Print vs. Electronic - Student Information Behavior in a Fuzzy Information Universe

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Abstract

The information environment students are entering at the beginning of their academic careers becomes more complex and diversified. The continuum in information experience, provided in the print era, has diminished in the electronic age. The identification of patterns in the information preferences and behavior of students that belong to the generation of "digital natives" could be an important indicator of necessary transformations in educational and information policies of universities.
This paper provides a contribution to this aim, by defining generic information behavior patterns of the Faculty of Humanities and Social Sciences' students, more precisely, those enrolled in the first and last year of studies. Potential differences between those two groups would indicate a shift of preferences in information choices inherent to a specific student generation. The research data will be derived from surveys, which will focus on questions like the frequency of usage of different services and information types, students' familiarity with the existence of specific information services, their perception of the quality particular resources offer etc. The investigation will specifically focus on scenarios for the integration of information resources into e-learning systems.

Examination of the mentioned issues and areas could alert educational policies and strategies to issues which can raise the quality of learning experiences. In conclusion and based on survey results, the authors will try to articulate consequences, guidelines and recommendations for information providers, library policy and faculty administration.

Introduction

The continuum in information experience, provided in the print era, has diminished in the electronic age. Entering an educational institution, the learner tries to gain proficiency in information structures he faces. In the print era these proficiencies where sufficient throughout one's education, while today, in the electronic environment, learners can't relay on those very long. Information landscapes are restructured and change continuously and dynamically. There is a parallel change in information preferences of users, therefore perceptions of academic institutions about information behavior patterns of users have to be continuously reconceptualized as well.

After facing challenges of constructing e-learning environments and integrating information resources into new information and learning flows, information and educational institutions are confronted with a new, Web 2.0 hype, referring to a more participative and socially oriented environment with the potential to change paradigms for building, sharing and using knowledge.

To prepare students to act in a complex and information-dense age, preferences in their information seeking behavior should be considered and reconsidered, if necessary. More exact insights into differences compared to previous student generations could result with recommendations for designing new educational directions and policies and anticipate new or emerging preferences, allowing reacting to them in the most effective way.

New generations of students: myth or reality?

In the last two decades, higher education institutions, libraries and other service providers in this sector have recognized the potentials offered by networks and multimedia for the enhancement and upgrade of their services. They literally pushed new services towards learners and users, seeing them as consumers and supplying them with information resources, which was largely satisfying, even fascinating for the first generation of web users that where not born to the digital world, but have learned to cope with it. However, in the last few years higher education is faced with discussions about a new generation of learners who where born into the digital world and grew up within a networked culture, in crossfire's of multimedia stimuli and dense information landscapes. This generation, best described by Prensky's notion of digital natives[1], is believed to have developed new cognitive thinking patterns, expectations and methods of deriving meaning. Having in mind this context, the question educational institutions are posing these days is: did a generational shift happened and should services and policies change accordingly?

The hypothesis about the discontinuation in information behavior patterns between generation of older students, the so called digital immigrants who prefer more traditional services and the digitally born digital natives who refuse to be passive consumers of prepackaged content and are occupying Second life islands while busily tagging or blogging, is defining much thinking in higher education.[2] The uptake of this hypothesis means for higher education institutions that they have to provide more traditional services for older individuals while integrating new and engaging Web 2.0 services for younger

[1] Prensky, M. "Digital natives, digital immigrants". *On the horizon*, vol. 9, no. 5., 2001. Available at: http:// www.scribd.com/doc/9799/Prensky-Digital-Natives-Digital-Immigrants-Part1 (2008-04-25).

[2] Ojala, M. "Social media, information seeking, generational differences". *Online*, vol. 32, no. 2. Mar/Apr 2008, p. 5. Available at: http://www.infotoday.com/Online/mar08/HomePage.shtml (2008-04-25).

generations. In order to define and identify potential educational directions and institutional cultures, it is necessary to detect qualitative differences and define using patterns of digital natives, as well as answering whether an end user segmentation between younger and older generations actually exists and where demarcation lines can be drawn.

