

## Role of ODL on sharing pilot plant resources among European Food Engineering Universities

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### Abstract

The new means of communication in the last decade opened new learning opportunities that include the so called distance learning or opened distance learning. These are being more and more used by educational institutions at all levels. The EU Thematic Network ISEKI\_Food (Integrating Safety and Environmental Knowledge Into Food Studies towards European Sustainable Development), through working group 5, in charge of Practical/Laboratorial teaching at Pilot Plant scale, developed some work in order to assess the current situation in the institutions that teach food engineering and food science in Europe. A questionnaire was developed and sent to several institutions to know if e-learning was being already used to teach topics such as unit operations and food processing and if virtual experiments were being developed thinking of those to whom the real presence in the pilot plant laboratory to attend practical classes is too difficult.

The results showed that European universities are far from being familiar with ODL/DL. At least in what concerns food studies, it seems that the first steps are being taken just now with the objective of reaching other possible markets or to follow the new technologies, being only 27%, the ones who already feel the demand.

### Keywords

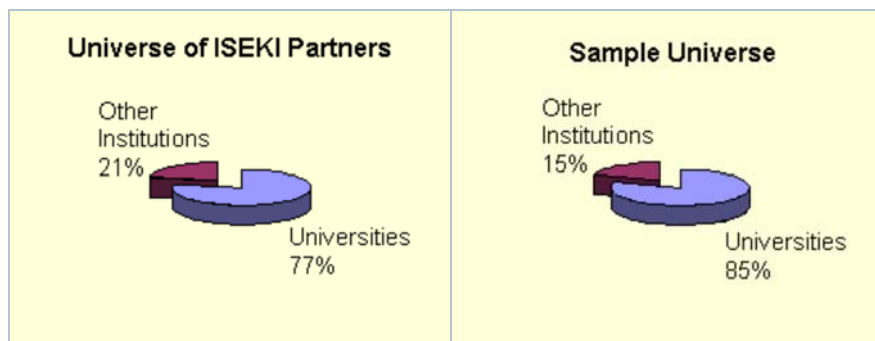
e-learning, distance-learning, virtual, pilot-plant, food, ISEKI

### Introduction

The development of all the new means of communication namely internet, led to a new way of teaching, allowing distance learning or opened distance learning, more and more used by educational Institutions at all levels. Although we may all have a slight idea of why, how and to what extent it has been developed, it was the intention of Working Group 5 (WG5), in charge of Practical/Laboratorial teaching at Pilot Plant scale, to assess what is happening in the Institutions that teach food engineering and food science in Europe. A pilot plant database <http://www.ualg.pt/est/adea/iseki.php> was developed by WG5, where information about pilot plant equipment that exists in the institutions of ISEKI\_Food partners was collected. The name, manufacturer and photo of each equipment, its model and some characteristics such as maximum and minimum production are presented, the Unit Operation name where it is used, the Institution from where it belongs and the contact person. In this database it can also be found, short movies for each of the laboratory experiments presented in the book "Unit operation and Food processing experiments" by Vieira, M.M.C. and Ho, P. (to be published shortly by Springer). In these movies, the pilot plant equipment is shown and all steps of the experiment are explained and actually performed to help the understanding of students while learning subjects such as momentum, heat and mass transfer, unit operations or food processing and product development.

The main objective of this survey was to know if there are already institutions using e-learning to teach topics such as unit operations and food processing and whether virtual experiments are then used instead of physical contact with equipments in the pilot plant laboratory.

A questionnaire was designed in the Nantes ISEKI meeting and quickly after, placed in the website of the Institution of the coordinator of WG5, <http://www.ualg.pt/est/adea/> and all ISEKI partners were invited to answer it through an email. The questionnaire had 9 questions (closed system) (Reis and Moreira, 1993), and was answered by faculty members of a total of 53 institutions being 45 universities (out of a Universe of 92 Institutions, being 71 universities and 21 institutes, associations or research centers) from 24 countries out of 29 countries in Europe, all ISEKI partners (Figure 1, Table 1), which we consider to be quite representative of the reality in Europe.



**Figure 1.** Comparison between the Universe of the ISEKI partners and the sample obtained in this survey.

#### WG5 - Questionnaire on ODL (open distance learning)

Please enter you identification:

Institution: \_\_\_\_\_ Name: \_\_\_\_\_ Email: \_\_\_\_\_

Comments:

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**1. In your conception of ODL, is it**

☐ Free of charges ☐ Not Free of charges

**2. It is reached**

☐ Through internet (downloads, e-mail, e-learning) ☐ Off-line (CD Rom information) ☐ Information sent by mail

☐ Tutor guided ☐ Self learning

**3. Does your Institution have**

☐ ODL ☐ DL ☐ None of the above ☐ Planning to have it in the future

**4. What was the main reason to start ODL/DL?**

☐ Lack of students in the institution ☐ To reach other possible markets ☐ To satisfy an existing demand

☐ To follow new technologies ☐ Because it is less expensive

**5. Please define the target group**

☐ Students from your Institution ☐ People from Industry ☐ Alumni ☐ Students from other institutions

