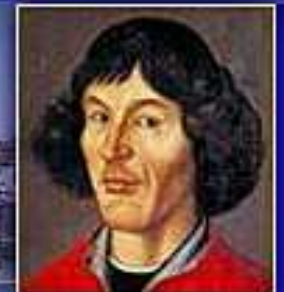




REPORT FOR MID-TERM MEETING OF THE HIPST-PROJECT



NICOLAUS COPERNICUS UNIVERSITY



UT 4 – Torun Poland

Division of Physics and Astronomy Education Group

Dr. Józefina Turlo – co-ordinator

Prof. Grzegorz Karwasz,

Dr. Katarzyna Przegiętka,

MSc. Andrzej Karbowski,

MSc. Krzysztof Służewski



1. National Partners

a) Schools from the surrounding area are represented by the teachers from:

- Low Secondary Schools: M. Czerwińska, A. Sławińska, M. Sadowska, P. Felski, L. Rebain
- High Secondary Schools: J. Kosicki, J. Rybicki, L. Gerszberg, E. Pater, J. Chojnacka, Z. Stojcka

b) Museums, Planetariums:

- Regional Museum in Torun
- Nicolaus Copernicus Museum in Torun
- Museum of Warmia and Mazury in Olsztyn
- W. Dziewulski Planetarium in Torun
- Planetarium and Astronomical Observatory in Olsztyn
- Hevelianum Center in Gdansk

c) Other Insitutions:

- National Ministry of Education
- General Teacher Training Center in Warsaw and Regional Training Center



2. National Conferences

National Conference in Torun Programme (40 Participants)

- 15:00 – 15:15 Dr Józefina Turlo, *Introduction to the Project HIPST*.
- 15:15 – 16:15 Lecture of professor Andrzej Bielski on: „*Witelo, the first Polish nature scientist from XIII c.*”, having international reputation.
- 16:15 – 17.15 Lecture of prof. Lech Bieganowski and prof. Janusz Mallek on: „*Invention of spectacles in Europe*”
- 17:15 – 17:45 Coffee, tee break
- 17:45 – 18:30 Lecture of prof. Grzegorz Karwasz on: „*Practical realisation of interactive exhibition on OPTICS – FIAT LUX*” (including the optical historical experiments, eg. Witelo, Goethe).
- 18:30 – 20:00 Dr Józefina Turło, Presentation of the Questionnaire on „*The HIPS elements in science teaching*” study results. Research group establishment, discussion in groups, plan of work, summary.

3. Thematic working groups

Four working groups were established:

Group 1 - working on elaboration of materials and methodology of elements of History and Philosophy in Science Teaching in secondary school teaching (including curriculum development) – responsible:

J. Rybicki, M. Czerwinska, M. Sadowska, J. Kosicki, Dr. K. Przegiętka, Dr. J. Turło,

Results: *Report on „The place of HIPST in new Polish Core Curricula, Presentations on HIPST, Scenario of lessons and their realisation in school (pilot lessons).*

Remarks: *We have created the common e-mailing list, all materials elaborated by the group members and consecutive actions are discussed and corrected by e-mails and during the face to face meetings (recently 1 per two weeks).*

Group 2 - working on elaboration of teachers education and training programme with the History and Philosophy of Science elements - responsible: Prof. A. Bielski, Prof. G. Karwasz, Prof. M. Grabowski, Dr. J. Turło,

Results: *Analysis of the „Philosophy of science” subject existing so far for pre-service science teacher training.*



3. Thematic working groups

Group 3 - working on elaboration of materials and on practical realisation of exhibitions and collaborating with Regional Museums on activities related to **History and Philosophy of Science** - responsible: Prof. G. Karwasz, K. Służewski, P. Miszt, A. Karbowski,

Results:

1. *Designing and practical realisation of the „FIAT LUX – from Witelo to optical tomography” exhibition in the Regional Museums*

Torun (29.04-15-09.08), Gdansk (20.10.08-15.02.09), Olsztyn (01.03.09- 01.06.09), Legnica, where Witelo was born (...). 5 school teachers are collaborating.

