

# An evaluation concerning customers' acceptance of internet-based teaching material

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## Abstract

*In this paper, customers' acceptance of internet-based teaching material with a low degree of interactivity is evaluated. In contradistinction to prevalent experts' opinion, it seems as if even this material was well accepted, provided that there is a need of information about the offered material. Furthermore, the evaluation demonstrates informative outcomes concerning the access-behavior of learners.*

## 1. Introduction

In many papers on the usage of internet-based teaching materials, it is insisted in that only material with a high degree of interactivity is attracting users. It is claimed that an offer with a lower degree of interaction serves only to waste hard-disk memory and to occupy valuable data-transmission resources.

As a consequence, many educators are discouraged who possibly could produce important contributions of internet-based teaching material, but who have not yet the necessary experience in setting up an Internet-based course with a high degree of interactivity.

In this paper, the acceptance of two contributions of that category is statistically evaluated. "Statistical evaluation" in the sense of the presented paper means that numbers and time of accesses to such pages were counted and that information about the accessing computer

was collected. Statistical evaluation in the sense of that paper does not mean that there have been control instances nor other means to ensure that the results apply in the average to similar internet offerings. The presented results are thus to be interpreted in a sense of encouraging trends.

## 2. Analysis of two HTML-offers

Two HTML-based collections of course material have been analyzed. The results will be shown in the following subsections. Both contributions were generated as supplements to existing lectures. It was not their aim to replace lectures or exercises, nor did they claim to increase students' fun factor.

### 2.1 Basic engineering mathematics

The first of these contributions is a summary of basic engineering mathematics that is complemented with a small selection of questions in form of a multiple-choice test. This material was first designed to demonstrate to external candidates for post-graduated studies what knowledge on that material they were supposed to have.

Within the framework of cooperation in the expired INEIT-MUCON thematic network [1], [2], the web pages have been improved and besides an English version, a French version has been produced. The project was discussed on the last EAEEIE-conference in Ulm, Germany.

Thus, partners in different European countries knew it. Therefore, it was expected that most accesses came from European countries, particularly from the university of Ulm, Germany, and from Université Henri Poincaré, Nancy, France, since these universities are co-operating in this project.

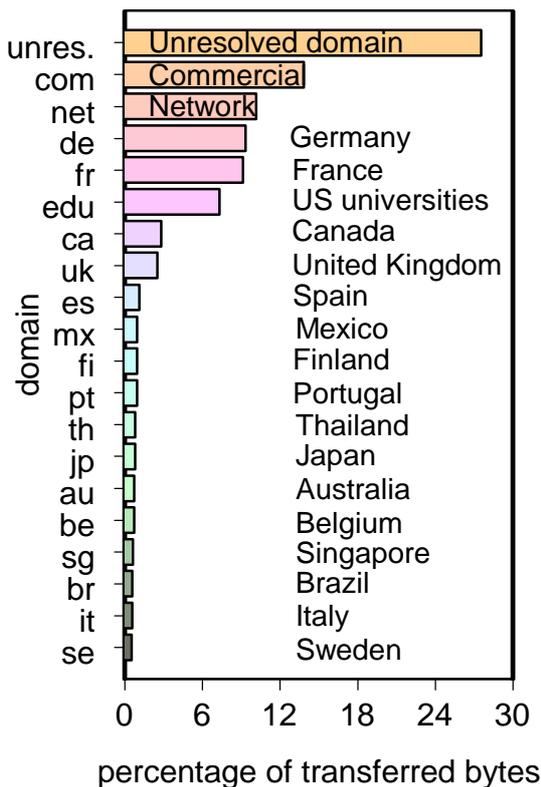


Figure 1: Domains from where most accesses on the math-project occurred

Surprisingly, however, a statistic on accesses to the material shows that it is not only used from within Europe, but from more than 100 countries! Domains from which most data have been requested are shown in Fig. 1.

A relatively large percentage of host domains could not be resolved or accesses happened via commercial or network organizations.

It is rather amazing that there are relatively many accesses from US universities. Since accesses are well distributed over all offered pages of the offered project, it might be speculated that there is apparently a need for web pages with higher mathematical content, even if the degree of interaction is (still) not too high.

Very interesting conclusions can be drawn from an analysis of the points in time where accesses occur. Figs. 2–4 show some statistics.

In Fig. 2, the distribution over the daytime is shown. According to the fact that most accesses come from Europe, it is understandable that most accesses are seen during the European afternoon and evening. Due to the accesses from overseas, fairly many accesses occur also during other times of the day.

In Fig. 3, the monthly distribution of accesses is shown.

The peak that is seen around 8pm will find its explanation when the second project will be considered.

