

OECD/CERI ICT PROGRAMME

A Case Study of ICT and School Improvement at

I.T.I.S. A. Einstein – Rome- Italy

18th May - 12th June 2000

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Overall view

(an extract from the interview to the headmistress)

Interviewer: *Which are the main values of the innovation process?*

Headmistress: *School must train; so each training strategy mustn't be neglected. There are lots and lots of scientific and technological subjects in an institute for electronics and telecommunications, but what does this institute need more? A basic cultural area. I have always fought for the introduction of other cultural activities, that weren't provided for in the regulations of an institute for industrial and technical experts, such as: theatre, music, reading and library courses. It was unnecessary to underline what they had been doing for 20 years and at that moment multimedia did not exist. Contrary to what happened in the past, multimedia combine technology with image and sound. Now the two areas are not separable. Now we speak about culture, or better about technological, classical and scientific culture.*

The school chosen for the pilot study is the Industrial and Technical School "Einstein" in Rome. Its Internet address is: <http://www.itis-eistein.roma.it>

It is a secondary school (for boys and girls aged between 14 and 19) which houses an industrial, technical school (ITIS) specialized in electronics and telecommunications (an evening course for working students is also organized) and a secondary school specialized in scientific and technological studies (LST).

The school hosts students living in the north-west area of Rome, near the big ring-road. Students come mostly from the two "borgate" (i.e. "suburbs") Primavalle and Montesparcato and belong to the working and lower middle classes of the Roman suburbs, while the number of foreign students is low (1.5% of students).

The Einstein entrance-halls are prepared to welcome its students: the spacious entrance-hall is furnished with comfortable, light-wood benches (designed by a teacher and realized in the institute's laboratories), a bar, the entrance to the amphitheatre-shaped room, the great hall, where performances are played, the containers in which the prizes and cups won by students during sports competitions are kept, several bulletin boards are on the wall and display appointment-notice for students, parents, teaching body and teachers of other schools which share different projects with this school.

The school is open and widely attended 15 hours per day on the average, because of evening courses and several activities and projects. In the afternoon, students are involved in "extra-curricular projects", within the framework of the so-called "enlargement of the training offer". Students



(about 30%) attend these courses of their own will. In some classes, students are all present because they carry out the "modular activities", strictly correlated with the school curriculum.

The ordinary co-ordination activities among the teaching body, such as teacher's meetings, student and parent-teacher associations, meetings about branches of learning, that is to say the co-ordination, planning and organization meetings which are typical of any school, take always place in the afternoon.

Both modular activities and extra-curricular projects are now joined closely together and interact, but the situation was different in the past. The extra-curricular activities, introduced in the school long before than the modular ones, have also introduced innovations into the disciplinary didactic planning. For they represent the "incubation" and experimentation period to estimate if these projects are good from the didactic point of view and can be proposed in the curricular hours.

"Einstein" has, like all other secondary institutes of this kind¹, a good equipment of information technology laboratories and a group of teachers, experts in the field of computers, who have provided to the information training of their colleagues over the last few years, enlarging the possibility to introduce ICT in other subjects. The school teachers are extremely willing and attentive to receive the external proposals and incentives which allow them to provide cultural, didactic help for their students, especially for those who live in the quarter. So the school is today the experimentation center of many projects, i.e. the "modular activities", aiming at the innovation of the disciplinary teaching methods, with use of ICT (such as: "Multimedialità in classe" - "The use of multimedia in a classroom", a project promoted by Microsoft, funded by the Ministry of Education and supported by the teachers of almost all the subjects; "Dalla città ideale alla città reale" - "From the ideal town to the real one", a project aiming at the creation of a multimedia product concerning the town-planning development of Rome, with the collaboration of history, Italian literature, technology and drawing teachers; "Lettura e analisi del linguaggio cinematografico" - "Reading and analysis of the cinematographic language", a project run by arts teachers;

"Il giardino del teatro" - "The garden of the

Elenco per famiglie - Microsoft Internet Explorer

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IDENTIFICAZIONE SISTEMATICA

Divisione: Angiosperme **Ordine:** Liliiflore **Nome Scientifico:** *Nolina longifolia*

Classe: Monocotiledoni **Famiglia:** Agavacee **Nome Comune:** Nolina

ORIGINE E DIFFUSIONE

Originaria del Messico, da cui fu importata, è stata introdotta nelle nostre serre e nei nostri giardini, situati nei climi più favoriti del bacino del Mediterraneo, nel 1812 e reintrodotta, poi, ancora più tardi, nel 1867. E' presente nelle zone a clima mite con freddi mai intensi e prolungati, o in ambienti molto caldi e aridi.

DIMENSIONI E PORTAMENTO

Di crescita lenta, con il tempo assume un portamento arborecente e può raggiungere i m.3 e più di altezza.

TRONCO E CORTECCIA



Pianta legnosa, con un grosso tronco con base spesso rigonfiata e corteccia suberosa, di forte spessore (ciò indica che è tipica di luoghi siccitosi) e profondamente screpolata.

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theatre", a project done in collaboration with the municipal administration to catalogue the plants of one of the most beautiful parks in Rome, i.e. Villa Pamphilj, and coordinated by science teachers; and many other different projects).

It is possible to supplement the "modular activities", which are part and parcel of the didactic program, with some proposals put forward to enrich the technological, scientific curriculum of the institute. These proposals regard:

- the acting activities, in Italian and English (the project called "Laboratorio teatrale" – "Theatre laboratory" was done in our institute more than 15 years ago and ends every year with the production of a performance that draws big audiences from the quarter. This year they have introduced another project, called "On stage", a series of short comedies in English having a happy ending, i.e. one-act plays);
- sophisticated musical and film productions (project "Suono e immagine" – "Sound and image" – aiming at introducing young people to

multimedia languages);

- projects in cooperation with other schools of Rome, such as Didanet which aims at carrying out some projects among different schools and tackles one or more subjects, each one dealt with according to the investigation levels related to the classes involved.

All these extra-curricular activities, which have transformed the institute in a point of reference for all young people living in the quarter, involve ICT innovatory applications, too.

This school is extremely vital, loved by its students and their families. That's why this institute unlike, on the average, the schools of the suburbs in Rome has never experienced acts of vandalism or thefts. Nevertheless there are a lot of conflicts among the teaching body, even about politics, and the spread of the innovation process is still the beginning: 30% of teachers hold a role of responsibility in all the projects under way, and another 30% of them contribute actively to their realization. The headmistress and her closer collaborators are deeply troubled by the thought that an equal offer may not be reached for all the grades in the school.

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The history

The school is located in one of the suburbs of Rome, built following the so called "slum clearance program" of the twenties and thirties². In the 70s there were still social conflicts inside the quarters of the area, in particular at Primavalle. During the interviews, some of the teachers who had been teaching in this school for years remembered the strong political commitment of the first teachers of the institute, who wanted to offer, through the school, a cultural centre of aggregation for those who lived in the quarter. Since the beginning, the first initiatives of the institute, such as discussions after a film show, concerts and theatre performances, were addressed to all young people living in the quarter and were devoted to their cultural and social recovery, rather than to their school engagement.

Information technology was introduced in the school fifteen years ago, through the experimentation of new electronics and telecommunications curricula in the three-year course and mathematics and physics curricula in the two-year course. It was proposed by the Ministry of Education. These kind of experimentation were strictly related to the school matters and information technology was confined to its applications to the teaching of scientific and technological subjects³.

In 1990, when the new headmistress came into office, the first "Progetto recupero Einstein-scuola aperta" - "Recovery project, called Einstein-open school" started. This Project combined full immersion courses for those students who had been left behind with performances and shows, organized by the school, helping them to choose "didactic" activities. For example, qualified music courses are organized in collaboration with the most important school of music in Rome, Santa Cecilia Academy. They aimed at arousing enthusiasm for learning, enlarging the cultural horizons of the students and enriching the school offer in the classical and artistic field. All these activities follow a parallel path but they did not affect didactic programs and methodologies.

In the last few years, the several experiences under way and the increase in professionalism by the teachers correspond positively with the proposals which the Ministry of Education was addressing to the school world as from 1996.

The Einstein institute supports different governmental projects:

- didactic, methodological and organizational renewal of the institutes ("Progetto Qualità" – "Quality Project");

- introduction of new technologies and their experimentation in the didactic method of all subjects;
- help and support to the students who have left school and to students who have been left behind;
- multiculturalism.

Since then, the extra-curricular offer and the didactic experimentation are found in a unitary project which characterizes the school innovation process under way.

Since 1995, some teachers of the technological matters, engaged in the project "Einstein open school", have been spreading the use of ICT as a support of the school curriculum. These teachers promote projects having a "service" function for the school, such as for example the "Progetto Archivio Einstein", an archive file about the works of all the school classes. Information technology courses are also organized for the teachers of all the disciplines.

These initiatives are supported both by funds from a Community project (Socrates) and by ad hoc funds of the Ministry of Education assigned to the ICT training of teachers and to the purchase of computers used only by teachers, through the "Programma di Sviluppo delle Tecnologie Didattiche (PSTD)" – "Development Program of the Teaching Technologies".

In this way there is a large group of teachers who are also ready to experiment ICT in their disciplinary field, and there are the curricular innovation projects, which allow the morning classes to do experimentations, to arouse enthusiasm for learning, to pay attention to the variety of the training offer which is peculiar to the "afternoon" activities.

The projects which are based in particular on new technologies are more and more increasing, also because they are able to develop and support multimedia. This means that enlargement offer and innovation proposal about disciplinary teaching are unified and related. The school "classical" and technological matters have in common the use of multimedia. In this way we pass from the "Progetto Musica" – "Music Project", with the courses of the Santa Cecilia Academy, to the project called "Suono e Immagine" – "Sound and Image", which involves technological disciplines and skills to realize multimedia works.

ICT training concerns also non-teaching staff, allowing the school technical staff to support innovation. Thanks to the students computerized register and to the immediate records of the teachers interventions, we establish close relations with the student parents so as to encourage the co-operation between school and families.

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The present

"EINSTEIN" INFORMATION CARD

School name	Industrial, Technical Institute for electronics and communications - A. Einstein
Municipality, province, region, country	Rome - Lazio – Italy
Location	In the suburbs of the big city

Kind of school	State secondary school specialized in industrial, technical studies for electronics and communications and secondary school specialized in scientific, technological studies
Number of students	800, 100 of which are girls. Foreign students: 14; handicapped students: 8
Budget	1,929,900,860 Italian lire
Budget allocated to ICT	
Funds	Ministry of Education, students' parents; the school has also benefited from European Community funds.
School staff	120 teachers and laboratory technicians. About 60 people including administration staff, technical assistants, surveillance personnel.
Average number of teaching hours	18
School schedule	From the first half of September to the second half of June for all classes except for the fifth forms taking their final examinations from mid-June to mid-July. On average, 36 lesson hours per week out of six days.
Assessment methods	<p>The teaching/learning process is divided into two periods of four months, with two-monthly tests to inform families of their children progress.</p> <p>On average, students must do three written tests and three oral examinations in each period of four months. Written tests are mainly traditional (composition, problems); sometimes they involve questions and tests made up of many elements.</p> <p>Some disciplines work on common tests (Italian and mathematics); moreover, the fifth forms are trained for their final examinations. In particular, simulations of the third test (a test made up of many questions defined by the board of examiners) and practice on the written tests assigned at a national level in the previous year.</p>
Students' academic performance in mathematics and Italian	<p>In mathematics, the percentage of failures and formative debts (final marks below 6/10) reaches 50% in second forms and 30% in fourth forms.</p> <p>In Italian, the percentage of failures and formative debts reaches 10% in second forms and 5% in fourth forms.</p>
Total number of multimedia computers connected to the Internet	About 80

Total number of other computers	About 30
Computer location	Laboratories are all equipped with multimedia computers connected to the Internet (10-12 in each laboratory) except for "Systems 1 and Electronics" laboratory (out of 386sx). Other computers are arranged in library, secretariat and other offices as well as in the two information technology rooms available for teachers only (Pentium MMX)

The institute Einstein is a state secondary school. It has two courses:

- Technical, industrial course specialized in electronics and telecommunications (ITIS)
- Secondary school specialized in technological, scientific studies (LST).

ITIS has also an evening course attended by working students and young people or adults who have prematurely given up school for different reasons (i.e. school failure, lack of interest, family reasons). Coming back to school can be a useful tool for getting into the work market or improving their working conditions.

This school has a permanent teaching body and the headmistress has realized a well-constructed delegation system. Each special project (modular paths or enlargement of the training offer) has a co-ordination teacher having operational responsibilities who is helped by a commission involving in ordinary didactics. Through this system we try to guarantee the process of osmosis between experimenter teachers and teachers who follow a more traditional teaching and to spread the innovation process.

This development is followed with care so as to guarantee the same rights for all the different courses. The learning objectives, in terms of skills and abilities, are defined in the Training Offer Plan (POF)⁴, thus making them independent of the special disciplinary content.

In this way the same criteria are applied to students in all classes. A group of teachers who joined in the "Progetto qualità" - "Quality project" of the Ministry of Education have been regularly monitoring teaching for some years. The monitoring results are regularly revised and presented in the shape of graph during the teacher meetings.

