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Preschool and Primary School Teacher Program Students' Opinion on Science Subjects Necessity for the Profession

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Abstract: An important educational task is to encourage preschool and primary school teachers to engage children in scientific activities in a way that will nurture their natural curiosity. The aim of the study was to clear out preschool and primary school teacher program students' attitude to science subjects and their opinion on the necessity of science subjects' topics in the acquisition of the preschool and primary school teacher profession. The electronic survey of the 1st and 2nd course preschool and primary school teacher study programs full time (FT) and part time (PT) students from the University of Latvia was carried out. Altogether 120 students were surveyed. The results of the research showed that most of the surveyed preschool and primary school teacher program students consider that different topics of science subjects must be taught in one common science course for preschool and primary school teacher study programs students and the most appropriate course title might be *Basics of natural sciences*. Many preschool and primary school teacher program students are very interested in such topics as child's health and factors affecting it, stress management, child's behaviour disorders, child's learning disabilities and physiology of child's development. Surveyed FT students as the most important science subjects in the acquisition of the profession of preschool and primary school teacher consider *Physiology of human development* but part time students *Child's behaviour disorders*. Most of the surveyed preschool and primary school teacher program students consider that organizing more outdoor activities outside the classroom, the involvement of children in observation of natural processes and enabling students to do more practical work in nature are the most important ways how to raise pupils' interest in science subjects.

Keywords: university education, students, science subjects, preschool and primary school teacher profession.

Introduction

Preschool and primary school teachers have a significant influence on the development of children and the formation of children interests. An important role in the preparation of a professional teacher plays the professional competence of the teacher. The content of the teacher professional competence consists of knowledge, skills and attitudes necessary for the professional activity of a teacher (Andersone, 2010). Thus, the content of the teacher programs plays a crucial role in developing the competence of prospective teachers. Prospective teachers need knowledge on promoting purposefulness to be able to choose their life goals and be aware of the possibilities to achieve them. Regarding the formation of purposefulness, prospective students need to perceive studies as a process personally significant for them. In such a way, they develop their self-experience where learning becomes personally relevant for them (Jurgena, Cedere, Katane, 2019). Therefore, teachers must be satisfied with the chosen study content.

The economic growth of a country on a great extent depends on science and engineering education and the scientific literacy of young people. The lack of knowledge and skills in science and mathematics can be considered a threat to modern science and technologies - driven economy. Key competences for lifelong learning in knowledge, skills and attitudes were defined at European Union level. They are communication in the mother tongue; communication in foreign languages; mathematical competence and basic competences in science and technology; digital competence; social and civic competences; the sense of initiative and entrepreneurship; learning to learn; cultural awareness and expression (Developing Key Competences…, 2012). Successful studies of young people in science-related professions and the development of interest in these disciplines are closely connected with their primary school experience and interest in science subjects (Bottia et al., 2018). A primary school teacher must be competent in a variety of science subjects in order to generate interest in science among students. Generating meaningful causal explanations of scientific phenomena lies at the heart of both the scientific endeavour itself and of effective classroom teaching. To focus on knowledge acquisition in teacher

education, however, obscures the critical issue of subject-related pedagogical knowledge that ultimately influences classroom practice (Parker, 2004). Therefore, important are the development of both subject knowledge and subject-related pedagogical knowledge in science education.

Studies have shown that Latvia students' cognitive interest in science subjects and mathematics can be assessed as a medium; still, it is very different and is paced in a wide range as regards particular students. The attention is drawn by the fact, that relatively many students have explicitly low interest in the science subjects included in the study. Boys display higher interest in chemistry, physics and mathematics, while girls have a higher interest in biology (Cēdere et al., 2015). Students have a relatively high interest in science in the context with real-life and processes in the surrounding environment. Students' inquiry interest is equally high, and it is expressed as making the experiments, analysis, evaluation, finding out the causes, the solution of real-life problems (Cēdere, Jurgena, Targamadze, 2018; Andersone, 2017). The most important factors that cause students to interest in the subject are the opportunity to acquire an interesting profession related to the subject, possibility to apply obtained knowledge in life and influence of teachers. Especially high the influence of teachers is evaluated by pedagogical specialities students. Students highly appreciate the ability of the teacher to teach the subject simply and comprehensibly and attract students to the subject (Porozovs, 2019).

