

A PARTNERSHIP BETWEEN STUDENTS AND PROFESSOR FOR A NEW PATTERN OF LEARNING

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ABSTRACT

Considering the INTERNET a vast resource in the education area, not only for research purposes but to take part in it, the students enrolled at Eng 196 - Polymer Technology of the Chemical Engineering graduation course of Universidade Federal da Bahia, Brazil, were built a homepage over the learning matter - polymer, in some technical aspects. The experience was very profitable in multiple aspects, such as: the students interact in the INTERNET rather than browsing through it; the students got the habit of consulting the INTERNET, the professor experienced a new tool for teaching , the student-professor partnership for building and learning.

1. KNOWLEDGE UNLIMITED

The Internet is today a vast resource in the education area. Unlimited in space and time, easily accessible and non-expensive for most people, the Internet (a.k.a. "the Net") has become the largest and most efficient channel for knowledge, communication and information gathering or dissemination in the world. Through the World Wide Web (known as "www", or just "the Web" -- the graphic part of the Net), thousands of information cells become uncountable sources for research. Less attractive at first glance, the text-only discussion forums covering specific matters (the news groups) provide a more interactive access to information and leisure. Together, the graphical and multimedia-packed sites (in the Web) and the news groups (via e-mail or IRC) combine to form the Net, bringing instant access not only to information but also to on-site job-training, learning and leisure (in the chat groups).

With the possibility of bringing the Internet to the classroom open through a University connection,

not only for research purposes but to take an active part in it, the students enrolled at the subject ENG 196-POLYMER TECHNOLOGY of the Chemical Engineering graduation course of Universidade Federal da Bahia (UFBA) were challenged by the professor to build a home page over the learning matter, the polymer.

2. THE MAKING

In the beginning of the second semester of 1997, we discussed in class about the use of the Internet during the course. At that time, half of the students had had some experiences in the Net and knew how to use it; 25% had heard or read about it, while the other quarter ignored it. First it was proposed a training work about what exactly the Internet was and how it worked, so as to provide the students with some basic notions for browsing the web pages, the so called "navigation". The students then had training hours with the professor and used the computers of the Informatic Laboratory of the Chemical Engineering Department of the UFBA (LIDEQ) to work out the class hours. Quickly all the students got acquainted and excited with the resources of the Internet and moved to a navigation work in some educational sites over polymer, previously selected by the professor. This work consisted of getting to know about the sites (elaborated by universities all over the world) and making comments on their contents.

From that work resulted an increase in the number of the proposed sites, and the students soon started making some critical analysis of its subjects, by themselves, thus actually interacting in the Net, rather than simply using it as a mere source for researchs. Professor and students then concluded that it would be feasible and interesting to make a home-page over polymers, in its various topics.

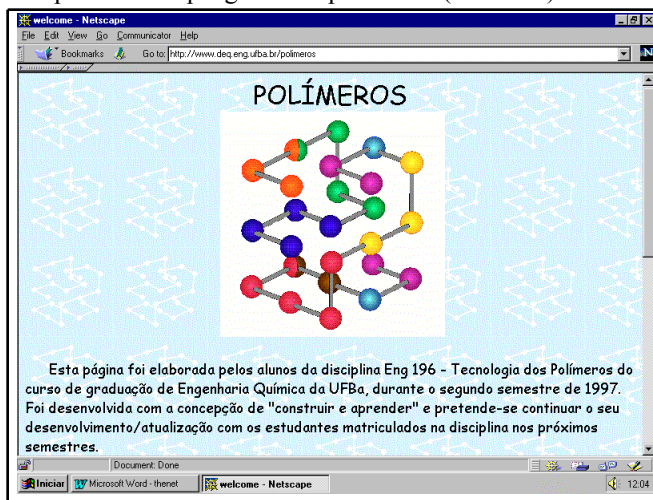
It was decided that the page's subjects would be researched and developed by the students, with guidelines supplied by the professor in each phase of the site building-process.

To aid the group as editorial assistant we invited an Informatic Monitor of the Chemical Engineering Department. During the last two months of the semester, the students researched and compiled the subjects to compose the site.