Further evidences of student's information behavior: the case of the Faculty of Humanities and Social Sciences in Zagreb

Knowledge of information-related needs and exploration patterns of student populations would help inform the design of systems that more adequately address actual needs in the educational arena. The majority of studies reported to date are concerned with the use of information sources and systems, with an over-riding interest to determine how information sources could be made more useful to teaching staff and students, and how they could be persuaded to make better use of such sources[3].

An analysis of the situation in Croatia shows that there is little research into the information skills of young people in and entering higher education. This is probably a result of a lack of strategic support for information literacy programs, which are, if provided, not systematic and ad hoc in nature. A richer and more coherent picture of student information behavior is essential, since input from learning theories, the creation of new virtual learning environments and the emergence of institutionally free, personal learning spaces through Web 2.0 applications demand new philosophies and reconceptualizations of relative new and recently devised strategies. Such thinking motivated a student survey at the FHSS in Zagreb.

The approach applied in the investigation was primarily quantitative and designed to discover generic preferences of information resource usage among students. The aim of the survey was to discover whether patterns of usage could be established and whether they where different in different groups of students - more precisely, those enrolled in the first and last year of studies. Potential differences between those two groups would indicate a shift of preferences in information choices inherent to a specific student generation. The question was motivated by the much discussed notion of behavior shifts between digital immigrants and digital natives or the NetGen transition.

In particularly, the study posed questions about the typology of information resources used by higher education students, the frequency of usage of different services and information types, students familiarity with the existence of specific information services, their perception of the quality particular resources offer and in what contexts the resources and services are being used (e.g. for work, study or entertainment).

Design of the study

The survey was conducted over a four-week period in January-February 2008. The sample consisted of 80 students from the FHSS selected from the first and the last year of study. Having in mind the aims of the study, students from the Department of information

[3] Wilson, T. D, "Human information behavior", *Informing science*, vol. 3, no.2, 2000, Available at http://inform.nu/Articles/Vol3/v3n2p49-56.pdf (2007-01-10).

sciences where chosen to answer the questionnaire. We believed that the information behavior of students from this Department:

a) comprises higher levels of critical awareness in using information resources
b) could serve as an indicator for future practices in the information sector since these student group represents future information professionals.

Because of the quantitative approach of the study, it did not offer exhaustive motivational insights into user behavior patterns, but revealed basic aspects that could be used as indicators for the overall direction of strategies. The sample, drawn from two groups, will enable the exploration and comparison of the differences between student generations.

Results

The results of the study confirm findings of previous research and indicate that there are some differences in preference patterns between new enrolled students and those at the end of their studies, but showed also that these differences are not significant: there are more common patterns typically for the whole surveyed population than genuine differences.

The majority of students in both groups uses the internet on an every-day base, but while the whole population (100%) of first-year students prefers to use it for fun, students in the last year of studies show a stronger preference for educational use.

On the other hand, students show a similar behavior when it comes to library use, although similar in a defeating way: the majority of students (55%) in both groups uses libraries once a moth. Nevertheless, even 25% of first-year students indicated that they have never been in a faculty library, while just 7% of the students in the last year of the studies provided this negative answer. At the same time, the first-year students are showing a stronger preference for resources that are electronic in nature and use them more often on an every-day base.

Several next questions tried to determine whether they use more institutionally-provided sources (academic search databases and other library-provided sources) or free and open-access resources, like open-access journals or Web 2.0 services. The results are shown in the charts 1, 2 and 3.