The experimentations which are taking place are often the fruits of collaboration between school and external world. This is the case, for example, of the "Progetto Microsoft" - "Microsoft Project": thanks to an agreement with the Ministry of Education, Microsoft has guaranteed a technological support and furnished the school laboratories with computers. In exchange for this it has asked teachers to experiment computers in order to define their possible didactic applications. 16 out of 46 school classes take part in this project. This project has developed the following:

- the school Intranet,
- connection to the Internet for all the classes,
- MUD use during the teaching of foreign languages,
- computerized short supplementary thesis to be disputed during the state examination,
- use of new software in the teaching of mathematics,
- hypertexts made with the collaboration of teachers involved in different disciplines (classical and scientific areas).

"Creative learning", which is a project of the European Community, and the project "Il giardino del teatro" – "The garden of the theatre" have been carried out thanks to external incentives.

Other projects have been carried out thanks to the incentive of the Einstein teachers. This is the case of "Suono e immagine" – "Sound and image", which has drawn the Italian television's attention, or the Didanet project. All teachers who want to try, work, experiment are supported and encouraged by the headmastership.

The variety and enlargement of the school offer are also a tool for reaching all the students, arousing their enthusiasm, ensuring that everyone has the possibility of being successful in their studies.

This needs a lot of working engagements, more than in more "traditional" schools. The passage from what was initially "extra-school" into the standard teaching planning, that is an exclusively voluntary space, provokes many oppositions, even of a trade-union nature.

Even if everybody recognizes the ICT incentive function, there are many uncertainties about their educational importance even by the same teachers who undertake to introduce them. In fact, a few teachers take notice of the active participation of students in all the innovative didactic proposals, but this doesn't mean that they have a greater capacity for studying autonomously.

Finally, the didactic introduction of ICT is not always correlated with the innovation process described: the teachers of some technical disciplines requiring information applications, according to the school curriculum, are among the most skeptical ones about their widespread use in many experimentation.

If the teaching staff are involved in debates and self-critical reflections, but also in a new desire to experiment other ways, the perception of students and relations is different. The attendance data of last-year students show the stability of the number of students, in spite of the national population decrease and the fall in the persons enrolled at all the schools having the same typology. The interviews to students and parents show the high popularity rating of the school and its initiatives. All the classes are involved in the curricular innovation paths and the voluntary attendance at the courses of enlargement of the training offer corresponds to 30% of the student population.

In analyzing the effectiveness of the innovation process some data are evident:

- campaign against illiteracy: the ratio between the number of students who have given up their studies and the total number of students has decreased (from 36% to 25%). Nevertheless this ratio has increased for the evening courses, but the students of these courses can not, because of class schedule, benefit from other school offers and a special innovation project has been recently launched.;
- school success: the percentage of students who fail their examinations has decreased (from 30% to 18% in the morning courses and from 24% to 17% in the evening courses);
- the enrolments on the evening classes have risen.

Ex-students go on attending the school, which is also a means of helping them to find a job: every year many companies for information ask for the list of diploma's holders. A co-operative of ex-students is often engaged in remedial courses and machine maintenance courses. The school plans to publicize the curricula of the students so as to encourage their introduction in the work market.

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Hypotheses and conjectures

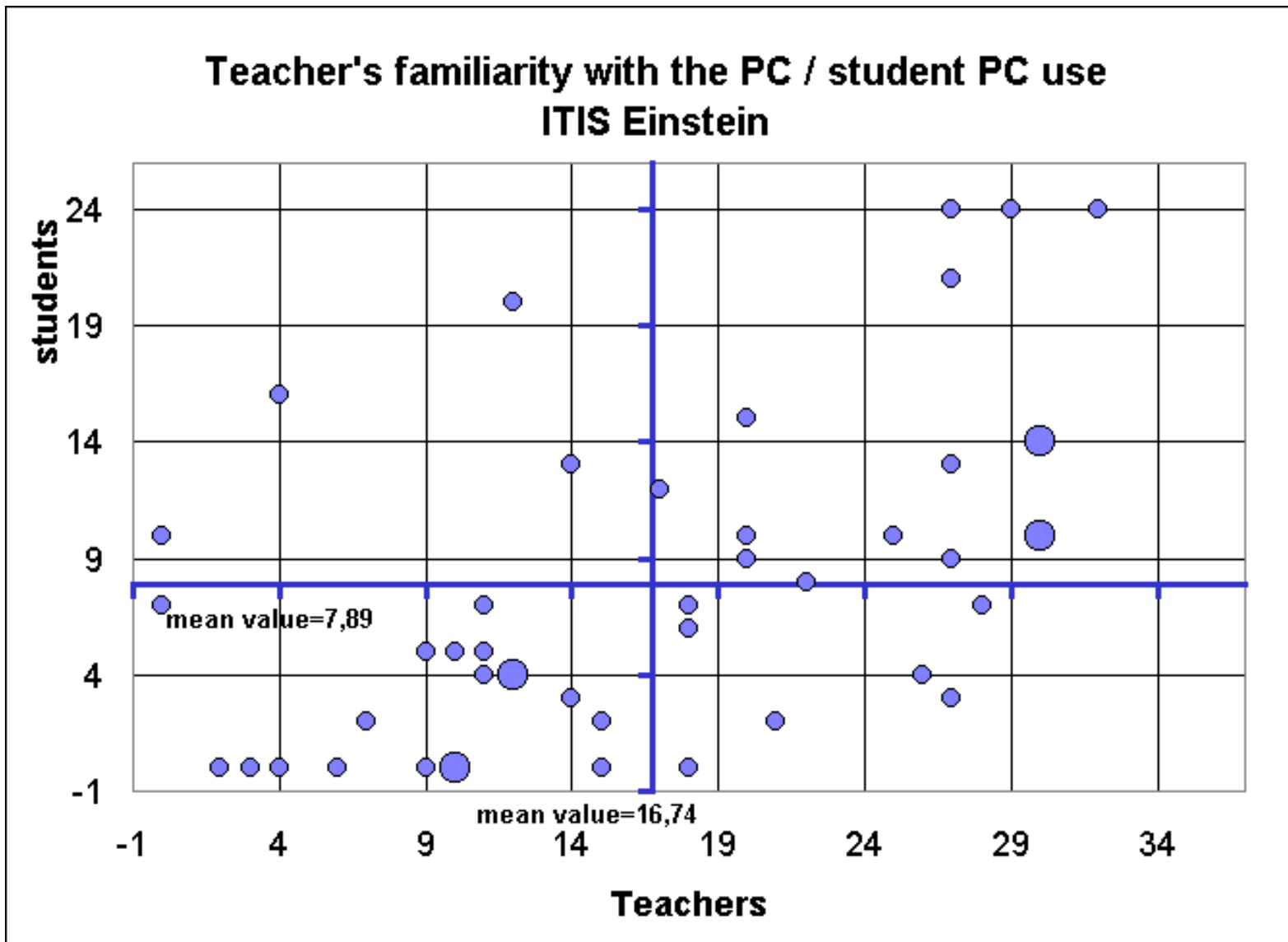
1. It is clear that technologies have acted as catalyst in the innovation process involving ITIS Einstein. Some innovation processes were already present in this school, but they proceeded on different paths which were not always convergent. In the past, there was a sort of conflict between the teaching body who were concerned with the technological subjects and, by force of circumstances, were interested in ICT use and a part of the teaching body who were concerned with the scientific, classical disciplines and so were more interested in a cultural growth of the school offer. The spread of the

computer and multimedia technologies which was carried out on two levels at least (i.e. school and didactic organization) has contributed to the creation of one and only strong initiative shared by a lot of the teaching body. Some elements point out rather clearly this change, such as the widespread use of technologies, the constant, growing need for cultural development, and the growing demand for the availability of technologies.

2. It stands to reason that the ICT use spread has followed a way that had been opened by a group of pioneers. They have met the growing demand and need coming from a higher number of colleagues interested in being familiar with ICT use in teaching. The process has benefited by some national, local governmental incentives and by incentives coming from private citizens and enterprises. The contribution given by the headmistress and by the assistant staff has been particularly important because they have got the positive energies existing in the school to let them flow in a unified project. But the spread of this innovation is still in an "early majority" stage according to the Rogers model; about 30% of the teachers is responsible for innovative projects and another 30% does the same moderately. The balance in the educational offer and the innovation spread to the different classes represent one of the main objectives of the headmistress engagement.

3. Since 1985 the school had widely introduced ICT in the teaching of technological and scientific disciplines. It was equipped with laboratories for information technology, that is to say it had a rich technological infrastructure. But the innovation which is now becoming established, thus characterizing the engagement of both teachers and students in the field of experimentation, is certainly connected with the large number of teachers who use ICT, not only with the so-called "technologists", and with the quality of the applications suggested: especially multimedia and www (development of multimedia and hypertexts, chat rooms in language courses, etc.).

These hypotheses are corroborated by the qualitative data of the interviews and by the analysis of the results of the questionnaires on the school.



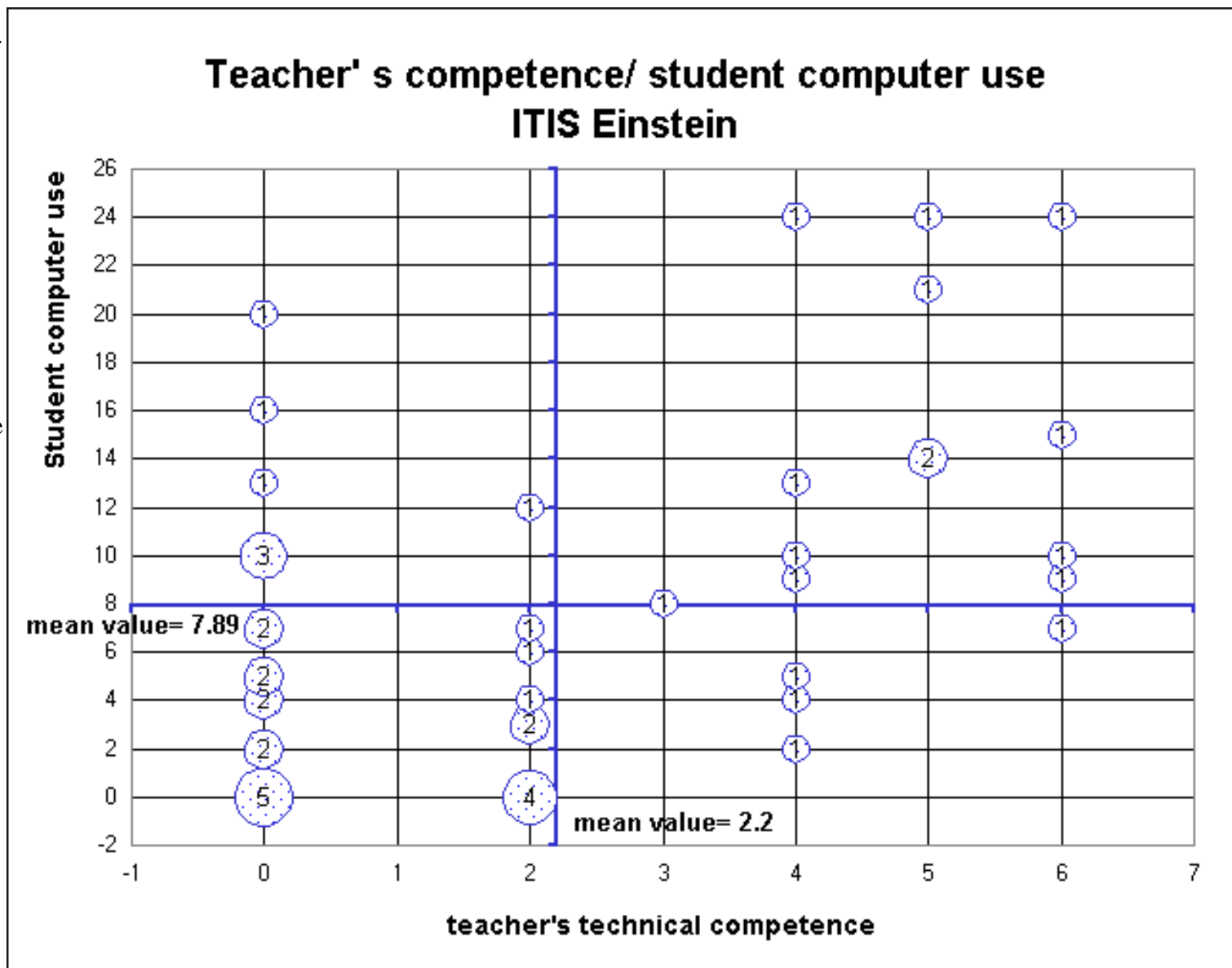
The graph shows the link between the familiarity of teachers with computer and their use by students in classes. The data are obtained by a processing described in the Appendix B.

A "diagonal trend" can be seen in the graph. It shows quite clearly how the increase in the familiarity of teachers with computer is linked to their use by students in classes.

It is also interesting to compare this graph with the one showing the correlation between the use of computers made by students and the technological ability of teachers.

In this case the trend is more complex because of the presence of a high number of teachers having no technical ability, but who still use and let their students use the computer. The teachers of the classical matters involved in experimental projects are likely to answer to the second quadrant of the graph.

