A learning platform for the introduction of Remote Sensing principles and applications in Higher Education

Nektaria Adaktilou

University of Athens

Faculty of Physics

Division of Applied Physics

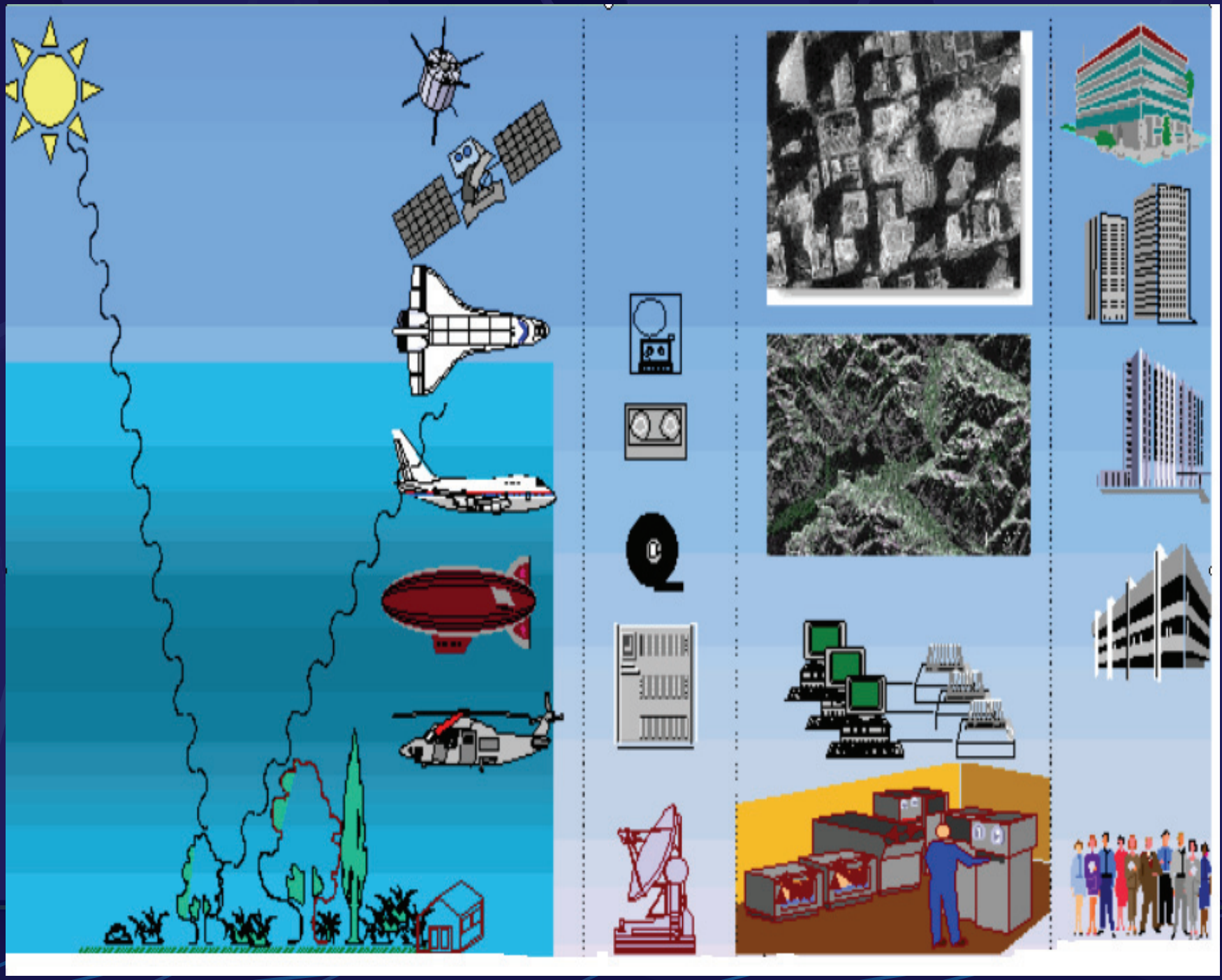
Remote Sensing and Image Processing Laboratory

The purpose

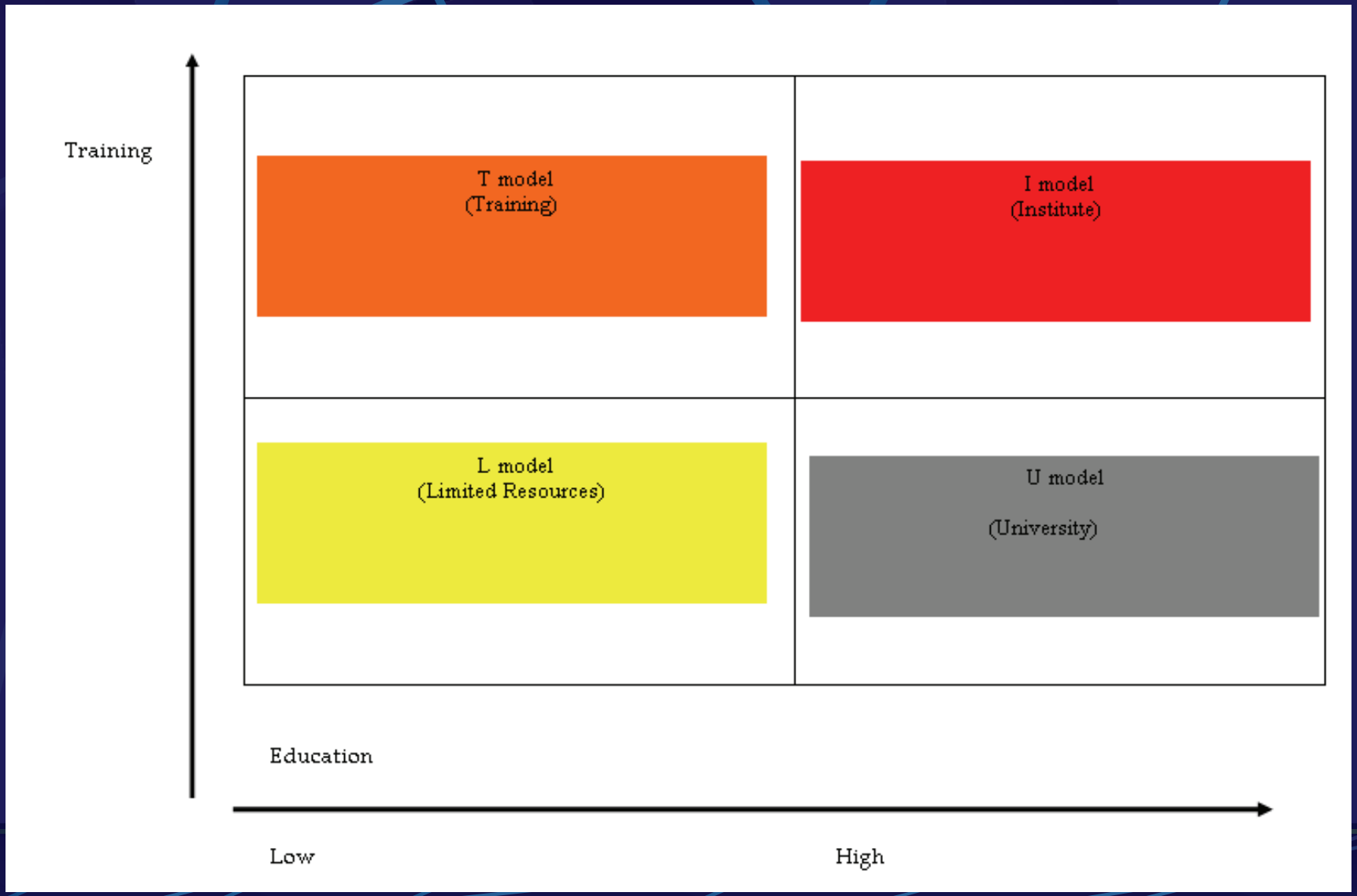
The purpose of the paper is to present the framework for the design, development, pilot implementation and formative evaluation of a learning tool (electronic platform) for the Introduction of Remote Sensing Principles and Applications in Higher Education.

Remote Sensing - Technology

- Remote Sensing utilizes technology by its nature, so as to process data and produce information and knowledge concerning the impact of human activities on the environment, which is needed in order to make informed decisions.



Remote Sensing Education Anderson et al.(1983)



The need to move towards more effective and flexible learning tools that have the potential to meet the constantly changing learning needs of the students in a thematic area that is evolving rapidly and that has applications in a wide range of sectors is obvious.

