

## Report on the first round of the Curricular Delphi Study on Science Education Latvia

### 1 Framework and procedure of the first round – participation rate

#### 1.1 First attempt

The answer sheet for the formulation of statements was adopted into Latvian language (see appendix) and together with covering letter of the study send to 6 groups of participants:

- students;
- science teachers (teacher students and trainee teachers; teachers and trainee teachers (experienced teachers));
- educators, didactics, and in – service teacher educators;
- scientists;
- education politicians;
- people who are not directly involved with sciences.

Together from May till the end of July 2011, 184 participants were asked via e-mail to fill out the PROFILES Delphi questionnaire (1<sup>st</sup> attempt) 59 experts (see Table 1) gave feedback. The amount of participants for each group and the participation rate after first attempt is shown in Table 1.

Group		Number of questionnaires sent out	Number of responses	Response rate (%)
<b>Students</b>		25	15	60
<b>Science teachers</b>	teacher students	32	1	3
	trainee teachers;	12	0	0
	teachers	17	7	41
	trainee teachers (experienced teachers)	15	9	60
<b>Educators, didactics, and in – service teacher educators</b>		18	9	50
<b>Scientists</b>		18	4	22
<b>Education politicians</b>		24	2	8
<b>People who are not directly involved with sciences</b>		23	12	52
<b>Total</b>		<b>184</b>	<b>59</b>	<b>32</b>

Table 1: Structure of the sample, amount of participants for each group and participation rate after the first attempt.

## 1.2 Second attempt

In order to reach a sample of sufficient participants from 12 th of September till 16 th of September 60 potential participants (some of them repeatedly) were asked via email to fill out the questionnaire. 44 experts gave feedback and sent back filled out answer-sheets (see Table 2).

Group		Number of questionnaires sent out	Number of responses	Response rate (%)
<b>Students</b>		15	15	100
<b>Science teachers</b>	teacher students	14	11	79
	trainee teachers;	0	0	0
	teachers	4	4	100
	trainee teachers (experienced teachers)	4	3	75
<b>Educators, didactics, and in – service teacher educators</b>		7	4	57
<b>Scientists</b>		15	6	40
<b>Education politicians</b>		1	1	100
<b>People who are not directly involved with sciences</b>		0	0	0
<b>Total</b>		<b>60</b>	<b>44</b>	<b>73</b>

Table 2: Structure of the sample, amount of participants for each group and participation rate after the second attempt.

## 1.3 Third attempt

To reach a sample of sufficient participants in groups of “educators, didactics, and in – service teacher educators” and “scientists” from 14th of January till 17 th of January 19 potential participants were asked via email to fill out the questionnaire. 19 experts gave feedback and sent back filled out answer-sheets (see Table 3).

Group		Number of questionnaires sent out	Number of responses	Response rate (%)
<b>Educators, didactics, and in – service teacher educators</b>		9	9	100
<b>Scientists</b>		10	10	100
<b>Total</b>		<b>19</b>	<b>19</b>	<b>100</b>

Table 3: Structure of the sample, amount of participants for each group and participation rate after the third attempt.

In table 3 is shown overview of the final sample of the first round of the study. In three attempts questionnaire was sent out to 263 respondents and 122 participants took part in the first round of the study and sent back filled out 347 answer-sheets.

Group	Subgroup	Number	Total number	Percentage	
<b>Students</b>	Students at school without advanced science courses	Biology Chemistry Physics Science	15	30	25 %
	Students at school with advanced sciences courses	Biology, Chemistry, Physics, Science	15		
<b>Science teachers</b>	University students in the education program	Biology	4	35	29%
		Chemistry	4		
		Physics	3		
		Science	1		
	Trainee science teachers	Biology			
		Chemistry			
		Physics			
	Science teachers	Biology	4		
		Chemistry	1		
		Physics	3		
		Science	3		
	Science trainee teachers educators	Biology	5		
		Chemistry	2		
Physics		5			
<b>Educators, didactics, and in-service teacher educators</b>	Chemistry	6	22	18%	
	Physics	8			
	Biology	7			
	General Science/Primary Science	1			
<b>Scientists</b>	Chemists	14	20	16%	
	Biologists				
	Physicists	6			
	Others				
<b>Education politicians</b>	Spokespersons for education policy	3	3	2 %	
	Members of the Senate				
<b>People who are not directly involved with sciences</b>	University students	2	12	10 %	
	Teachers	5			
	Parents	3			
	Humanists	2			

Table 3: Structure of the sample of the first round of study

## 2. Answer categories

There were developed categories for each study question. See table 2. Categories for questions was developed and classified by two independent data analysts. The final classification system

consists of 50 categories. For 1st question (situation, context, motive) 11 categories were developed. 2 nd Question (field) contains 19 categories and 3 rd question (qualification) 20 categories.