☐ Anyone interested

**6. What kind of subjects are taught in ODL/DL in your Institution?**

☐ Food Chemistry ☐ Food Safety ☐ Biotechnology ☐ Thermodynamics ☐ Environmental Aspects

☐ Transport Phenomena ☐ Food Processing ☐ Unit Operations ☐ Food Product Development ☐ Food packaging

☐ Quality Control Assurance ☐ Quality Management ☐ Mathematics: ☐ Basics ☐ Applied ☐ Statistics ☐ Modelling

☐ Others Please specify: \_\_\_\_\_

**7. These courses include**

☐ Theory ☐ Problem solving ☐ Practical/experimental work (home based) ☐ Virtual experiments ☐ Simulation

**8. What is the length of a module?**

hours  months

**9. Do you intend to include the ISEKI database on any of these courses**

☐ Yes Which? \_\_\_\_\_ ☐ No

**Figure 2.** WG5 - Questionnaire on ODL (open distance learning)

**Table 1.** Institution that answered the questionnaire

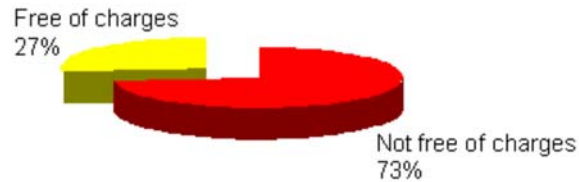
| Country     | Institution                                                 | Country  | Institution                            |
|-------------|-------------------------------------------------------------|----------|----------------------------------------|
| Belgium     | Heldb-Meurice<br>U. Ghent                                   | Finland  | MMETT-Helsinki Univ.                   |
| Denmark     | Kvl<br>Levenedsmiddle Centret*                              | Sweden   | SIK*<br>Chalmers Univ.                 |
| Germany     | ATB-Postdam                                                 | UK       | Nottingham Univ.<br>FRPERC*            |
| Greece      | AUA<br>AUTH<br>TUC<br>Nagref*<br>European Profiles*<br>NTUA | Bulgaria | ESCS<br>Univ. Plovdiv                  |
| Spain       | Fac Veterenária<br>UPV<br>UNAV<br>Deleg. Agric. Pesca*      | Estonia  | Tailin Univ. of Technology             |
| France      | ENSAIA<br>ENVT<br>Cylteha*                                  | Latvia   | LLU                                    |
| Ireland     | UCD<br>UCD                                                  | Lituania | KTU<br>IZUU                            |
| Italy       | UNISA<br>Univ. Sassari                                      | Hungary  | Szeged                                 |
| Netherlands | WAU                                                         | Poland   | Ag. Univ. Poznan                       |
|             | BOKU                                                        | Romania  | CDIMM<br>UGAL<br>Usamvb<br>Titan Comp* |
|             |                                                             | Slovenia | U. Ljubljana                           |
|             |                                                             | Slovakia | Tuzvo<br>STUBA                         |
|             |                                                             | Turkey   | Gaziantep<br>Ege Uni.                  |

|          |                                                                         |  |  |
|----------|-------------------------------------------------------------------------|--|--|
| Austria  | Amadeus Association*                                                    |  |  |
| Portugal | ESAC<br>ESB/UCP<br>U. Minho<br>Pol. Insti. of Viana Castelo<br>EST/UALG |  |  |

(\*) – Institutes or Associations

The data obtained in this questionnaire was then analysed with a statistical software for market surveys, SPSS 13.0, resulting that most faculty members (73%) understand *ODL* to imply some kind of fee as it can be observed by Figure 3.

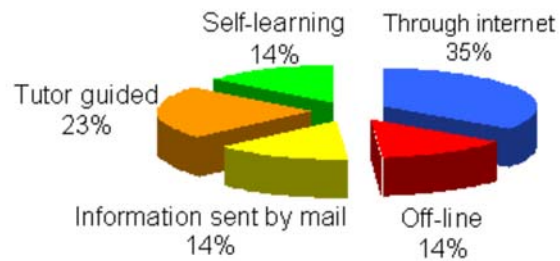
### In your conception of ODL, is it...



**Figure 3.** Most people find *ODL* to be not free of charges.

It also could be observed that most people used internet as the main way to disseminate their *ODL* courses.