During the past decade, early childhood teachers have been faced with new needs to develop their content knowledge and pedagogical content knowledge for different science subject areas. To meet these challenges, there is a strong need for professional learning programmes for early childhood teachers that focus on the development of knowledge, and skills to work with science activities in their context (Nilsson, Elm, 2017). The curricula reforms at the levels of preschool and primary school in Sweden have caused new demands on the teachers. In particular, numerous teachers lack educational training in science subjects. In terms of the groups of 1-3 and 4-6 grades teachers, the needs relating to scientific literacy were revealed, with a focus on engaging students in socio-scientific problems (Walan, Rundgren, 2014). Teachers' attitudes and conceptions toward the science subject domain and science education influence their ways of teaching and engagement (Spektor-Levy, Baruch, Mevarech, 2013). An important educational task is to encourage preschool and primary school teachers to engage children in scientific activities in a way that will nurture their natural curiosity. To accomplish this task, teachers themselves must be interested in science subjects.

The aim of the study was to clear out preschool and primary school teacher program students' attitude to science subjects and their opinion on the necessity of science subjects' topics in the acquisition of the preschool and primary school teacher profession.

Methodology

The electronic survey of the 1st and 2nd course preschool and primary school teacher study programs full time (FT) and part time (PT) students from the University of Latvia was carried out. Altogether 120 students were questioned (32 FT students and 88 PT students). The survey was worked out to clarify opinion of students on necessity of science subjects and science subjects' topics in preschool and primary school teacher study programs, the interest of students in different science subject topics and opinion of students about the possibility to increase the interest of children in science subjects. The Likert scale was used in some of the survey questions. The answers of FT and PT students were compared.

The research question was: how much preschool and primary school teacher program students are interested in science subjects and whether they believe, that the science subjects' topics are necessary for the acquisition of the preschool and primary school teacher profession?

Results and Discussion

The results of the investigation showed that the majority of the surveyed preschool and primary school teacher program students consider that different topics of science subjects should be taught in one common science course for preschool and primary school teacher study programs students. Seventy-one percent of FT students and 53 % of PT students support this point of view. Many students share the view that different science subjects must be included in the content of preschool and primary school teacher study programs (29 % of FT students and 45 % of PT students). Only 2% of PT students believe that science subjects are not required for the preschool and primary school teacher education.

Most of the surveyed preschool and primary school teacher program students consider that if a joint course on science subjects will be developed in preschool and primary school teacher study programs, the most appropriate course title might be *Basics of natural sciences* (Figure 1). There are also many other opinions about science course title. FT students are more interested in the study course *Health education* in comparison with PT students, PT students are more interested in *Child's behaviour disorders* and *Environmental science* in comparison with PT students. Some students used the other answer, for example, suggested a course on *Children and behavioural disorders*.

