

Towards an efficient training of university faculty on ICTs

Arkaitz Lareki , Juan Ignacio Martínez de Morentin , Nere Amenabar

Abstract

This article presents the results of a research study that took place during the 2007–2008 academic year at the University of the Basque Country¹ (UPV/EHU in its Spanish and Basque acronyms). The research's goal was to establish the guidelines for training opportunities in information and communication technologies (ICTs) that could better address the needs of the faculty at the aforementioned university. The conclusive results provide a picture of the necessary training in ICTs that the faculty requires for their teaching as well as for conducting research. This led us to develop some suggestions that are related to the modular organization of past and present training courses as well as improved guidelines that would help us to restructure the design of the training currently being offered. This restructuring is fundamental in order to include ICTs in the new European Space of Higher Education (ESHE)².

Keywords

Adult learning; improving classroom teaching; pedagogical issues; post-secondary education; teaching/learning strategies.

¹ The University of the Basque Country / Euskal Herriko Unibertsitatea is known as UPV/EHU in its Spanish and Basque acronyms. The university has three campuses, one located in each of the three Basque provinces.

² The European Space of Higher Education, or ESHE, began in 1999 and is a convergence of the institutions of higher education in Europe.

1. Introduction

The introduction of information and communication technologies (ICTs) and the expansion of their use in the educational field have forced the creation of training programs for faculty on the use of ICTs. The main obstacle for designing any ICT training program has to do with the lack of information on the actual needs of faculty members and the type of format that should be utilized for those training needs (Galanouli et al., 2004). An adequate way to learn about those needs is to analyze the studies that have made a correct diagnosis of faculty's training needs in the field of ICTs and the characteristics of the specific training that they receive.

By reviewing the existing literature on the needs analysis and use of faculty training, we found that there are a number of studies that focus on the use of new technologies in primary and secondary education (Williams et al., 2000). Those studies clearly stated that, in those two levels of education at the time the research was undertaken, the use of ICTs was very low. Additionally, there are significant studies on the integration of ICTs in classroom teaching, in which those tools complement and modify the pedagogical practice (Hennessy et al., 2005).

Since the time that those studies took place, we know that reality has changed. The training plans have borne fruit. For instance, new research centers on educational technology, with access to innovative processes and methods to teach and learn, have been created (CREET: Centre for Research in Education and Educational Technology, 2008). Also, new applications and specific observatories to study ICTs and education have been created (Púlsar u Observatorio e-learning de la Universidad del País Vasco, 2007), and those observatories report on the use of new technological tools by university professors. For example, in 2008, the ICT Sector Commission of the Spanish Universities' Chancellors Conference carried out an exhaustive analysis of the introduction of ICTs in the Spanish university system. This study highlighted the fact that there is an increase in the use of emergent technologies in higher education. Furthermore, the 5th Horizon Report also stated that emergent technologies and their impact are increasingly greater in relation to the tasks undertaken by faculty in higher education. Moreover, the United Nations' report on the global information society (Sheridan, 2008) evidenced an evolution of society regarding the use of ICTs worldwide, which is based on greater technological development as well as on a positive attitude towards educational technology.

We cannot forget that the application of ICTs in the educational field is also closely linked to pedagogical changes that are taking place. This relationship, mentioned in different articles (John & Sutherland, 2004; Stephenson, 2001), will determine the transition process of universities towards the information society (Burbules & Callister, 2000), as technology has the ability to transform the teaching and learning processes (Sutherland et al., 2004).

In relation to the studies published to this date, this present work attempts to identify criteria that would allow us to develop more efficient training methods on ICTs for university faculty by analyzing the training needs and preferences of the University of the Basque Country's faculty. That is to say, we attempt to put forward a series of recommendations about what and how to train university faculty in the field of ICTs.