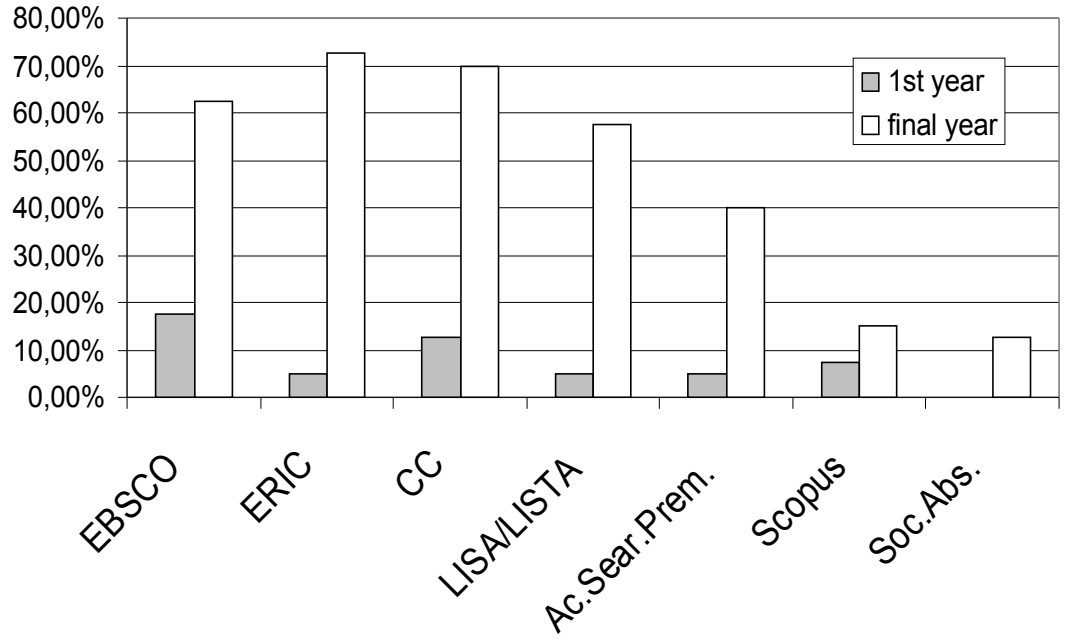

Chart 1. Academic databases usage

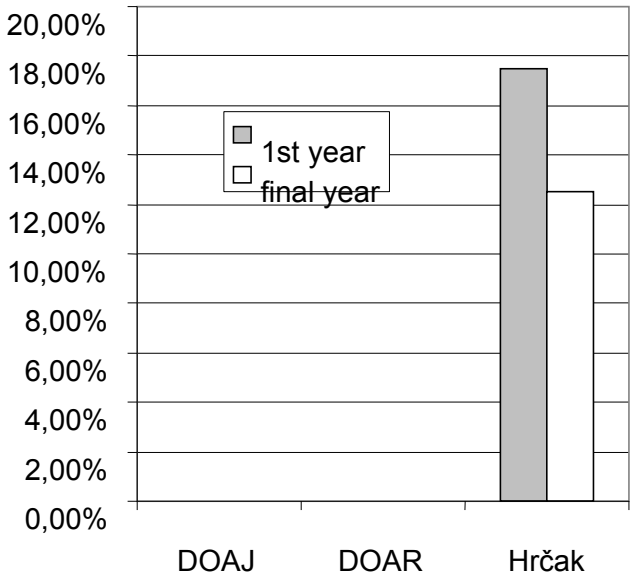

Chart 2. Open access usage*

* Hrcak is an open-access portal of Croatian scientific journals

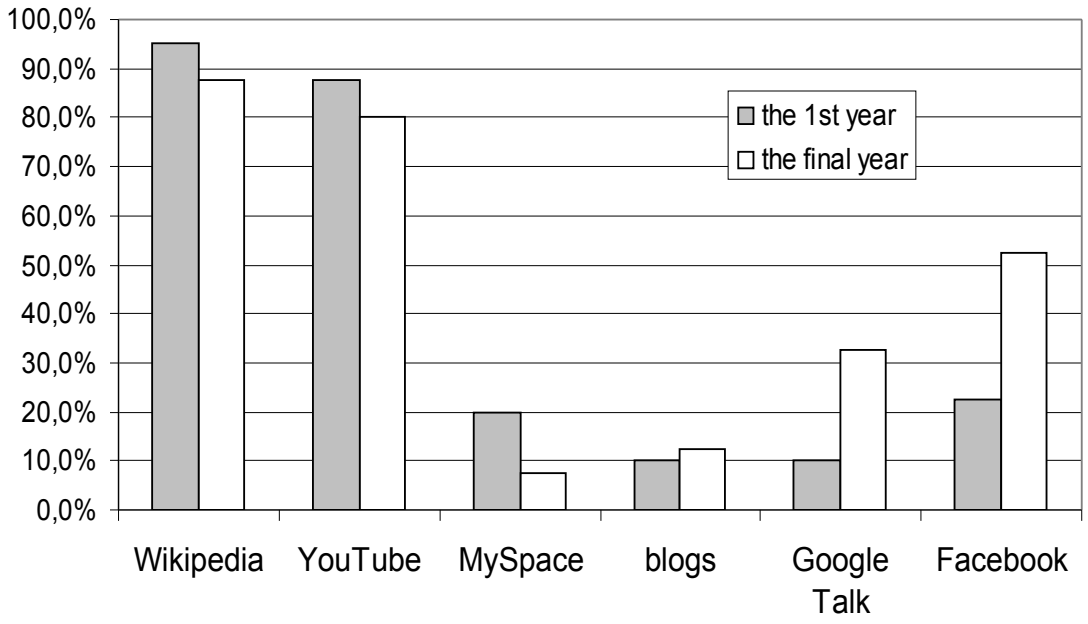

Chart 3. Web 2.0 usage

It can be inferred from the above charts that the more frequent use of institutionally provided services and resources is to a higher percentage a feature of the information behavior of older students. Nevertheless, it is not sure whether this high percentage is a result of the educational path they have already gone through or a reflection of their genuine preference in the usage of information resources. It is more likely that the younger students as relative new members of the academic community haven't had the opportunity to use institutionally provided information resources yet.

75% of students are not familiar with the open access concept. They do not use either DOAJ (Directory of Open Access Journals) or DOAR (Directory of Open Access Repositories). However, 17.5% of the first year students and 12.5% of the final year students use the Hrcak portal. Hrcak is central portal of Croatian scientific journals that includes 160 open access scientific journals.

On the other hand, it was interesting to see that the use of Web 2.0 applications and services is evenly spread across student groups, which inclines that the preference for participatory, free-floating features expressed by Web 2.0 applications is not necessary a function of age or attributable to those who are more digital native, since there are plenty of older students who make considerable use of Web 2.0 technologies.

Several questions relating to information behavior processes also revealed some similarities, but with some obvious deviations. When asked about their first resource choice when writing a research paper, the answers where absolutely congruent: for the whole population of respondents (100%) internet search engines where the first place where they started the research process. Differences where evident in the second and the