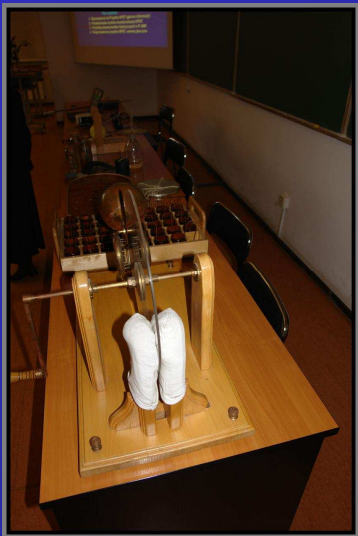
2. *The sustainable network of University, Regional Museum and Planetarium in Torun and Hevelianum Center was established with prof. Karwasz as the co-ordinator. He is also the member of Advisory Board on Culture at President of Torun.*

Group 4 - working on designing of historical experiments replicas and materials suitable for the use in school, university and out of school education – responsible: Dr. Z. Turło, K. Służewski, Eng. T. Robaczewski.

Results: *Reconstruction of the Copernicus Astrolabium, Galileo telescope and Witelo device for plotting conical curves (from our resources).*

4. The main products

- Designing, performing and evaluation of the Questionnaire studies on: *The elements of HIPST in practice.*
- *Regional Seminar* for science teachers on HIPST and related problems was established. There were the following topics presented: *Witelo, the first Polish nature scientist from XIII c, Invention of spectacles in Europe, Astonishment in the mathematics and science cognition, „Practical realisation of interactive exhibition on OPTICS – FIAT LUX” (including the optical historical experiments, eg. Witelo, Copernicus, Galileo, Goethe).*



4. The main products

- The most important, selected materials on HIPST Project were placed at Polish web page of HIPST: (<http://hipst.fizyka.umk.pl>). *There are general information and about the main activities within the project: Materials, Seminars, Meetings etc.*



The screenshot displays the HIPST project website. At the top, there are logos for HIPST and the SEVENTH FRAMEWORK PROGRAMME, followed by the title "History and Philosophy in Science Teaching". Below this is a navigation bar with links to "HIPST - toruńska strona główna", "HIPST - strona główna", and "Wydział FAiIS - strona główna". The main content area is divided into three columns. The left column, titled "O projekcie", contains sections for "O projekcie" (with links to "Podstawowe informacje", "Uczestnicy", and "Koordynator"), "Outcomes" (with links to "National Work Plan for Poland" and "National Meeting No. 1"), and "Materiały" (with links to "Jak eksperymentowano dawniej?", "FIAT LUX - wirtualna wystawa z optyki", and a dropdown menu for "Współpraca z nauczycielami" containing "Scenariusze", "Prezentacje", "Filmy", and "Zdjęcia"). The middle column, titled "Elementy Historii i Filozofii w Nauczaniu Przedmiotów Przyrodniczych", features a large image of the Vitruvian Man, the European Union flag, and the HIPST logo. The right column, titled "Seminaria", lists three seminars: "Seminarium 12.09.2008", "Seminarium 7.12.2008", and "Seminarium 4.02.2009". Below this, the "Spotkania" section lists two meetings: "Florencja, 12-17.02.2008" and "Budapeszt, 26.02-1.03.2009". At the bottom, there is a "Logowanie" button and a "Drupal" logo.

4. The main products

- New Polish physics curricula (obliged from 1st September 2009) for secondary schools have been analysed taking into account the possibility of HIPST elements introduction. *The related report is beeing translated into English.*
- *The first list of teaching materials* was identified by the Torun Partner Group members and by the Questionnaire answers of science teachers. *Some were described.*



4. The main products

- *To improve strategies for the development and implementation of selected materials from optics (related to eg. Witelo, Copernicus, Galileo, Newton, Goethe experiments, historical microscopes and spectacles) the teachers **are working on presentations and scenarios of the inquiry-based lessons.***



Original astronomical table made by Copernicus at the wall of Olsztyn castle

- *Two groups (one in school and the second at the Institute of Physics) are performing original **Nicolaus Copernicus experiment on „Time measurement”** by using the sun reflection method.*

4. The main products

- *to intensify these activities we ask our three students - science teachers to be to collaborate with practising teachers and us on HIPST issue. There are the topics:*
 - 1. Active methods for motivation students towards effective learning of physics*
 - 2. Proposition of physics teaching enriched by HIP implementation*
 - 3. Development of inquiry- interactive methods of teaching.*



4. The main products

- *The cooperation between schools, university and museums was strengthened and a permanent infrastructure of sustainable networking was established and interactive exhibition „FIAT LUX – from Witelo to optical tomography” was prepared and exposed at the Regional Museum in Torun, Gdansk, Olsztyn.*
- *Additionally, the teachers are working on educational materials (including work sheets) devoted to the particular demonstrations.*