1 Our line of work follows up other studies such as *Basis, orientations and criteria for the*
2 *design of training programs for faculty* (Braslavsky, 1999), which established its own
3 criteria in the design of postgraduate courses in order to prepare university faculty. We
4 hope that the conclusions presented here can be of use to other higher education
5 institutions that have programs and plans in progress to train faculty on ICT
6 applications.
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8 9 10 **2. Material and methods**

11 The nature of the present research study is descriptive according to Van Dalen &
12 Meyer's (1979) definition of these types of studies. In other words, we have attempted
13 to collect detailed data that describe a situation, identify problems, make comparisons
14 and evaluations, and plan future changes by facilitating the decision-making process.
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17 Among the existing different methodological possibilities (Cohen & Manion, 1985;
18 Borg & Gall, 1976), we opted for a *web-based online questionnaire* (White et al., 2001)
19 that, from an integral perspective (Dendaluz, 1999), includes specific characteristics of
20 the qualitative and quantitative research. When determining the steps to be taken in the
21 execution of our research, we followed the ones specified by Floyd (2001).
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25 We took into account Schwarz's (1999) and Holt's (1997) recommendations in
26 designing the tools for the collection of data as well as the suggestions given by
27 Norman, Friedman, Norman, and Stevenson (2001) in creating an online survey.
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30 In order to accurately define the items and the perspective of the questionnaire, the
31 authors of this article revised the different surveys used by the authors and institutions
32 mentioned in the previous section. After designing the first draft, the authors consulted
33 with the team in charge of faculty training at the UPV/EHU. According to the
34 qualitative analysis of these meetings' minutes, the workgroup thinks that, if teachers
35 have to identify their ICT training needs instead of the knowledge that they already have
36 about it, they will probably take more significant information into consideration, such as
37 their real need of ICT use and the expectations that they have about the applications. For
38 this reason, this survey focuses on the teachers' training needs.
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42 One other outcome of the meetings was the definition of the survey's items. Taking into
43 consideration the faculty's tasks and functions in the teaching and research fields, the
44 workgroup separates the resources and application technologies that can be used at the
45 university into two groups: on one hand, there are the basic resources (identified in the
46 first part of the questionnaire) and, on the other hand, there are the advanced resources
47 (identified in the second part of the questionnaire). So, every item of the survey refers to
48 an ICT application that can be used by any faculty member in the development of any
49 teaching and/or research tasks.
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53 After these meetings, the questionnaire was validated, and two groups of experts
54 supervised the validation. The first group was composed of high-ranking administrators
55 of the Campus of Gipuzkoa, and the second one consisted of specialists on the
56 application of ICTs in higher education. Moreover, a pilot study was done in order to
57 test the questionnaire and to collect the opinions of teachers about its validity.
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1 The improved questionnaire was digitized by the Microsoft FrontPage program and was
2 uploaded to a public directory on the University of the Basque Country's main website
3 (www.ehu.es/tic). The faculty members were asked to evaluate the ICT applications
4 according to their individual training needs following a Likert-Scale from 1 to 4:
5 nothing, something, enough, much.
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8 Questionnaire Part 1: Basic Resources 9

10 01.1 Computerized resources:

11 01.1.1. Projector

12 01.1.2. Computer

13 01.2. USB memory sticks (pen drives)

14 01.3. DVD reproduction programs (PowerDVD)

15 01.4. Platforms for faculty use:

16 01.4.1. Moodle (virtual teaching system)

17 01.4.2. E-kasi (UPV/EHU's e-learning platform)

18 01.5. Mailing lists

19 01.6. Blogs

20 01.7. Online teaching (virtual university)

21 01.8. Others

22 01.9. Internet browsing

23 01.10. Electronic mail

24 01.11. Word processing software (Word or Writer,...)

25 01.12. Presentation software (PowerPoint or Impress,...)

26 01.13. Database software (Access, Filemaker,...)

27 01.14. Spreadsheet software (Excel...)

28 01.15. Graphic design software (Photoshop,...)

29 01.16. Web page design software

30 01.17. Digital video editing software (Premiere, Pinnacle,...)