New Technologies and Learning

- Over the past decade there is a number of driving forces in Higher Education worldwide to use technology in order to support teaching and learning.

- ICT enhanced environments provide 'excellent tools and mechanisms to deal with the Higher Education challenges, especially those technologies related to e-learning platforms and virtual campuses (Gonzalez et al., 2007).

eLearning

- eLearning understood as online learning, or web-based learning, has raised expectations as to what sophisticated multimedia technologies may contribute to learning and training.
- eLearning has been defined as the 'new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration'

e- Learning

An effective resource to :

- shift the emphasis from the tutor to the student and create personalized learning paths.
- Support collaborative learning practices.

E-Learning

- While the ostensible aim is to use e-Learning to improve the quality of the learning experiences for students, the drivers of change are numerous and learning quality often ranks poorly in relation to most of them.

  (Laurillard, 2005).

Emerging issues

- Understanding of the technology and pedagogy integration.
- Systematic and credible evaluations
- Paradigm shift from teacher to student centeredness

The goal of this work

- The design, development and evaluation of a friendly to use and complete learning tool for satellite remote sensing at an introductory level in higher education. The study actually had five main directions of action, which were:

The goal of this work

- The development of the learning material to the detail required.
- The design and the establishment of the learning platform.
- The adoption of an appropriate scientific approach and the inclusion of pedagogy.
- The preparation of the formative evaluation tools.
- The implementation of the formative evaluation in order to get the first feedback by the students.

Critical Issues

- The subject content for Remote Sensing is state of the art and maintained up-to -date.
- The platform functions without problems across all users.
- The design principles are appropriate to the needs of the users and are clearly able to support pedagogic issues.

Learning Platform

- create an environment in which students can learn by doing, receiving feedback and continually refine their understanding and build knowledge.
- visualize difficult to understand concepts such as the ones found in remote sensing.
- interactivity makes it easy for students to revisit specific parts of the environment to explore them more fully, to test ideas and to receive feedback.
- connect students among them as well as with working scientists..

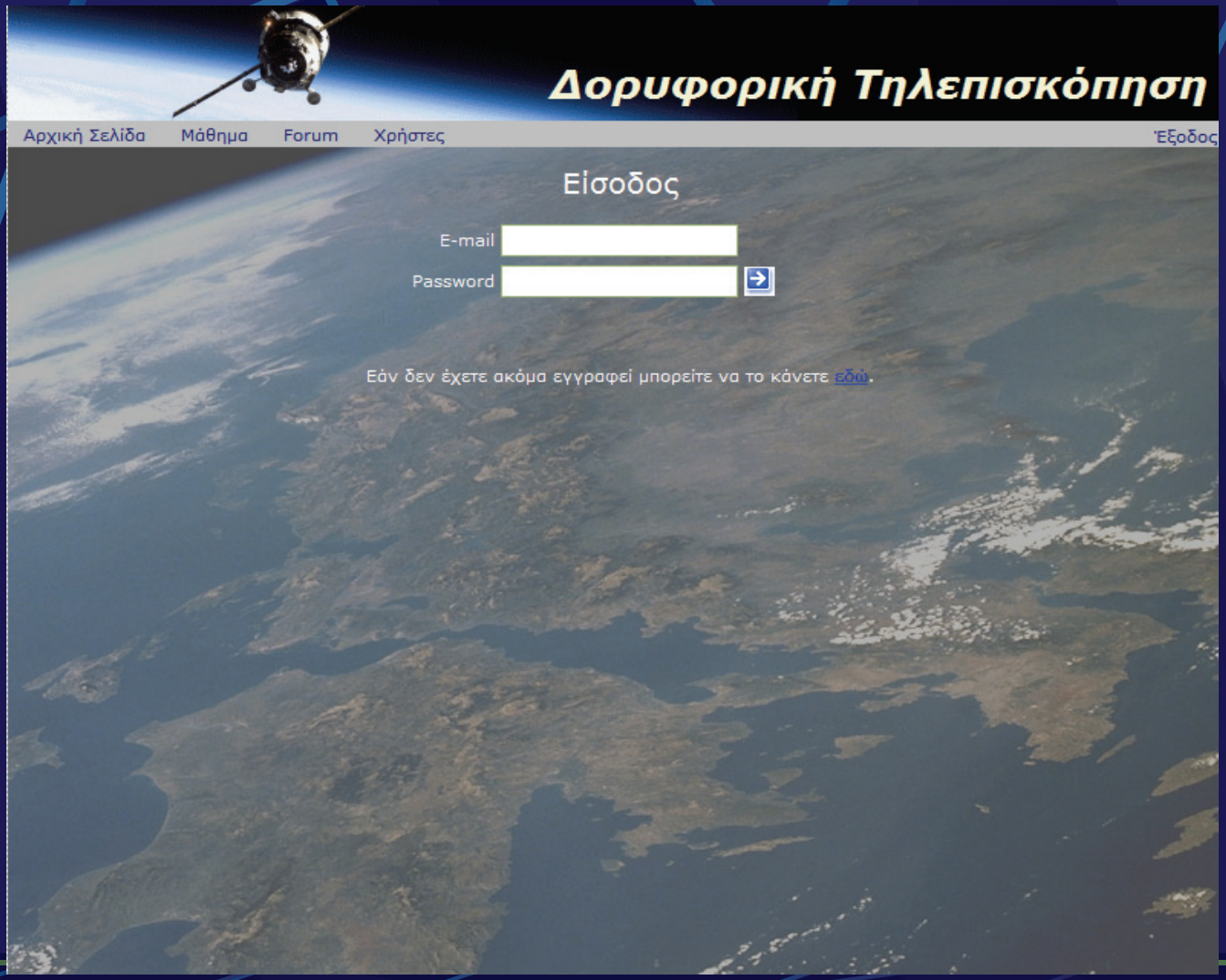
The platform-Technology

- **Web-based architecture** (the learning tool may be accessed by using the web browser, without installing other software to the computer).
- **Modular organization of the material** (allows to import / export courses and adaptation of training paths to specific learning needs).
- **Portability** (the platform has the possibility to work correctly independent of the computer and the operating system on which it runs).

The main elements of the platform are:

- The remote sensing material.
- Interesting links with resources for the technique.
- A forum where students may be able to exchange views.
- E-mail contact with the course's instructor and fellow students.
- News (deadlines –results etc. and seminars-conferences etc.).


Δορυφορική Τηλεπισκόπηση
Αρχική Σελίδα
Η Εργασία
Η επιστημονική και παιδαγωγική μεθοδολογία
Η ηλεκτρονική πλατφόρμα
Ανακοινώσεις
Αξιολόγηση
Το Εργαστήριο
Καλωσήλθατε στην ιστοσελίδα του μαθήματος της Δορυφορικής Τηλεπισκόπησης
Η ηλεκτρονική πλατφόρμα για τη Δορυφορική Τηλεπισκόπηση και τις εφαρμογές της δημιουργήθηκε στο πλαίσιο εκπόνησης διδακτορικής διατριβής στη θεματική περιοχή της χρήσης των νέων τεχνολογιών στην εκπαίδευση. Στην προκειμένη περίπτωση στόχος ήταν η δημιουργία και η εφαρμογή και αξιολόγηση πρότυπου εκπαιδευτικού υλικού για τη διδασκαλία της δορυφορικής τηλεπισκόπησης στην τριτοβάθμια εκπαίδευση με την πρακτική της ηλεκτρονικά υποστηριζόμενης μάθησης.
Νεκταρία Αδακτύλου
Ομάδα Τηλεπισκόπησης και Επεξεργασίας Εικόνας
Τομέας Εφαρμογών Φυσικής - Μετεωρολογίας
Τηλ . 210-7276843
e-mail: nadak@phys.uoa.gr
Είσοδος
Σύνδεσμοι
NASA
U.S. Geol.Survey
Earth Observatory
WWW Virtual Lib.
Tutorial
Principles
Fundamentals
Int. Society
Int. Journal
Applications
Urban Studies
Spot Image
Landsat
Quickbird
Radarsat-2


Δορυφορική Τηλεπισκόπηση
Αρχική Σελίδα
Μάθημα
Forum
Χρήστες
Έξοδος
Είσοδος
E-mail
Password
Εάν δεν έχετε ακόμα εγγραφεί μπορείτε να το κάνετε εδώ.