### It is reached by...



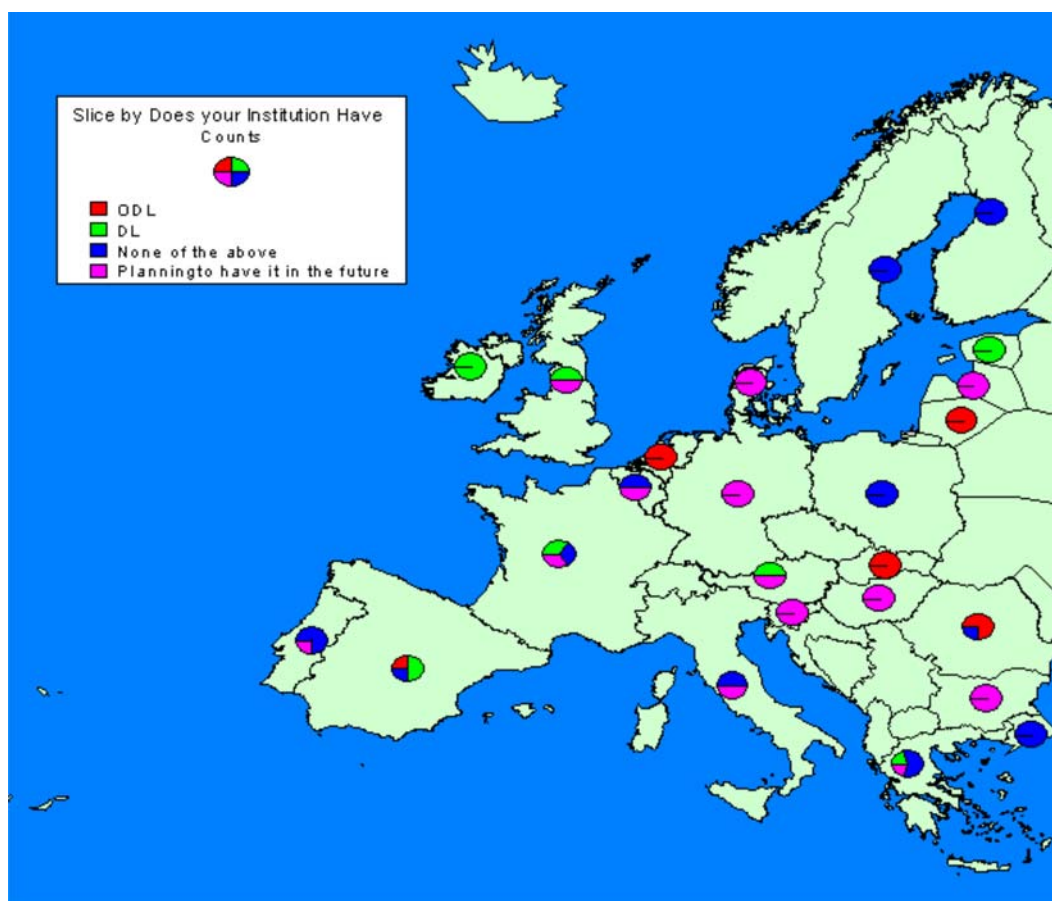
**Figure 4.** The major opinion about the easier way to reach distance learning is through internet.

In 2004/2005 only 34% of the institutions had *ODL* or *DL*, and 33% were planning to have it in the future (Figure 5).



**Figure 5.** Amount of Institutions that have ODL/DL in Europe among the ISEKI partners.

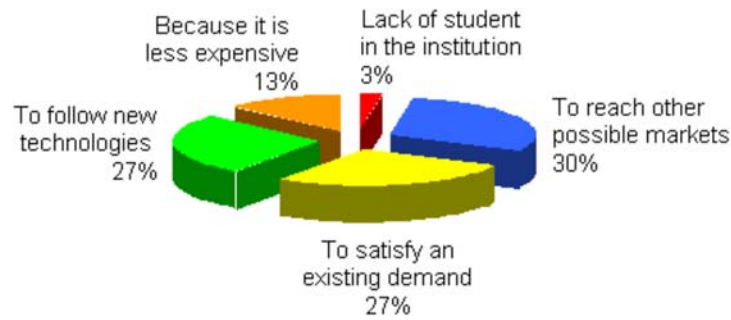
We can observe in the map presented in Figure 6 that UK, Ireland, Central Europe, and the Baltic countries either had it already or were planning to have it being the southern countries as well as the Scandinavian, south-eastern and eastern countries the ones that answered that are not thinking even of having it in the future.



**Figure 6.** Distribution of ODL/DL in Europe.

Most Institutions that are embracing this new way of teaching, answered that it was in order to reach other possible markets or to follow new technologies or satisfy an existing demand (Figure 7).

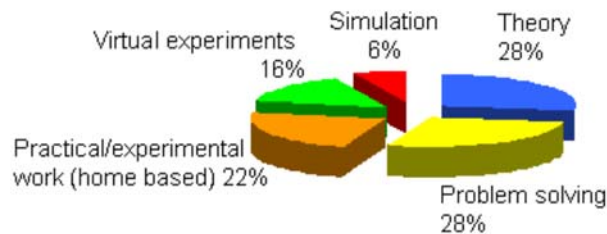
### What was the main reason to start ODL/DL



**Figure 7.** Reach other possible markets followed by satisfying an existing demand or to follow new technologies are the main reasons to start *ODL/DL*.