31 01.18. Other resources.

32 Questionnaire Part 2: Advanced Resources 33

34 02.1. Online applications for scholarships (Ikertu, Ramón and Cajal...)

35 02.2. Statistical package software (SPSS, Nudist, Invest,...)

36 02.3. Computer resources provided by UPV/EHU's different libraries

37 02.4. Communication and interaction platforms (Messenger, Skype...)

38 02.5. Video conferences

39 02.6. Creation of PDF pages (Adobe Acrobat,...)

40 02.7. ISI Web of Knowledge (database of journals)

41 02.8. Online access to other libraries

42 02.9. Reference Managers (bibliographical references)

43 02.10. UPV/EHU's password

44 02.11. Microsoft Project (project management)

45 02.12. Other resources.

46 Although the questionnaire provides significant information about numerous
47 applications, the authors have not processed quantitative data about some applications
48 related to Web 2.0 (wikis, social networks, etc.) or new resources (whiteboards, PC
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tablets, digital books, etc.), because when the questionnaire was designed -the previous year to the research-, these applications were not commonly used by the faculty members. But, the information collected through open questions indicates that the use of these applications is growing, so any future revisions of this questionnaire by those seeking to evaluate teachers' training needs must take into account these new resources and applications. Additionally, the designed questionnaire could be improved by adding specific applications for different fields of knowledge (teaching sciences, foreign languages, chemistry, journalism, etc.)

2.1. Participants

The survey was sent via a personalized e-mail invitation to 1 074 faculty members working at the UPV/EHU's Campus of Gipuzkoa. We received 472 completed surveys, which constitutes 43.74% of the total faculty. In statistical terms, the sample is representative of the faculty campus, with a level of reliability of 95% and an error margin of 3.45.

The grade of reliability of the global scale used was Alpha of Crombach = 0.90. For each of the questionnaire's two parts, we also obtained very high grades of reliability of the subscales in relation to the training needs in the teaching field (Alpha = 0.929) as well as in the research field (Alpha = 0.923). All of the items in each subscale were correlated in a positive and significant manner with the rest of the items—i.e., a statistically significant limit of 0.01 (correlation test of Pearson).

We used the statistical program SPSS 15.0 to analyze the statistics. According to Allen and Seaman (2007), the Likert scale is ordinal in nature, and for this reason, we conducted non-parametric procedures like frequencies and percentages in order to determine the faculty's training needs. We have also carried out a factorial analysis to establish useful criteria for organizing future ICT programs regarding teaching.

3. Results and Discussion

3.1. Training needs in teaching

In the factorial analysis of the established resources within the framework of teaching, we observe that there is a first element that explains 47.16% of the variance of the results and a second factor that explains 10.45% of the variance. To those two elements, a third factor is added that explains 7% of the variance. For us, it was particularly interesting to know how the training needs that the faculty members have in each of the evaluated technological resources are situated in the rotated space (by Varimax method). Therefore, we drew a graphical representation of the spatial situation of each of the resources in relation to the two components that better explain the variance (see graphic). At the center of the graphic, we observe two well-differentiated groups of resources.

***** Figure 1 *****

The first group is constituted by those components that are on the left side of the second quadrant. Those make a lower contribution to the first element and an unequal

1 contribution to the second one. The first group is formed by programs for digital video
2 editing, graphic design software, spreadsheets, databases, programs to create web pages,
3 mailing lists, blogs, virtual teaching, and the platforms Moodle and E-kasi.

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5 The second group is placed on the right side of the second quadrant and makes a great
6 contribution to the first element and very little to the second one. Within this group, we
7 found the following resources: presentation programs such as PowerPoint, word
8 processing software, e-mail, Internet browsing, computers, USB flash drives, projectors,
9 and DVD reproduction programs.