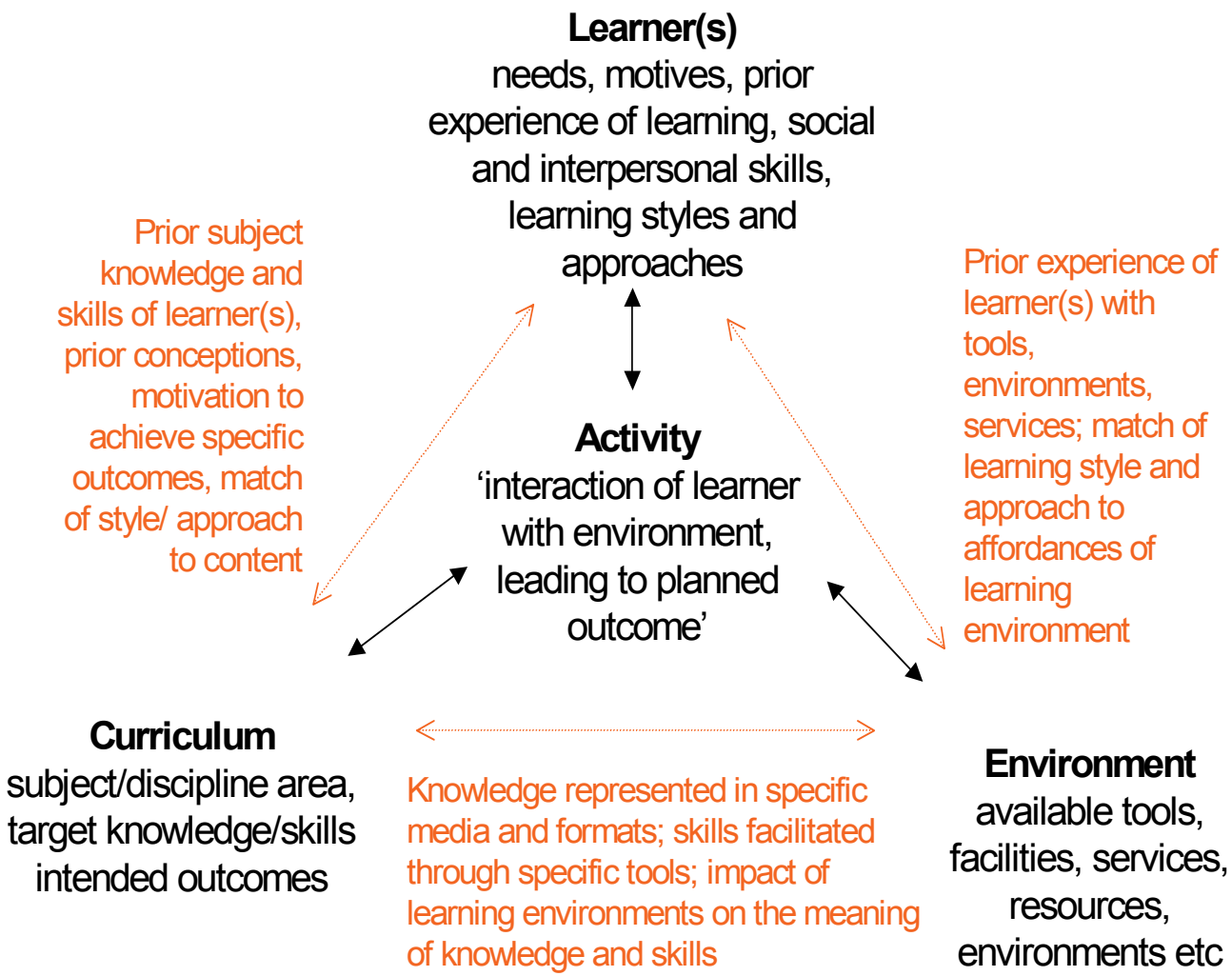
Thematic areas

I.An introduction to the main principles of remote sensing

The concept, electromagnetic radiation, types of remote sensing with respect to wavelength region II. Remote sensing platforms and sensors

- III. Digital images characteristics
- IV. Image enhancement techniques
- V. Image corrections
- VI. Classification techniques
- VII. Applications of satellite remote sensing, case studies.

(urban issues, coastal zone, climatology, industrial accidents, marine application).

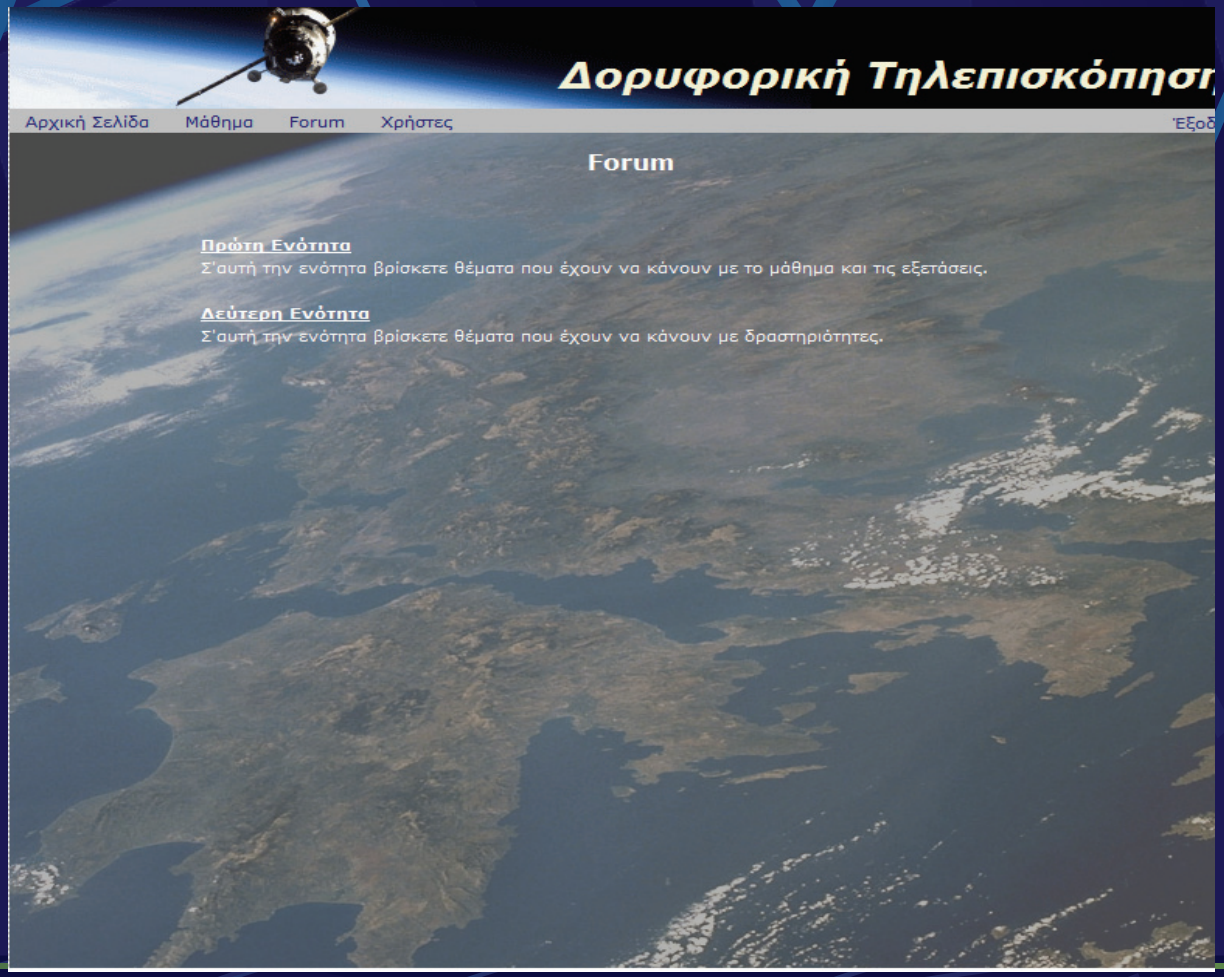


A specification for learning activities ***(H.Beetham, Feb '04)***

Forum-tracking mechanisms

There have been several studies of possible links between attendance and performance (Colby 2004; Barrett at. al. 2007). There have also been studies where the total use of the virtual learning environment has been correlated to the students' performance. More specifically, Lally(2002) investigated the correlation between students' performance and their contributions to an on-line forum.

The forum


Δορυφορική Τηλεπισκόπηση
Αρχική Σελίδα
Μάθημα
Forum
Χρήστες
Έξοδ
Forum
Πρώτη Ενότητα
Σ'αυτή την ενότητα βρίσκετε θέματα που έχουν να κάνουν με το μάθημα και τις εξετάσεις.
Δεύτερη Ενότητα
Σ'αυτή την ενότητα βρίσκετε θέματα που έχουν να κάνουν με δραστηριότητες.

