

Strategic and Collaborative Approach in Information Literacy applied in Engineering Teaching

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Abstract: This paper provides an overview of an information skills program integrated into the first year engineering subject "Documentation techniques". This is a problem based learning subject, which requires the students to work through and report on an engineering project. Over the past four years the program has transformed radically as a result of applying an action research framework which is primarily concerned with continual improvement and change in practice. Currently the information skills program consists of a student-led orientation tour, an integrated subject web page (developed using SEARCH AND WRITE tutorial).

Key words: engineering, information literacy, information resources, search strategies, search engines, invisible web.

1. Introduction

The anticipated learning outcomes of the information skills training are that the students can:

- use the library confidently and competently
- recognize the variety of information sources
- the importance of information in engineering practice

- evaluate the information found
- cite the information used
- engineering students have a heavy workload and it is important that the information skills program should be available at times and in places that best suit the students. This program also needs to be seen to be closely integrated with the academic content of the subject therefore a subject homepage was developed which contains information from the lecturers and the library. [1]

2. Elements in delivery of information literacy

Information literacy combines skills or competencies that together make for effective use of information. In an era of lifelong learning, this effectively means that information literacy has relevance for all ages from primary school to senior

citizens. Information literate people understand more than how to find information, they understand its limitations and the need to examine how they use information, and they understand how to manage and communicate information.

Perhaps the most recent alternative definition to the one offered here by CILIP is that originating in the UNESCO-sponsored Meeting of Experts on Information Literacy in Prague:

"Information Literacy encompasses knowledge of one's information concerns and needs, and the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address issues or problems at hand; it is a prerequisite for participating effectively in the Information Society, and is part of the basic human right of life long learning." (US National Commission on Library and Information Science, 2003) [4]

"Information literacy is an understanding and set of abilities enabling individuals to 'recognise when information is needed and have the capacity to locate, evaluate, and use effectively the needed information'." (CAUL, 2004). [4]

3. Information literacy and higher engineering education

Developing lifelong learners is central to the mission of higher education institutions. By ensuring that individuals have the intellectual abilities of reasoning and critical thinking, and by helping them construct a framework for learning how to learn, colleges and universities provide the foundation for continued growth throughout their careers, as well as in their roles as informed citizens and members of communities. Information literacy is a key component of, and contributor to, lifelong learning. [6]. Information literacy competency extends learning beyond formal classroom settings and provides practice with self-directed investigations as individuals move into internships, first professional positions, and increasing responsibilities in all arenas of life. Incorporating information literacy across curricula, in all programs and services, and throughout the administrative life of the university, requires the collaborative efforts of faculty, librarians, and administrators. Information literacy is increasingly important in the contemporary environment of rapid technological change and proliferating information resources. In light of the above-mentioned competencies, the present article envisages to present the programs developed at “Transilvania” University Library and provided for the students *SEARCH AND WRITE TUTORIAL*.

4. “Transilvania” University of Brasov-model of engineering learning *SEARCH AND WRITE TUTORIAL*

Search and write tutorial is one online teaching model. The web pages of tutorial are presented below, every theoretical page have practical exercises.[7]