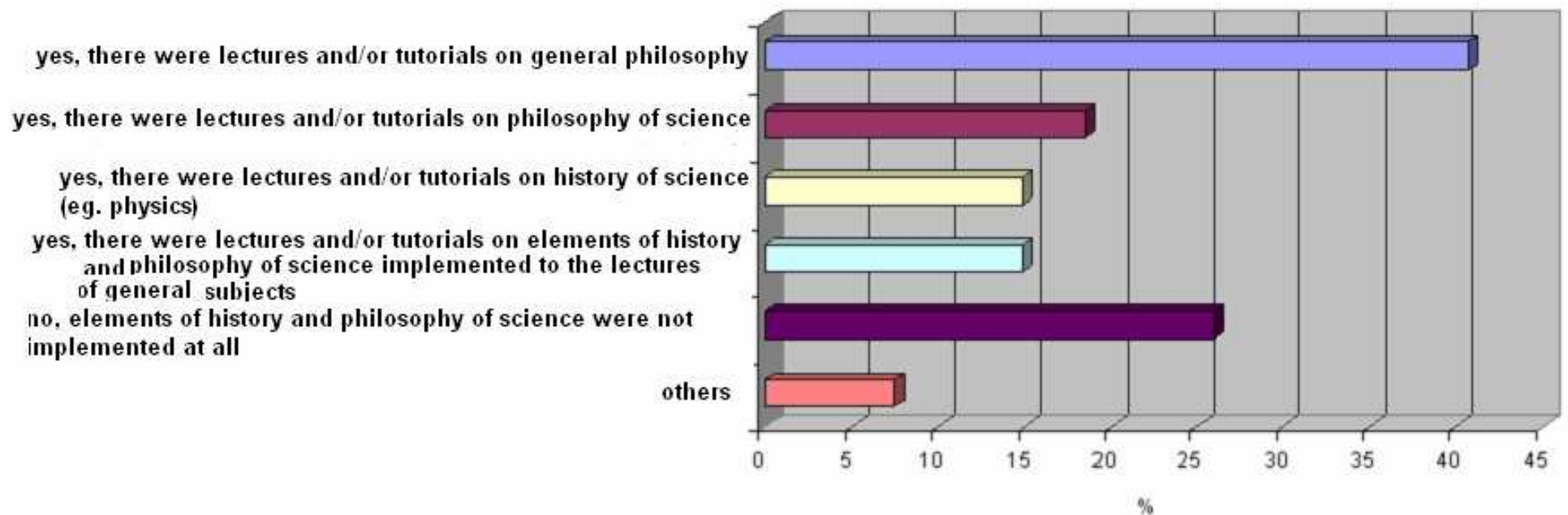
http://dydaktyka.fizyka.umk.pl/FIAT_LUX/html/

5. Results of the Questionnaire Studies

- 28 science teachers, mostly experienced (80% of nominated and diploma) secondary school teachers (45% - physics teachers) from whole parts of Poland were taking part in the investigations on: “The HPS elements in science teaching”.

a) National situation regarding HPS was investigated by 4 questions.

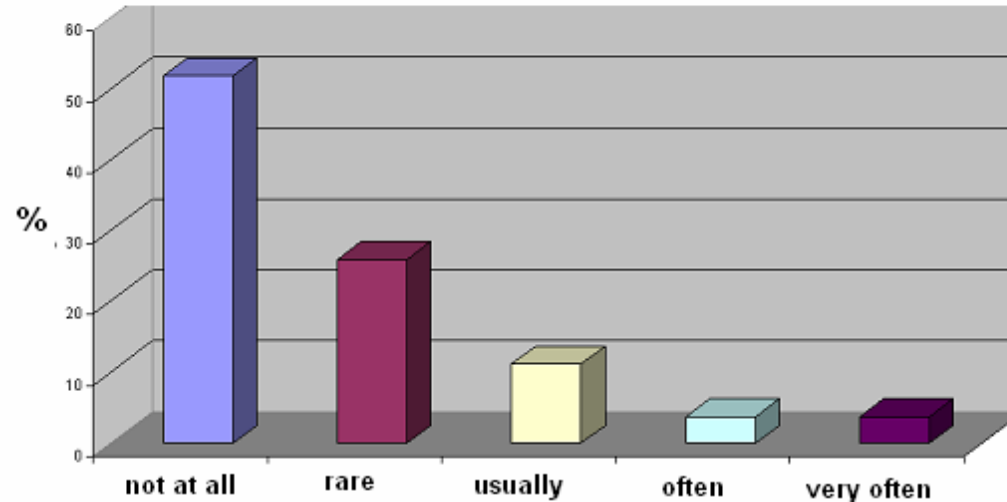
7. Whether the elements of History and Philosophy of Science(HPS) were implemented to you curriculum of pre-service teacher training course?



