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Educational Experiences in Informatics: Innovations in Internet Searches in Academic Environments

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Abstract. This paper presents innovative experiences in the way of teaching to search information of academic style in Internet to first year students, of the UNRN (Andina headquarters) where Informatics is a transversal topic to their careers. Since 2013 in the Workshop on Informatics a group of teachers inquiries about innovate the way how students make Internet information searches on the academic section, trying that they acquire the ability and the criteria to potentiate their searches, to value their results and to give meaning to the iterative cycle of conformation of correct search keywords, trying this to be useful in the development of their performance as students and later as professionals. We will discuss the methodological recommendations that are offered, the types of tasks and guidelines with which it is tried to innovate the search of information in Internet in academic environments, and the obtained results since 2016.

Keywords: search information of academic style in Internet, higher education, learning, collaborative environment, b-learning.

1 Introduction

Internet information searches in traditional academic settings such as the university are exercises in which students have to collect information about a particular topic or a particular subject without an immediate and conscious construction of knowledge in the act.

In the Informatics and ICT Workshop, which has as its main characteristic its great practical load, it is worked so that students acquire skills and abilities in the management and use of an isolated or networked computer system for educational purposes.

As a result of the socio-cultural reality of the region, our students are mostly the first generation of university students of their families to whom we try to insert as active participants in the information and knowledge society, respecting the project of each of them, emerging from different contexts and responding to different perceptions and expectations [1], and taking in mind the type of group to which they

belong (older adults, adults, young people and students with completed higher education) [2]. Then, it is an interesting challenge for teachers to inquire more about how much of the knowledge provided in the courses is assimilated by our students in college.

If we wish to improve the quality of our students' research results in the academic field, we must take into account that the evolution of information technologies poses new challenges to education, because in the future the acquisition and organization of information it will become in the vital activity that dominate a good part of the population [3]. Therefore continue teaching to look for information as we were doing before the development of web 2.0 and web 3.0 would become a bad practice.

Also, it is interesting to use some innovative strategy in didactic for the teaching of subjects oriented to the TICs, trying to "humanize" the teaching of the contents of Informatics, which would allow approach the students in the understanding of the phenomena, in a more simple, complete and realistic form [4].

The Internet represents a significant and indispensable tool for the agile search for academic and scientific information that teachers and students must take advantage of, which imposes a rethinking, reflection and questioning of contexts for learning in the field of higher education [5].

There are studies that analyze the relationship between cognitive style and academic achievement in which, for example, issues that bring ICTs, field independence and learning achievement are addressed. And in research involving university students who searched information in databases with a hypermedia structure, the results showed that the independent students of the fields used the tools autonomously, while the dependent students of the field needed social assistance [6]. That is, if there is a background in which ICTs are used in relation to the search for information and academic achievement, from the classroom we can make our contribution so that the learning of internet searches is productive and allows our students to enrich their learning process so that they value the possibility of learning to learn.

1.1 Motivation

The importance of this research is based on the search for quantifications and recommendations on the subject in the UNRN. Even though there are similar studies with specific courses, this research is justified in the university teaching by the interdisciplinarity of the students of the same course, where Informatics and ICTs are a transversal subject, and the interest of the chair to implement experiences where incorporate innovations in the way of looking for information of academic style realized by the contemporary university students, whom we will call university students 3.0.

The strengths of this experience may be the commitment of the coordinator and of the teachers of the Informatics and ICTs workshop, as well as the good reception of the study among the students of the Workshop. And the weakness detected lies in the quality of the internet connection, with a deficient service in both the wireless connection and the wired connection; this despite the good will and predisposition of the technical team that maintains the resources of the Informatics Laboratory, which is beyond the conditions of study that teachers can propose and control.

1.2 Context

This research is framed within the set of tasks that the members of the Information Exploitation Research Group carry out as research teachers, who try to improve the educational level in Information Technology and ICTs. The presented analysis involves students of the Schools of Humanities and Social Studies; Production Technology and Environment; and of Economy, Administration and Tourism; and to the teachers of the Workshop on Informatics and ICTs of the Andina Headquarters of Bariloche and El Bolsón.