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11 ***** Table 1 *****

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14 If we take into account this first division and we transfer it to a graphical representation
15 of the distribution of training needs, we find out that each of the groups has specific
16 characteristics. For instance, in the first group, there are those resources that require
17 relatively high training needs, while the resources that present low training needs are
18 found in the second group (see Table 1).

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21 If we do a more a detailed analysis of the variables in the rotated space in the graphic,
22 we can establish subgroups within each group in relation to their closeness to the
23 variables. In addition, those subgroups have a theoretical base.

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26 For example, within the technological resources group that has a high training need,
27 mailing lists, blogs, virtual teaching, and Moodle and E-kasi are in close proximity in
28 the rotated space. All those resources are relatively new Internet applications, which, on
29 a theoretical level, are part of the so-called Web 2.0.

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32 The second subgroup of resources with high training needs is less compact in the
33 graphical representation, and it is formed by advanced programs in data, text, and still
34 and motion images, such as digital video editing, graphic design, spreadsheets,
35 databases, and web page design (see figure 1).

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38 Within the group of resources that have a low training need (i.e., those on the right side
39 of the quadrant) in the distribution table, we can do a further division regarding the
40 position that those resources occupy in the graphical representation of the rotated space.

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43 We can observe a very compact group formed by those Internet and office automation
44 applications that are basic: PowerPoint, word processors, e-mail, Internet browsing, as
45 well as the computer. We do not believe that it is a coincidence that the computer is
46 found in this category.

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49 Within a second subgroup, we include all those resources that are close to the previous
50 group. Two of them are related to hardware elements (USB memory sticks and the
51 projector), while a third one is related to DVD reproduction programs.

52 53 54 55 **3.2. Research training needs**

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58 The distribution of the results obtained in the scale that references the resources
59 classified in the research field has a series of specific characteristics.

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1 The training needs of those resources are widely dispersed among all the given options
2 (nothing, something, enough, much). In our opinion, it implies a more diversified
3 training need than in the teaching resources field, where the dispersion of the answers is
4 lower.
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7 ***** Table 2 *****
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10 The similar valuation of the training needs of all technological resources categorized in
11 this field makes the grouping of such needs difficult. However, in relation to project
12 management programs (e.g., Microsoft Project) and data analysis programs
13 (quantitative programs such as SPSS or qualitative programs such as Nudist), we found
14 a greater training need for programs in which the statistical mode is 4.
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17 With the goal of finding criteria to group those resources, we did a factorial analysis of
18 the variables classified within the field of research, and we obtained two factors that
19 explain 56% and 9% of the variance of the results.
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22 Similar to the previous section, we drew a graphical representation of the position of the
23 variables in the rotated space (via Varimax method). We found out that, close to the
24 position of management project programs and programs that analyze data, there are also
25 others such as communication platforms, the use of video-conference systems, and the
26 use of programs that create pdf documents.
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29 ***** Figure 2 *****
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32 At the other end of the graphic, we found those training needs that are related to the
33 management of bibliographies. The distribution of these training needs is also very
34 similar to the following items: libraries' computer resources, impact magazines'
35 databases, libraries' access websites, and bibliography management programs. In all of
36 them, the statistical mode is the second option (something) followed very closely by the
37 third option (enough).
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40 Following what has been said in the previous section, we can identify two groups of
41 training needs within the field of research. The first group is related to bibliographical
42 issues and the second one to computer application programs for research. Both groups
43 present a similar level of training needs.
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45 **3.3. Conclusions**

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48 In addition to the results already commented on in the previous sections, combined with
49 the experience gained during the analytical process followed to determine the faculty's
50 training needs, we have obtained a series of criteria that other higher education
51 institutions can utilize to design their own faculty training programs more efficiently.
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53 **3.3.1. To establish systems for the detection of training needs**

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56 We obtained a high level of participation in the study (47% of the population, the
57 participation being voluntary), which indicates that faculty have a great interest in
58 providing information about their training needs. It is recommended that higher
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1 education institutions also foster the creation of stable structures designed to learn the
2 training needs that their faculty might have at different moments in relation to ICTS.