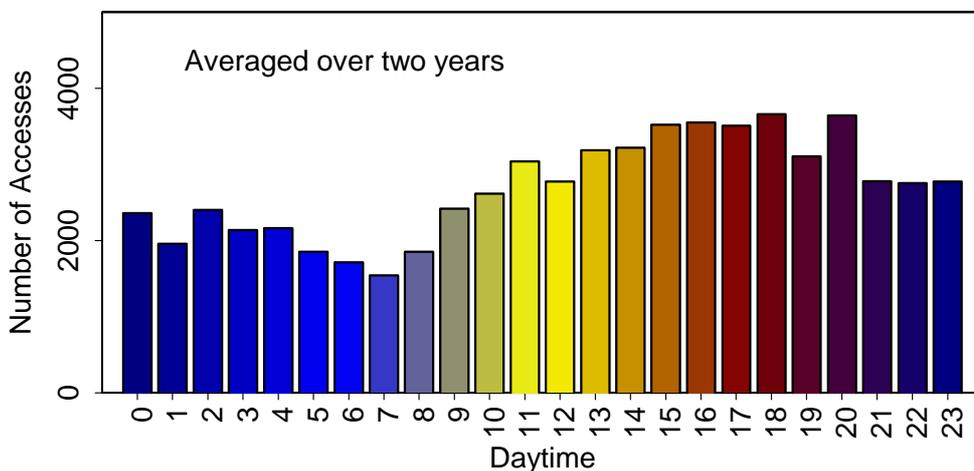


Figure 2: Number of accesses to the math pages vs. daytime

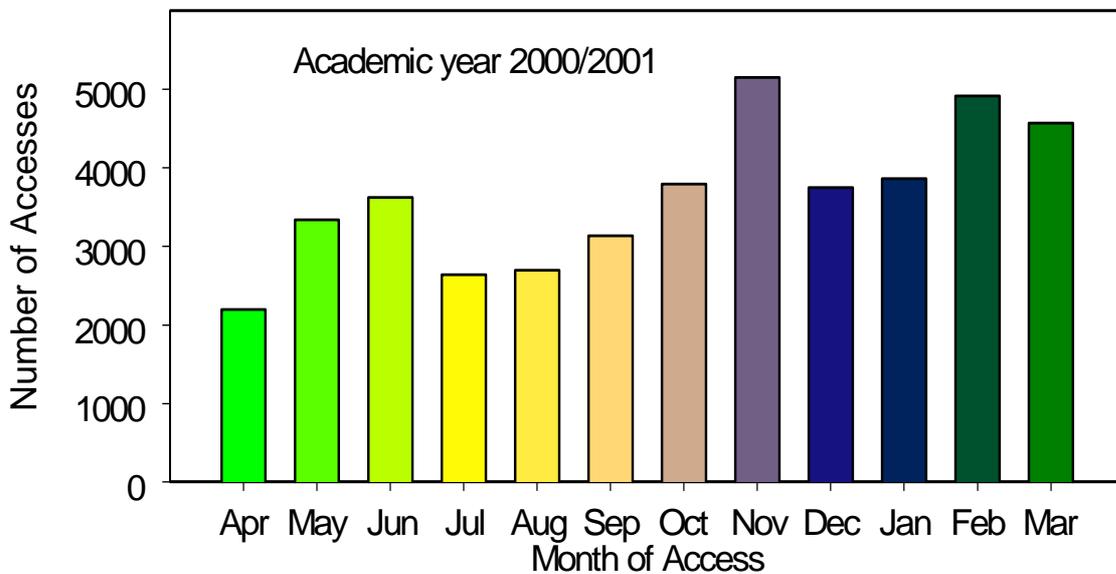


Figure 3: Number of accesses to the math pages vs. month

Summer holidays obviously lead to a decrease in the number of accesses. The November peak correlates to the time where in Ulm Fourier transforms are taught for students and the peaks in February and March correlate to times when there are preparations for written exams. Correlations to similar events in Nancy have still to be checked.

accesses during weekdays, indicates that students are more diligent than some pessimistic colleagues would admit.

### 2.2 RF & Microwave engineering

The second contribution consists of slides of a lecture on an introduction to microwave engineering that the author has made accessible to his students in the Internet. The idea was to give all those students an opportunity of recalling the material that missed the lecture for some reason. It was *not* thought as a complement to the lecture. Furthermore, since there is no built-in interactivity in these pages (apart from navigation), it was expected that this material was only accessed from within the university of Ulm and by a very specialized group of users. Statistics show the contrary.

While it is true that the majority of accesses can be traced back to German Internet-addresses (55.3%) and of unresolved host addresses (27.2%), even a certain, lower percentage of international users is seen (see Fig. 5). Surprisingly, there are data requests by US universities, US government addresses and by the research departments of the US department of defense (Arpanet).