4. The innovation process carried out in the school aims at turning the school into a training, production and cultural spread center. This objective arises from the social sensitivity of the school staff engaged in bridging the structural, cultural gaps of the place of origin of the students, that is to say the suburbs of Rome. ICT have been deliberately used in this school so as to support the students coming from families whose economic, cultural conditions are straitened. Their first introduction apart from technical disciplines has been connected with remedial activities and even today they are widely used for the disabled rehabilitation activities.



5. The school materials used by students are often gathered by selection unless they are given by teachers. Through ICT some interaction tools are used in this school, such as for example those used for learning foreign languages which stimulate students and let them reach higher learning standards.

So if the use of both ICT and ICT generated materials is made under the direction of teachers, the quality of the subject-matters doesn't seem to worsen.

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Projections to the future

Even if there is a group of firm opponents, most of the staff involved in the innovation process are firmly convinced of the importance of the innovation under way and support it, even if the commitment of the individual persons is very differentiated. On the other hand this innovation falls in with the governmental policies and meets with the families' approval.

The cultural apprehension and worried reflection of some teachers must be pointed out inside this positive picture: the differentiated offer given by school doesn't succeed in contrasting with the attitude of superficial, passive receptiveness many students benefit from. The variety of projects and the greater and greater importance given to the laboratory make the work carried on at school more effective, while the study and the individual reflection that students are willing to do by themselves at home seem to be less important.

This dissatisfaction of the teachers who are more conscious and engaged keeps up with the request for a higher external aid for the disciplinary innovation, especially by using ICT.

As we have already shown above the innovation process is spreading inside the school and it is up to the headmistress to guarantee that it spreads more and more.

When new teachers arrive at school, they are requested to participate in the planning meetings.

The tutorial guidance model offered by expert teachers, which is used at school to spread ICT, is now exported to the Didanet Project. Einstein teachers act as educators for their colleagues coming from other schools (generally compulsory schools) in the field of ICT. This project has been chosen within the framework of a competition announced by the Ministry of Education and has received funds.

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Appendix A

ITIS A. Einstein – Rome- Italy

A school was selected which took part in the majority of projects promoted by the Ministry of Education about multimedia and ICT experimentation in the teaching of all disciplines.

The group's co-ordinator phoned the headmistress, introduced her to the project and set the first appointment.

The headmistress required the person responsible for ICT and two teachers among her collaborators to attend the meeting too, in order to make a work plan together; besides the group's co-ordinator, two members of the OCSE-CERI research group and a CEDE researcher were also present because, at first, they thought to carry out together the IEA-SITES research as well. Actually this was not possible and thus they went on with the two projects separately.

The meetings schedule was organized by one of the teachers of the headmistress' collaborators staff. She also organized the distribution and collection of both questionnaires to the teachers and didactic materials and filled in the site questionnaire, except for that part concerning ICT, completed by the person responsible for the new technologies. Because of the large number of teachers involved, it was not easy to select a group of teachers that the headmistress and her collaborators considered, at first, as being too limited to be interviewed. The headmistress tried to introduce us to as many

projects as possible and the two researchers were invited to take part in all the public presentations (performances, final meetings with various schools, meeting with Ministry of Education and Microsoft).

Almost all the teachers were particularly stimulated since the first questions and therefore they talked freely.

All the interviews were recorded and written out; then they were put on the web and discussed by the whole research group. During the school-period in which the pilot study was carried out (from the second half of May to the beginning of June), the classes visited and the practical work served in laboratories were extremely reduced because in this period, this kind of school is already entering the final straight: training for the final exams, completion of the projects started.

Meeting schedule

Interviews

- **Interview to the headmistress** (18th May; 24th May; 12th June) over 2 hours
- **Interview to the responsible for ICT** (19th May) 1h
- **Interviews to teachers**
 - BP technology, drawing and designing (18th May) 1h
 - MP technical drawing (18th May) 1h 30'
 - PE English (18th May) 45'
 - FC Physics (18th May) 1h
 - GF humanities (26th May) 45'
 - LM electronics (3rd June) 45'
 - GC humanities (24th May) 45'
- **Interview to students** (30' each)
 - FG (IVF ITIS; 19th May) (Students in the 4th year of Industrial, Technical Secondary School)
 - AS (IVBs LST; 26th May) (Students in the 4th year of secondary school specialized in scientific, technical studies)
 - SP (IIBs LST; 19th May) (Students in the 2nd year of secondary school specialized in scientific, technical studies)
 - FB (IID ITIS; 24th May) (Students in the 2nd year of Industrial, Technical Secondary School)
 - MT (IID ITIS; 24th May) (Students in the 2nd year of Industrial, Technical Secondary School)
- **Interview to parents** (30' each)
 - SP (1st June)
 - P (24th May)
 - S (24th May)
 - IC (1st June)

- **Visits to classes in lab**

- Technical drawing laboratory (2nd year class; 18th May) 2h
- Technical drawing laboratory (3rd year class; 18th May) 1h
- Physics-chemistry laboratory (2nd year class; 19th May) 1h
- Technology, drawing and designing laboratory (4th year class; 26th May) 1h

- **General visits**

- First meeting with the school (24th May)
- Presentation of the project of classification of "Villa Pamphili" flora (19th May)
- Presentation of DIDANET project (24th May)
- "Sound and image" show (1st June)
- Presentation of Microsoft project (12th June)

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APPENDIX B

ITIS A. Einstein – Rome- Italy

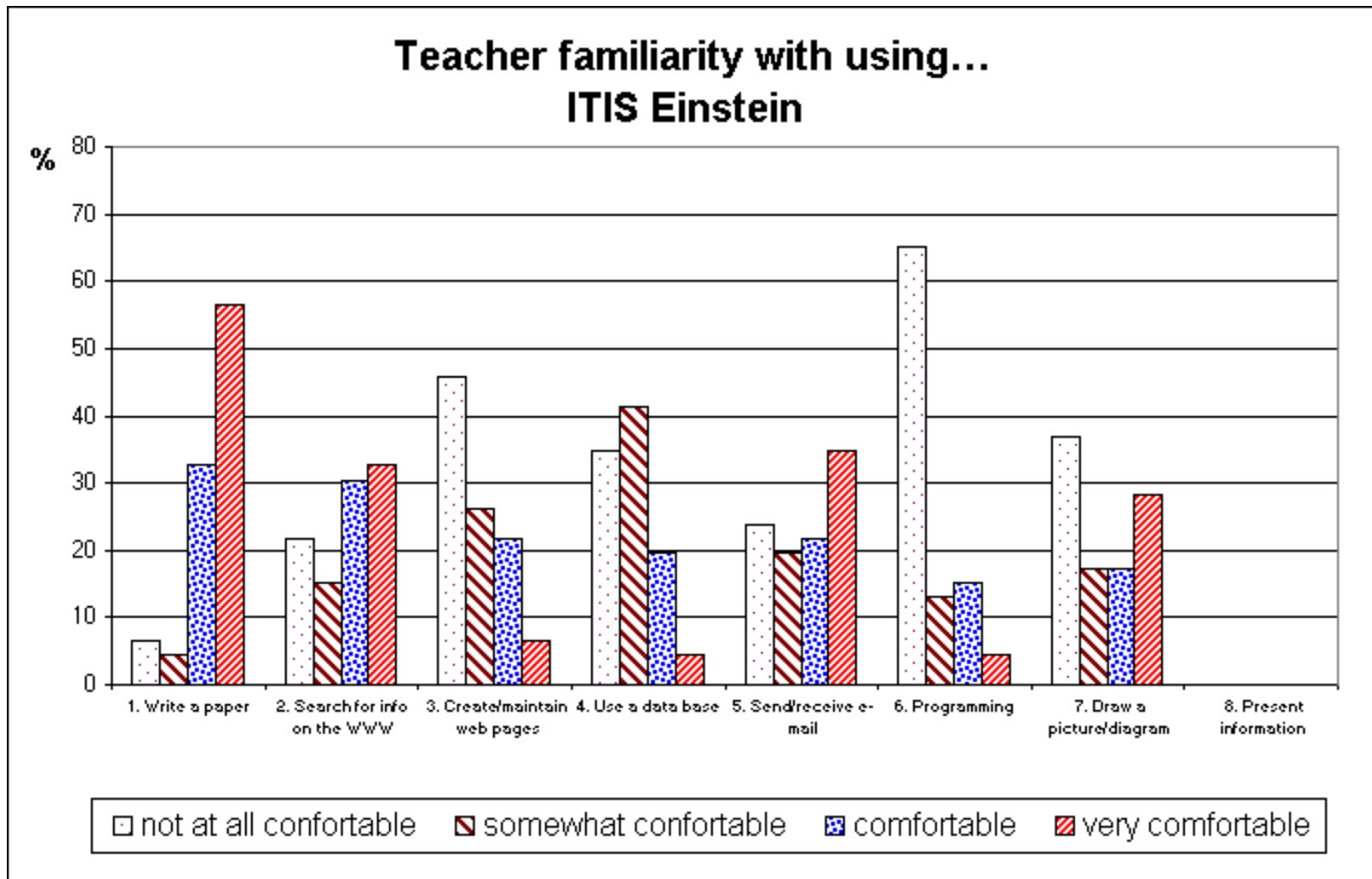


Figure 1: Per cent distribution of the answers to 1–8 questions concerning the teachers' familiarity with the computer use in different contexts. The situations where no response was given as regards to a specific application were not taken into account. Question 8 about the use of "power point" presentation programs was not included in the pilot study questionnaire.

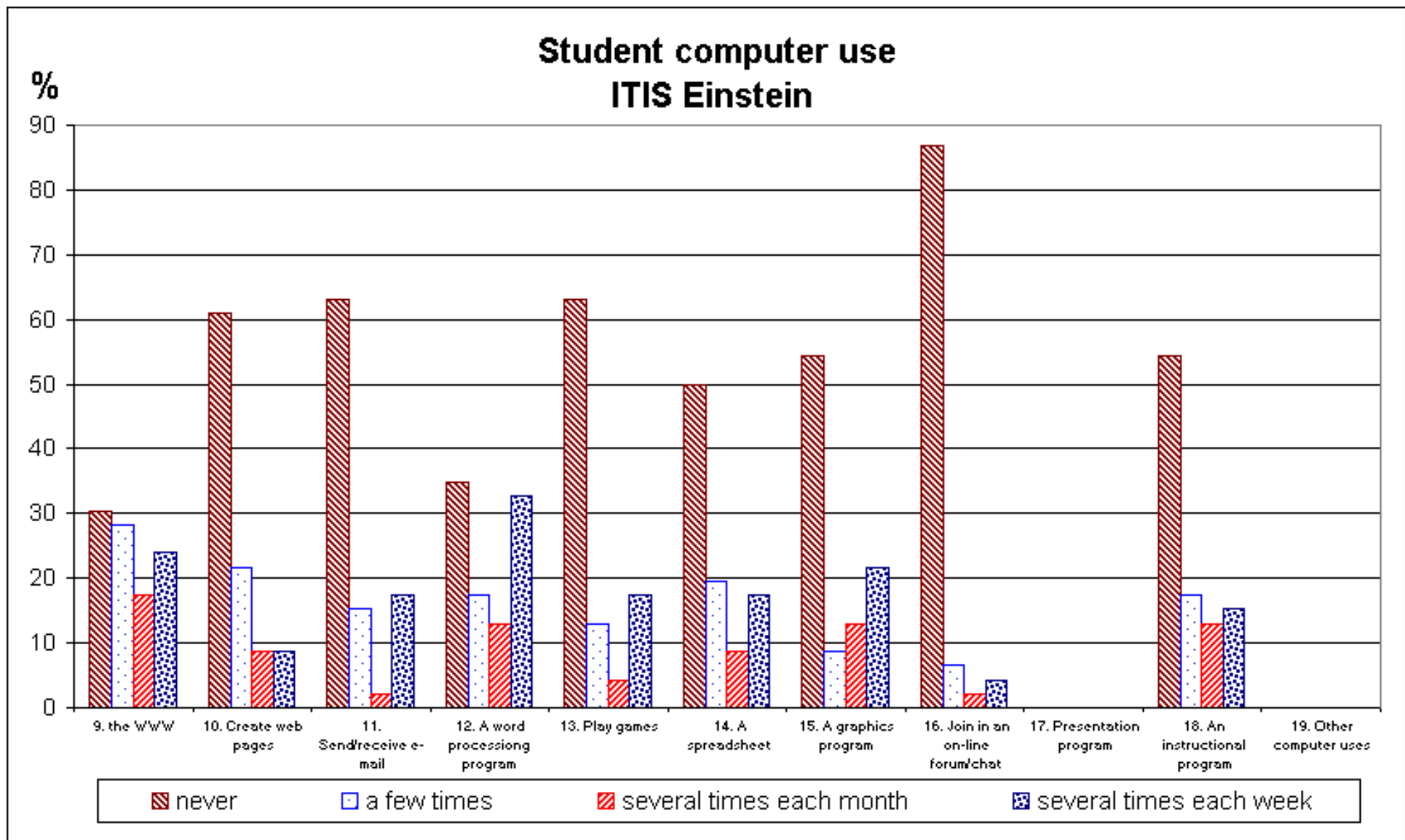


Figure 2.: Per cent distribution of the answers to questions 9-19 concerning computer use by students in the class. The situations where no response was given as regards to a specific application were not taken into account. Question 17 (use a presentation program) and 19 (other computer use, specify) were not included in the pilot study questionnaire.