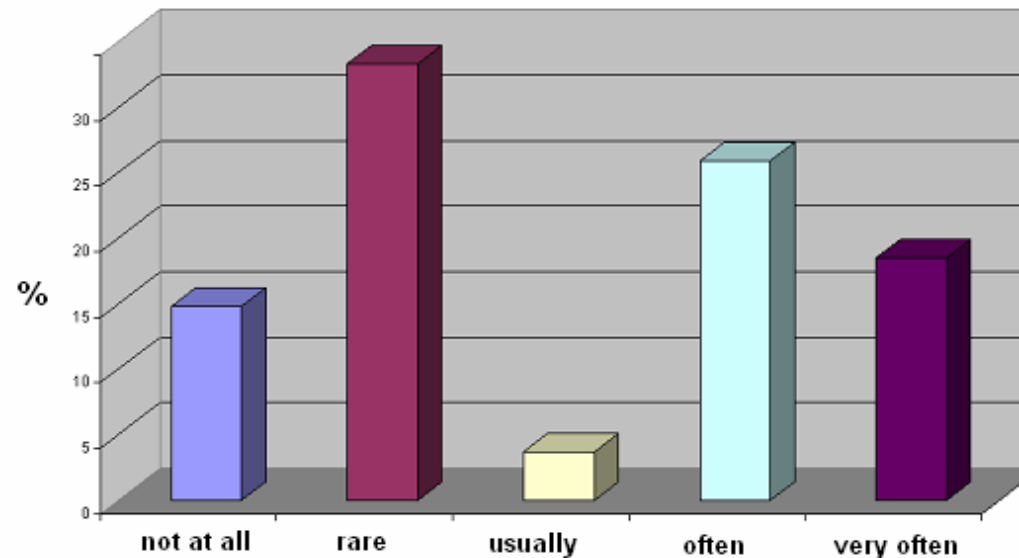
5. Results of the Questionnaire Studies

a) National situation regarding HPS.

8. Whether the elements of History and Philosophy of Science were implemented to your curriculum of in-service teacher training courses?



9. Do you apply the elements of History and Philosophy of Science in your science teaching?



5. Results of the Questionnaire Studies

a) National situation regarding HPS

10. If in question 9 you selected YES, please give the examples of lecture topics, where the elements of History and Philosophy of Science were used and in which way?

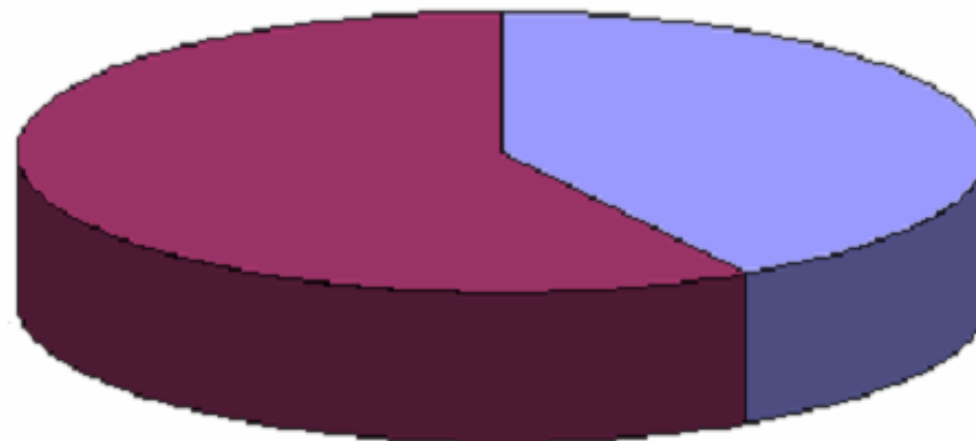
Exemplary answer:

The place of Earth in the Universe, the system of Ptolemaeus, Copernican revolution, astronomical observations from Copernicus, Tycho de Brache, Galileo, Kepler, Descartes, Newton (general gravitation law)

11. If you selected NOT, please give the reasons why you are not using the elements of History and Philosophy of Science in your science teaching, eg.?

there is not enough time in the school curriculum for implementation of the additional contents

58%

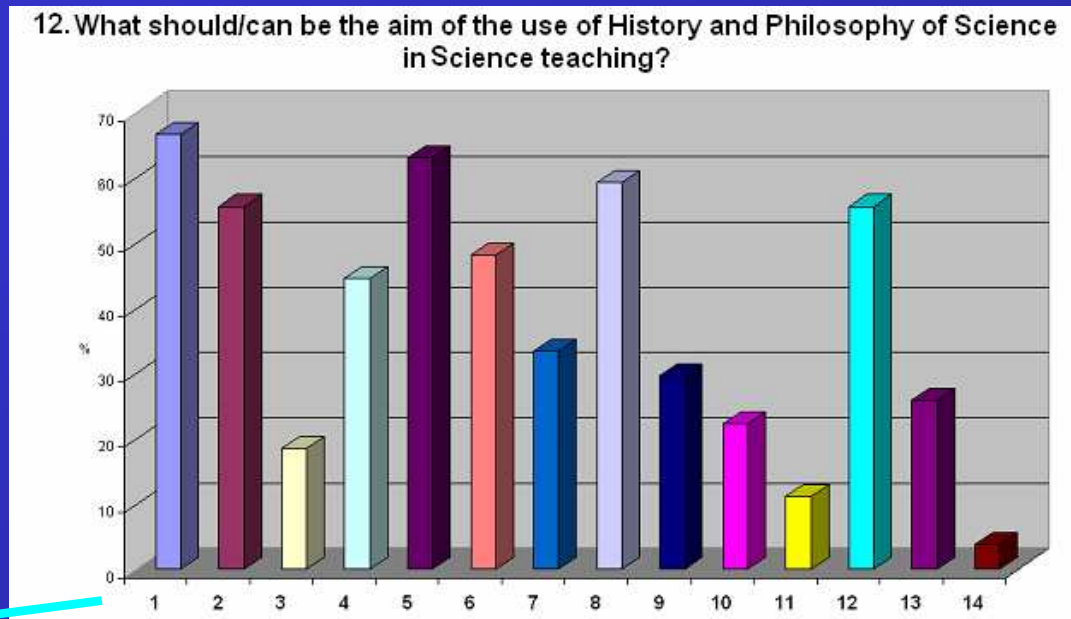


lack of suitable curricula and teaching standards, textbooks and educational materials, which facilitate implementation of this elements to the school teaching

42%

5. Results of the Questionnaire Studies

b) Discussion of problems and perspectives on implementing HIPST.