Collaborative practices

- Collaborative experiences may be very well supported by the learning tool. The majority of studies conducted have shown that collaborative learning is efficient.
- Important issues:

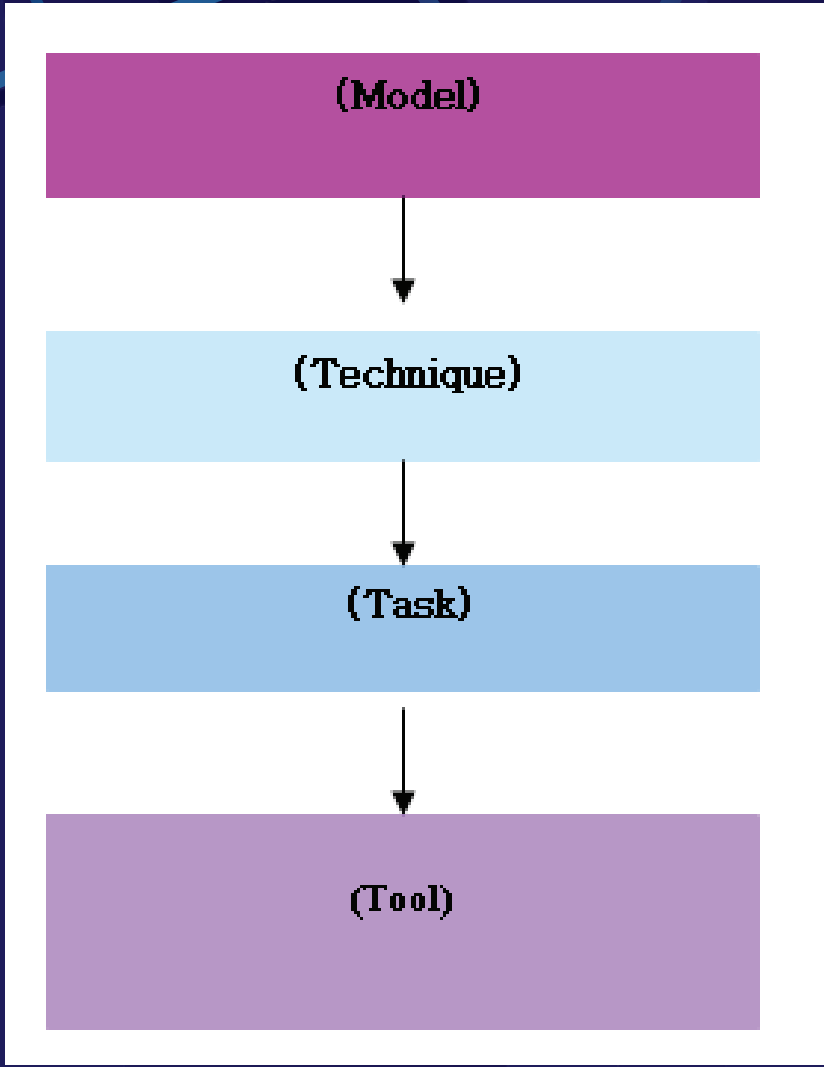
The group composition

The task features

The communication media.

- New technologies offer possibilities such as: e-mail. Forum, chat, blogs, that facilitate team work to a great extent

Turani et al.



Evaluation

- Elearning is by its nature **innovative**: it introduces new modes of teaching, learning and assessment.
- In introducing eLearning, one will be reflecting on whether what he is doing and how he is doing it, is meeting his intended aims and objectives.
- A well designed evaluation could provide some evidence as to the reasons why, and extent to which, a particular approach has been or is likely to be of potential value to others.

Evaluation stages

1.Formulating the questions

- Why am I carrying out this evaluation? (identify objectives, designate stakeholders).
- What information do I need? (define research questions).

2.Collecting the data

- Who can provide the information (identify resources).
- How can I best collect this information? (choose a data collection strategy).
- When should it be collected? (before, during, after a learning activity, or at a different point in a module).

3.Analyzing the data

4.Drawing conclusions and reporting on the findings.

Self evaluation

- Test the function and potential usability of the learning platform, both from its technological and pedagogical aspect.
- The evaluation framework that was used was a combination of elements from an evaluation method proposed by Colace et al. (2003, 2006). This model has been used to make comparative evaluations of a sample of existing learning platforms.

- A series of indices describing functional elements of the platform were examined.
- All indices' value is calculated by dividing the obtained value for the supported tools, by the maximum value. So, the maximum value for each indicator is 1.

1.Management Index

- This index determines the number of services for the management of students and their progress that are available in the learning platform (ex. Progress tracking, contents management, reports, assessment, on-line registration etc.).

2. Collaborative index

- This index aims to determine how many collaborative services are available in the platform (ex. E-mail, forum, chat, video, etc.).

3. Management and enjoyment of interactive learning objects

- The title fully describes the aim of the index. It determines the platform's availability of functions such as: videos, contents download, application sharing, virtual classroom, etc.

4. The adaptation of users' formative learning path.

- This index aims to evaluate how many services offered by the platform allow the creation of personalized learning paths and the continuous assessment of students (ex. progress tracking, reports, assessment, multiple question test, etc.).

	Remote Sensing Platform	Other commercial platforms
Index 1	0.875	1, 0.917,0.750,0.875
Index 2	0.68	1, 0.5, 1,0.47
Index 3	0.44	1, 0.22, 1, 0.22
Index 4	1	0.818, 0.818, 1, 0.818

Table 1. Scores for the self-evaluation process

Formative evaluation by the students

- Nine students.
- Six of the students are about to obtain their BSc, three specializing in Education and three specializing in Environmental studies.
- One student is completing his MSc in Environmental Physics.
- Two students are PhD candidates in the Department of Environmental Physics and Meteorology.

- All students attended an approximately twenty- hour course in order to get acquainted with the learning material and the learning tool as a whole, as thoroughly as possible, so as to be able to evaluate it and provide some useful feedback about its quality and its effectiveness.

Questionnaires

- Questionnaire 1: Technical characteristics of the platform (10 questions)
- Questionnaire 2: Content and quality of the learning material (10 questions).

- Questionnaire 3: How functions offered by the platform (forum, e-mail, easy navigation, extra resources, links, etc) affect interaction processes and attitudes developed by the students (participation, trust, cohesion, conflict, etc.) based on the model proposed by Chang et al. (2006). (matrix)

- Questionnaire 4: Students' attitudes towards the practices of collaborative learning (14 questions).
- Questionnaire 5: Performance of the instructor in the specific learning environment (45 questions).

The maximum value for each index is 1, as in the previous evaluation.

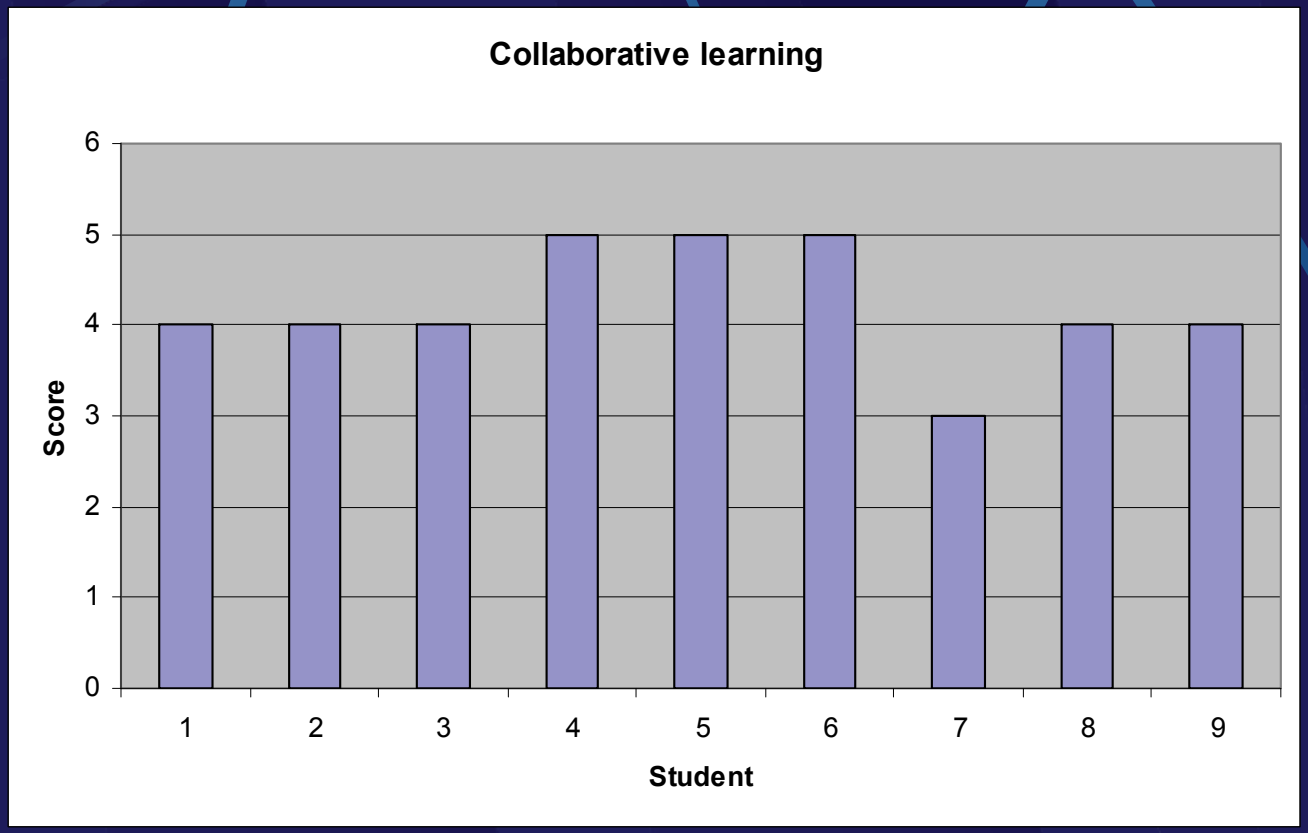
(score obtained/maximum score)