3 4 **3.3.2. To create a modular training offer**

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6 The results obtained in the factorial analysis suggest organizing the ICT training of
7 university faculty in a modular way. Actually, according to the grouping of the variables
8 in the factorial analysis and its graphical representation in rotated space by the Varimax
9 method, the structure of those modules could be as follows:

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11 Modules directed towards teaching tasks:

- 12 - Basic computer modules.
 - 13 ○ Hardware resources: computers, projectors, USB memory sticks.
 - 14 ○ Basic programs and the Internet: word processing software, browsers, e-
15 mail.
- 16 - Advanced computer and Internet modules.
 - 17 ○ Web 2.0 applications: blogs, mailing lists, wikis.
 - 18 ○ Management content systems: virtual platforms.
 - 19 ○ Advanced computer programs: software for the treatment of images,
20 video, data, etc.

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22 Modules directed towards research tasks:

- 23 - Modules on the management of bibliographical resources.
 - 24 ○ Web page management of documentation centers: catalogue and
25 database searches.
 - 26 ○ Management of bibliography programs.
- 27 - Modules on computer applications for research.
 - 28 ○ Searches for research scholarships.
 - 29 ○ Project management programs.
 - 30 ○ Analytical programs for quantitative and qualitative data.

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32 The idea of organizing the teachers' training in modules is already being carried out in
33 some learning programs taking place in different countries. One of the main programs
34 is the "Academy of ICT Essentials for Government Leaders – A Modular Training
35 Program." This program was created by the Asian and Pacific Training Centre for
36 Information and Communication Technology (APCICT) of UNESCO Bangkok, and it
37 summarize the pedagogical and didactical advantages of modular training (Singh,
38 2008).

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40 At the same time, the International Labour Organization in its 91st meeting pointed out
41 the advantages of modular training. Competency-based modular training has recently
42 received more international support. Compared with time-based training programs,
43 competency-based approaches are seen as more efficient, relevant, and outcome-
44 focused. (ILO, 2003).

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46 In the case of universities assuming this kind of curriculum organization, future studies
47 would have to verify if the creation of ICT certification programs at two levels (course
48 and module) is better received by faculty members than the creation of independent
49 courses that are not interconnected. Moreover, at the university level, there is a
50 possibility of creating a third group of modules related to the managerial tasks that
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1 faculty members carry out through the use of ICTs. Even this possibility is not being
2 introduced in the present work.

3 4 **3.3.3. To adapt the training needs to the demand**

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6 The ICT training that universities offer to their faculty has to be adjusted to the needs
7 that this group requires at each moment. According to the present study on the
8 UPV/EHU's faculty training needs and, specifically, after analyzing Tables 1 and 2, we
9 can say:

- 12 ➤ In response to a low need, we propose to limit the range of training directed
13 towards mastering the applications in the basic computer module that are related
14 to hardware resources and basic programs.
- 15 ➤ In response to a high need, we propose to extend the training modules related to
16 the content management systems for virtual teaching, Web 2.0 applications, and
17 advanced programs.
- 18 ➤ In response to an average need, we propose to maintain the intermediate training
19 offered in the bibliography management programs and computer applications for
20 research.

21 22 23 24 **3.3.4. To intervene in the work environment**

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26 In studies carried out at the University of the Basque Country (Lareki, 2007) and other
27 Spanish universities (Bautista, 2001; Cabero et al., 2003), we observed that a great
28 majority of the consulted faculty are self-taught in the use of new technologies. On
29 many occasions, this autodidactic training has been completed with the collaboration of
30 colleagues when there is a need to use a specific technology. In addition to the modular
31 training that universities could offer, we understand that there is room for the
32 implementation of other measures that should focus on the working environment of
33 those faculty members. Those measures should encourage and acknowledge the faculty
34 dedication to the field of ICTs. The creation of referential professors in the application
35 of ICTs, who are recognised as dedicated leaders in this area or field, or the creation of
36 scholarships that promote educational innovation with ICTs could help regulate self-
37 teaching and self-training between equals (equal people).