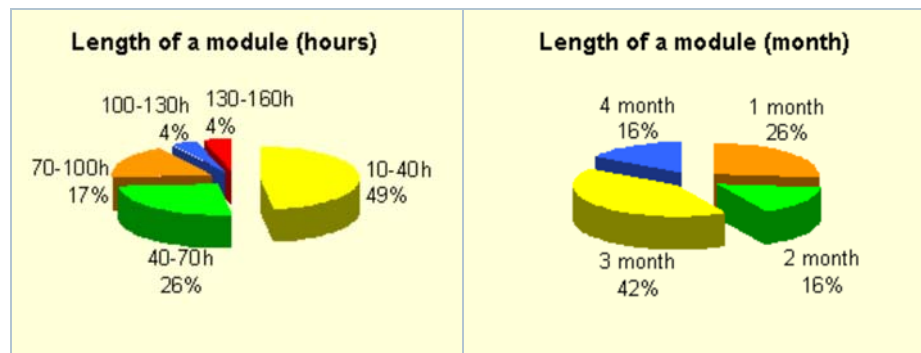
The distance learning courses that already existed included a wide range of teaching methodologies but only 16% of the courses included virtual experiments as it can be observed in Figure 8.

### These courses include...



**Figure 8.** A wide variety of topics included in the courses.

The majority of the courses comprised modules of 10-40 hours (46%) followed by some with 40-70h (26%), lasting 1-3 month (43% for 3 month) (Figure 9).



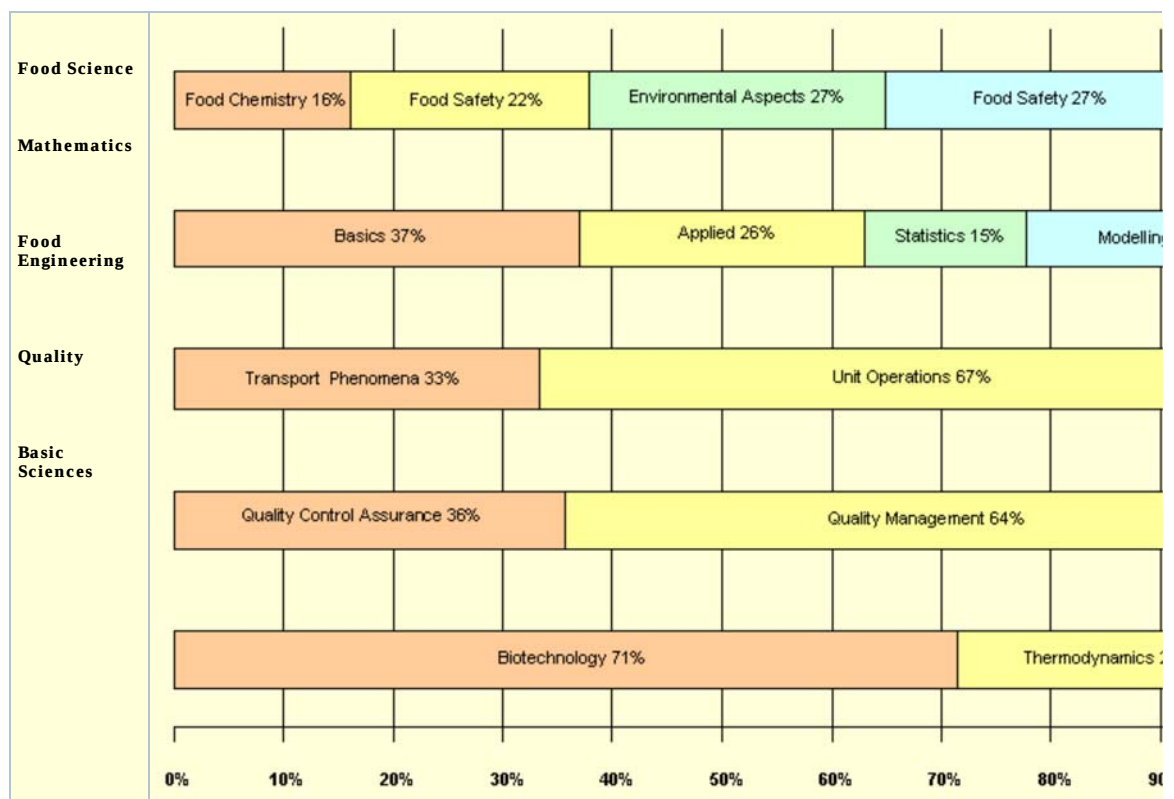
**Figure 9.** Length of modules in number of hours and months.

The group for whom these courses were designed (target group) are mainly people from industry followed by anyone interested or students from any institution. Alumni seem to be a less interesting group to this kind of learning (Figure 10).