Students' evaluation scores

Technical characteristics	0.68
Learning material	0.82
Interface functions that promote interaction processes and attitudes	0.70
Collaborative learning	0.80
Performance of instructor	0.92

Table 2. Scores for the students' evaluation

Collaborative learning has assisted me to clarify concepts/find solutions to problems through group discussion



1: Totally disagree

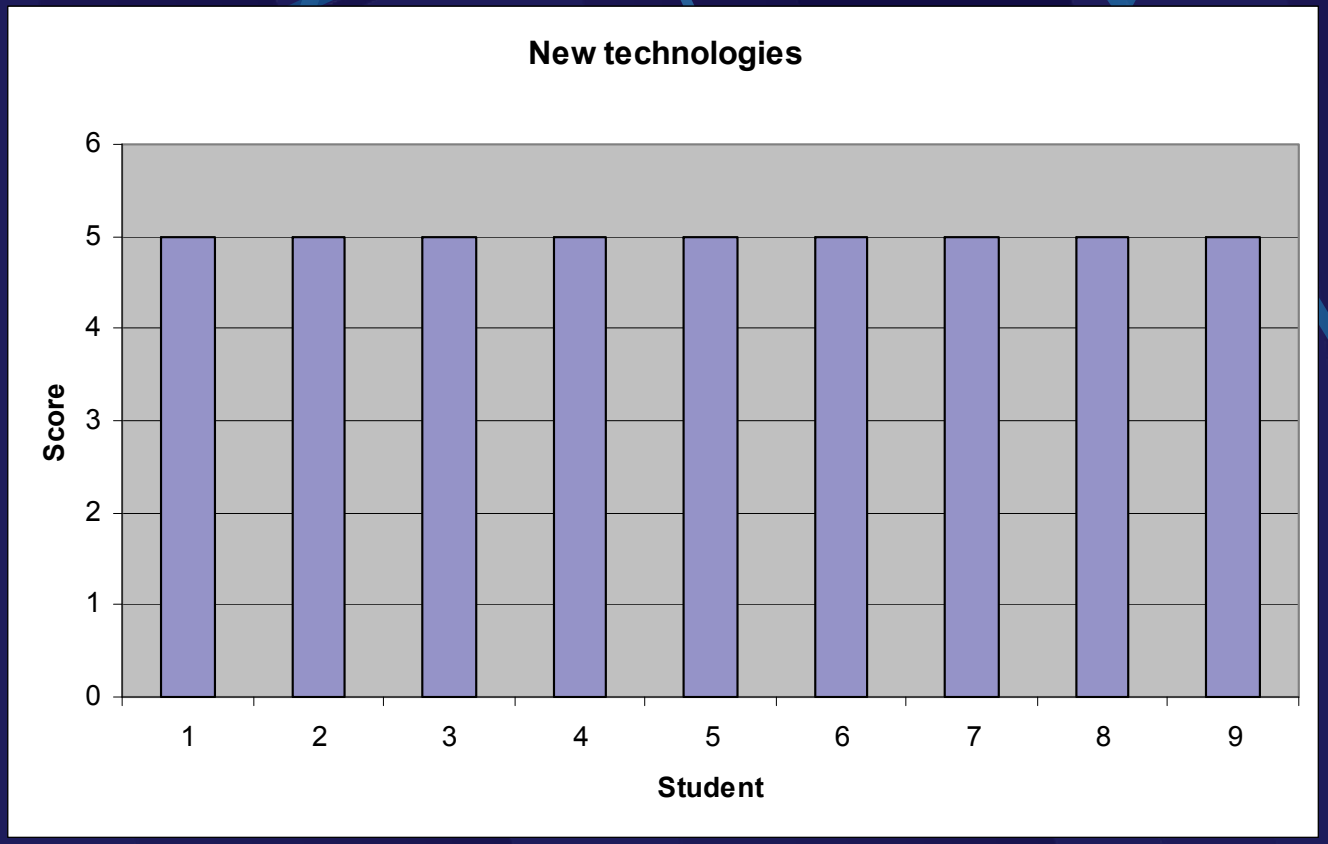
2: Generally disagree

3:Neither agree nor disagree

4: Generally agree

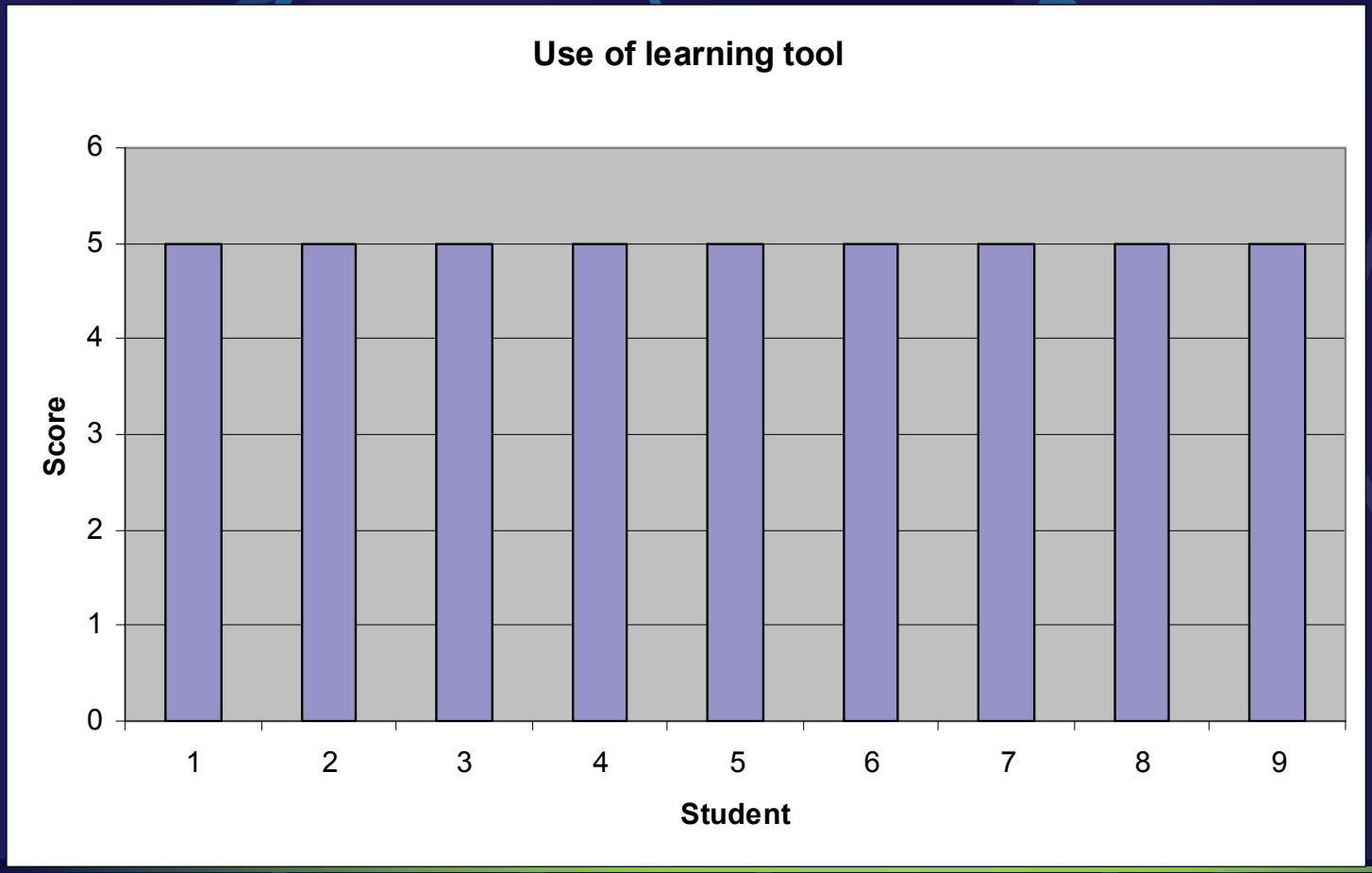