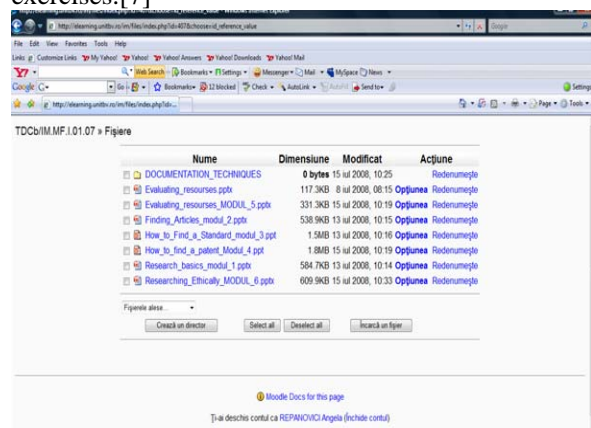


Fig.1 E-learning platform

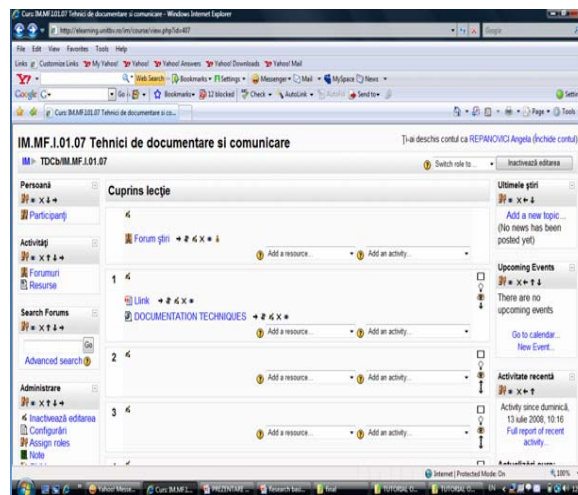


Fig.2 Documentation techniques course

Course 1: RESEARCH BASICS

- There are a number of ways to find reliable information sources:
 - Books which have been added to the library's collection have generally been evaluated by a librarian;
 - Articles published in peer-reviewed journals have been evaluated by other researchers;
 - Web pages recommended by a librarian have been evaluated for authenticity and reliability;
 - Web pages published by governments or organizations have the weight of the organization behind it;
 - Asking some simple questions about the source can help you evaluate its reliability;[5]

Recommendations:

- Use our subject guides the librarians have created subject guides for all disciplines by selecting and evaluating the most useful databases, web sites, journals & other resources <http://www.unitbv.ro>
- Use peer-reviewed journal articles;
- Use the library's scholarly databases to find articles that have been evaluated by experts in the field before being published. You can get database suggestions from the subject guides above or go to the databases page <http://www.unitbv.ro/biblioteca>;
- search techniques you can do more successful searches by using the search techniques
 - "phrase searching"
 - "truncation *?,"
 - boolean and, or, not

A domain search allows you to limit your search to web sites with a specific domain such as .ro (Romanian sites), .edu (educational institutions), or .gov (government sites).

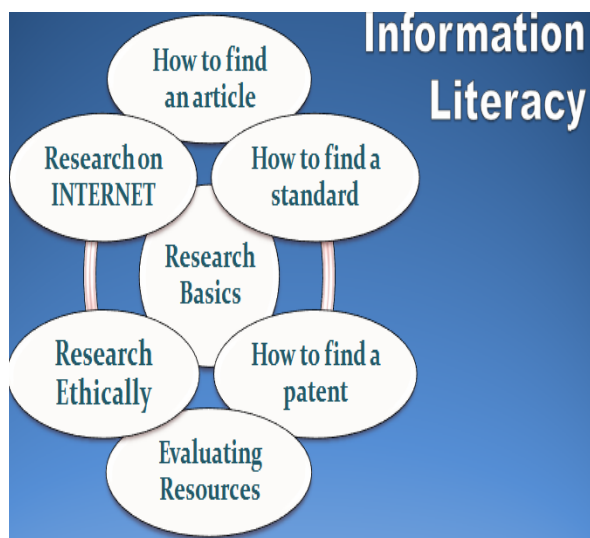


Fig.3 Information Literacy courses

Course 2: EVALUATION OF RESOURCES

Anything can and will be published on the Web, so critical evaluation skills are essential to determine the value of the information before you use it in your research.[3]

There are six criteria to consider when evaluating a web site:

authority

- is it clear who created the web site?
- is there contact information?
- are the authors qualifications and credentials stated?
- is the site supported by an organization?

currency

- is it clear when the information was last updated?
- are the links up-to-date?

accuracy

- how reliable is the information?
- are references given for statistical data?
- is the information comparable to other sites on the same topic?
- is a bibliography or reference list included?

coverage

- are topics explored in depth?
- is there substantial original information or only links to other sites?
- is the site selective or comprehensive?

objectivity

- is the information presented with a particular bias?
- is the site trying to explain, inform, persuade or sell?
- is there advertising which might indicate a conflict of interest?

purpose

- What is the purpose of the site and does the content support it?
- Is the information geared toward a specific audience (scholars, general reader)?
- Is the site well organized and focussed?
- Are the links appropriate for the site?