**Figure 10.** Target group

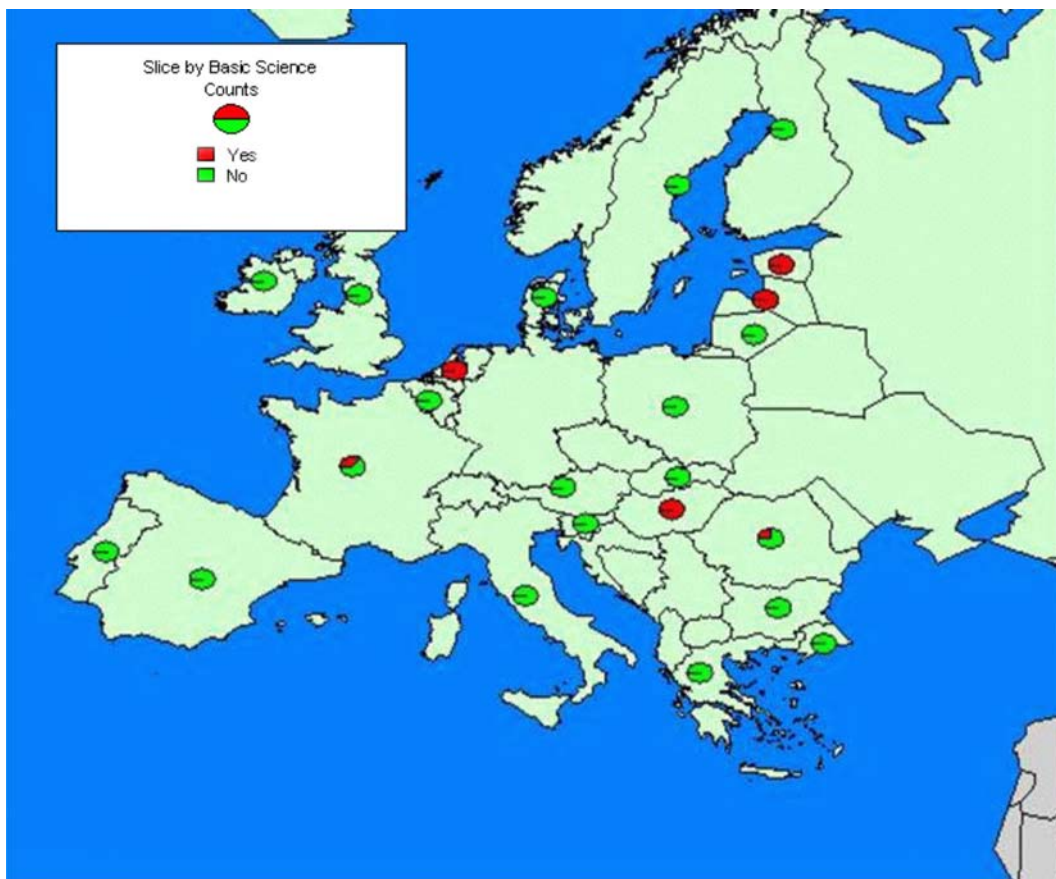
When inquiring about the subjects taught in ODL/DL a large variety of courses was mentioned and for better statistical analysis there was a need to group the disciplines. To have an idea of which are the more often taught courses in each group of disciplines Figure 11 is presented.



**Figure 11.** Most offered courses by ODL/DL per group of disciplines.

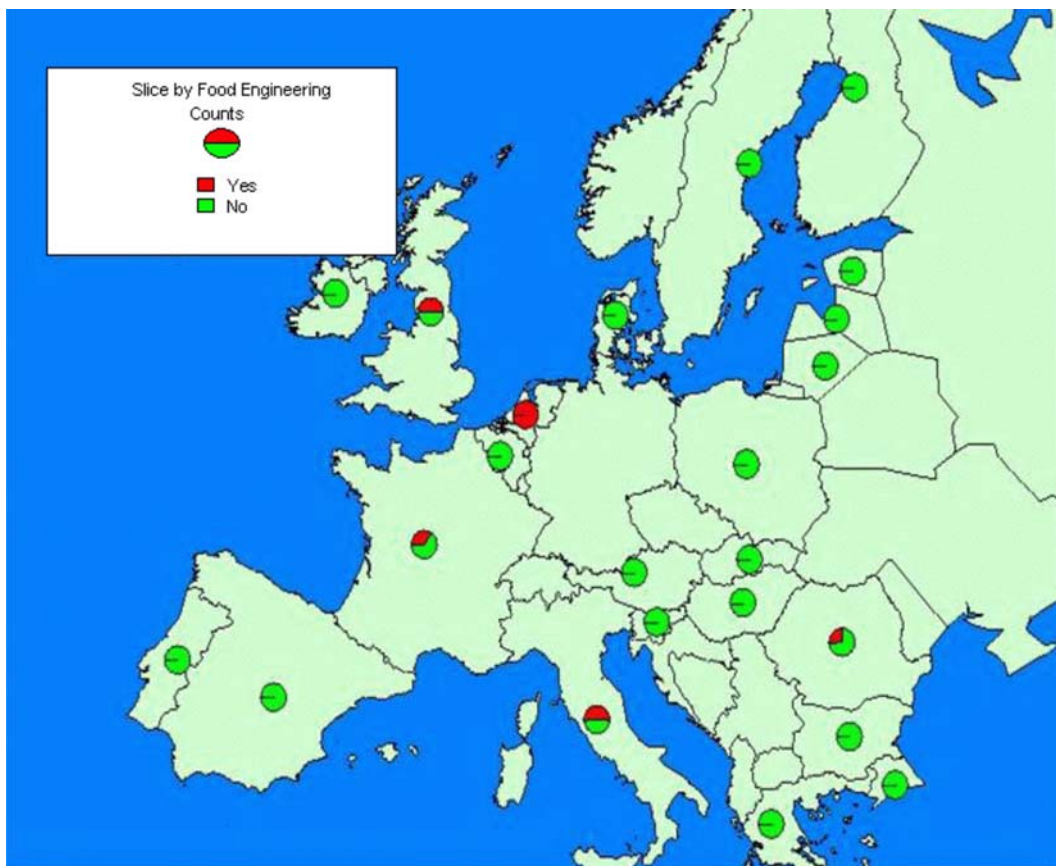
To view their distribution all over Europe there were just a very few countries having courses in basic sciences, as the red dots in the map in Figure 12 are showing.