third resource choice - while the younger students' choices is Wikipedia, students in the final year prefer to use print books and library catalogues. For them the Wikipedia is on the 4th place to look at when solving an information problem. Academic databases are for both groups on the 6th place (see Table 1.)

CHOICE NO.	1ST YEAR STUDENTS	FINAL YEAR STUDENTS
1	Search engines	Search engines
2	Wikipedia	Printed books
3	Printed books	Library e-catalogues
4	Library e-catalogues	Wikipedia
5	Academic databases	Academic databases
6	Printed library catalogues	Printed library catalogues

Table 1. Students' resource choice when writing a research paper

The same picture of preferences was visible in the next question, where respondents indicated where they find electronic resources they use in their research papers: 95% of first-year students use resources from the internet, while just 5% of the electronic sources used where library-provided. The majority of older students uses free internet resources as well (75%), but with a much higher percent of students who indicate that they use electronic resources from libraries (Chart 4).

The next set of questions referred to the usage of Web 2.0 application and services. The answers have led to the rejection of the initial survey hypotheses, according to which the preference and usage of Web 2.0 services is a function of age, therefore students in the first year of study would be more attracted to this group of services. The results however have shown that there are practically no differences in the usage of Web 2.0 services between younger and older students, neither in content nor in the frequency of use. Nevertheless, a relative difference does exist when in comes to the context of use: younger students tend to use services like Wikipedia, YouTube or Facebook for educational/study purposes, while the older one do it more for fun.