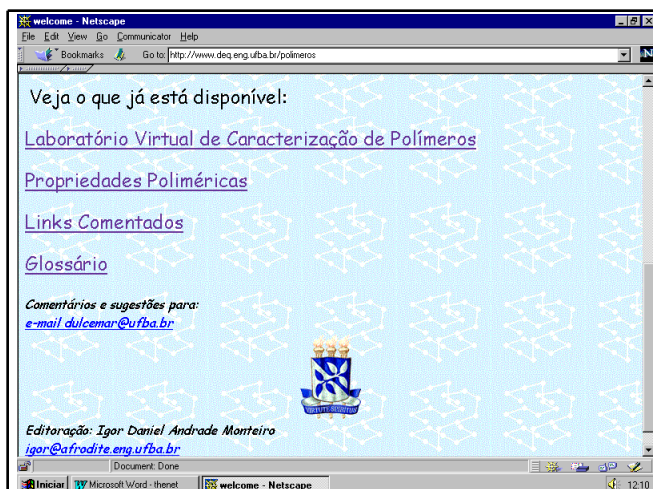
It was used the Netscape Gold editor, which we found easy to use. The language adopted was Portuguese as spoken in Brazil. All the site's pages show the author identification and the used references.

3. THE HOME-PAGE

The web address is <http://www.deq.eng.ufba.br/polimeros> (Picture 1).



The front page shows the site contents as following:

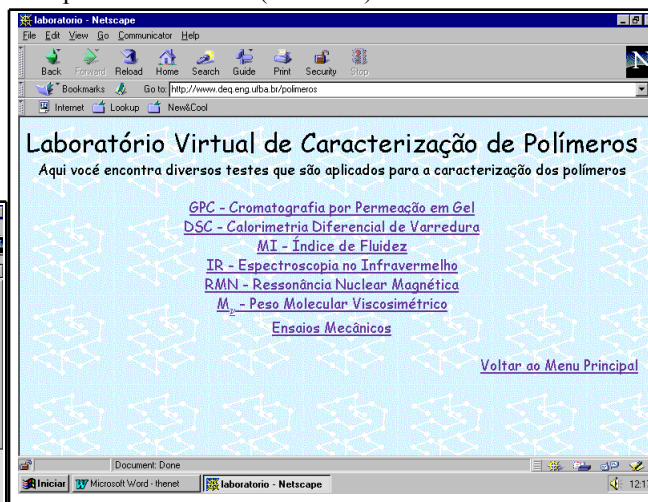


Picture 2 - The front page

3.1 Virtual Laboratory on Polymer Characterization

In our virtual lab, one can learn a lot about different useful tests usually applied on polymer characterization.

They are: gel permeation chromatography (GPC); viscosity molecular weight; infra-red spectroscopy (IR); nuclear magnetic resonance (NMR); melt index (MI); differential scanning calorimetry (DSC); mechanical tests such as tensile yield stress, hardness, impact strength, modulus of elasticity, compression tests etc. (Picture 3).



Picture 3 - Virtual Laboratory on Polymer Characterization

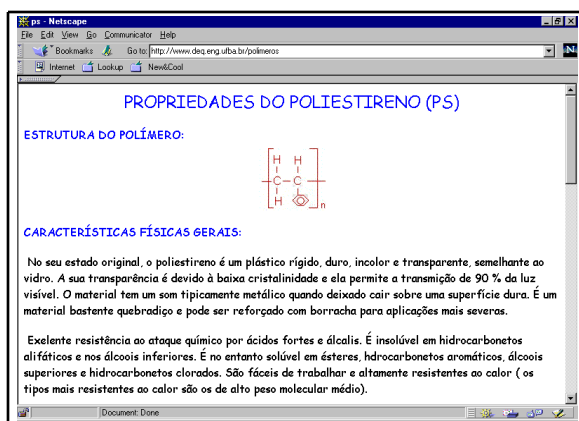
Here, one can find the test procedure, the theoretical basis, description of equipment and a list of the main equipment's producers. See Picture 4 as an example.



Picture 4 - The DSC test

3.2 Polymeric Properties

On this page, one can find the physical-chemical properties, the mechanical properties, the structures, general aspects of polymers, uses and the main Brazilian producers of the 7 following thermoplastics: polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), polyethylene terephthalate (PET), high-density polyethylene (HDPE), low-density polyethylene (LDPE) and linear low-density polyethylene (LLDPE). See Picture 5.1 and 5.2 as an example.