<b>Question</b>	<b>Categories</b>
<p>1. Which <b>situations and motives</b> can be taken as a basis and in which <b>context</b> should science lessons be put in order to stimulate and further science-related educational processes?</p>	<p>Everyday life;            Individual and society impact on the quality of the environment;            Impact on human health;            Topicality;            Knowledge of subject;            Meetings with professionals;            Experimentation;            Creation of models;            Promotion of interest;            Technology;            Nature / natural phenomena;</p>
<p>2. Which <b>contents, methods and themes</b> related to science should be taught in science lessons?</p>	<p>Content of physics;            Content of chemistry;            Content of biology;            Content of mathematics;            Content of geography;            Organization of excursions;            Demonstration;            Experimentation;            Discussion;            Work with information;            Enquiry;            Laboratory works;            Work in groups;            Gallery method;            Project method;            Cooperative learning;            Appropriate choice of methods;            First aid;            Safety rules;            Interview;</p>

	Situation analysis; Learning game; Problem solving;
<i>3. Which <b>skills or competencies</b> and attitudes respectively should be developed and enhanced to support students in becoming scientifically educated?</i>	Knowledge; Understanding; Critical thinking; Questioning; Experimenting; Creative thinking; Conclusion making; Skills to work with information; Enquiry skills; Observation; Cooperation skills; Presentation and listening skills; Appropriate choice of methods; Health maintenance; Environmental conservation; Ability to apply acquired knowledge; Problem solving; Ability to analyze; Ability to generalize; Attitude towards nature; Communicative skills; Argumentation skills; Ability to discuss;

Table 4: Categories differentiated according to the three questions in the questionnaire.

### 3. Number and average number of form sheets per participant

A total number of 347 form sheets was filled out by the participants. The average number of form sheets filled out was 3,72 form sheets per participant.

Group	Number of form sheets	Average number of form sheets per participant
Students	52	1,73
Science teachers (teacher students, trainee teachers, teachers, trainee teachers (experienced teachers))	96	2,74
Educators, didactics, and in – service teacher educators	95	4.3
Scientists	36	1,8
Education politicians	16	5,3
People who are not directly involved with sciences	52	4,33
<b>Total</b>	<b>347</b>	<b>3.43</b>

Table 5: Number and average number of form sheets per participant

All participants had the opportunity to fill out up to ten form sheets. As shown in Table 6, 50 percent of the participants filled out only one form sheet. Two form sheets filled out 21 percent and ten form sheets 11 percent of participants.

Number of form sheets and percentages			
Number of form sheets	Frequency	Percentage	Cumulated percentages
1	61	50	50
2	26	21	71
3	6	5	76
4	6	5	81
5	4	3	84
6	2	2	86
7	3	2	88
8	0	0	88
9	1	1	89
10	13	11	100
	122	100	

Table 6: Number of form sheets and percentages

#### 4. Results

The relative frequency (number of statements in a category / sum of all statements) of the categories was processed by using MS Excel application. As we can see from Chart 1 category “everyday life” has been answered most in all groups of participants. Categories “Knowledge of subject” and “Impact on human health” also represented more than others categories.