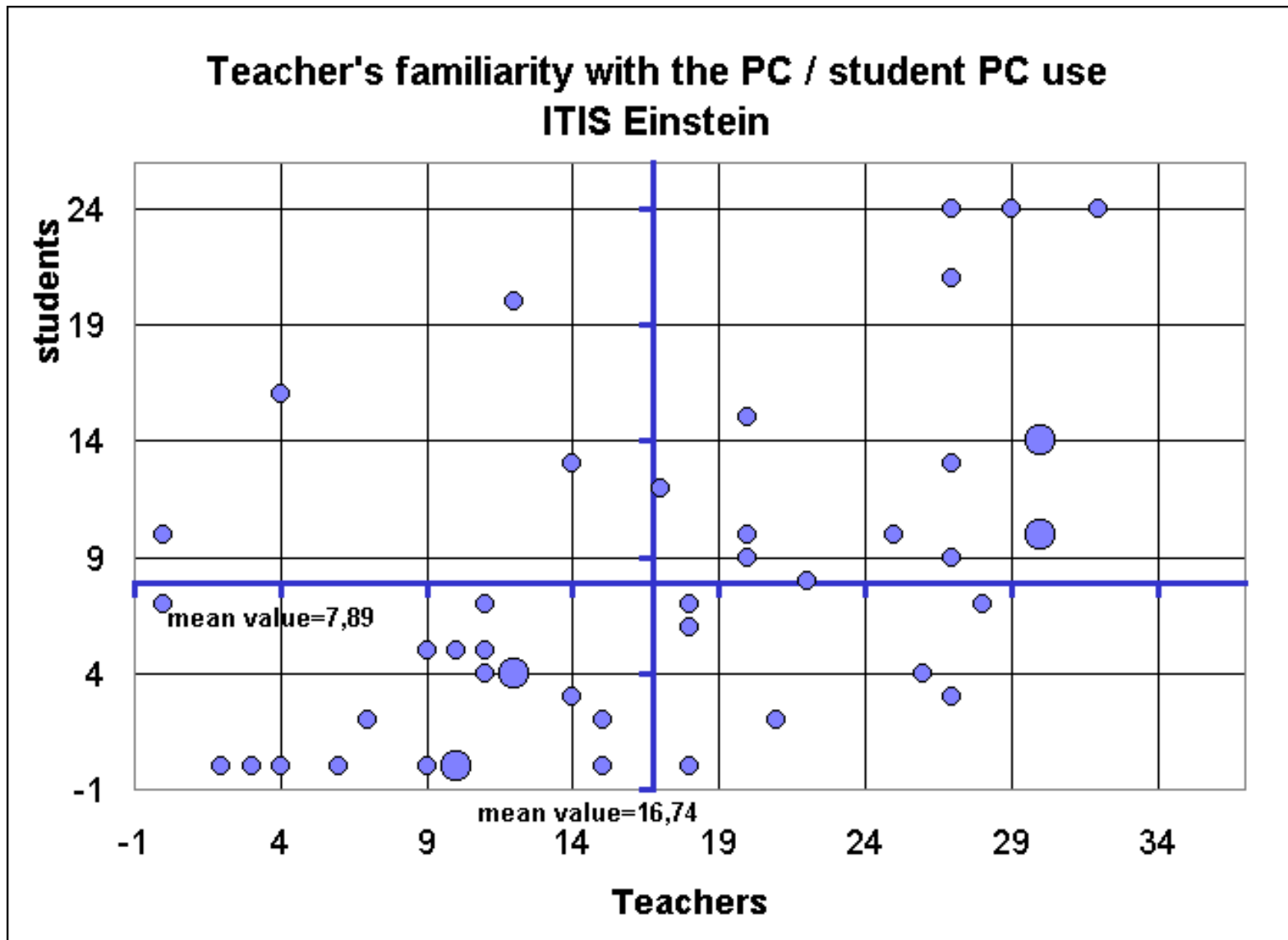


Figure 3: Relation between the familiarity of teachers with the computer (questions 1-8) and their use by students in classes (questions 9-19). The answers 1-8 were assigned a score from 0 to 3 for the possible values of answer (no familiarity, a little, enough, much). Furthermore, these scores have been weighted according to the statistic relevance pointed out by the answers to these questions (as shown in the histogram of fig. 1). The most frequent answers were assigned a double score. The bubble size indicates the datum frequency. Questions 8 and 17 concerning the use of presentation programs both by teachers and students were not included in the pilot study questionnaire. Almost all the points in the graph fall within an ideal sheaf of inclined parallels suggesting a diagonal pattern, a sort of proportionality: the more the teachers feel at their ease and use the computer, the more they suggest its use to their students in the class. This pattern also accounts for the incentive to ICT didactic applications by the leading staff and for their

introduction in the didactic methodology.

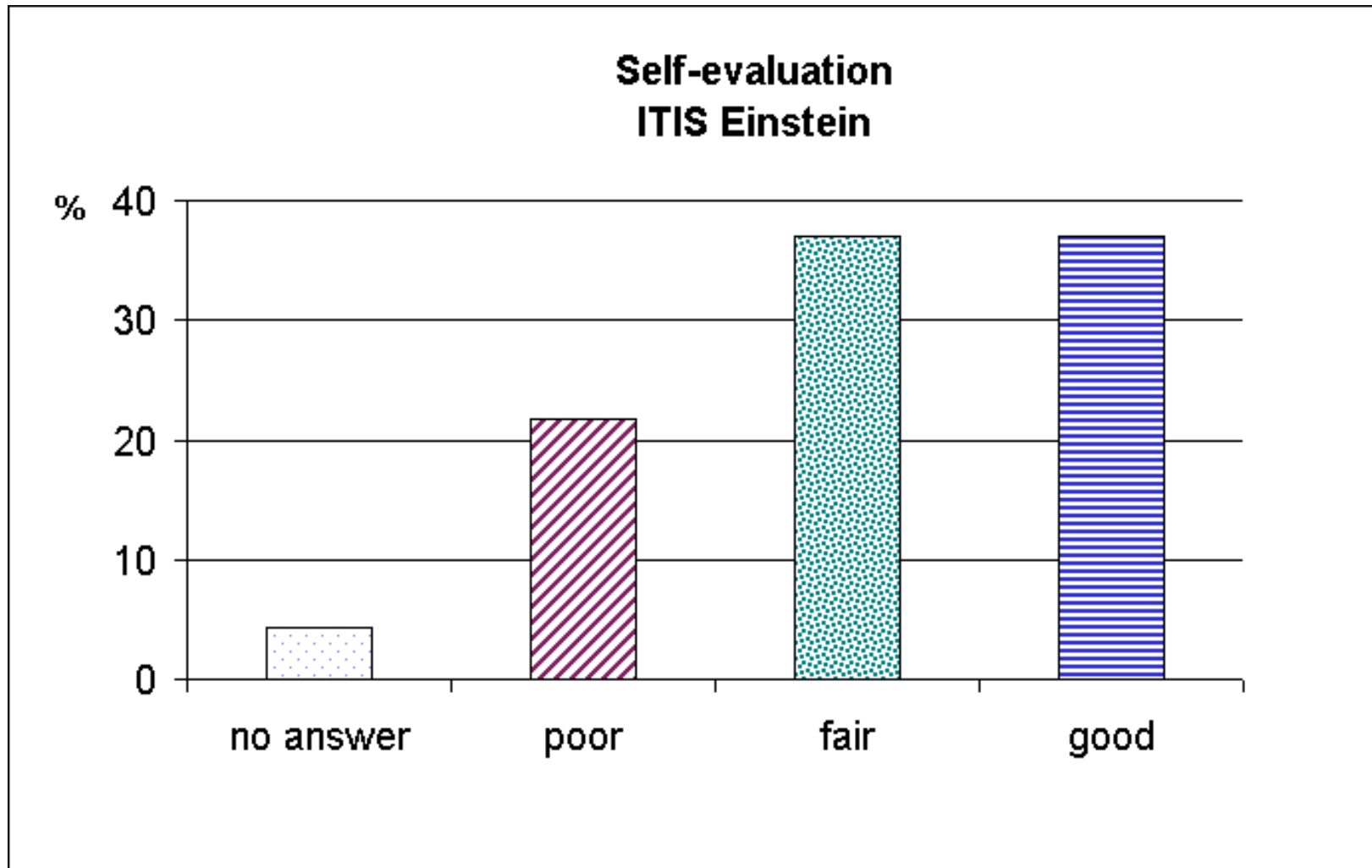


Figure 4: Per cent distribution of the answers to question 20 concerning the teachers' self-evaluation about their computer use skill (How would you rate your ability to use a computer? Choices are: good, fair, poor).

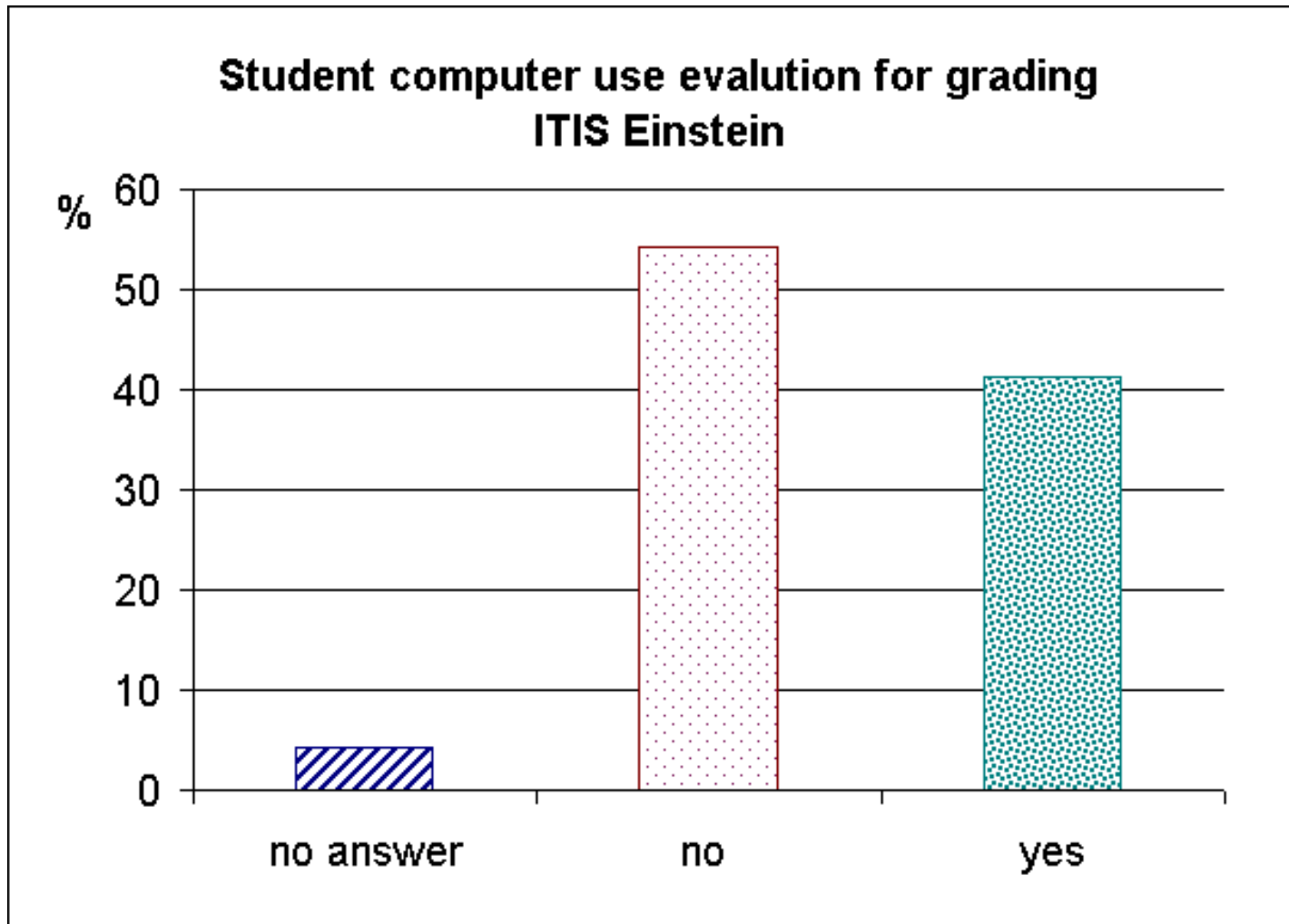


Figure 5: Per cent distribution of the answers to question 21 about the importance of computer use at the moment of students assessment. (Was student computer use ever evaluated for grading? Yes – No).