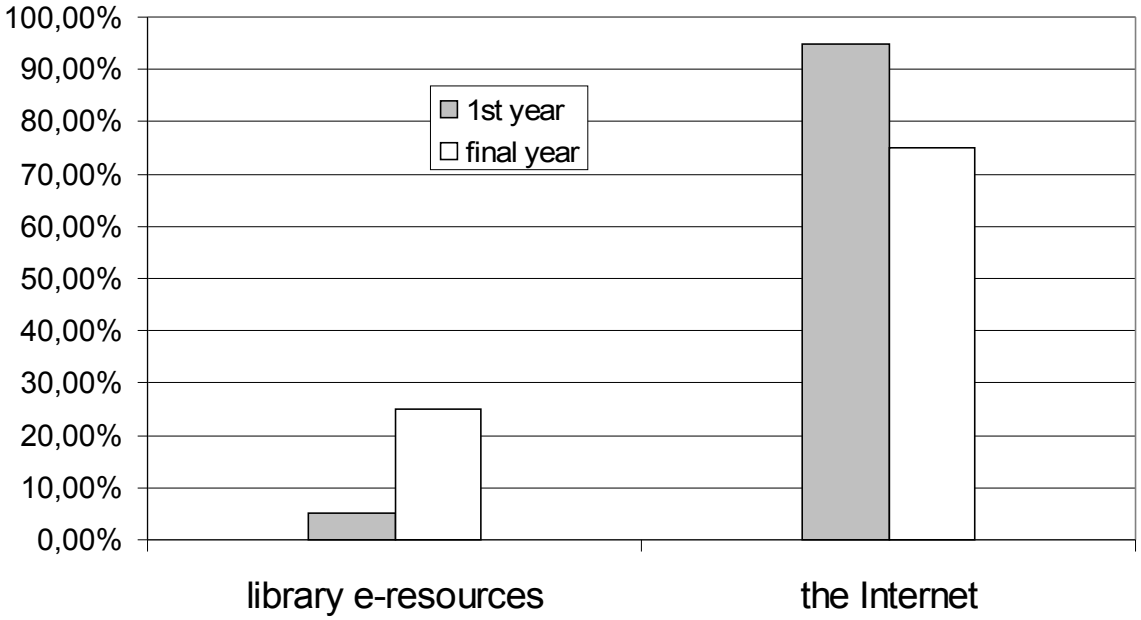

Chart 4. Electronic resources preferences

The last part of the questionnaire referred to the use of the e-learning system, OMEGA, which is a localized translated version of Moodle. Surprisingly, the frequency of usage of this virtual learning environment is much lower compared to Web 2.0 applications, although practically all their courses run on Omega. Generational differences are not significant, but minor differences are evident in content use available in this system. Chart 5 shows that both groups of respondents are using a similar spectrum of available resources, except institutionally provided library resources, like library catalogues or academic databases, which are to a higher degree used by students at the end of their studies.