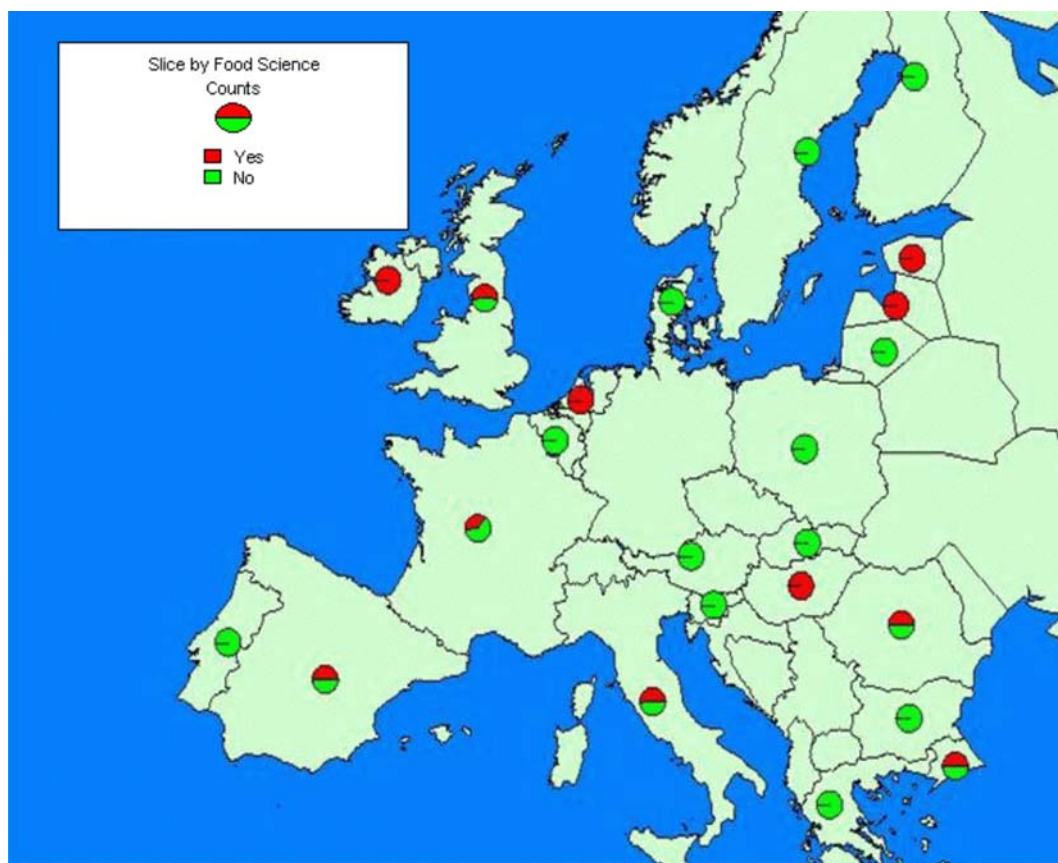


**Figure 12.** Distribution in Europe of courses in basic sciences, taught by ODL/DL.

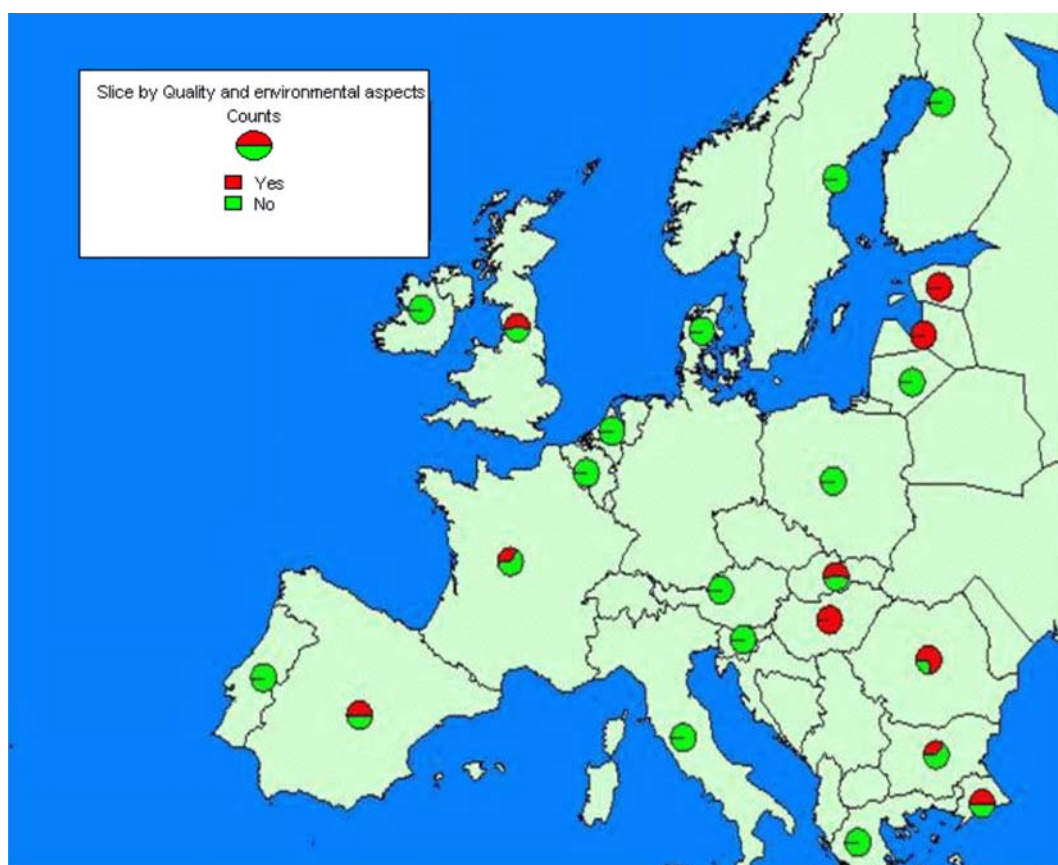
In Figures 13, 14 and 15, as we can observe, as far as food engineering, food science, or quality food quality assurance and environmental aspects