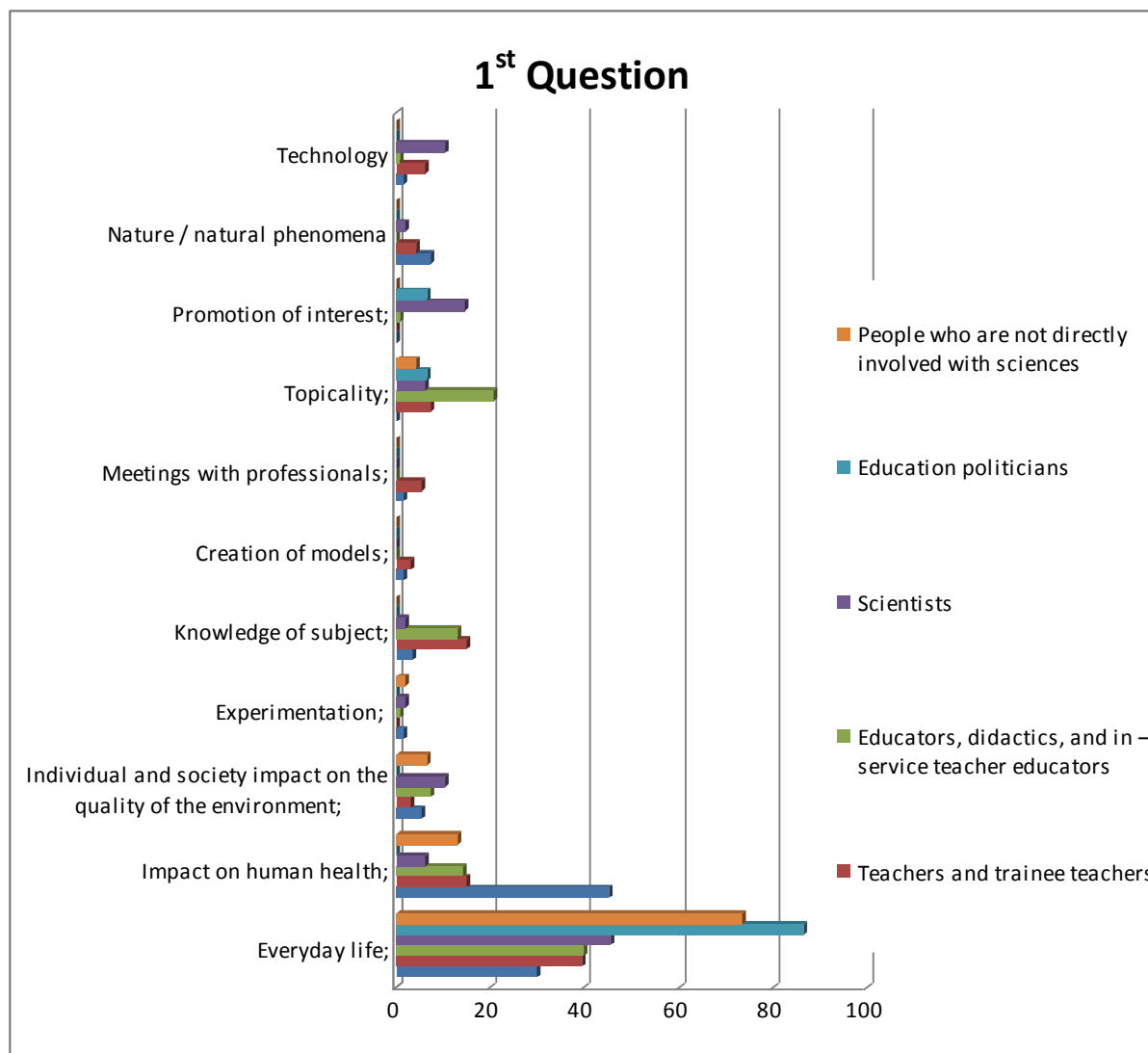


Chart. 1: Relative frequency of the categories regarding the statements in 1st question.

Relative frequency of the categories in second question. The most represented categories are “content of biology”, “content of physics”, “content of chemistry”.