The axes of the present investigation are:

- Internet searches in academic environments
- The use of collaborative work environments in university courses
- Assessment methods in computer science and university ICT workshops when students use Web-based work environments.

Among the software tools used in the workshop on Informatics and ICT are:

- A **Virtual Platform in Moodle**, where teachers organize and store all course material including practical activities, homeworks delivery time, evaluation dates, and qualifications. It is a useful tool for students that cannot attend the class for some special reason (health, labor, or climatic factors) and for one or very few days.
- **Google's collaborative environment** with its applications, especially the Google Docs with their word processor, spreadsheet, and digital presentations generator.
- **Local free software applications** installed in the computer lab of UNRN over the Linux Ubuntu operating system, like LibreOffice and Firefox.

1.3 Objectives

Some of the questions that guide this research are: *How do the students who enter the university seek information? How do ICT help university students in their academic production? Are varied the search engines that students use? How much does help to the process of learning IT and ICT the search for information in academic environments? Do help internet searches to university students for their continuous training?*

The objectives of the present investigation are:

- Minimize student dropout from the Informatics and ICT Workshop
- That students be learn and use different Internet search tools and familiarize themselves with web-based work tools to improve academic production
- That the assessment of knowledge acquired in the workshop be reflect the ability of students to use learned techniques.

We will focus on the teaching of Informatics and ICTs in the university with students of different careers, and in its relation with the school performance applying the b-learning modality for the accomplishment of group works for integrate knowledge, and mainly in the search of information and including contextualized

searches for students of each career in an exam of Informatics and ICTs, to which the notions of Copyright, Copyleft and Creative Commons are associated, and lastly, the answers are analyzed to reveal a consummate learning associated with knowledge theoretical practical of Informatics and ICTs, or not.

2 Description of Experience

This experience consists of:

- Teach to formulate a search strategy, that includes:
 - Selecting a correct search source
 - Selecting search keys relevant to the topic to be searched
 - Defining a strategy based on operators and/or filters by gathering at least three search keys
 - Evaluate the results of the search
 - Redesign the strategy and return to the selection of the search keys
 - Finally store the results of the searches and information about how to quote those results.
- Teaching to make internet searches through the different types of search engines that students can find and use (i.e. search engines for common search, metasearch, visual search, specific search, semantic search, and resource directories), going from text keys to image keys.
- Propose some examples in class where the students should to solve short problems of internet searches combined with writing exercises using Google's collaborative word processor and applying the technics learned with the known search engines that best fit each problem.
- To design an assessment that contains internet searches using keywords related to the career of each student. This means that the teacher should think about and should stay reported on topics that appear in scientific articles, technical manuals, technical reports, or other academic or professional recognition publications, preferably with reference. Such keywords should be known or understood by first-year college students.
- The assessment must combine some questions of traditional exams where the answer depends of the study and reasoning of the student, with some innovative questions with answers that are not deterministic and can vary from one student to another.

3 Preliminary Results

Since the incorporation of the use of collaborative environments, of a virtual platform, and of the implementation of this new form of internet search in the Workshop of Informatics and ICTs, in the year 2016 were generated around 6 integrator works by course in the headquarters Andina Bariloche, and the dropout rate of 4 students per year was maintained on the highest dropout course.

In two commissions in which this new way of searching for information was applied, one student couldn't promoted the workshop with a grade equal to or greater than seven (7) and none of them disapproved the course.

The question about traditional searches in the evaluation, ask to mark True options in 30% of the evaluation, and to write definitions and examples in a 10%. The search questions that we will call innovators are those that by using two search engines available, and three contextualized keywords to each of the careers of the students of the course (given by the teacher), complete two rows of a table with the addresses of sites or pages that contain material with all of those keywords and which are licensed by Copyright, Copyleft and Creative Commons respectively.

We will comment on the experience carried out in two commissions of School of Production in headquarter Andina Bariloche, with 23 students in total, each one of which was separated into two groups to carry out the evaluation (due to the computers availability and times preference) for two hours.