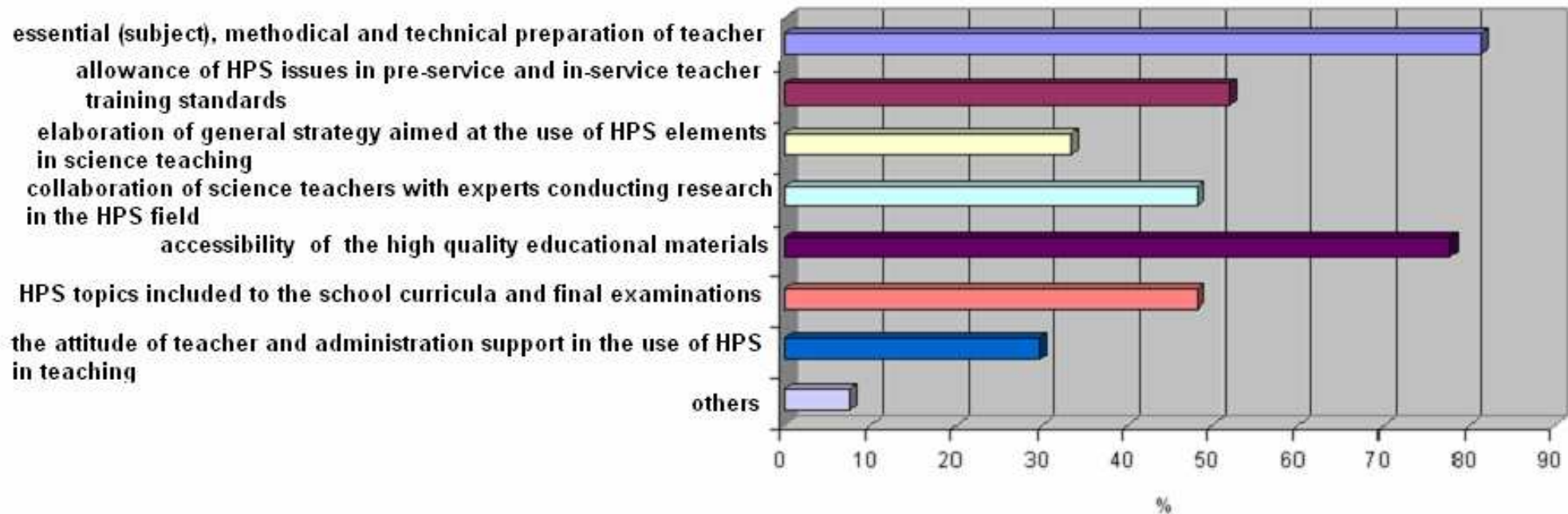


1. to emphasise that knowledge of science and history of science is the important part of our culture
2. to recognise the methods and character of scientific research
3. to stress the ethical values of science
4. to achieve the skills of planning and executing of experiments, especially hands-on experiments
5. to increase interest and motivation of students
6. to increase the students' activity during lessons
7. to raise the science teaching effectiveness
8. to understand the applications of science in context (technics, everyday life)
9. to perceive the role of science in personal life (health, diet, saving of energy)
10. to gain the skills of discussion on science topics with others
11. to know the origin of preconceptions and misconceptions of students
12. to include interdisciplinarity in science teaching
13. to get the ability of information judgement (received from different sources)
14. others

5. Results of the Questionnaire Studies

b) Discussion of problems and perspectives on implementing HIPST.

14. Indicate the conditions and factors, which can facilitate (or inhibit) introduction of History and Philosophy of Science (HPS) elements to science teaching, eg.:

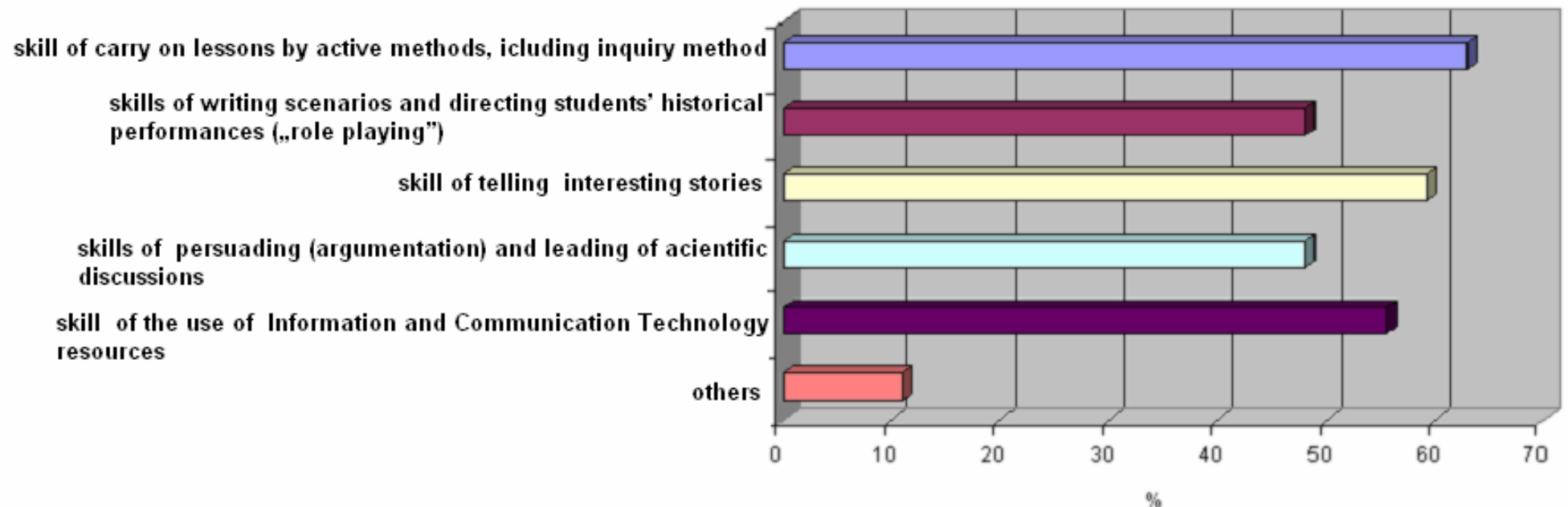


Additionally, teachers stress the enthusiasm and great passion of teachers as well as financial resources to buy suitable educational aids, being the factors for an effective implementation of HPS elements into teaching.