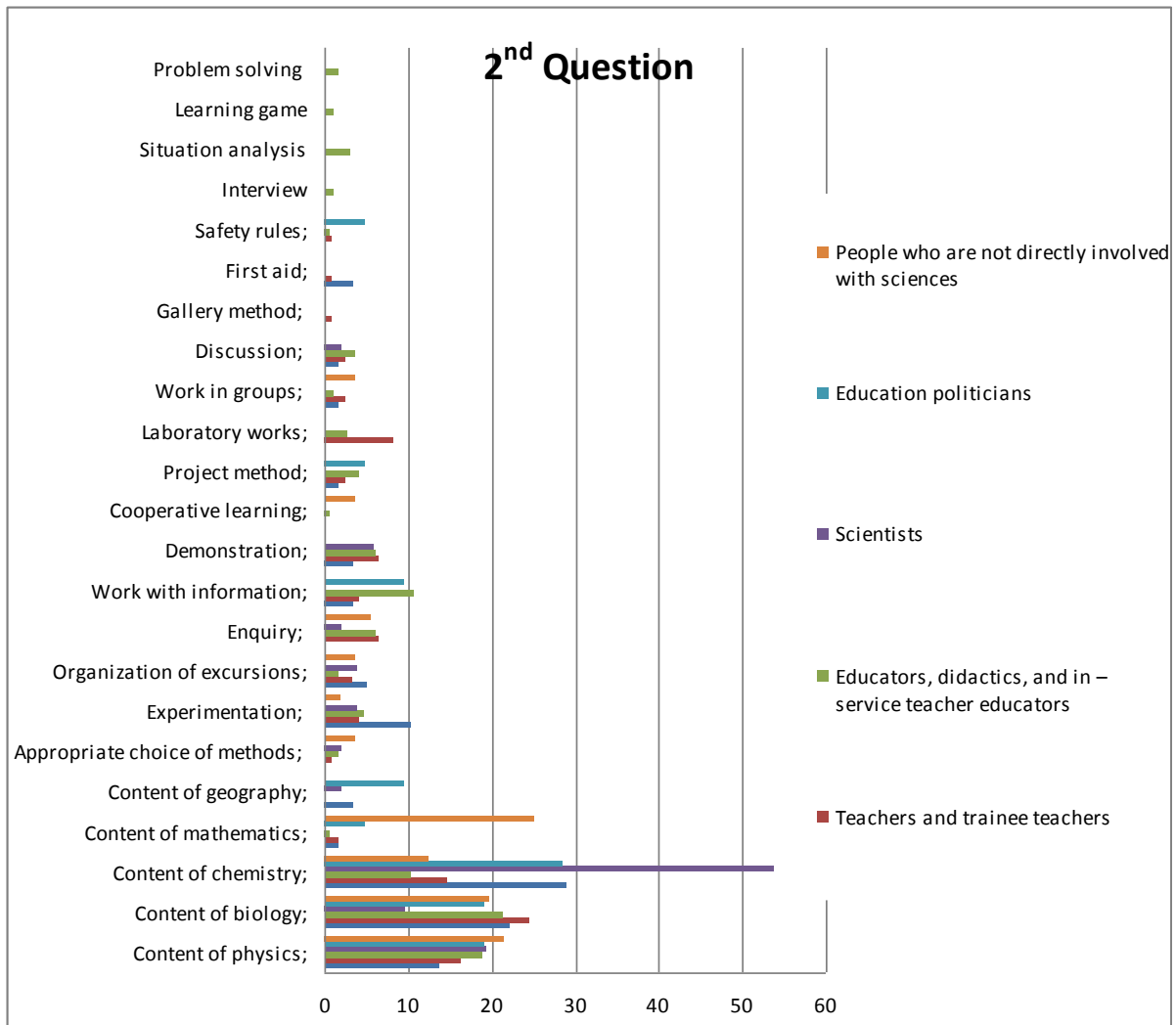


Chart. 2: Relative frequency of the categories regarding the statements in 2nd question.

Relative frequency of the categories in third question (see Chart 3). The most represented categories in third question are "Skills to work with information", "Understanding", "Knowledge".