To this first question considered innovative: *Using a pair of available search engines complete the table with the first two "useful" sites marked with Copyright license, two with Copyleft and two with Creative Commons*, they were associated three assigned search keywords according the careers of the students, as it is shown in Table 1.

Table 1. Internet search keywords assigned by career.

Career	Keywords		
Nursery Technician (TEVI)	Nurseries	Patagonia	bulbs
Chemistry Teacher (PQUI)	chemistry	teaching	molecules
Physics Teacher (PFIS)	Physics	optics	lenses

For the searches of TEVI the correct answers that are expected are two with Copyright and with Creative Commons, and none with Copyleft; and for PQUI and PFIS searches the correct expected answers are two with each type of license.

The number of students who answered without error the results with the Copyright license was almost the double of the results with the Creative Commons license and the results with the Copyleft license (Fig. 1). A similar relation it is verified between the answers with one error for the Copyright license and the Creative Commons license versus the Copyleft license (Fig. 2). And finally, those students who answered incorrectly the two questions of Copyleft were 14 and of Creative Commons were 6. None of the students have had two wrong answers for results with Copyright license.

The second question considered innovative it is: *Provide a list of at least two Application Software that you believe could be useful to you in your professional activity after your graduation, with type license CC-BY-NC and indicate it the career you are studying and ¿what for do you believe you would use them?*

The students who answered correctly to this question were 4, answered fifty percent correct 10 students, less than fifty percent 5 and totally incorrect 4. The category of less than fifty percent corresponds to the answers that show a correct explanation about the type of application software selected and the use the student think for it but couldn't identify an application by name (i.e. word processor or

spreadsheet). The distribution of the answers of TEVI, PQUI and PFIS for this second innovative question it is shown in the Fig. 3.