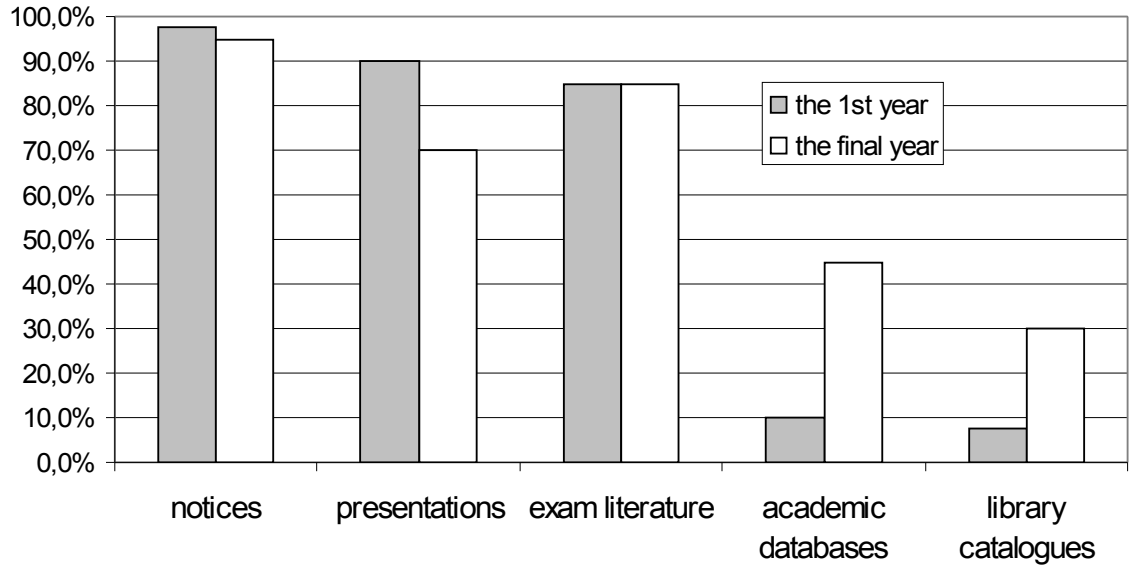

Chart 5. OMEGA usage

Discussion

Having in mind the quantitative and methodological limitations of the above described survey, its results may not be statistically significant but could serve as an indication of students information behavior and as a point of departure for making strategic decisions at the divergence point higher education and their information institutions have just reached. From the elicited results several things could be inferred: demarcation lines between older and younger generation of students are blurring and it is getting harder to distinguish age-related preferences, at least when the usage of new technologies, particularly Web 2.0 services, is analyzed. Nevertheless, some new highlights in the information usage of students can be recognized:

- their preference for electronic resources
- the internet as the first choice in research processes
- a general decline in using library-related, institutionally provided resources
- a high percentage of use of Web 2.0 services
- a more frequent use of Web 2.0 services than their learning management system.

Nevertheless, a deeper characterization of the above statements does reveal some minor, but indicative differences relevant for formulating strategies. For older students authoritative, even print-based resources are a more viable choice than for younger students, for whom the Wikipedia is a more preferable choice than a refereed print resource. Generally spoken, for younger students libraries and library-provided resources are to a lesser extent a part of their academic identity.

On the other side, the trend in separating learning and entertainment context is more visible within the group of older students, while students in the first year of studies use the web simultaneously for fun and education, probably integrating this two activities,

which was confirmed in another set of responses indicating that they use Web 2.0 services for education, which is not the case with older students. This coincides much with the picture of digital natives for whom entertainment and educational practice are intertwined. Except this minor difference, the shift from institutionally provided and authoritative to user-generated and participative is obvious and should initiate changes in information provision in order to successfully engage with these new generations of students.

Student's information behavior, learning theories and the question: to integrate or not to integrate?

For several years ideas of integrating learning management systems with institutionally provided information resources and repositories have motivated directions and rethinking of strategies[4]. A general consensus was made about the need for seamless access and integration. In the case it is not provided, students would have to make separate searches of online catalogs, databases, institutional repositories, sources provided within their virtual learning environments etc. Such a fragmentation certainly complicates the structures of institutionally provided resources and reduces the readiness of potential users to access them. The world was clear: fragmented interfaces, resources and services should be integrated and the ideal environment for the end-user would be created.

But once again the circumstances have changed: in the last few years the picture of a new user with a different culture of using and seeking information has emerged, the "digital native". The time seemed ripe for a new redirection of approaches and strategies aligned with believes about generational shifts between older students leaving universities, and the younger once that have or will enter it. While the undertaken survey does partially support this view, the overall impression is that actually there are minor, not genuine differences in information behavior of older and new students. While institutionally maintained environments and resources, including libraries and academic databases, are actually more used by the older generations (which is not necessarily a reflection of their preferences, but a result of their better acquaintance with the research process), the take-up of Web 2.0 services is not exclusively in the domain of younger students. Older generation of students are increasingly catching up and express preferences very similar to the younger, more digital native students. Is it then justified to design information strategies and policies around the dichotomy between digital immigrants and digital natives, as previous research[5] is suggesting? And is the idea of integration of information tools and social software in e-learning environments a sustainable direction or a service stereotype?

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[4] McLean, N.; Lynch, C. "Interoperability between information and learning environments – bridging the gaps: a joint white paper on behalf of the IMS global learning consortium and the coalition for networked information. Draft. " June 2003, Available at http://www.imsglobal.org/DLims_white_paper_publicdraft_1.pdf (2008-04-25).

[5] Frand, J. "The information mindset: Changes in students and implications for higher education", *EDUCAUSE Review*, March / April 2006, p.15.; Large, A. "Children, teenagers and the Web", *Annual Review of Information Science and Technology*, vol. 39, no. 1 2006, pp. 347-392.; George, C. et al. "Scholarly use of information: graduate students' information seeking behavior", *Information research,* vol.11, no. 4, July 2006, Available at: http://informationr.net/ir/11-4/paper272.html (2008-04-25).