Course 3: SEARCHING OPAC LIBRARY

Select your topic [7]

- a good topic should be interesting, controversial, current or familiar
- state it as a question
- do preliminary research - textbook, reference book

Define the key concepts and terms

- identify two or three important words
- consider alternative spellings and synonyms

Determine how much detail you require

- specific or general
- quantitative or narrative
- recent or historical

Determine what type of information you need

- facts and figures
- review or survey
- discussion of event
- analysis

Determine which information sources to use

- books, bibliographies, government documents - review or survey
- periodicals, journals, magazines - analysis
- news reports, TV, radio, newspapers - discussion of an event
- statistics - facts and figures

Locate the information sources

- books, bibliographies, government documents
- look in the LIBERTY online catalogue
- periodicals, journals, magazines
- search a periodical database such as Research Library
- news reports
- search a newspaper database such as Virtual News
- statistics
- search a statistical database such as E-Stat;

Course 4: FINDING ARTICLES

What is a journal?

A journal is an on-going publication which may be issued weekly, monthly, quarterly, yearly, etc. and may also be called a periodical or a serial.

Why should I use a journal article?

currency - usually contains the most recent information on a topic

validity - read and reviewed by experts in the field before being published

authority - written by experts for professionals, academics, and/or scholars

detail - topics are usually discussed in depth

What are the types of periodicals?

- scholarly
- publish the results of original research done by professional scholars and
- evaluated by other experts in the field (peer-reviewed)
- popular
- usually called magazines and written by journalists for the general public
- trade
- written by professional organizations for people in a particular profession

Course 5: RESEARCH ETHICALLY

"Transilvania University defines plagiarism as the presentation of the work of another author in such a way as to give one's reader reason to think it to be one's own. Plagiarism is a form of academic fraud.

Plagiarism is considered a serious academic offence which may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree.

In its grossest form plagiarism includes the use of a paper purchased from a commercial research corporation, or prepared by any person other than the individual claiming to be the author."

Examples of Plagiarism

- taking a phrase from a book without placing it in quotations
- copying information from any sources including the Internet and classmates
- using work that you have already received credit for
- failure to properly use footnotes and other citation methods;

Paraphrasing

Learn how to paraphrase so that you avoid copying an idea word for word. Restating the idea in your own words will help you understand the concept and avoid plagiarism at the same time. Use the following steps:

- Reread original passage to understand full meaning
- Restate the passage in your own words
- Avoid borrowing language
- Make sure you accurately express all the essential information in a new form
- Use quotation marks

- Record source
- Cite source in your text.

CITATION

Citations are an important form of scholarly communication. They formalize the origin of ideas and concepts so that anyone can trace the development of the research on a subject.

They provide enough information for any interested person to access the same research for further study.

A citation provides all of the essential information needed by anyone to locate a copy of the book if they wish to. A citation does not include a library call number because the reader of a term paper or article will not necessarily be in the same institution as the writer. The following citations are in the MLA style:

Course 6: STANDARDS AND PATENTS

STANDARDS

WHAT IS A STANDARD?

A standard is a requirement established by user consensus that prescribes the best criteria for a product, process, test, or procedure. It provides safety, quality, interchangeability of parts or systems, and consistency across international borders.

FIND A STANDARD

There are three ways to locate standards:

FULL-TEXT ACCESS

- IEEE Standards: <http://ieeexplore.ieee.org>
- Military Standards: <http://dodssp.daps.dla.mil>

UNIVERSITY OPAC

- For standard documents that are not available online search for the print version OPAC

- Search for the standard title in the **Title** field OR for the standard number in the **Call Number** field. If you do not have the standard title or number, you can find this information using Global Engineering Documents (outlined above).

- To browse the titles we have from a specific standards agency, search for the standards agency name in the **Author** field.

- Standards are shelved alpha-numerically in the **Standards** section by Agency Number (e.g. ISO 9241 1998). Some standards can be borrowed for a period of three hours while others are available in-library only.

DOCUMENT DELIVERY

- Request a copy of a standard that is not available in the University Library collections through Document Delivery. A paper version of the document delivery form is available at the Free access collections

CHOOSE AN INDEX

GLOBAL ENGINEERING DOCUMENTS

<http://global.ihs.com>

This service indexes national, international and industry standards. Use keywords to identify standards or search for known ones to find currency and prices.

API (AMERICAN PETROLEUM INSTITUTE) STANDARDS

<https://login.ihserc.com/login/erc>

API Standards database indexes approximately 550 technical standards for petroleum engineers.