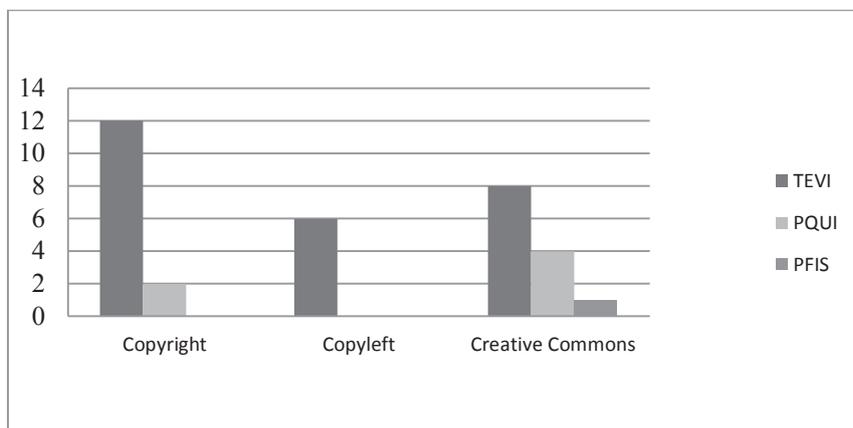


Fig. 1. Answers to the First Innovative Question without errors

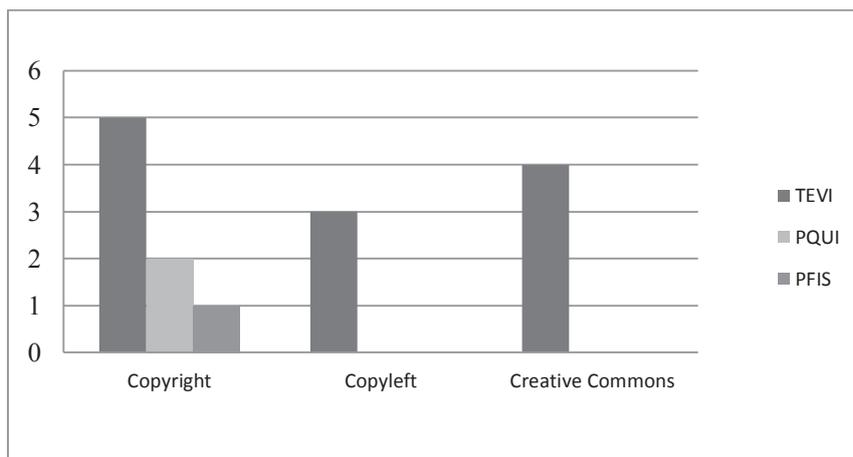


Fig. 2. Answers to the First Innovative Question with one error

The third question considered innovative it is: *Choose a search engine (record your choice in this evaluation) and use it for information about "the benefits of informatics knowledge in college". Perform three (3) iterations and list the first 5 results (your links and names) you obtained on each iteration. Explain what changes you make between one iteration and the next. Select the best result obtained.*

This last question was added to a subgroup of the students since the first semester of 2017 looking for new ways to investigate how complete it is the knowledge of our students about the searching process when they must to perform some internet search of academic type refining the searching key, and this will be measured and analyzed at the end of this year or early next year.

It is important to keep in mind that to these innovative questions there is associated another traditional question in the same assessment (*Define Copyright and Copyleft on the web, and explain their differences*), so that the student can demonstrate his knowledge about the topics Copyright, Copyleft and Creative Commons. Then with the internet search the student would finish demonstrating the understanding of both topics and could gain knowledge about available sites and resources with information related to his career.

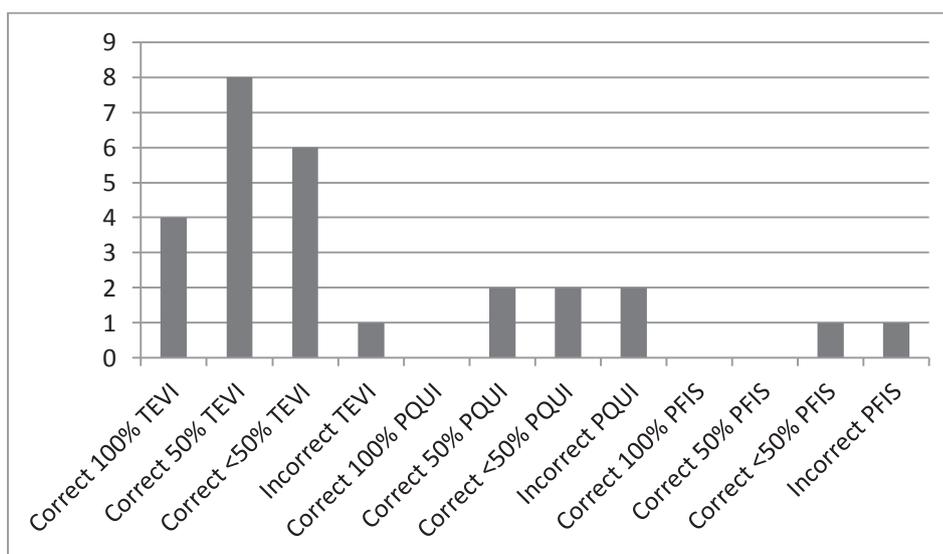


Fig. 3. Answers to the Second Innovative Question

4 Conclusions

It is observed that the searches performed by students with ordinary search engines for academic topics do not generate too many disadvantages when the result is licensed by Copyright; without going too deeply into the quality of the content. On the contrary, finding results with a Creative Commons license it present them with some degree of difficulty, and they find it difficult to find results with Copyleft license.

The result of the first innovative question may be caused because the new generation of university students is very impatient and they do not read consciously the information of the sites or pages that choose as correct answers. In many internet searches they have found keywords as part of advertisements or links to another pages or sites, which are not part of the main text, and probably that was the reason of the mistake in their selection. Another reason for this result may be the few experience of the students in the field of knowledge to which belong the questions.