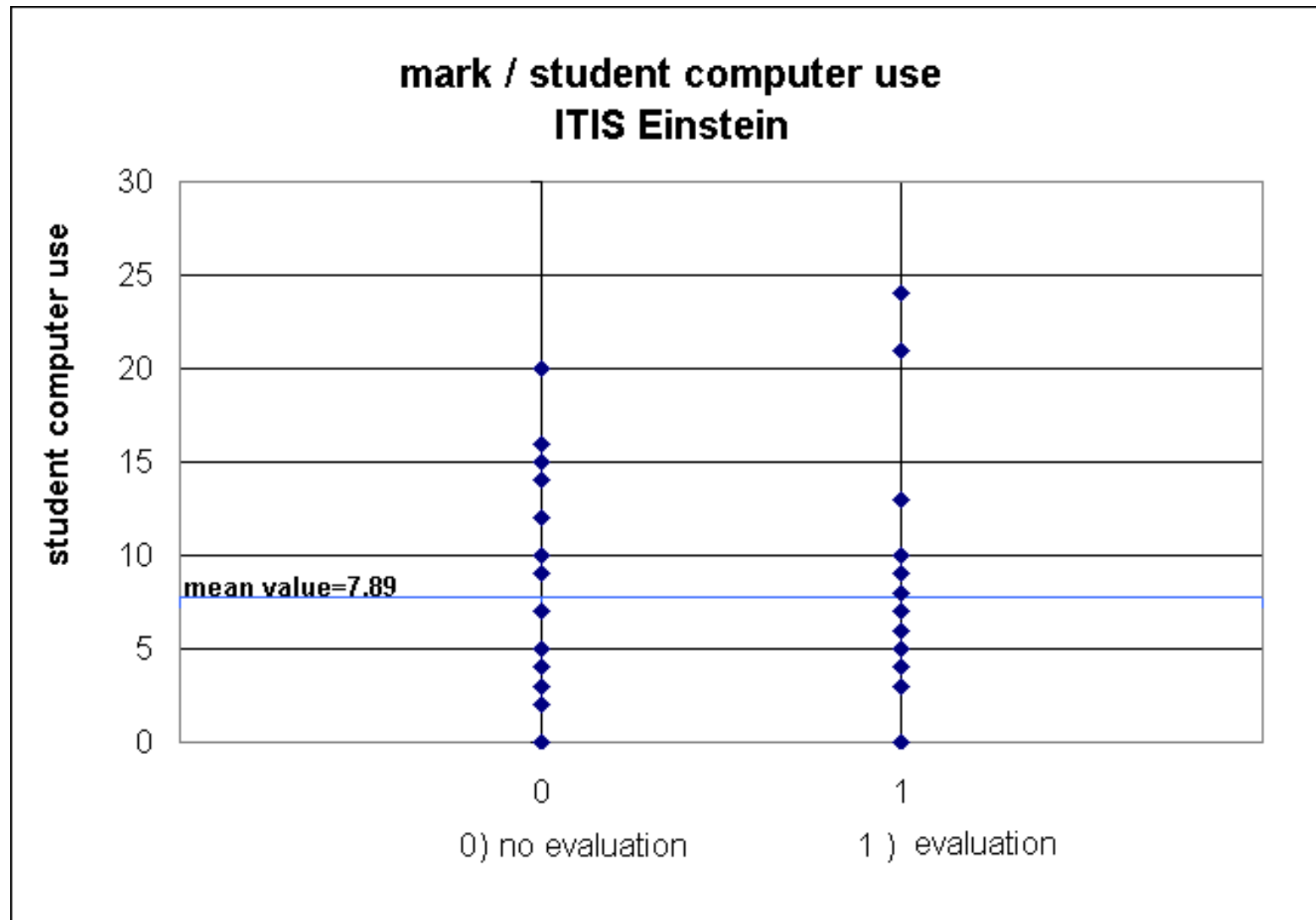


Figure 6: Comparison between ICT applications suggested to students in class (questions 9-19) and the computer work assessment in giving marks (question 21). On abscissa, 0 means lack of evaluation and 1 means evaluation. The sum of scores concerning the uses of computer suggested to students is on ordinate; their values range from 0 = never or no answer to 3 = many times per week.

Question 17 (use a presentation program (e.g. power point)) was not included in the pilot study questionnaire. The points concerning the computer work assessment in giving marks in correspondence with limited uses attest to (the lower part of the set of points 1 on abscissa) the high presence in this kind of school of scientific courses of study (mathematics, information science, electronics and so on) requiring highly specialized ICT applications. In this school there are many "laggards" among teachers with respect to the institute innovation process.

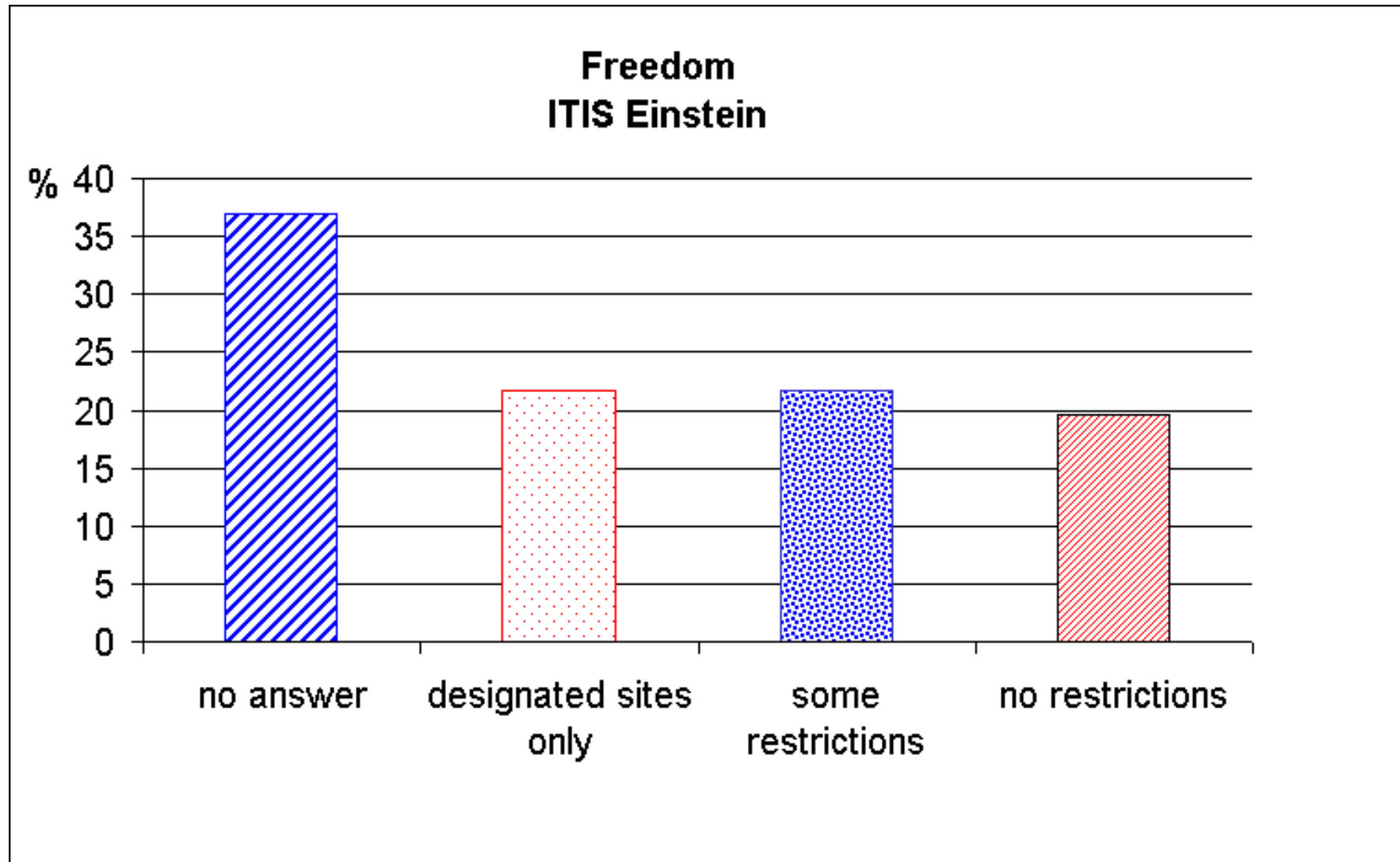


Figure 7: Per cent distribution of the answers to question 22 concerning the restrictions imposed by teachers as to the Internet access by students (if you assigned World Wide Web searching, how much freedom did you allow students in locating sites to visit?): no restrictions, some restrictions, designated sites only.

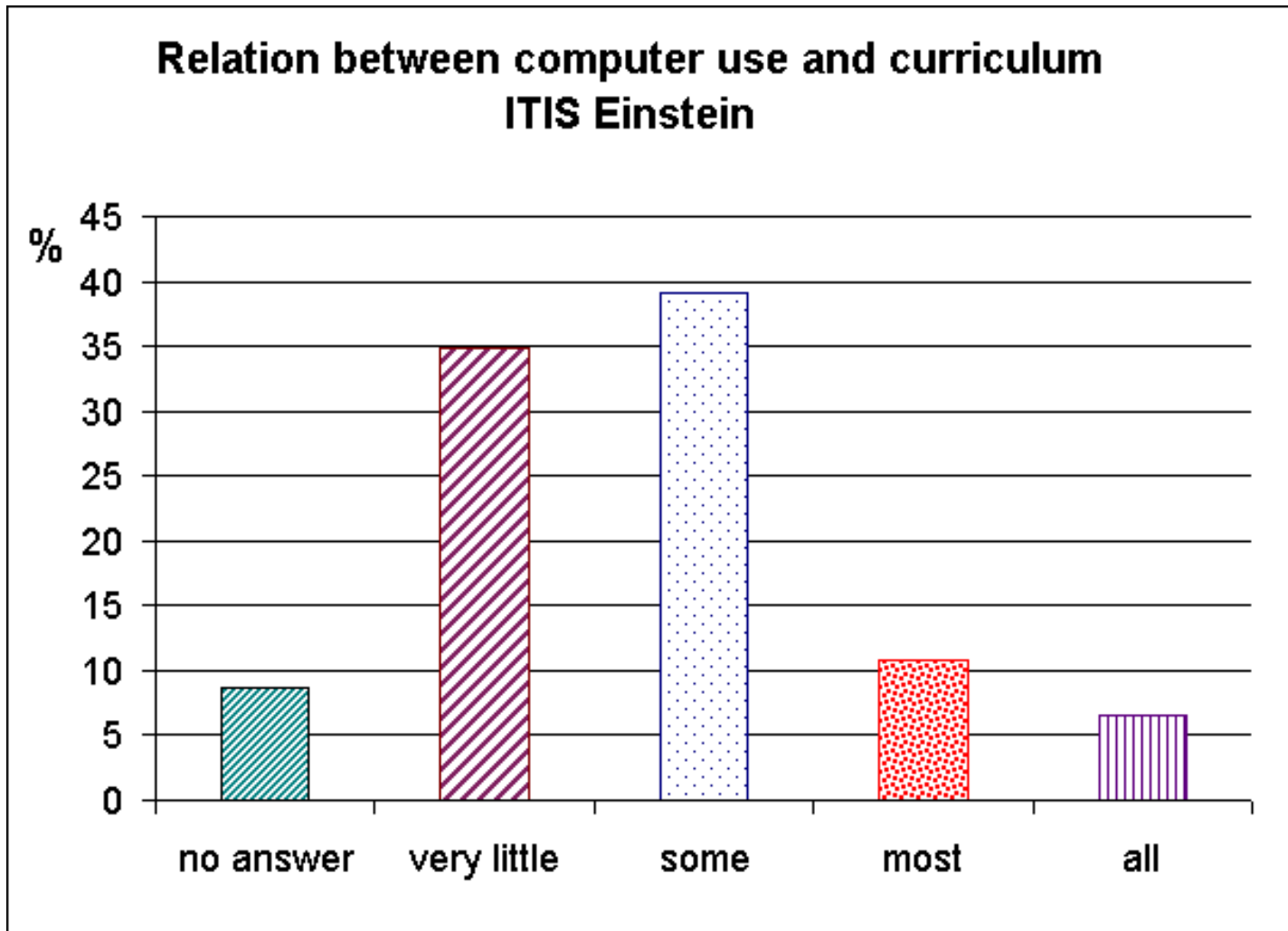


Figure 8: Per cent distribution of the answers to question 24: at what extent computer use is directly related to the didactic planning (what portion of the computer use in your classes was directly related to the course content): all, most, some, very little.