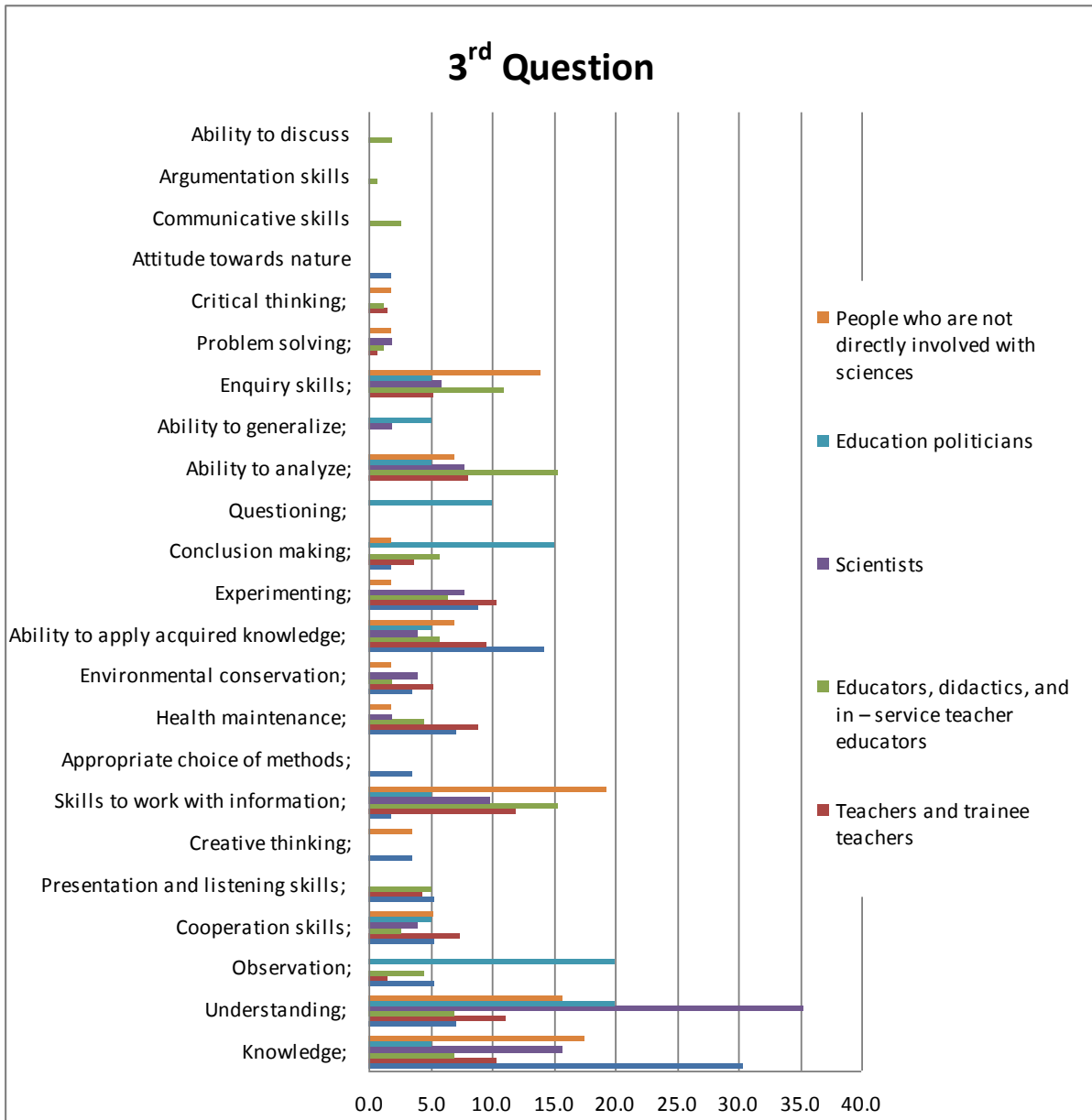


Chart. 3: Relative frequency of the categories regarding the statements in 3rd question.

In Charts 4, 5 and 6 is represented *number of statements in every category*.