A point of departure for answering these questions should not rest on demarcation lines between digital immigrants and natives, since this line is blurring, but on pedagogy. The efficacy and usefulness of different tools in support of learning depends on which learning activities the tools should support. It has long been recognized and accepted that for active learning processes a rich information base is necessary. Therefore, many institutions have aimed for the implementation of homogeneous, monolithic and centrally administered landscapes of tools where diverse databases, repositories etc. are residing on the same interface. Does the same logic apply to Web 2.0 tools?
When taking pedagogy, in particular constructivism as a point of departure, than policies will not deal with artificial segmentations of student groups according to the information preferences, but on what it means to design constructivist learning spaces. Constructivism assumes that learning is an active process of constructing rather than acquiring knowledge and that instruction is a process of supporting that construction rather than communicating knowledge content, and finally, that construction happens in interaction with others. Approaches to learning that promote social constructivism, or learning within a social context, feature active group construction and organization of knowledge, rather than the passive transfer of knowledge. Therefore Web 2.0 tools provide ideal learning environments not just for the digital natives, but all those engaged in learning processes.
On the other hand, centralized approaches with unifying features of LMS, library catalogs, academic databases characterize predominant thinking of information and educational policy makers, which contrasts sharply with the growing dissemination of decentralized, networked tools and services that provide increasingly powerful means to augment a wide variety of activities and practices outside of institutional boundaries.[6]
The survey at the FHSS has confirmed that libraries and the wider educational arena should do some rethinking: what is the benefit of deliberately pushing services and products into e-learning systems if students more frequently reside in free Web 2.0 spaces than in their institutionally provided closed course-management system, which they primarily use as a mechanism for lecture/presentation delivery. Obviously it is time for library services to step out and be part of educational worlds students really and frequently use, and conversely, integrating the philosophy of these popular tools into library frameworks.

In conclusion: future scenarios and strategy issues

An important niche of discussion in the academic sector will refer to the way institutional landscapes of tools and services are structured and shaped. Should everything be integrated in order to provide seamless access, should social software application have a place in these integrated environments or should these tools reside outside of formal educational settings, what should information services look like, should they resemble more to the Web 2.0 features?
The generational shift in higher education already happened and the gap between digital natives and immigrants is closing; immigrants more and more resemble to digital natives in their information behavior and preferences. In this context it is necessary to rethink

[6] Fiedler, S. "Getting beyond centralized technologies in higher education", Proceedings *of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2007, pp. 1340-1346.*

existing approaches and define how services and tools within institutional landscapes could be re-designed and opened-up to become more competitive and equally attractive in comparison with popular, socially networked applications. Specifically, regarding social software services and applications surveys have shown that students, those on the beginning of their studies as well as those at the end of their studies, are showing considerable preferences for using Web 2.0 services. Thoughts in learning theories, e.g. social constructivism underpin the justification in using those services in learning processes, but also alert that their full potential will enfold in institutionally free web spaces.

Information preference patterns of students, which are clearly oriented towards liberty of use and involvement comprised in Web 2.0 tools and services, should motivate educators and librarians to restructure their services and interfaces making them more participatory, more Web 2.0 friendly. But they have to do it in decentralized ways, otherwise those potentials will be suppressed.

It is also important to stress that libraries will have new and unique functions in the Web 2.0 context: the only way educational institutions can control or influence student information behavior in this new realms is indirectly, through information literacy programs, but which will have to change in content: not being oriented towards formally institutionally integrated tools like library catalogs, academic databases or Boolean operators, but integrate tagging issues, trust authenticity privacy issues, which are crucial for their usage in educational processes.

In conclusion, it should be reminded that information services have reached a divergence point in their strategies: some “islands” of services should be connected and integrated, others should reside in institutionally free spaces. Information services should be more Web 2.0 friendly and resemble or be consistent with the wider preferred internet experience of students. They should reach and influence institutionally free learning spaces students are creating for themselves indirectly, with new information literacy activities which overlap in their content and logic with the Web 2.0 environment.

It seems that demarcation lines don’t have to be drawn: the older generation is jumping on the bandwagon of changes and higher education institutions have to do it as well. Classrooms and libraries have to become digital native. Institutional systems as well as information services need to find ways of connecting to, integrate with and push their content into these newly formed and popular learning spaces in order to ensure that they stay competitive and relevant in the eyes of a new and relative homogenous generation of digital native students.

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