are concerned, the red dots which represent the yes are also scarce, specially, for food engineering.



**Figure 13.** Distribution in Europe of courses in Food Engineering taught by ODL/DL.



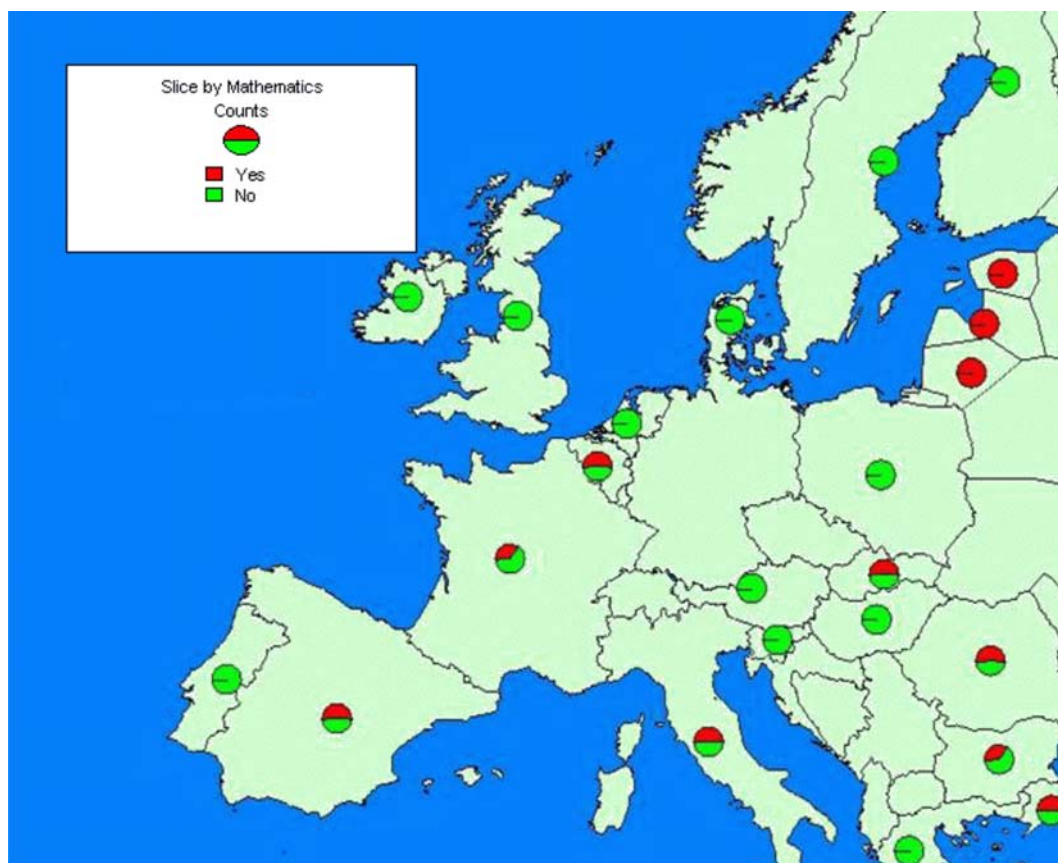
**Figure 14.** Distribution in Europe of courses in Food Science taught by ODL/DL.