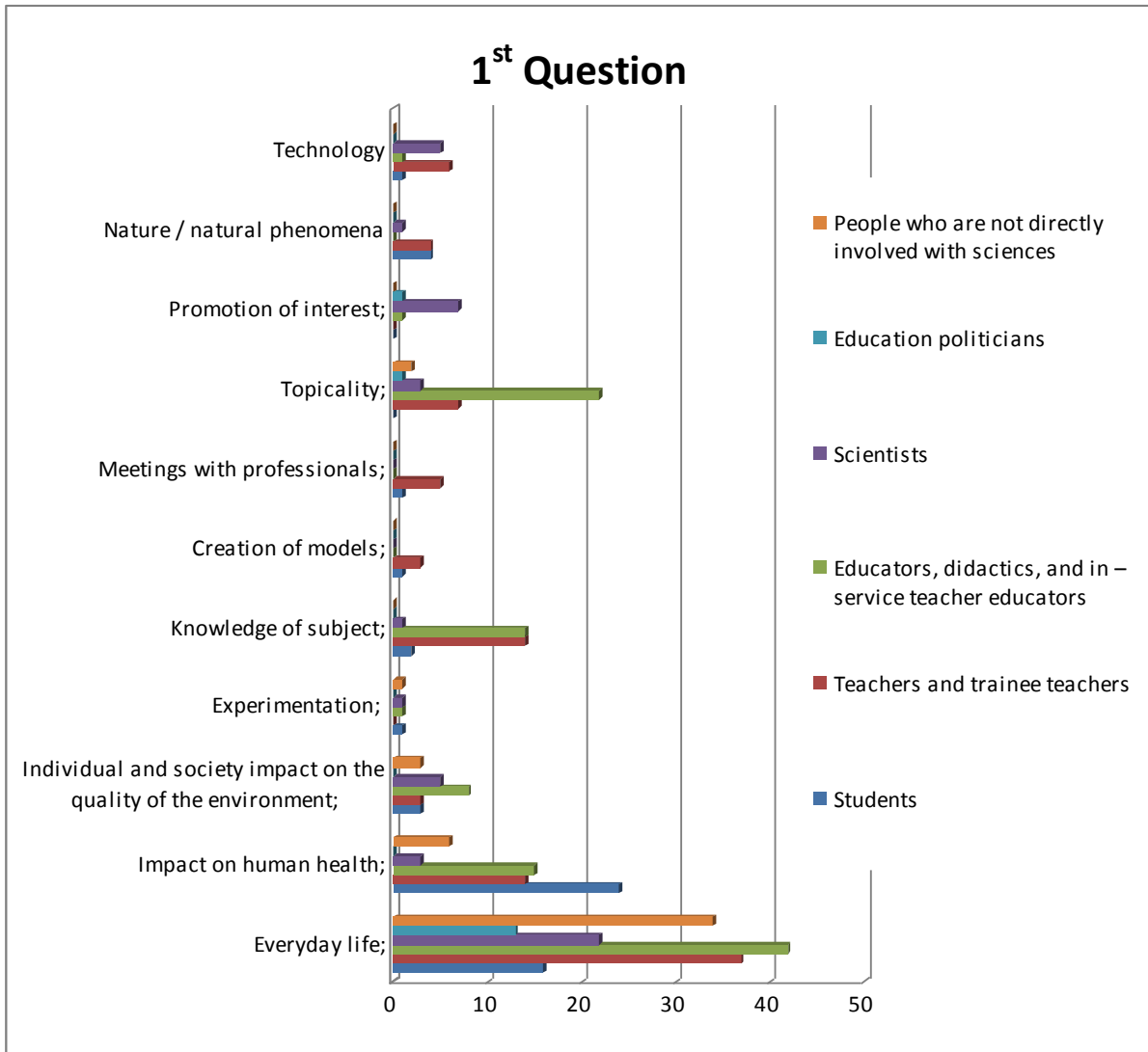


Chart. 4: Number of statements in categories in 1st question.