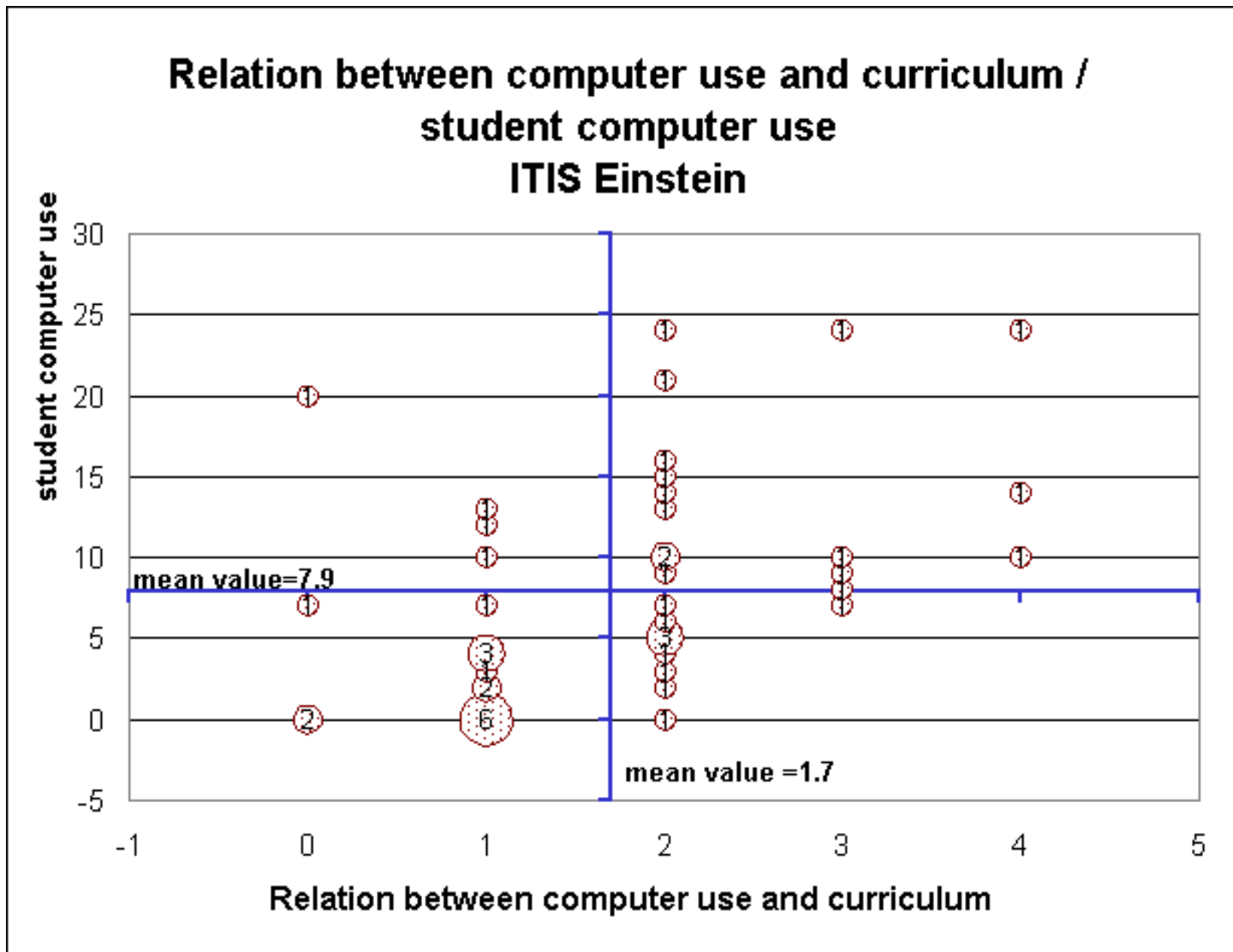


Figure 9: Comparison between ICT applications suggested to students in class (questions 9-19) and their correlation with curriculum (question 24). The answers concerning ICT integration in curriculum are given on abscissa. Values range from 0 = no answer, 1 = very little to 4 = completely. The sum of the scores given to answers 9-19 is on ordinate, that is 0 = never and 3 = many times per week. The bubbles size shows the frequency (the number inside the bubble) of the given value. The sum of these frequencies corresponds to the number of teachers who have answered the questionnaire. Question 17 (use a presentation program (e.g. power point)) was not included in the pilot study questionnaire. The presence of a significant number of points in the second quadrant can be an indication of the various enlargement activities of the training offer, mainly extra-curricular ones. In fact, these points show a high score regarding the use made by students combined with a low integration with the courses content. The points in the fourth quadrant where the high correlation with curriculum is combined with a limited computer application suggested to

students in class could be an indication of the attitude of some teachers of the scientific, technical area who confine the didactic use of ICT to the traditional applications of their programs (for example the Pascal programming for mathematics teachers).

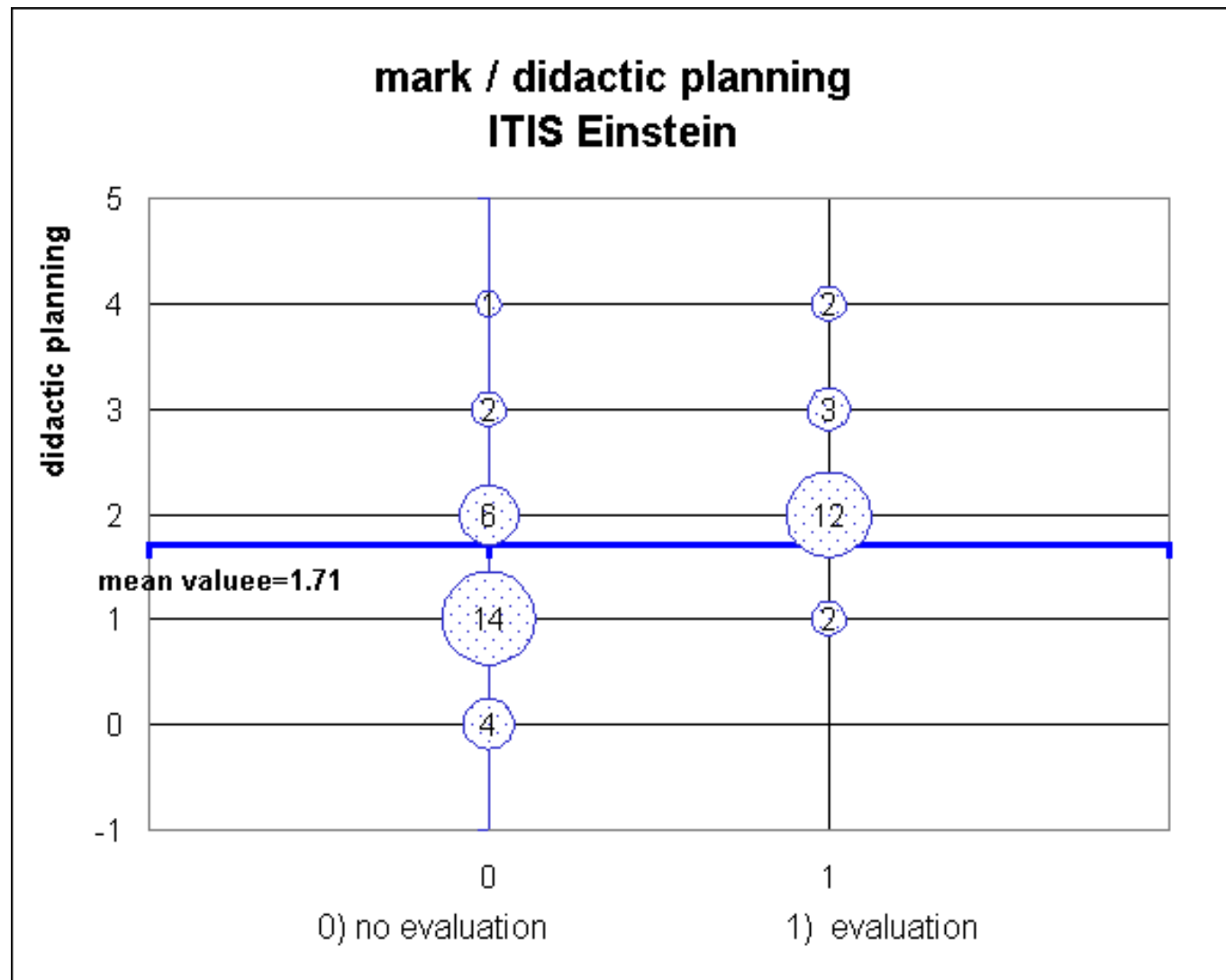


Figure 10: Comparison between computer use assessment in the assignment of marks (question 21) and link between computer use and didactic planning (question 24). The presence or absence of assessment are shown on abscissa (yes/no = 1/0), while on ordinate the values range from 0 = no answer, 1 = very little, up to 4 = completely. The bubble size shows the frequency of the given value. The sum of the values given in the bubbles correspond to the number of the answers obtained. The large number of cases in which the computer use is highly correlated with the didactic planning (points lying in the upper part of the graph) probably corresponds to the high presence of scientific, technical teachers in the school.

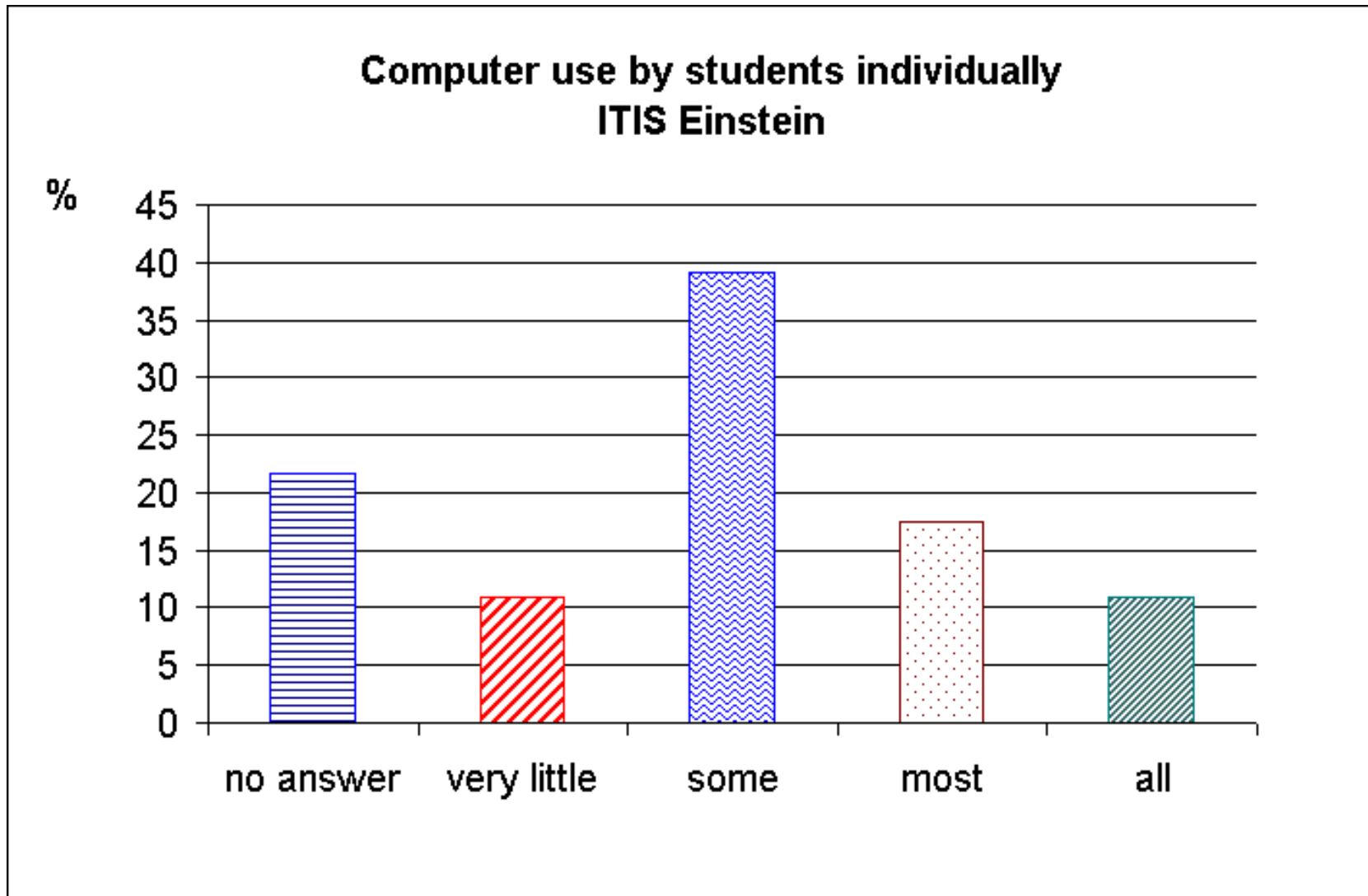


Figure 11: Per cent distribution of the answers to question 25 concerning the individual computer use by students in the class (what portion of the computer use that you assigned was done by students individually?): all, most, some, very little.