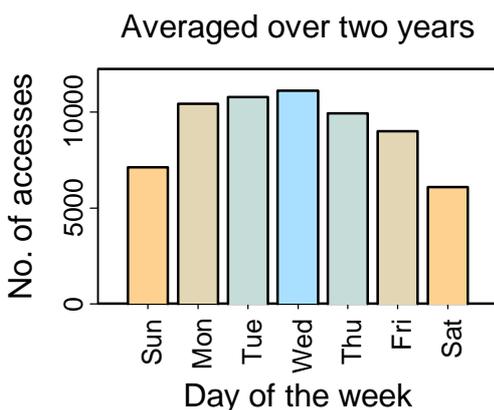


Figure 4: Number of accesses to the math pages vs. day of the week

In Fig. 4, the number of accesses to the math project is plotted versus the day of the week. It is not a surprise that on the weekend, there are fewer accesses than during the week. However, the fact that there are still about half of the number of

A closer look at the host computers that are requesting data shows an interesting aspect. Apart from the universities of Ulm and Nancy fairly many universities

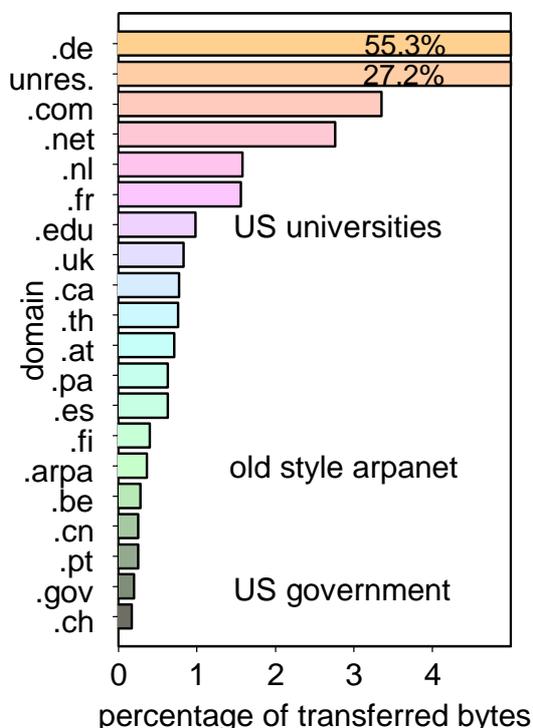


Figure 5: Number of accesses to the math pages vs. day of the week

make use of this material, e.g.

- FH Ravensburg-Weingarten, Germany
- University of Oulu, Finland
- University of Vigo, Spain
- ENST Bretagne, France
- Instituto Superior Técnico, Lisbon, Portugal

These and other universities have been cooperators in the INEIT-MUCON project that was granted by the EU [1]. Their access to the material is thus not surprising.

Other universities, e.g.

- TU Clausthal-Zellerfeld, Germany
- Uni Giessen, Germany
- TU Hannover, Germany
- Gesamthochschule Wuppertal, Germany
- FH Heilbronn, Germany
- University of Alberta, Canada

- University of British Columbia, Vancouver, Canada
- Shenzhen University (or other organization in Shenzhen), China
- Engineering College of Odense, Denmark
- University of Applied Sciences, Berne Institute of Engineering and Architecture, Switzerland

did not cooperate, but make use of the material. Until today, no response, request or annotation has come of these institutions. The author knows from one of the universities of applied sciences that the material is even used as substitute for a reference book.

Also companies and organizations are making use of the pages. Some of them are

- Alcatel, France
- Jet Propulsion Laboratory (JPL), NASA, USA
- Mentor Graphics, Wilsonville, OR, USA
- Nokia, Finland
- Philips Silicon Valley Center, USA
- Siemens, Germany
- Sycamore Networks, Chelmsford, MA, USA
- Technical Research Centre of Finland,

On the one side, since one of the aims of the European project INEIT-MUCON has been the dissemination of teaching material, the author is very satisfied with this result.

On the other side, a problem is coming to light. As soon as teaching material is put into the Internet without limitation of access, it will be used. Copyright aspects are then no longer controllable.

Concerning the accessing behavior of learners, there is an additional result seen from the statistics.