The result of the second innovative question exposes many doubts of the students related with application software concept by one hand and with the presumption of the license of the applications that they know and usually use by the other. Some of

the proposed applications with name are shown in Fig. 4 and the generic applications type most proposed are shown in Fig. 5

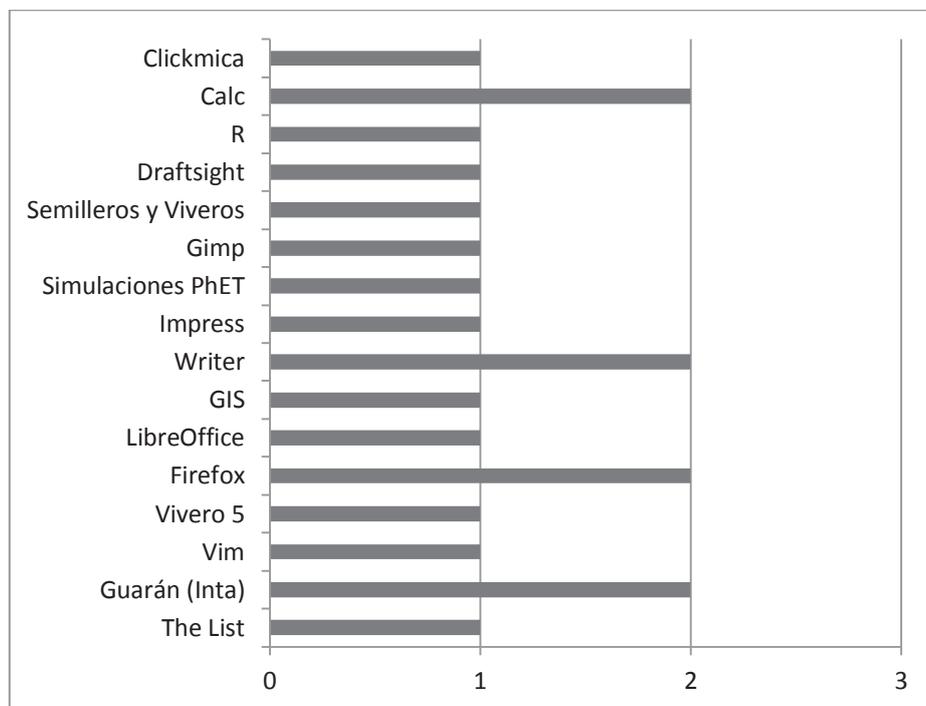


Fig. 4. Applications software with name

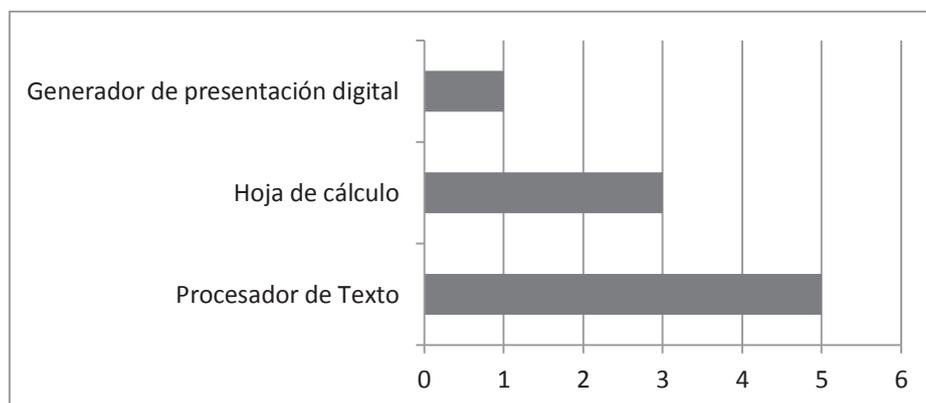


Fig. 5. Generic application type

The third innovative question tries to impulse to the students to make a certain number of repetitions of the cycle of refinement of the search key using connectors, synonyms and all the necessary elements to improve the results of the internet

searching process. The study and analysis of the responses to this question will be part of future works in this direction.

With this we can conclude that although the Workshop promote the use of free software and work with collaborative and cooperative resources, the materials of interest that our students can easily find on the web are not always marked with licenses that allow their reusability and redistribution, such as those licensed with Creative Commons and Copyleft.

5 References

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