5: Totally agree

The use of new technologies was necessary for the specific course



1: Totally disagree
2: Generally disagree
3:Neither agree nor disagree
4: Generally agree
5: Totally agree

The way in which the instructor used the learning tool was effective

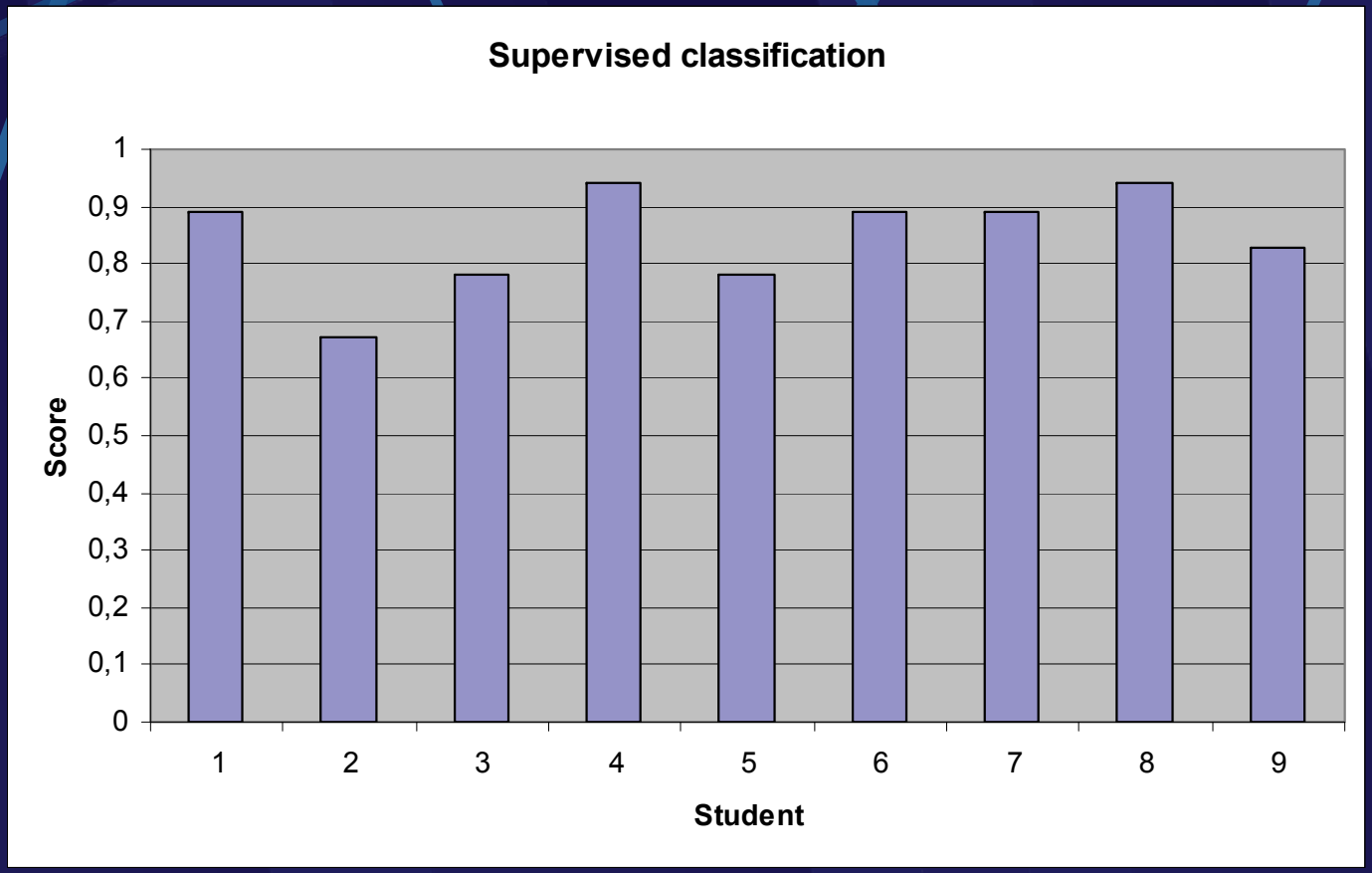


1: Totally disagree
2: Generally disagree
3:Neither agree nor disagree
4: Generally agree
5: Totally agree

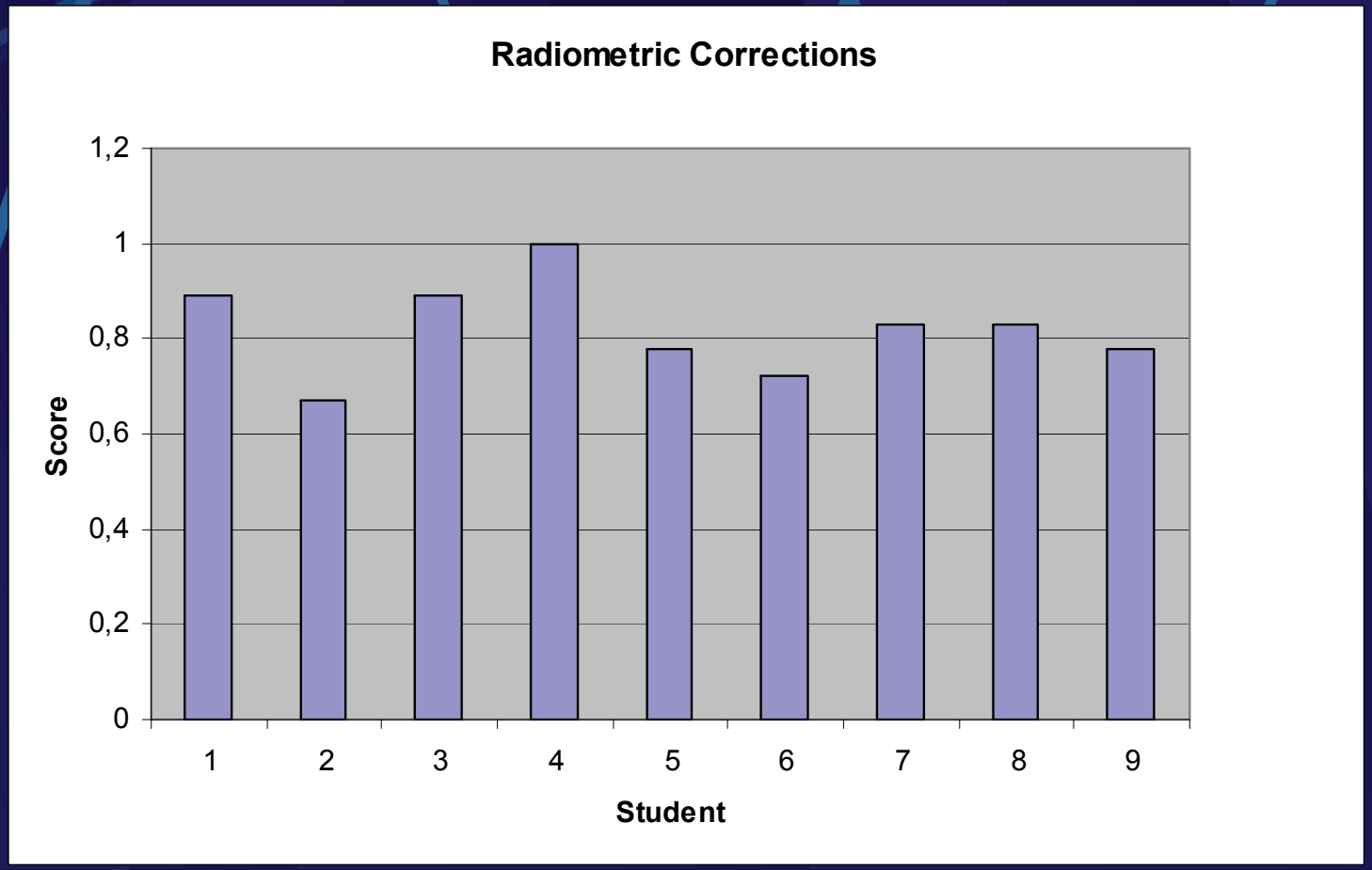
Collaborative learning helped me develop my communication skills in a small group