5. Results of the Questionnaire Studies

b) Discussion of problems and perspectives on implementing HIPST.

15. What kind of knowledge and specific skills should teacher possess to succeed in introduction of HPS elements into teaching, eg.:



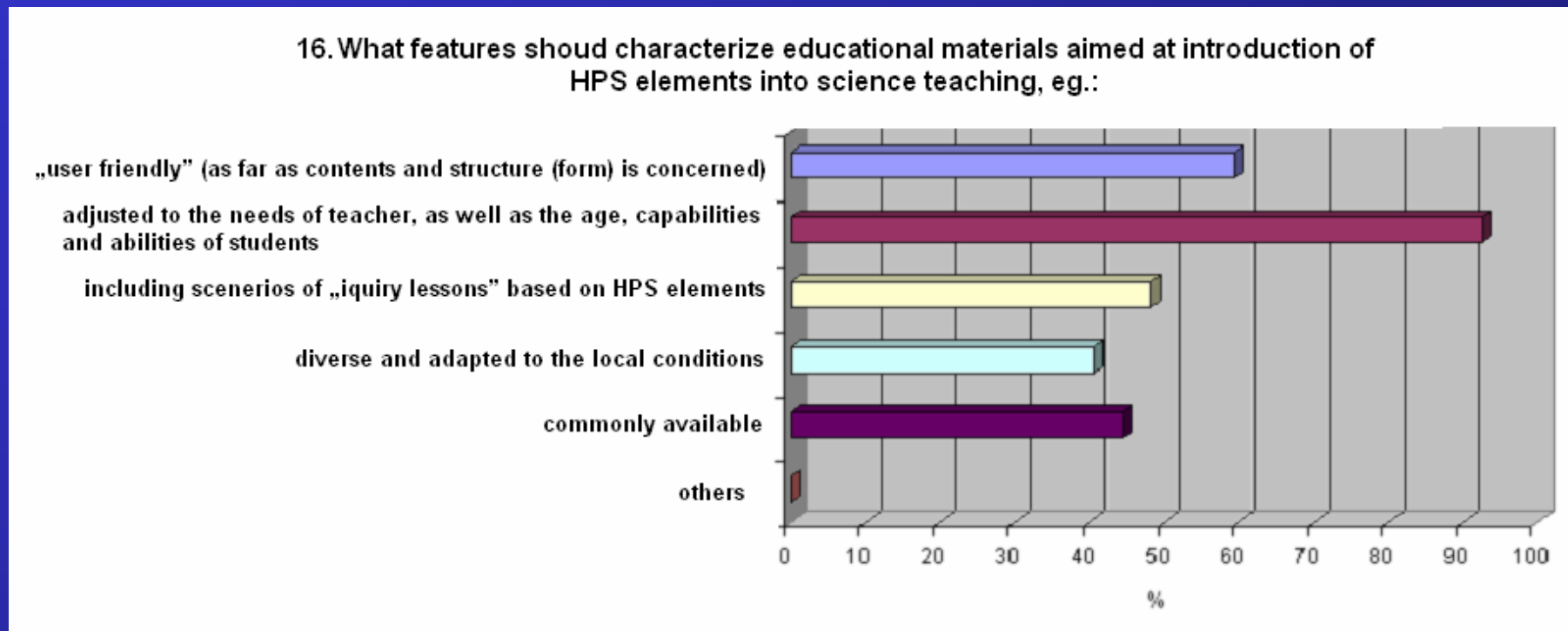
Some teachers are adding the role of personal engagement of teacher and her/his skill of students' inspiration for activity.

17. Please point out the core curriculum subject questions, which teaching could be supported by the elements of HPS.

5. Results of the Questionnaire Studies

c) *Discussion on new teaching material and techniques, results of evaluations, upcoming collaboration of schools etc.*

13. Point out the educational resources (source texts and other educational aids, which you are using in your professional practice and which can be used in the project HIPST (eg. during the pilot lessons or during the collaboration of school with museum).