THOMSON TECHSTREET

<http://www.techstreet.com>

Thomson Techstreet indexes national, international and industry standards, and highlights New Standards and Codes directly from the Start Page. You can search for specific terms or browse by organization (e.g. IEEE, CSA, etc).

STANDARDS WRITING ORGANIZATIONS

Most Standards Writing Organizations (ANSI, ISO, ASHRAE for example) maintain indexes to their own standards at their web sites. Remember to check Sexton's collection before ordering a standard.

A COMPREHENSIVE LIST OF THESE SITES IS AVAILABLE AT:

http://www.ansi.org/internet_resources/overview/overview.aspx?menuid=12

PATENTS

What Is A Patent?

Used to legally identify the owner of an intellectual property. An intellectual property consists of inventions, artistic expressions and other products of the imagination Source: Intellectual Property (IP). Glossary: Pew Initiative on Food and Biotechnology. Retrieved May 9, 2007, from

<http://pewagbiotech.org/resources/glossary/>

Why Are Patents Important?

Patents legally identify inventions as belonging to the inventor. Patents are thus useful if:

- You have invented something and want to make sure no one steals your idea.
- To make sure your own idea is original- that is, no one else has already invented it.

Obtaining A Patent

Some patents are available on the Web. Order others through our Document Delivery Service. Patents are not collected by University Library..

Directory of Intellectual Property Offices

Available at:

<http://www.OMPI.int/directory/en/urls.jsp>

Browse a comprehensive list of international patent offices to find their web sites and/or contact information.

Search for a European Patent

<http://ep.espacenet.com>

European patent applications (with page images) published over the last 24 months. For patents older than 24 months select the *Worldwide Database* option in the drop down menu.

Search for an American Patent (1976-Present)

<http://www.uspto.gov/patft/index.html>

Full text of United States patents. Updated weekly this site contains the full text and page images for each patent.

GOOGLE PATENTS

<http://www.google.com/patents>

Full text of U.S. patents. Updated weekly this site contains the full text and page images for each patent. [9]

Course 7: INTERNET SEARCH [8]

Modul VII: SCHOLARY INFORMATION



Fig. 4 Scholarly information course

Table 1

YOUR TOPIC'S FEATURES:	<u>Search Engines</u>	<u>Subject Directories</u>	<u>Specialized Databases</u>	<u>Find an Expert</u>	LUCK
Distinctive or word or phrase?	Enclose phrases in " ". Test run your word or phrase in <u>Google</u> .	Search the broader concept, what your term is "about."			
NO distinctive words or phrases?	Use more than one term or phrase in " " to get fewer results.	Try to find distinctive terms in <u>Subject Directories</u>	Want data? Facts? Statistics? All of something? One of many like things? Schedules? Maps? Look for a specialized database or webpage, or <u>Custom Search Engine</u> on your topic.	Look for a <u>specialized subject directory</u> on your topic. Find a society or organization on your topic and look at their links. E-mail the author of a good page you find. Find a <u>discussion group</u> or <u>blog</u> . It never hurts to seek help.	Fortune favors the bold! Keep your mind open. Learn as you search.
Seek an overview?	NOT RECOMMENDED	Look for a specialized <u>Subject Directory</u> focused on your topic			
Narrow aspect of broad or common topic?	Boolean searching as in <u>Yahoo! Search</u> .	Look for a Directory focused on the broad subject.			
Synonyms, equivalent terms, variants	Choose search engines with Boolean <u>OR</u> , or <u>Truncation</u> , or <u>Field limiting</u> .	NOT RECOMMENDED			
Confused? Need more information?	NOT RECOMMENDED	Try an <u>encyclopaedia</u> to learn basic concepts and keywords. For personalized help, <u>ask a librarian</u> .			