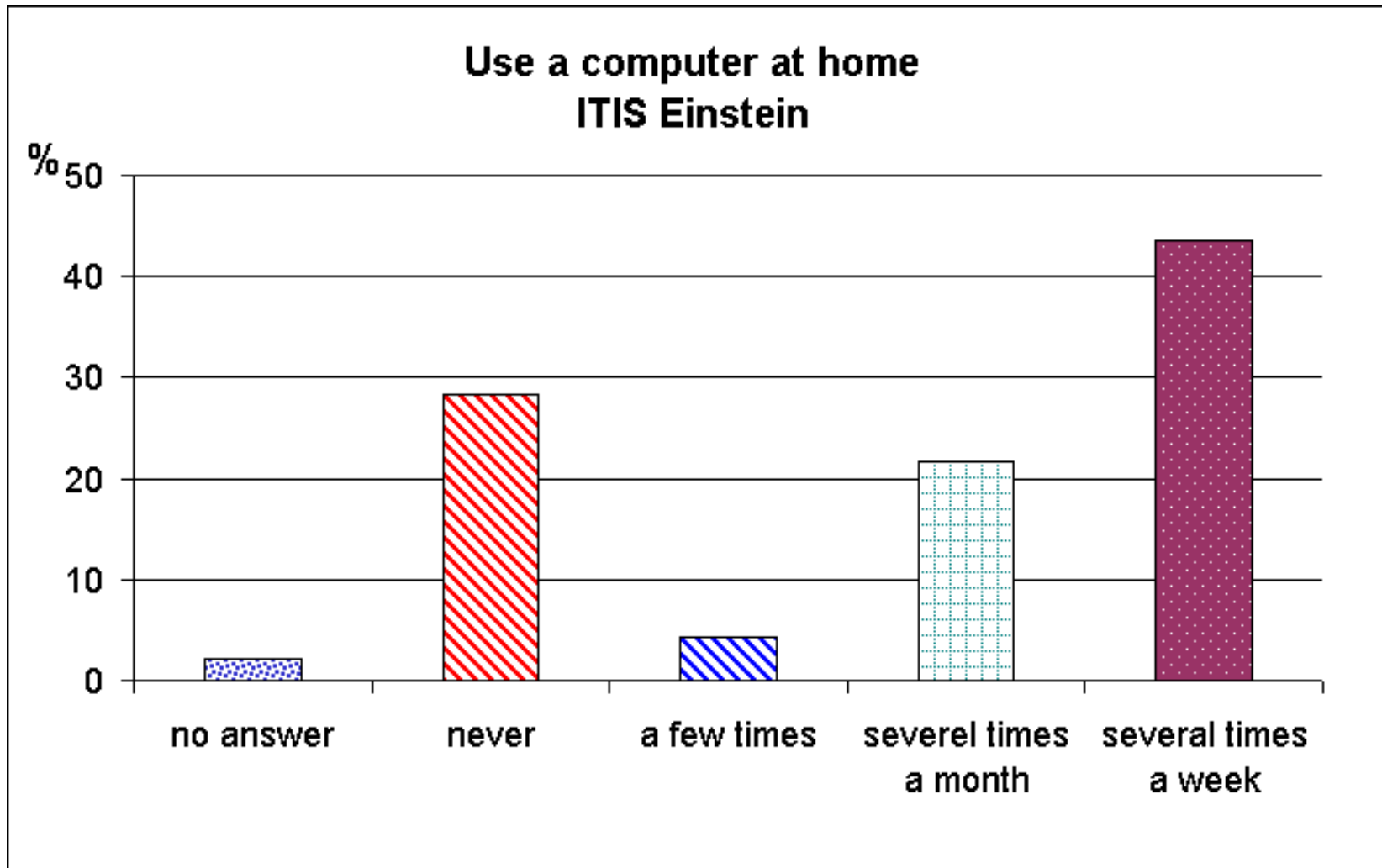


Figure 12: Per cent distribution of the answers to question 26 concerning the teachers' computer use at home to prepare their lessons (how often did you use a computer at home for preparing for teaching?)

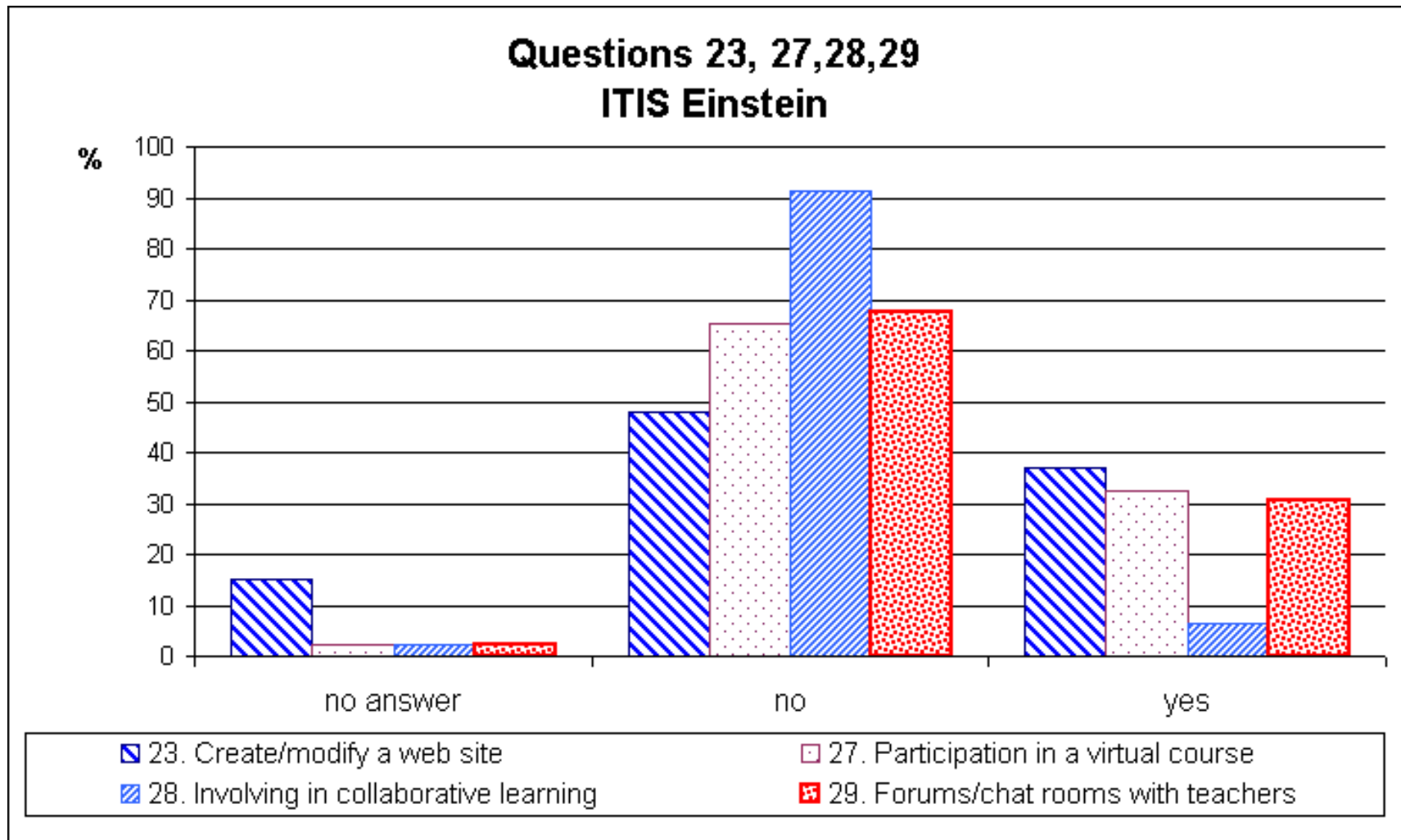


Figure 13: Per cent distribution of the answers to the question about ICT activities by teachers within their professional training courses (question 27 and 29) or about their work with the classes (questions 23, 28).

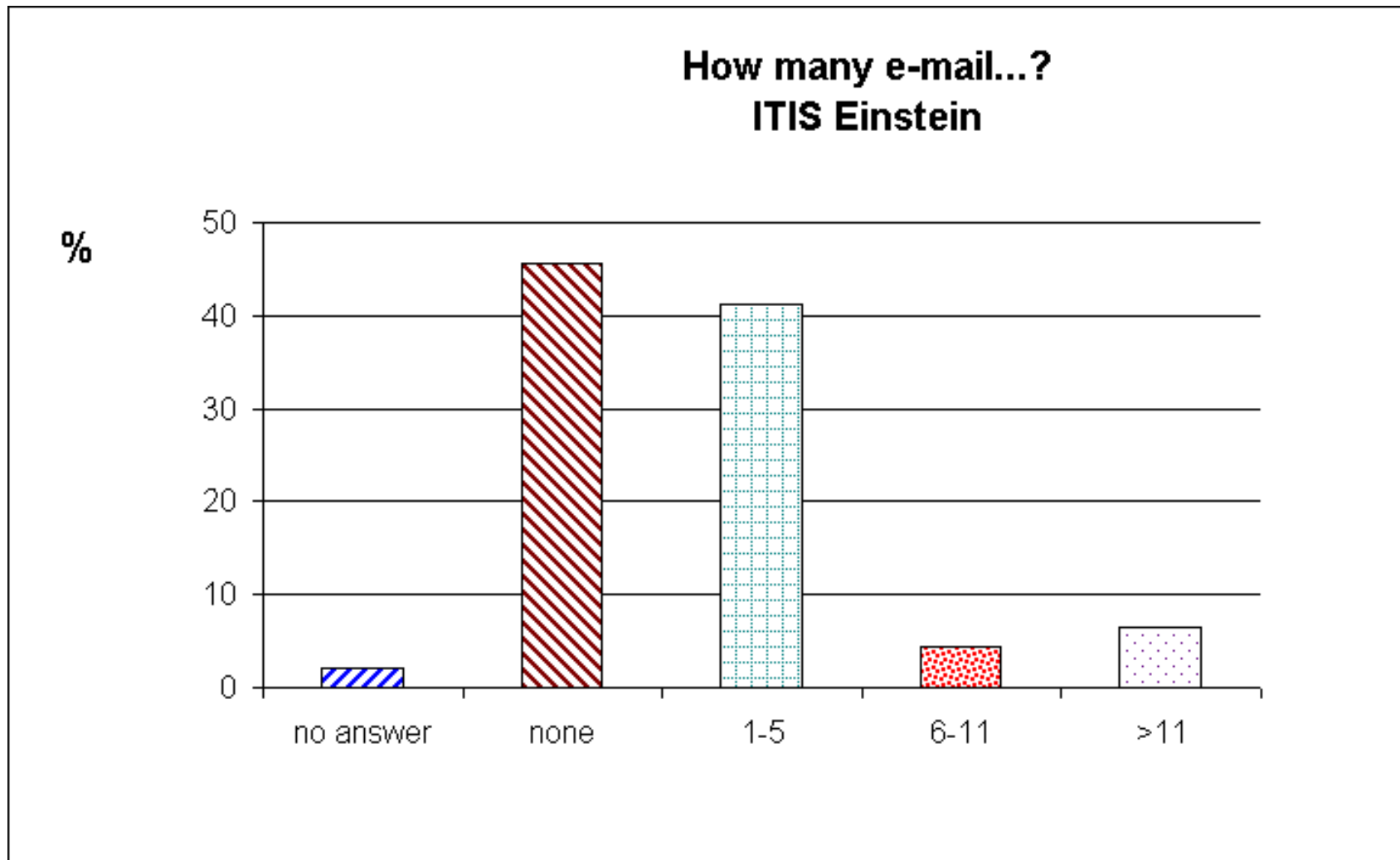


Figure 14: Per cent distribution of the answers to question 30 concerning the daily e-mail messages received by teachers (how many e-mail messages total do you send each day on average).

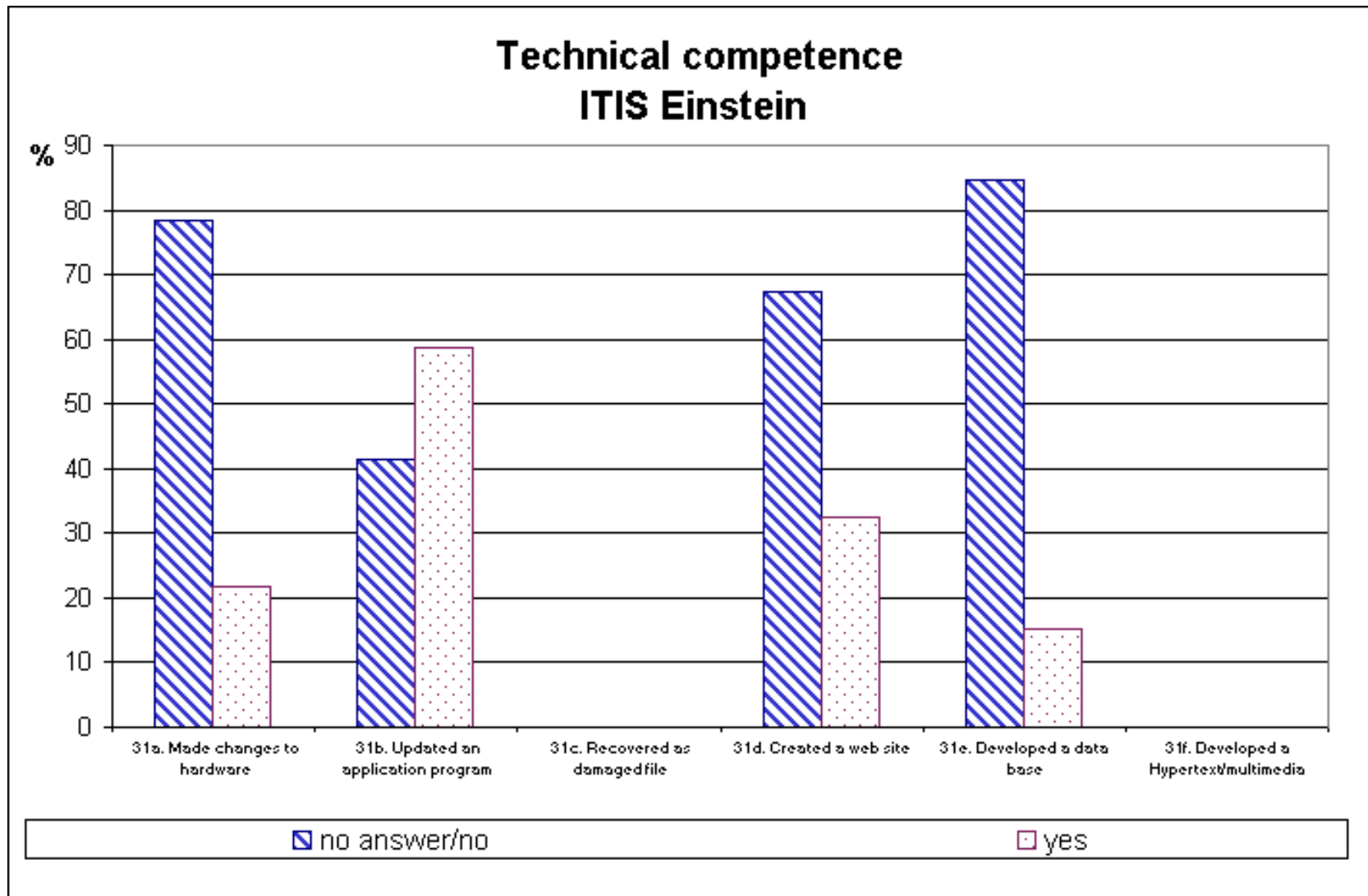


Figure 15: Per cent distribution of the answers to 31a – f questions concerning the teachers' technical skills and uses. In the pilot study questionnaire, the 31a–f questions concerning the teachers' skills were binary answers (yes/no). Question 31c (recovered a damaged file) and 31f (developed a hypertext or a multimedia with your class) were not included in the pilot study questionnaire.