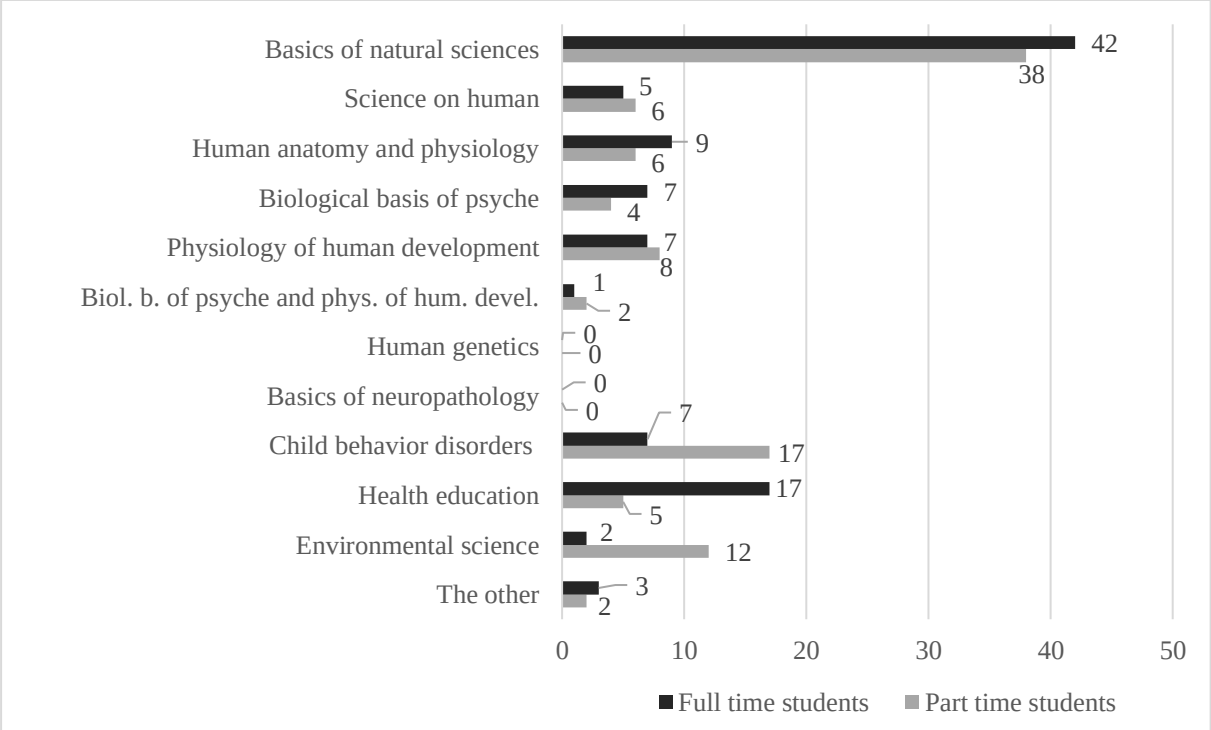

Figure 1. The opinion of preschool and primary school students on the title of science course in the preschool and primary school teacher study programs (in % of respondents). (Biol. b. of psyche and phys. of hum. devel. – Biological basis of psyche and physiology of human development).

Preschool and primary school teacher program students have interest in different topics of the science subjects (Table 1).

Table 1

Interest of the preschool and primary school teacher program students in topics of different science subjects (in % of respondents)

Topics of the science subjects	Full time students					Part time students				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Physiology of child's development	36	43	21	0	0	63	34	3	0	0
Child's behaviour disorders	43	36	14	0	7	68	30	2	0	0
Child's learning disabilities	41	38	14	0	7	56	42	2	0	0
Child's health and factors affecting it	44	40	16	0	0	39	46	15	0	0
Stress management	46	33	21	0	0	61	29	7	3	0
Teacher psycho-hygiene	24	26	43	7	0	36	27	27	10	0
Structure and functioning of human body	11	19	48	22	0	15	41	32	7	5
Human psychic activity and its disorders	17	34	37	12	0	29	32	34	5	0
Human heredity and hereditary diseases	14	34	38	14	0	15	36	39	7	3
Environmental problems	22	24	38	9	7	27	37	24	10	2

1 - very great interest; 2 - great interest; 3 - medium interest; 4 - slight interest; 5 - no interest.

FT students are especially interested in such topics as child's health and factors affecting it (84 % of FT students are very interested or interested in these topics), stress management (81 % of FT students are very interested or interested in these topics), child's behaviour disorders (79 % of FT students are very interested or interested in these topics), child's learning disabilities (79 % of FT students are very interested or interested in these topics) and physiology of child's development (79 % of FT students are very interested or interested in these topics). PT students are especially interested in similar topics: child's behaviour disorders (98 % of PT students are very interested or interested in these topics), child's learning disabilities (98 % of PT students are very interested or interested in these topics), physiology of child's development (97 % of PT students are very interested or interested in these topics), stress management (90 % of PT students are very interested or interested in these topics), child's health and factors affecting it (85 % of PT students are very interested or interested in these topics. Many students are also interested in other science subject topics: 51 % of FT students and 61 % of PT students are very interested or interested in human psychic activity and its disorders, 50 % of FT students and 63 % of PT students are very interested in teacher psycho-hygiene, 64% of PT students are very interested or interested in environmental problems. The results of the research show that most of preschool and primary school teacher students are interested in different science subject topics, especially in those, which are closely connected with child's behaviour, health and development. Fewer students are very interested in topics like structure and functioning of human body (30 % of FT students and 46 % of PT students are very interested or interested in these topics) and human heredity and hereditary diseases (44 % of FT students and 51 % of PT students are very interested or interested in these topics).

Most of the preschool and primary school teacher program students consider that different science subject topics are necessary for obtaining teacher profession (Table 2).

Table 2

The opinion of the preschool and primary school teacher program students about the necessity of including different topics of the science subjects in the preschool and primary school teacher study programs curriculum (in % of respondents)

Topics of the science subjects	Full time students				Part time students			
	1	2	3	4	1	2	3	4
Peculiarities of child development	85	15	0	0	93	7	0	0
Child's behaviour disorders	71	29	0	0	88	12	0	0
Child's learning disabilities	79	21	0	0	88	12	0	0
Child's health and factors affecting it	79	21	0	0	78	17	5	0
Stress management	86	14	0	0	88	10	2	0
Teacher psycho-hygiene	79	14	7	0	71	29	0	0
Structure and functioning of the human body	21	65	14	0	29	61	7	3
Human psychic activity and its disorders	43	43	14	0	64	32	2	2
Human heredity and hereditary diseases	36	50	7	7	44	42	12	2
Environmental problems	36	36	28	0	74	22	2	2

1 - fully agree; 2 - partially agree; 3 - partially disagree; 4 - fully disagree.