Search Tools:

Search engines have become somewhat standardized, allowing us to use some common search techniques in all of them:

Table 2

Things You CAN Do in Google, Yahoo!, and Ask.com	Things NOT Supported in Google, Yahoo!, or Ask.com
<ul style="list-style-type: none"> • Phrase Searching by enclosing terms in double quotes • OR searching with capitalized OR • - excludes, + requires exact form of word • Limit results by language in Advanced Search 	<ul style="list-style-type: none"> • Truncation - use OR searches for variants (airline OR airlines) • Case sensitivity capitalization does not matter

Some Ways the Recommended Search Engines Differ:

Table 3

Search Engine	Google www.google.com	Yahoo! Search search.yahoo.com	Ask.com www.ask.com
Links to help	Google help	Yahoo! help	Ask.com help
Size, type See tests and more charts .	HUGE. Size not disclosed in any way that allows comparison. Probably the biggest.	HUGE. Claims over 20 billion total "web objects."	LARGE. Claims to have 2 billion fully indexed, searchable pages.
Noteworthy features	Popularity ranking using PageRank™ emphasizes pages most heavily linked from other pages. Many additional databases including Book Search, Scholar (journal articles), Blog Search, Patents, Images, etc.	Shortcuts give quick access to dictionary, synonyms, patents, traffic, stocks, encyclopedia, and more.	Subject-Specific Popularity™ ranking. Suggests broader and narrower terms. AskEraser privacy option.
Boolean logic (what's this?)	Partial. AND assumed between words. Capitalize OR. () accepted but not required. In Advanced Search , partial Boolean available in boxes.	Accepts AND, OR, NOT or AND NOT. <i>Must be capitalized.</i> () accepted but not required.	Partial. AND assumed between words. Capitalize OR. - excludes. No () or nesting .
+Requires/ - Excludes (what's this?)	- excludes + will allow you to retrieve " stop words " (e.g., +in)	- excludes + will allow you to search common words: "+in truth"	- excludes + will allow you to retrieve " stop words " (e.g., +in)
Sub-Searching (what's this?)	The search box at the top of the results page shows your current search. Modify this (e.g., add more terms at the end.)	The search box at the top of the results page shows your current search. Modify this (e.g., add more terms at the end.)	The search box at the top of the results page shows your current search. Modify this (e.g., add more terms at the end.)
Results Ranking (what's this?)	Based on page popularity measured in links to it from other pages: high rank if a lot of other pages link to it. Fuzzy AND also invoked. Matching and ranking based on "cached" version of pages that may not be the most recent version.	Automatic Fuzzy AND .	Based on Subject-Specific Popularity™, links to a page by related pages.
Field limiting (what's this?)	link: site: intitle: inurl: Offers U.S.Gov't Search and other special searches . Patent search.	link: site: intitle: inurl: url: hostname:	intitle: inurl: site: last:[time period] (Details)
Truncation, Stemming (what's this?)	No truncation. Stems some words. Search variant endings and synonyms separately, separating with OR (capitalized): <i>airline OR airlines</i>	Neither. Search with OR as in Google.	Neither. Search with OR as in Google.
Language	Yes. Major Romanized and non-Romanized languages in Advanced Search .	Yes. Major Romanized and non-Romanized languages.	Yes. Major Romanized languages. Use Advanced Search to limit.
Translation	Yes, in Translate this page link following some pages. To and sometimes from English and major European languages and Chinese, Japanese, Korean. Ues its own translation software with user feedback.	Yes.	No.

Subjects directories: Table comparing some of the best human-selected collections of web pages: [10]

Table 4

Web Directories	<u>Librarians' Internet Index</u> www.lii.org	<u>Infomine</u> infomine.ucr.edu	<u>About.com</u> www.about.com	<u>Google Directory</u> directory.google.com	<u>Yahoo!</u> dir.yahoo.com
Size, type	Over 20,000. Compiled by public librarians. Highest quality sites only. Great, reliable annotations.	Over 125,000. Great, reliable annotations. Compiled by academic librarians from the University of California and elsewhere.	Over 2 million. Generally good annotations done by "Guides" with various levels of expertise.	About 5 million. Selected by the <u>Open Directory Project</u> and enhanced by Google searching and ranking. Often useful to find "better" results, especially on broad or widely covered topics.	About 4 million. Very short descriptions. Often useful, especially for popular and commercial topics.
Phrase searching <u>(what's this?)</u>	Yes. Use " "	Yes. Use " " term term requires exact match	Yes. Use " "	Yes. Use " "	Yes. Use " "
Boolean logic <u>(what's this?)</u>	AND implied between words. Also accepts OR and NOT, and ().	AND implied between words. Also accepts OR, NOT, and ().	No.	OR, capitalized, as in Google's web <u>search engine</u> .	Yes, as in Yahoo! Search web <u>search engine</u> .
Truncation <u>(what's this?)</u>	Use *. Also stems. Can turn off stemming ("fuzzy search") on <u>Advanced Search</u> page.	Use *. Also stems. Can turn stemming off. Use " " or to search exact terms.	Use *. Not accepted consistently.	No.	No.
Field searching	<u>Advanced Search</u> allows <u>Boolean</u> searching within subject, titles, description, parts of URLs, and more.	Select options under search box to limit to Author, Title, Subject, Keyword, Description, various subject categories, and more.	No.	Same as in Google's web <u>search engine</u> .	As in Yahoo! Search web <u>search engine</u> .