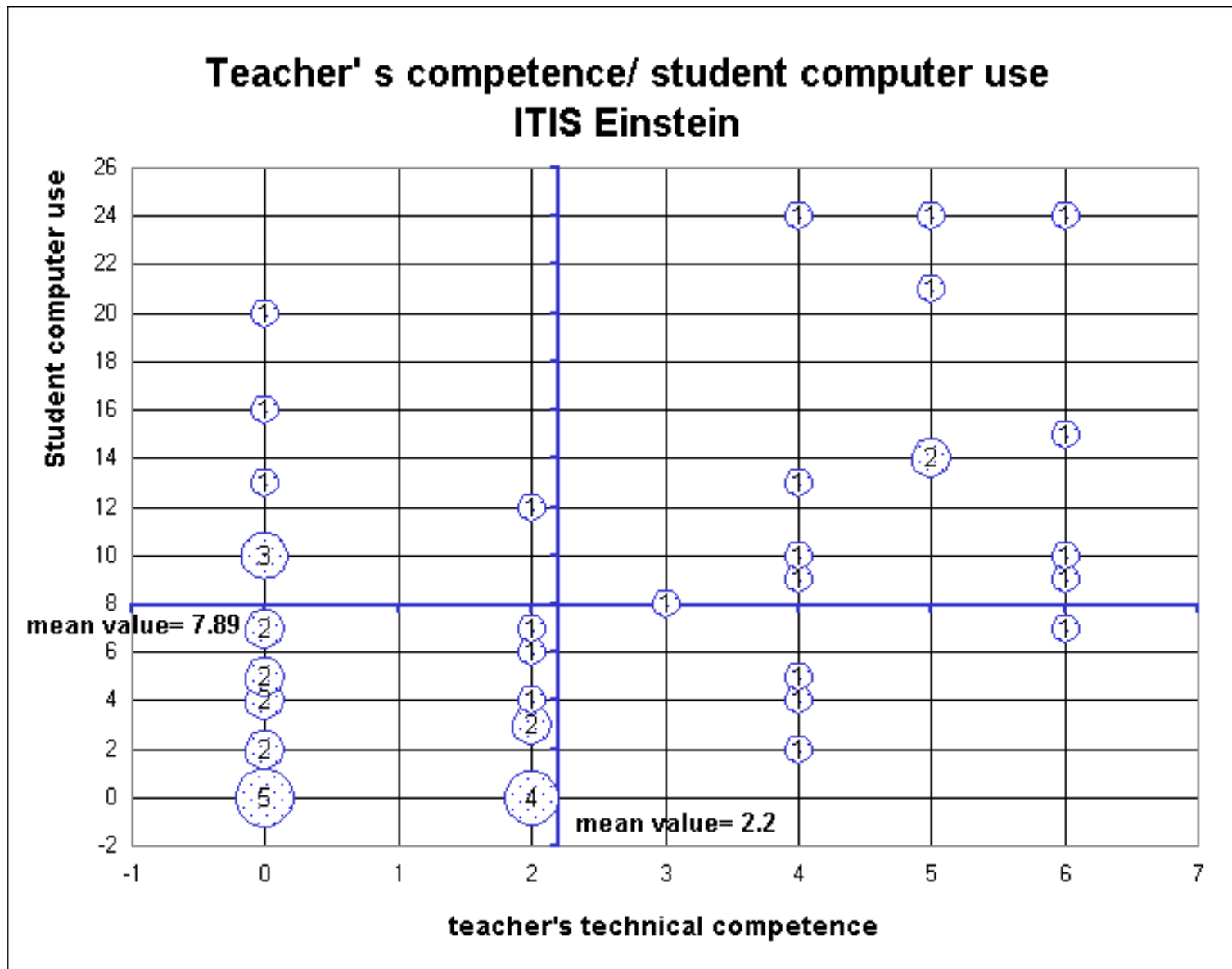


Figure 16: Relation between the technical competence and experience of teachers in the computer use (question 31a – f) and its use by students in classes (question 9-19). The bubbles size shows the frequency of the value which is also indicated by the number inside each bubble. The sum of these numbers corresponds to the answers obtained. On ordinate, there is the sum of the points given to the answers 9-19. The score for each question ranges from 0 = never or no answers to 3 = more times per week. On abscissa there is the weighted sum of the answers concerning the teachers' competence. The "weight" is obtained by an analysis of frequency of the answers 31a – f (fig. 15).

In the pilot study questionnaire, the 31a – f questions concerning the teachers' skills were binary answers (yes/no); the answers 31b ("updated an

application program – word processor, graphics program, etc.") and 31d ("created a web site") were assigned a double score. Besides, question 17 ("use a presentation program") was not included in the questionnaire.

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Appendix C

ITIS A. Einstein – Rome Italy

The school is often present in the local press for its cultural promotion activities but also the national television has devoted a special to the school multimedia projects within a specialised broadcast ("Mediamente", the video-clip is included)

Further materials

1. From the web-site it is possible to unload: (www.itis-einstein.roma.it/)
 1. "Piano dell'offerta formativa" (Training Offer Plan)
 2. A detailed list of the school premises
 3. A list of teachers with the respective reception schedule for students' parents
 4. A list of names and functions of the non-teaching staff
 5. Presentation of the modular paths specifying the classes and subjects involved, presentation of objectives and description of projects, estimate of the resources to be employed and of the productions to be realised.
 6. Presentation of the "training offer" enlargement.
 7. Multimedia "From the ideal town to the real town" carried out within the project *The school adopts a monument*.
 8. Multimedia productions carried out by students during the last years within the project *Sound and image* and site relevant to the project (in the school server)
 - Wall
 - Earth
 - Escaping line
 9. Tabloid carried out by the evening-course students
 10. Hypertext: "Il parco del Pineto" (The park in the Pine-wood)
2. *Didanet project: suggestion of a scientific-technological park on the web* (with its own site www.quipo.it/dida-net99/)
 1. Project card
 2. Invitation to make it available to public within the "Scientific Culture Week".

Other materials available

3. Introductory pamphlet of the *Creative LEARning*, the European community project which the school is involved in together with the "Centre for the Study of Networked Learning" at Sheffield University, the "Volkshochschule" in Meidling, the " Centre of Higher Education in Theatre Studies" in Athens and Binaly Logic Ltd.
4. Questionnaire which is answered by students' parents in order to provide information about school work.
5. Demand for parents' assent to a parents-teacher mixed commission aiming at "discussing school issues".
6. "POF" (Training Offer Plan) commission materials
 1. Questionnaire addressed to teachers to point out the kind and frequency of didactic evaluations and the trend of the initial planning development.
 2. Questionnaire addressed to discipline co-ordinators to point out the kind and frequency of didactic evaluations and the trend of the initial planning development.
 3. Questionnaire addressed to teachers involved in modular paths (training offer enlargement) to point out the kind and frequency of didactic evaluations and the trend of the initial planning development.
 4. Questionnaire addressed to staff responsible for laboratories to monitor computers efficiency.
 5. Responses grid
7. Map of the school LAN network.

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Appendix D

School Timetable – ITIS A. Einstein

Weekly Timetable - ITIS two-year course of study

Subject	I Grade		II Grade	
		Carried on in lab		Carried on in lab
Religious instruction / alternative activities	1		1	
Physical Education	2		2	
Italian Literature	5		5	
Foreign Language	3		3	

History	2		2	
Law and Economics	2		2	
Geography	3		-	
Mathematics	5	2	5	2
Environmental Studies	3		-	
Biology	-		3	
Physics	4	2	4	2
Chemistry	3	2	3	2
Design and Technology	3	2	6	3
Total hours	36	8	36	9

Weekly Timetable - ITIS three-year course of Telecommunications and Electronics studies

Subject	III Grade		IV Grade		V Grade	
		Carried on in lab		Carried on in lab		Carried on in lab
Religious Instruction / alternative activities	1		1		1	
Physical Education	2		2		2	
Italian Literature	3		3		3	
Foreign Language	3		3		2	
History	2		2		2	
Law and Economics	-		2		2	
Mathematics	4		3		3	

Mechanics and machines	3					
Electro-technics	6	3	3			
Electronics	4	2	5	3	4	2
Electronic systems	4	2	4	2	6	3
Telecommunications			3	-	6	2
Design, Technology and Electronic designing	4	3	5	4	5	4
Total hours	36	10	36	9	36	11

Weekly Timetable – Secondary School specialized in scientific, technological studies

Subject	I Grade		II Grade		III Grade		IV Grade		V Grade	
		Carried on in lab		Carried on in lab		Carried on in lab		Carried on in lab		Carried on in lab
Religious Instruction / alternative activities	1		1		1		1		1	
Physical Education	2		2		2		2		2	
Italian Literature	5		5		4		4		4	
Foreign Language	3		3		3		3		3	
History	2		2		2		2		3	
Law and Economics	2		2							
Philosophy					2		3		3	
Geography	3									

Mathematics	5	2	5	2	4	1	4	1	4	1
Computer studies and automatic systems					3	2	3	2	3	2
Environmental studies	3									
Biology			3		4	2	2	1	2	1
Physics-chemistry	5	5	5	5						
Physics					4	2	3	2	4	2
Chemistry					3	2	3	2	3	2
Design and Technology	3	2	6	3						
Drawing					2		2			
Total hours	34	9	34	10	34	9	34	8	34	8

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1) The national programs for this kind of schools, i.e. Industrial Technical Institutes, provide for 4 hours per week of laboratory for information technology applications (programs of physics and mathematics); sometimes computers are also used in further two hours per week in “technical drawing” laboratory. During the two-year course of study at ITIS these hours are 36 per week; on the contrary, the two-year course of study at LST, i.e. the Secondary School Specialized in Scientific, Technological Studies, provide for 34 hours per week, 9 of which are spent in laboratory (apart from 2+2 hours of mathematics and technical drawing laboratory, 5 hours per week of physics and chemistry are entirely spent in laboratory). In the three-year course of Electronics and Telecommunications studies at ITIS the laboratory hours with use of computers are 9 to 10 out of 36 total hours per week (electrotechnics; electronics; electronic systems; telecommunications; technology; electronic drawing and designing), while in the three-year course of study at LST the laboratory hours with use of computer are 5 out of 34 hours per week (mathematics; physics; informatics and automatic systems). The total school timetable is shown in Appendix D.

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2) *The term “borgata” was officially used for the first time in 1924 when Acilia was built at 15 Km. from Rome, in a malarial region, which lodged the inhabitants coming from the Caesar and Trajan Forum area and from the Sea Way. There is something disparaging in this term deriving from suburb: that is to say an area of the city which lacks completeness and organization to be called “quartiere”, or a built-up rural area having a feudal economic system in a reality which prevents it from developing. “Borgata” is a kind of suburb: an area of the city in the middle of the country, but actually it is neither of them. The inhabitants of both demolished areas or huts reached by the growth of the high-class neighbourhood were transported “without payment” to suburbs by the trucks of the volunteer troops for the national security.. an extract from “Roma moderna: Un secolo*

di storia urbanistica” (*Modern Rome: A century of town-planning history*) by Italo Insolera, Turin, Einaudi, 1962.

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³)Experimentations AMBRA for the telecommunications courses and experimentation PNI for teaching physics and mathematics in the two-year course of study of the secondary schools.

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⁴)The Training Offer Plan is the school “identity card”: each school proposes to families and, in general, to the public its special didactic project, the courses implemented, the strategies adopted in order to guarantee the student training success, the structures of the school, etc.

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