38 39 40 41 42 43 **5. References**

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Table 1:

	nothing	something	enough	much
Projector	57,4%	31,9%	5,3%	5,3%
Computer	44,4%	42,1%	10,8%	2,8%
USB flash drive	73,5%	20,4%	3,5%	2,6%
DVD reproduction software	34,5%	37,8%	18,6%	9,2%
Moodle	7,3%	26,7%	27,7%	38,3%
Ekasi	21,2%	24,1%	19,4%	35,3%
Distribution list	24,5%	35,1%	17,0%	23,5%
Blogs	18,9%	27,5%	25,5%	28,0%
Virtual Teaching	10,6%	28,6%	29,1%	31,7%
Surfing the net	49,0%	41,7%	5,9%	3,4%
e-mail	56,9%	37,4%	4,3%	1,4%
Word processing software	55,5%	37,4%	5,0%	2,1%
Presentation like PowerPoint	36,9%	38,7%	17,1%	7,3%
Database	20,5%	33,8%	26,0%	19,8%
Spreadsheet	22,7%	36,8%	23,1%	17,4%
Graphic design programs	20,9%	30,1%	23,0%	26,1%
Web design software	14,5%	18,6%	28,7%	38,2%
Video Editing software	19,8%	19,6%	23,4%	37,2%

Table 1: Training needs in relation to technological teaching resources: representation of percentages.

Table 2:

	nothing	something	enough	much
Online forms	25,6%	40,3%	17,8%	16,4%
Statistical packages	18,6%	27,4%	24,9%	29,1%
Libraries' computer resources	18,5%	42,6%	27,4%	11,5%
Communication platfoms	29,3%	37,9%	17,3%	15,4%
Videoconference systems	19,6%	32,4%	23,3%	24,7%
PDF file creation	27,7%	30,7%	20,4%	21,2%
Impact magazines' databases	18,4%	33,1%	25,1%	23,4%
Libraries' access website	22,9%	39,4%	24,5%	13,1%
Bibliography management programs	14,8%	36,5%	25,8%	22,8%
UPV/EHU's digital left-luggage	32,3%	30,1%	16,5%	21,2%
Project management software	24,8%	23,4%	17,6%	34,2%

Table 2: Training needs in relation to technological research resources: representation of percentages.

Figure 1:

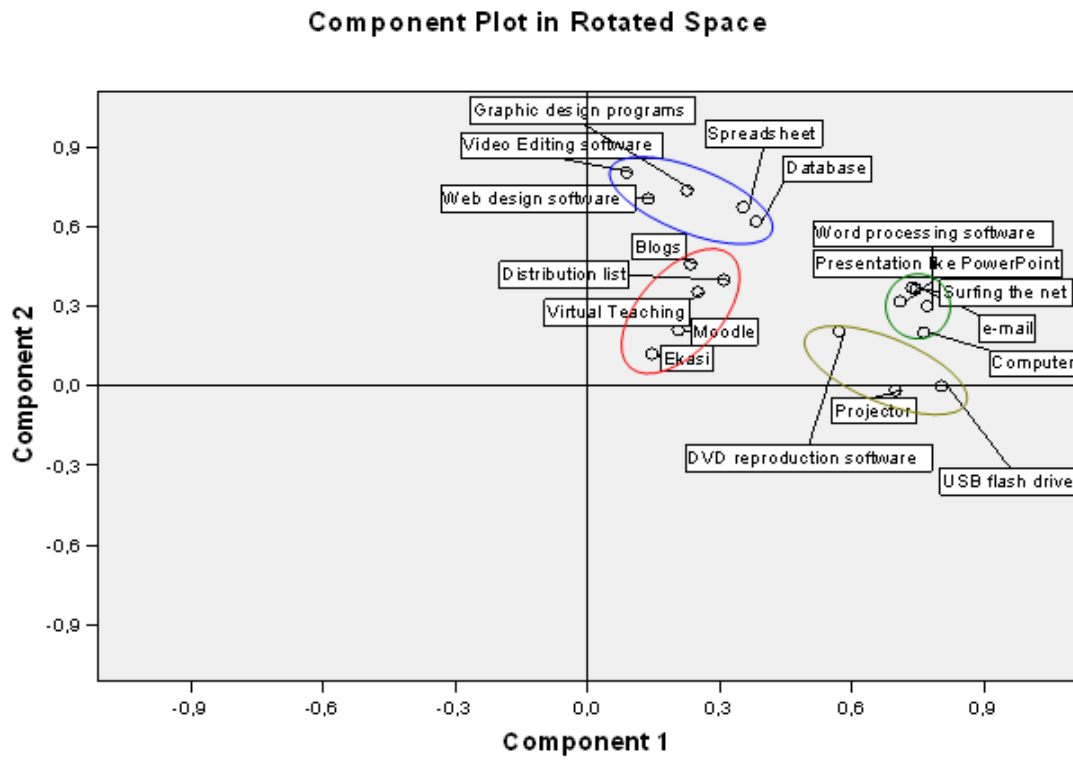


Figure 1: Arrangement of the teaching training needs in the factorial analysis II

Figure 2:

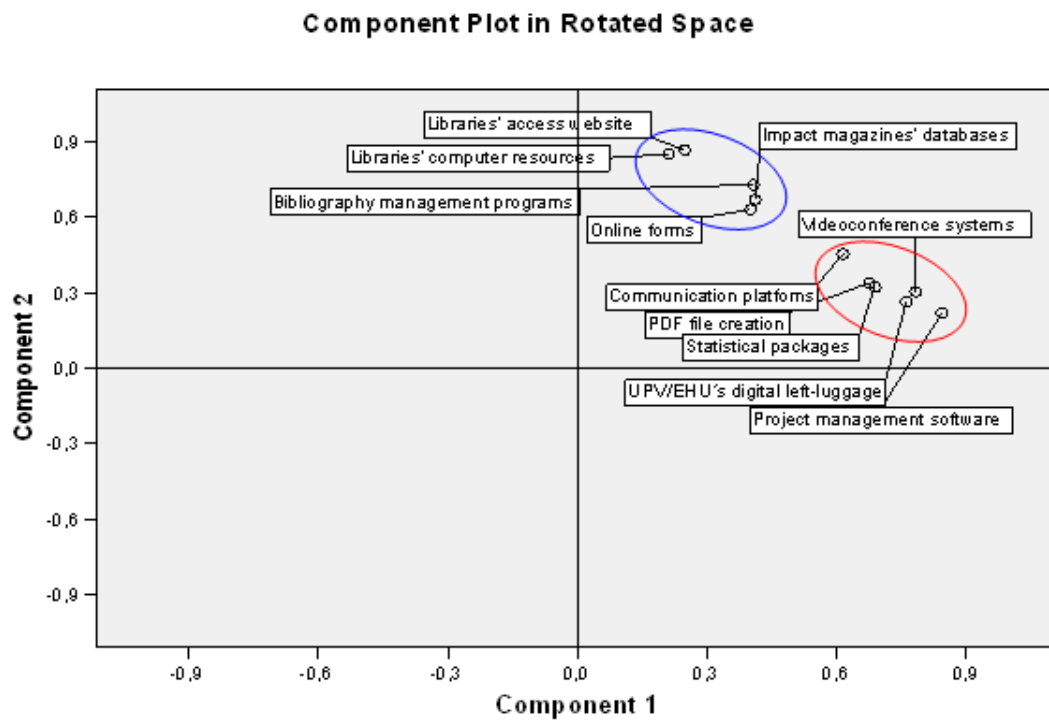


Figure 2: Arrangement of the research training needs in the factorial analysis

Authors

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