The majority of surveyed students fully agree that such topics as peculiarities of child development (85 % of FT students and 93 % of PT students), stress management (86 % of FT students and 88 % of PT students), child's learning disabilities (79 % of FT students and 88 % of PT students), child's health and factors affecting it (79 % of FT students and 78 % of PT students), child's behaviour disorders (71 % of FT students and 88 % of PT students) and teacher psycho-hygiene (79 % of FT students and 71 % of PT students) must be included in preschool and primary school teacher study programs curriculum. The majority of students also fully or partly agree that topics like human psychic activity and its disorders, structure and functioning of the human body and human heredity and hereditary diseases must be included in preschool and primary school teacher study programs curriculum. More PT students in comparison with FT students fully agree that topics of environmental problems must be included in the teacher study programs curriculum. Surveyed students support the point of view that mastering of these topics must be ensured for the preschool and primary school teacher study programs.

Surveyed FT students as the most important science subject in the acquisition of the profession of preschool and primary school teacher consider *Physiology of human development* but part time students *Child's behaviour disorders* (Table 3).

Table 3

The opinion of the preschool and primary school teacher students about the importance of different science subjects in the acquisition of the profession of preschool and primary school teacher (typing in numbers: 1-for the most important; 10-for the least important)

Subjects	Full time students (the sequence of the subjects from the most important to the less important)	Part time students (the sequence of the subjects from the most important to the less important)
Basics of natural sciences	3	2
Science on human	4	3
Human anatomy and physiology	6	7
The biological basis of the psyche	7	5
Physiology of human development	1	4
Human genetics	8	9
Basics of neuropathology	9	10
Child's behaviour disorders	5	1
Health education	2	6
Environmental science	10	7

FT students as important science subjects consider *Health education, Basics of natural sciences, Science on human* and *Child's behaviour disorders* but PT students *Basics of natural sciences, Science on human, Physiology of human development* and the *biological basis of psyche* as well.

An important task of preschool and primary school teachers is to raise pupils' interest in science subjects. Most of the surveyed preschool and primary school teacher program students consider that organizing more outdoor activities outside the classroom and involvement of children in observation of natural processes are the most important ways how to raise pupils' interest in science subjects (Table 4). Eighty-six percent of FT students and 93 % of PT students fully agree that organizing more outdoor activities outside the classroom could increase interest of children in science subjects and 82 % of FT students and 95 % of PT students fully agree that involvement of children in observation of natural processes could increase interest of children in science subjects. Many surveyed students (79 % of FT students and 91 % of PT students fully agree that enabling students to do more practical work in nature could increase the interest of children in science subjects as well.

Table 4

The opinion of the preschool and primary school teacher program students about opportunities to increase the interest of children in science subjects (in % of respondents)

Measures to increase children's interest in science subjects	Full time students				Part time students			
	1	2	3	4	1	2	3	4
To devote more lessons to science subjects	29	64	7	0	39	59	2	0
Organize more outdoor activities outside the classroom	86	14	0	0	93	7	0	0
Teach more about global environ-mental issues	29	64	0	7	29	61	10	0
Enable students to do more practical work in nature	79	21	0	0	91	7	2	0
Involve children in observation of natural processes	82	18	0	0	95	5	0	0
More often organize class tours	57	36	7	0	81	19	0	0
More often visit museums	29	64	7	0	42	58	0	0

1 - fully agree; 2 - partially agree; 3 - partially disagree; 4 - fully disagree.

Conclusions

- Most of the surveyed preschool and primary school teacher program students consider that different topics of science subjects must be taught in one common science course for preschool and primary school teacher study programs students.
- Most of the surveyed preschool and primary school teacher program students consider that if a joint course on science subjects will be developed in preschool and primary school teacher study programs, the most appropriate course title might be *Basics of natural sciences*.
- Many preschool and primary school teacher study program students are very interested in such topics as child's health and factors affecting it, stress management, child's behaviour disorders, child's learning disabilities and physiology of child's development.
- Most of the surveyed preschool and primary school teacher program students consider that organizing more outdoor activities outside the classroom, the involvement of children in observation of natural processes and enabling students to do more practical work in nature are the most important ways how to raise pupils' interest in science subjects.

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