in scientific research activity*.
*/ 5 most important recommendations, having collected most of the experts votes***

Recommendations
Apply modern study methods, promoting critical thinking and new subject search (1)
Students should be more involved in the performance of the lecturers' research works, as assistants, putting data in order (2)**
Develop lecturers and students' team work (2)
Include in study programmes more subjects for education of research competences(3)
Strengthen SSA activity (4)
Prepare more complex science projects, in which students could participate (5)

** In the brackets the rank is marked, where 1 corresponds to the highest rank.*

*** The second and the third recommendations collected the same number of grades; therefore their rank is the same.*

Submitting the recommendations, the experts once again stressed, that the current students' SRA situation has to be improved, therefore an integrated approach is necessary for changing the situation, and the changes are possible only if there are value changes. The experts think, that very important is lecturers and students' cooperation in this sphere, more active students' involvement in this activity. On the other hand, raising lecturers' qualification, improvement, remains a priority thing. Despite the financial difficulties, the institutions must find the possibilities and form conditions for professional improvement. In their own way, the lecturers themselves, as well, should search for possibilities to remain active researchers. A part of the experts expressed the position, that as early as possible, the students should be given the tasks requiring analytical, reflective, evaluative abilities, because the latter are more accustomed to repeat the information, but not to analyse, "produce" new knowledge.

4. Conclusions

In universities favourable conditions are formed for bachelor study students to actively perform scientific research activity both in the study process conducting various tasks, using active teaching/learning methods and strategies, and also participating in scientific projects, seminars and conferences going on at universities. On this basis, favourable conditions are formed to get acquainted with and get interested in the scientist's career.

A lot of factors influence the students' active involvement in scientific research activity: strategy and methods of the study process organization, students' motivation, lecturers' active position and a desire to cooperate with students, material base and conditions for the organisation of scientific research activity.

A lot of students practically are not interested in scientific research activity. A pragmatic attitude makes them participate more actively - in the study process the student must accomplish the assignments allotted to him. This evidently demonstrates that students lack inner motivation, interest in scientific reality cognition.

The main students' reason for not being interested in scientific research activity is lack of motivation. The students hardly accept the fact, that a professional specialist having university education will have to be able not only to perfectly apply the obtained knowledge in practice, but also in his own practical activity he will have to carry out the applied researches, create new strategies, deeper cognize the essence of professional activity and to control the changes. Scientific research activity requires creativity, insight, responsibility, consistency. Today's students do not possess these qualities. They choose an easier and simpler way of getting a diploma, the way which requires less time and efforts.

One can change the current situation only using an integrated approach to the problem (lecturer, student, study process). The lecturers should be interested in involving the students in their performed research works and projects. Lecturers and students' scientific cooperation should be developed, as a result of which, the students would have the possibility to actively participate in research studies, receive effective support, get experience and see the activity results. This would promote the students' motivation. In the study process, the students should have to complete more tasks, which would help them master the scientific reality cognition method: to analyse, generalize, systemize, reflect, raise hypothesis and search for the answers.

Note

Because of the article size limit, the authors presented only generalized results of all three research stages.

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