Meta-search engines: Use at your own risk: not recommended as an alternative to directly using search engines:
Better Meta-Searchers:

Table 5

Meta-Search Tool	What's Searched (As of date at bottom of page. They change often.)	Complex Search Ability	Results Display
Clusty clusty.com	Currently searches a number of free , search engines and directories, not Google or Yahoo.	Accepts and "translates" complex searches with Boolean operators and field limiting.	Results accompanied with subject subdivisions based on words in search results, intended to give the major themes. Click on these to search within results on each theme.
Dogpile www.dogpile.com	Searches Google, Yahoo, LookSmart, Ask.com, MSN search, and more. Sites that have purchased ranking and inclusion are blended in. Watch for Sponsored by... links below search results.	Accepts Boolean logic, especially in advanced search modes.	

Meta-Search Engines for SERIOUS Deep Digging:

Table 6

Meta-Search Tool	What's Searched (As of date at bottom of page. They change often.)	Complex Search Ability	Results Display
SurfWax www.surfwax.com	A better than average set of search engines. Can mix with educational, US Govt tools, and news sources, or many other categories.	Accepts " ", +/- . Default is AND between words. I recommend fairly simple searches, allowing SurfWax's SiteSnaps and other features to help you dig deeply into results.	Click on source link to view complete search results there. Click on  to view helpful "SiteSnap™" extracted from most sites in frame on right. <i>Many additional features for probing within a site.</i>
Copernic Agent www.copernic.com	Select from list of search engines by clicking the Properties button following Advanced Search search box.		

- **Invisible or deep web:** What it is, how to find it, and its inherent ambiguity (searchable databases on the Web). There are still some hurdles search engine crawlers cannot leap. Here are some examples of material that remains hidden from general search engines:

- **The Contents of Searchable Databases.** Most of the invisible web is made up of the contents of thousands of specialized searchable databases (library catalogs, article databases, etc.). When you search in one of these, the results are generated "on the fly" in answer to your search. Because the crawler programs cannot type or think, they cannot enter passwords on a login screen or keywords in a search box. Thus, these databases must be searched

separately.

- **A special case:** Google Scholar is part of the public or visible web. It contains citations to journal articles and other publications, with links to publishers or other sources where one can try to access the full text of the items. This is convenient, but results in Google Scholar are only a small fraction of all the scholarly publications that exist online. Much more - including most of the full text - is available through article databases that are part of the invisible web.

- **Excluded Pages.** Search engine companies exclude some types of pages by policy, to avoid cluttering their databases with unwanted content.

- **Dynamically generated pages of little value**

beyond single use. Think of the billions of possible web pages generated by searches for books in library catalogs, public-record databases, etc. Each of these is created in response to a specific need. Search engines do not want all these pages in their web databases, since they generally are not of broad interest.

• **Pages deliberately excluded by their owners.** A web page creator who does not want his/her page showing up in search engines can insert special "meta tags" that will not display on the screen, but will cause most search engines' crawlers to avoid the page. [11]



Fig.5 Scholar web

5. Conclusions:

Quality education implies the acquirement of professional skills in the shortest time and at the highest level. As for higher education, in order to achieve these desiderata, individual study and continuing education are constituents based on information literacy. The information literacy implies joint efforts of the Faculty, Library and Administration.

Engineering students all over the world are progress factors and they are eager to master the fields of specialization, of high skills and knowledge.

Finally:

- We need to know the students behaviour and their needs and expectations for them to become life long learners

- INTERNET develops tools in such high rhythm that we need to have research of students patterns often
- Due to the web space as space of the collaboration and to the fact that they all belong to the generation of the new technologies.

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