1: Totally disagree
2: Generally disagree
3:Neither agree nor disagree
4: Generally agree
5: Totally agree

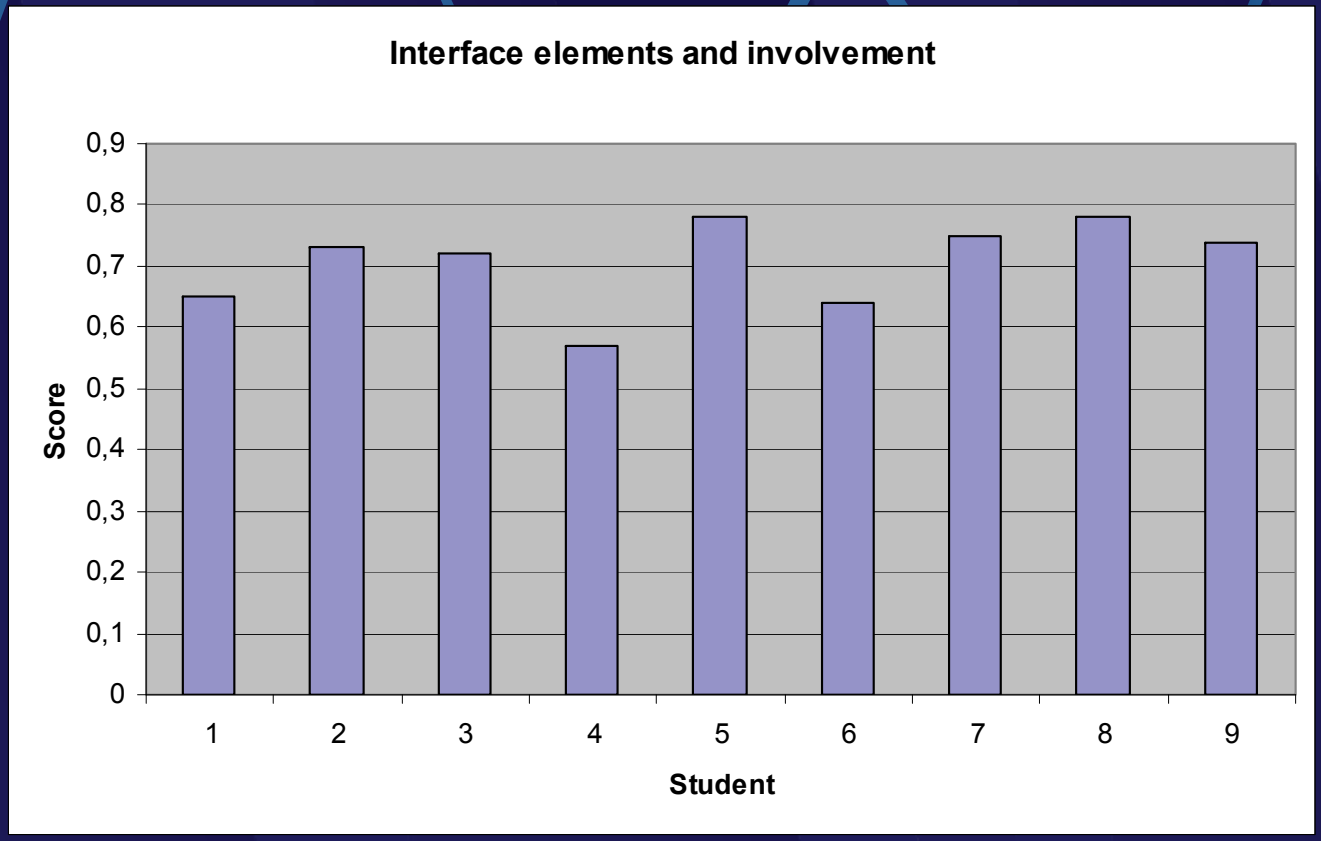
Quality of the learning material



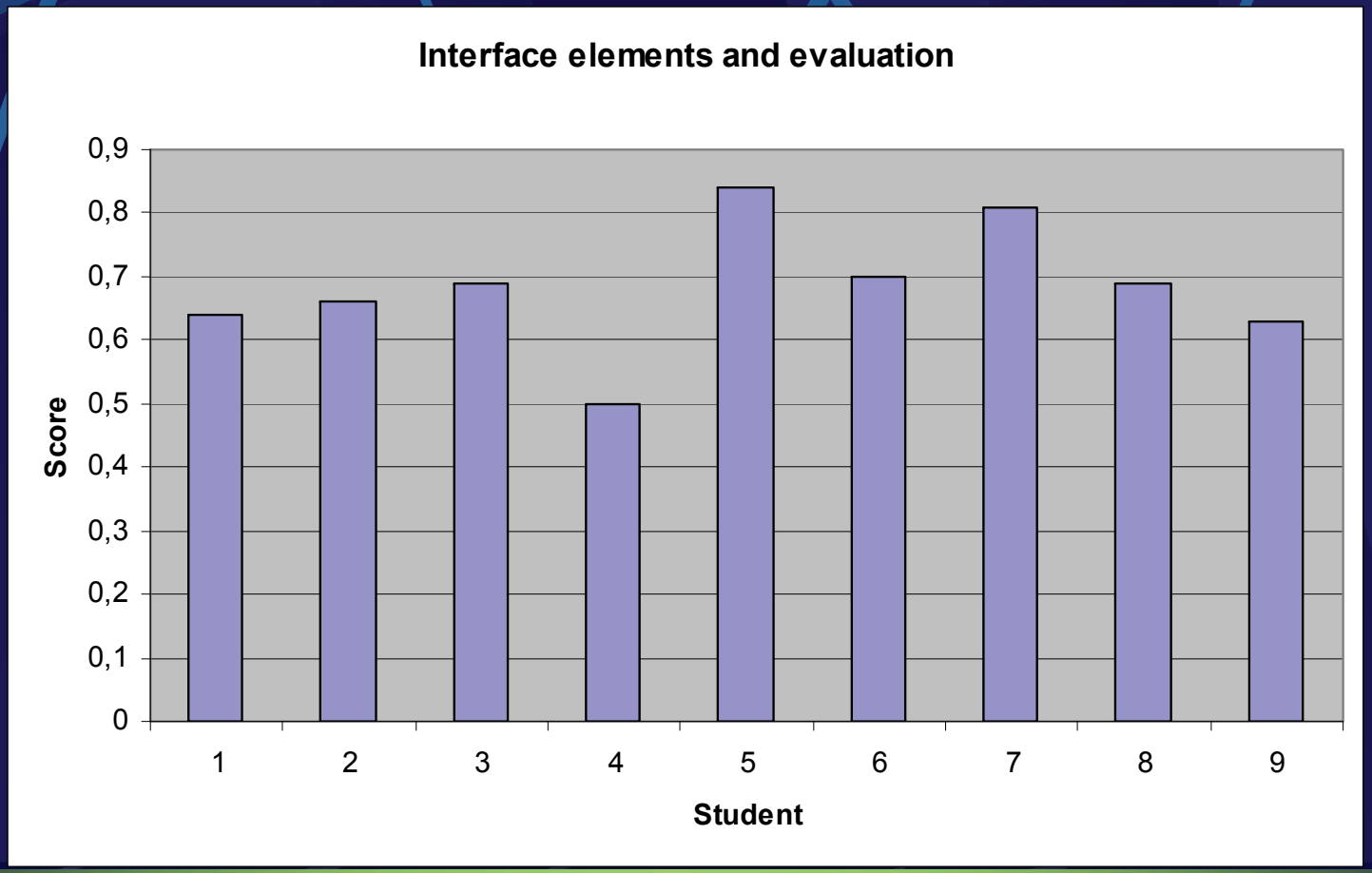
Quality of the learning material



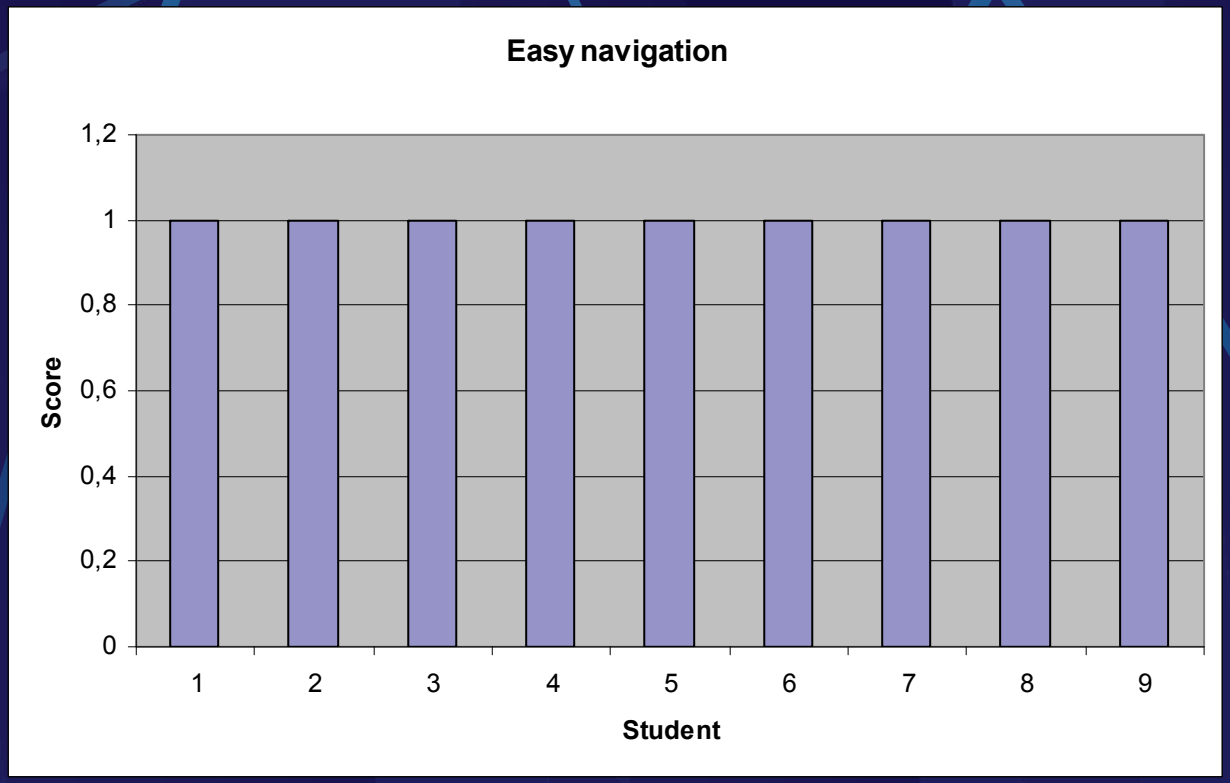
Participation, trust, cooperation, cohesion, conflict, media perception



Participation, trust, cooperation, cohesion, conflict, media perception



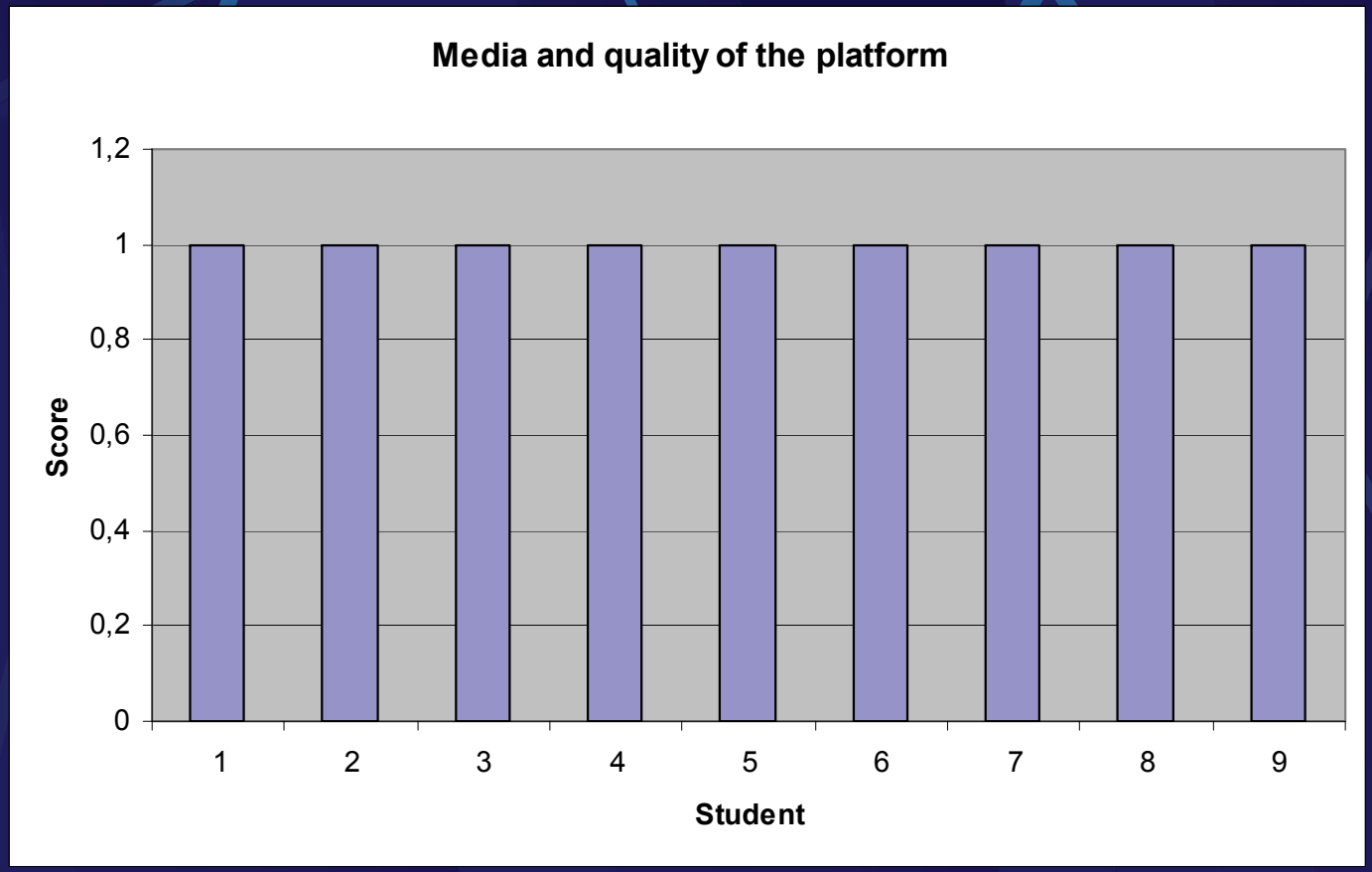
Is the navigation easy in the platform?



1:Yes

0: No

The media used contribute in an essential way to the quality of the learning platform?



1:Yes
0: No

Some findings

The highest scores were obtained for :

- Adaptation of users' formative learning path (1) and
- Instructor's performance (0.92),

- A main concern was to create a learner-centered environment that would provide students with the possibility to create personalized learning paths suitable for their various learning styles and needs.

- Moreover, since the blended learning approach was chosen, it was important to ensure that the instructor would successfully act as a facilitator who uses the media effectively and helps students frame their experiences, guiding them with mastery and removing obstacles of any kind.

The lowest index was for the ‘Management and enjoyment of interactive learning objects’ (0.44).

- The work was not technology driven and did not focus on creating an impressive –from its technical aspect- electronic platform.

Conclusions

- The present study, which is still under development, proposes the use of technologies, that is eLearning, for the introduction of remote sensing principles to university students. Since technologies do not guarantee effective learning, one of the main elements of the study is the evaluation of the learning tool. Its completion will allow the provision of evidence that will demonstrate whether learning in this scientific field has been enabled, enriched or enhanced through its use.

- There is no simple and easy way to adopt eLearning. It is complex and to a great extent doing it absolutely right is still an unknown process.
- This work is intended to provide some issues for consideration as experienced by the people involved in it and to add something to the efforts of the education community as it scans the horizon for information to support their decision making.

Thank You!