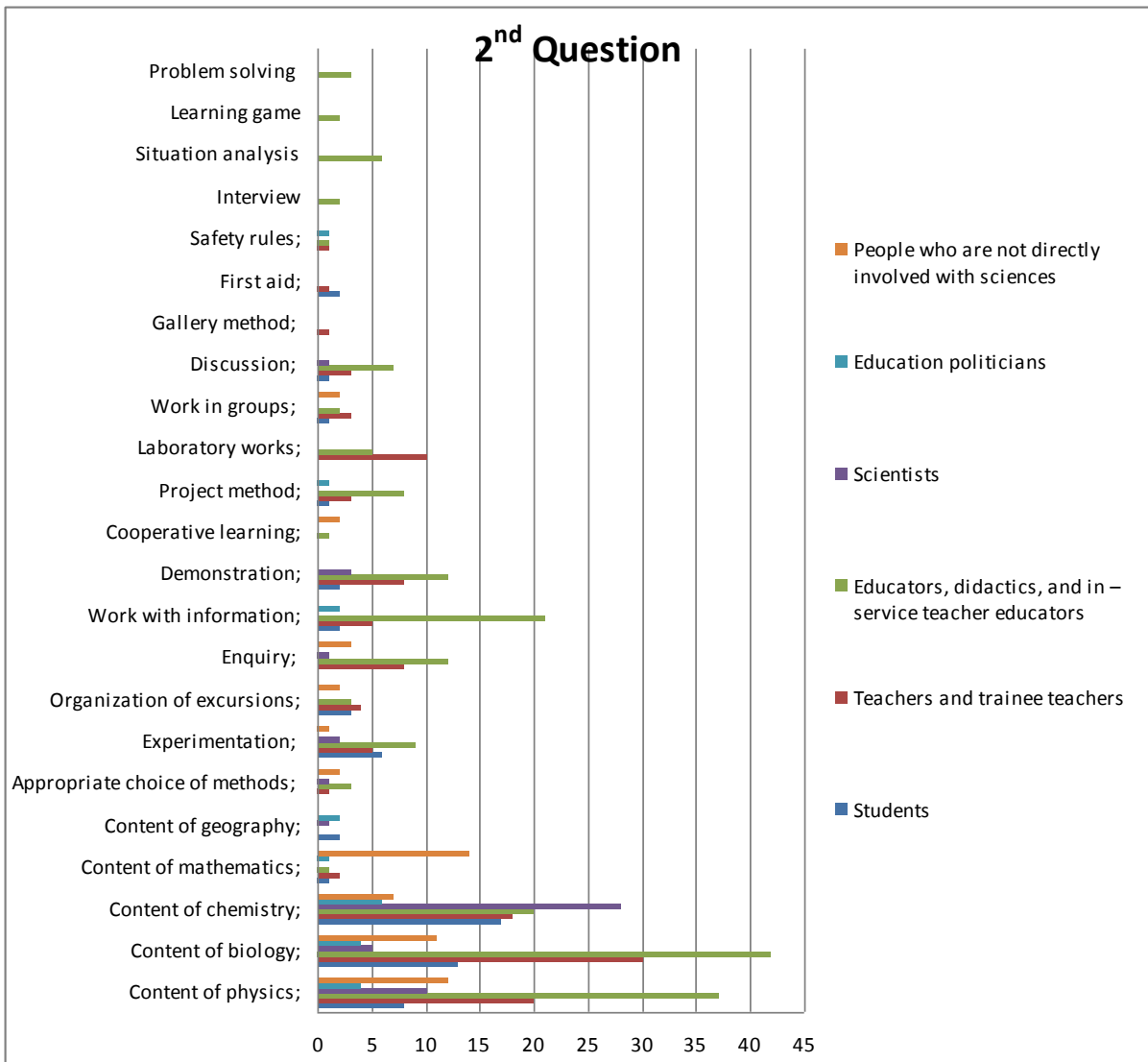


Chart. 5: Number of statements in categories in 2nd question.