In Fig. 6, the number of accesses is shown versus the hour of the day. Surprisingly, a significant peak is seen around 8 am. Since German students mainly use these pages, it must thus be concluded that these students are most

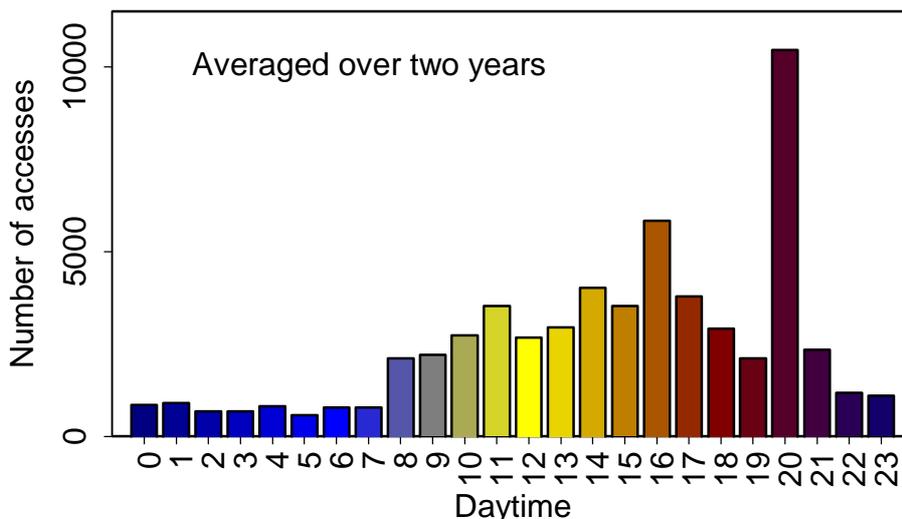


Figure 6: Number of accesses to the RF pages vs. daytime

likely to use the pages in the evening. The peak at 4pm is explained by the fact that this approximately the time when normal lectures are finished. Students take then the opportunity to use the PC pools at the university.

It is recalled that there was also a peak in the comparable diagram of the first project. However, this peak was not so significant. This can now be explained by the fact that many German users besides many learners from overseas had access to those pages.

is seen: most accesses occur on Saturday!

Overall, it appears as if students were most likely to visit these pages on Saturday evening at 8pm.

### 2.3 Browsers

It is often discussed whether to optimize HTML-pages only for one particular browser. Statistics on the identities of the browsers that were used to access the pages of both projects show that mainly Netscape and Microsoft browsers were used. Interestingly, for the RF pages the ratio was about 29:13 in favor of Netscape browsers while for the math pages the ratio was 31:21 in favor of Microsoft browsers. All other browsers including opera were significantly less used.

The consequence is thus that HTML-pages must be designed in a way that they are at least working for Microsoft and Netscape browsers. A closer look at the version numbers of the browsers shows that it is sufficient to optimize the pages for versions 4 and 5 of both browsers.

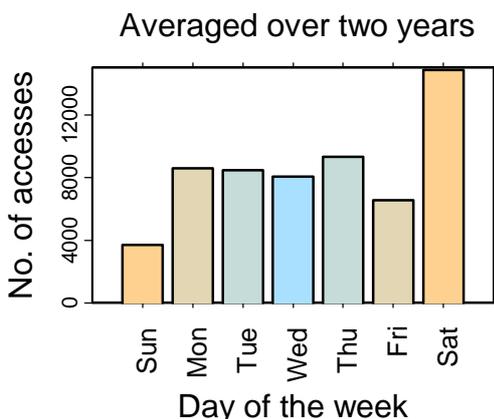


Figure 7: Number of accesses to the RF pages vs. day of the week

Fig. 7 shows the average number of accesses to the RF pages versus the day of the week. Again a surprising outcome

### 3. Conclusion

In summary, it is stated that the e-learning community accepts educational

material even with a low degree of interactivity, probably because there are not enough offers which are better adapted to the possibilities of the Internet.

Certainly, this is no reason to offer bad material in the Internet. But projects like the two that were described above, could be nuclei for improved offerings. They could support professional educators in learning how to generate e-learning material.

Therefore, all colleagues are encouraged to make available their learning material as HTML-pages to learners. This might well be the first step towards real computer supported learning. The second step ought then to include interactive problems in order that learners could test their comprehension.

Another interesting result is that one or two institutions from other universities seem to use the offered materials intensively as a material to teach their students without even giving the author of that material a note, which is regrettable, to say it that way, and without in turn to make available additional material to the public. It is perhaps because of the reasons that were given above. Maybe, these colleagues do not (yet) dare to offer their material because of being afraid to be criticized for lack of interactivity.

The author, therefore, appeals to any colleague to join the community of content providers in the Internet. A good opportunity to come into contact with colleagues having similar interests might be a cooperation in the European project THEIERE [5]. Jointly we are strong!

#### 4. Acknowledgments

The author would like to thank Dr. Frank Bögelsack for collecting the data concerning the described web pages.

#### References

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