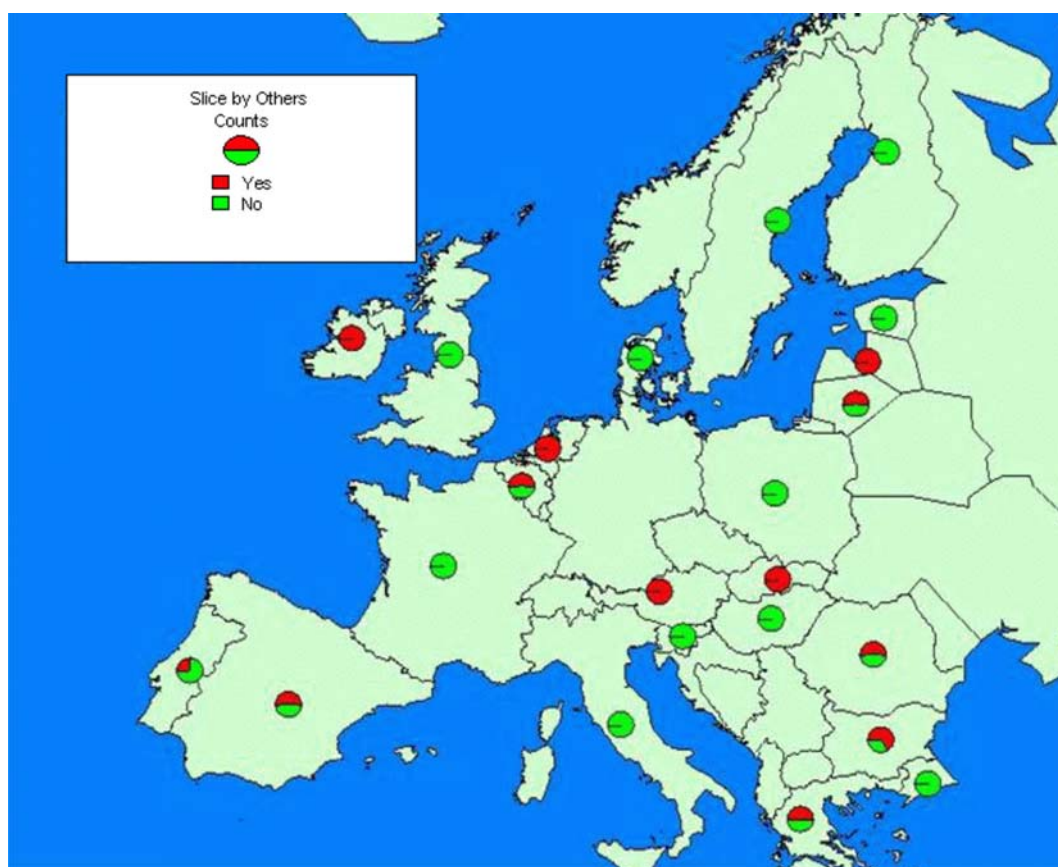
**Figure 15.** Distribution in Europe of courses in Quality and Environmental Aspects, taught by ODL/DL.

In mathematics we can see more use of ODL/DL all over Europe (Figure 16) as well as for other courses like Technical Applications of Computer Systems at Boku, Vienna, General Chemistry, Haute Ecole Lucia de Brouckère, Brussels, Belgium or Management and Rural Development at USAMVB in Romania.





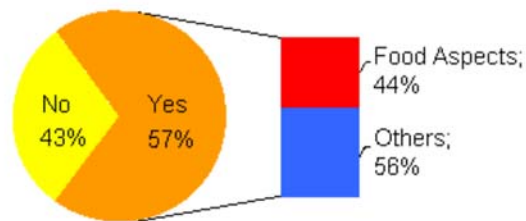
**Figure 16.** Distribution in Europe of courses in mathematics, taught by ODL/DL.



**Figure 17.** Distribution in Europe of other courses, taught by ODL/DL.

On Figure 18 we can see that 57% of the ISEKI partners are willing to use the ISEKI pilot plant database for food aspects as well as other subjects.

### Do you intend to include the ISEKI db on any of this courses?



**Figure 18.** Usefulness of the ISEKI database on pilot plant equipment.

## Conclusions

Although it is said that email and internet surveys are relatively new and it is said that these surveys might be biased because the internet user might not represent the general population (Statapac Inc., 2005), in this study the population was a specific one, faculty members from European universities, so this criticism does not apply in this case. The number of questionnaires 59 and of countries 24, covered by this survey makes it a reliable piece of information for 2005.

European universities are far from being familiar with ODL/DL. At least in what concerns food studies, it seems that the first steps are being taken just now with the objective of reaching other possible markets or to follow the new technologies being only 27% the ones who already feel the demand. From those who already have it, people from industry seem to be the most important target group and virtual experiments only represent 16% of the methodologies used to teach. In some cases the inquired answered that they were only planning to have ODL/DL in the future but later they chose subjects to be taught which means that some of the red dots are not even real, they are virtual!

The partners that are willing to use the ISEKI data base are 57% now but maybe after reading this study others might think also to use it when having ODL/DL.

## References

- [1] SPSS Base 13.0 User's Guide, ISBN: --13-1857232-1
- [2] SPSS Statistica Package for the Social Sciences, version 13.0
- [3] Rei, E. and Moreira, R., "Pesquisa de mercados", Edições Sílabo, 1ª Edição 1993.

## Internet Links

<http://www.statpac.com/surveys/>