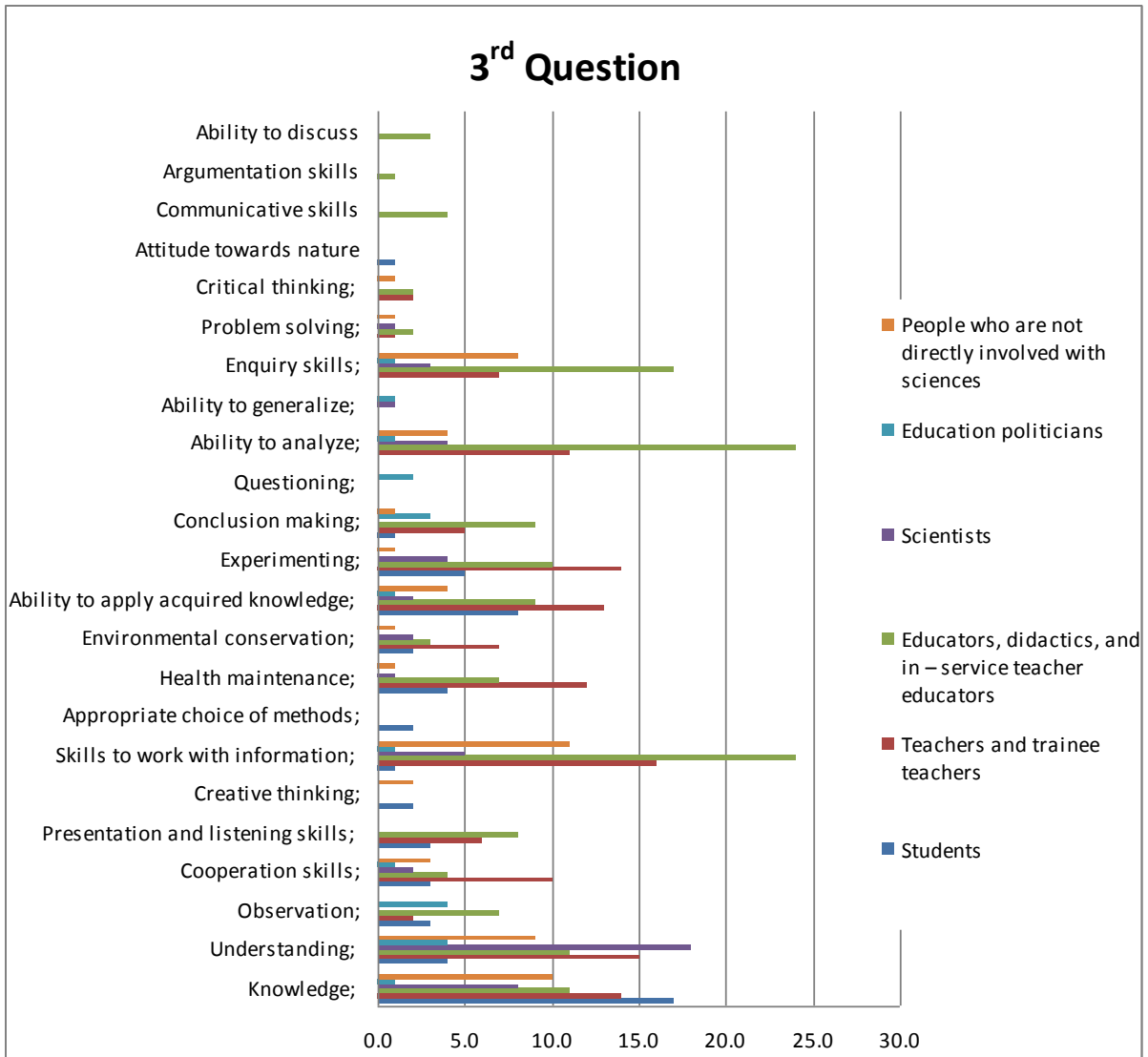


Chart. 6: Number of statements in categories in 3rd question.

## Appendix

### Form sheet of the questionnaire



#### Delfi pētījums par dabaszinātņu izglītību: atbilžu lapa apgalvojumu formulēšanai

Lūdzu formulējiet, kurus dabaszinātņu izglītības aspektus Jūs uzskatāt par lietderīgiem un pievilcīgiem indivīdam šodienas un tuvākās nākotnes sabiedrībā!

*Atbildot lūdzu domājiet par 15- 16 gadus veciem pusaudžiem (9.klase)!*

*Katrā no lapām lūdzu aplūkojiet vienu no aspektiem (jautājumiem)!*

#### **1.Reālā situācija/Konteksts/Motīvs**

*Nosauciet situācijas no reālās dzīves, kuras varētu tikt izmantotas kā konteksts dabaszinātņu apguvei mācību stundās, lai veicinātu ar dabaszinātnēm saistītu izglītošanās procesu!*

#### **2. Nozare**

*Norādiet tēmas, metodes, saturu no atbilstošajām dabaszinātņu nozarēm, kuras vajadzētu apgūt dabaszinātņu stundās!*

#### **3.Kvalifikācija**

*Kuras prasmes (kompetences) un attieksmes atbilstoši vajadzētu attīstīt un pilnveidot dabaszinātņu stundās, lai skolēni kļūtu izglītotāki dabaszinātnēs?*