Some teachers insist the real educational aids for reconstruction of the most important science historical experiments in the classroom.

5. Results of the Questionnaire Studies

d) Formulated NEEDS and WISHES of the participants.

18. Please present the propositions (ideas) of activities, which in your opinion allow to gain success in introduction of HPS into science teaching

1. Practical investigations (on-line experiments):

- Study of motion with the use of historical Galileo's incline plane,
- Measurement of velocity (frequency) of sound by different means,
- Study of electrostatics phenomena with the use of rotational weight,
- Reconstruction of different electrical measurements,
- **Demonstration of the most important in history experiments from optics, construction of simple optical instruments by students,**
- The use of bubble chamber for observation of ionising alpha particles.

2. Study visits of teachers and pupils at science museums

3. Pre-service and in-service teacher courses (workshops) on HPS

4. Edition of booklets (books) for teachers (with exemplary propositions)

5. Results of the Questionnaire Studies

d) Formulated NEEDS and WISHES of the participants.

5. The use of inquiry methods concerned with HPS elements combined with „brain storming”, „role playing”.
6. Collaboration of science teachers with teachers of history, literature, philosophy, etics, religion, etc.
7. Dissemination of the project results in different tools (collection of scenarios, journals, TV, www, newspapers, etc.).
8. Organisation of competitions:
for teachers on: „Proposition of the most effective use of HPS in science teaching” (scenario of lesson or/and historical experiment),
for students on: „Construction of simple historical experiment/model with the use everyday materials” and on: „Presentation of performance related to important discoveries in science”.
9. Establishment of periodic Seminars on HPS for science teachers.
10. Founding of Real Science Museum with on-line (including distance) experiments.



6. Dissemination of project results

- Web page devoted to the HIPST Project results: <http://hipst.fizyka.umk.pl>
- National Conference on HIPST Project in Torun.
- Regional Seminars with the topics related to HIPST.
- Publication on History and Philosophy in Science Centers: „Interactive Exhibition FIAT LUX – from Vitelo to optical tomography” (in Science Teaching – in print)
- Lecture with demonstrations for school students related to the historical observations of sky by Galileo, Kepler, Newton and others. This will be also repeated at the Hevelianum Center in Gdansk (1 lesson per week)
- Special lecture with demonstrations on „Historical experiment” at the General Workshop for Science Teachers.



7. Relation to HIPST objectives

There are three general objectives of HIPST:

1. To increase the inclusion of history and philosophy of science in science teaching for the benefit of scientific literacy.
2. To improve strategies for the development and implementation of domain-relevant materials, teaching and learning strategies into educational practice.
3. To strengthen the cooperation and establish a permanent infrastructure of sustainable networking of all involved stakeholders in the field of STL and public understanding of science (schools, museums, universities).

The above described activities are in accordance with these objectives. However, we would like to add some numbers related to their impact:

- Before the FIAT LUX exhibition in Torun Museum there was local training session for 25 science teachers from the Region, in Gdansk two training sessions (for teachers and staff and Hevelianum Centre) were organised, but in Olsztyn 4 training sessions are planned (one will be devoted to public).
- The „FIAT LUX” exhibition in Torun about 14 000 visitors was attended (including 50 classroom students, in Gdańsk there was 5 400 visitors- mostly school students).

8. Problems, expectations

- Generally, the acceptance of the FIAT LUX exhibition was very good, but unfortunately rather trivial. Therefore, **the much more detailed descriptions and evaluation tools are desired**. The same is valid with respect to lessons evaluation. We expect to change the attitude of students to the essential values of such exhibitions as well as to enhance their Scientific Literacy.
- As the some resources are presented at the exhibitions, there are not available to the teachers at schools.
- We would be intrested **in the further development of the exhibition's collection**, especially we would like to construct replicas of some others historucal telescops (there Galileo telescope was alredy constructed from our resouces).
- As far as „Copernicus experiment at school” is concern we are unlucky, becouse **we experience a lack of sunny days**.



9. Question to HIPST group

- Could you inform us systematically about the news at the **international HIPST web page**?
- As we would like to have an active link to the Main HIPST www, could you **give us its address**? Previously we used the following address
http://hipst.ul.pt/hipst_wiki/index.php/Main_Page

Thank You for the attention!