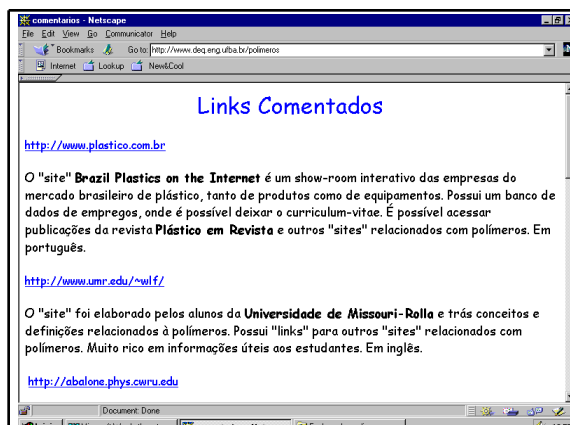
Propriedades	
Peso Molecular	150.000 - 400.000
Densidade (ASTM D 792-50)	1,05 - 1,07
Índice de Refração g/10min (DIN 53735 / ASTM D1238B)	1 - 30
Índice de Refração (ASTM D 542-50)	1,59
Temperatura de Transição Vítrea (T _g) °C	100
Temperatura de Fusão (T _m) °C	235
Temperatura de amolecimento °C (BS 1493-1958)	85 - 95
Tensão de Ruptura N/mm ² (ASTM D 638-56T)	28 - 53
Elongação % (ASTM D 638-56T)	1 - 2
Resistência ao Impacto (Izod) J (ASTM D 256-56)	0,25 - 2,5
Dureza Rockwell escala M (ASTM D 785-51)	65 - 80
Constante Dielétrica (BS 1493-1958)	2,45 - 2,70

USO:

Pictures 5.1 and 5.2 - Polystyrene Properties

3.3 Links Remarks

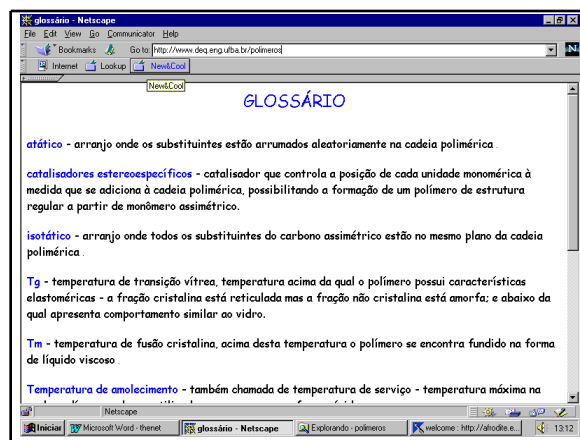
Our links give our visitors several web addresses about polymers together with a written note intended as a clear and succinct explanation about the links' contents. It is a result of a critical analysis made by the students as they surfed the Internet. It is time-saving and very useful, specially when one get a tedious list of web addresses without any references (Picture 6)



Picture 6 - Links Remarks

3.4 Glossary

During the home-page make-up one observed the need of including a glossary on the page, in order to make the texts clearer and more comprehensive to our visitors. The difficult or technical words were written in hypertext on the original text and then cross-linked on the glossary (Picture 7).



Picture 7 - Glossary

4.RESULTS

- The building and learning experience applied to a new resource (the Internet) proved profitable also to the professor, and the students now actually interact in the Internet, rather than simply browsing through it.
- A new resource (the home-page) is now available to provide technical information to the public in general and to people more directly concerned about polymers - the students themselves.
- Working in group was an enriching and exciting experience.

- The experience was pioneering in the Chemical Engineering Department of UFBA, and so it roused the interests of other professors in the Department over the possibility of application in other matters, thus stimulating a more frequent use of the Internet as an important learning tool in (and outside) the classrooms.
- The students got the habit of consulting the Internet in their studies and researches, reducing the difficulties of finding good (and updated) books at the UFBA Library.
- The professor experienced the practice of a new tool for teaching, able to rouse the student's interest on the subject taught (ENG 196 - POLYMER TECHNOLOGY).

5. CONCLUSIONS

Observing the positive answer from the participating students in the work and seeing the multiple possibilities opened with the construction of the home-page, it was decided to repeat the experience at each new semester with groups of new students who will be challenged to update, modify and amplify the original home-page. A translation of the page in the English language is also intended in order to make the information accessible for people around the world from the various search programs over the Net.

6. ACKNOWLEDGEMENTS

I would like to thank Elaine Isa de Santana, Márcio B. Pereira, Elizabeth Maier, George A.M. Ferreira and Igor Daniel Monteiro for their interest and help in preparing the home-page. I believe that it was very interesting and useful for all of us, strengthening the student-professor partnership for building and learning.

I would also like to thank Professor Néilson Pretto for his enthusiasm in new education resources as the Internet.