Strategies for Implementing the Adoption of Open Textbooks Initiatives: State of the Art Review

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***Abstract*—Open textbook initiatives have appeared as an alternative to traditional publishing aiming at the production of non-copyrighted educational resources. In this paper we review some cases which used different strategies favoring the adoption of open textbook initiatives. These strategies were conceptually linked with the notion of innovation adoption, framed in models of social diffusion of innovations. In addition, the major dimensions inherent to these strategies, are identified and extracted from such review.**

***Index Terms*—Educational resources, open textbook initiatives, strategies.**

I. Introduction

Open textbooks initiatives are presented as an alternative to traditional publications, aimed at the production of educational resources in a comprehensive and collaborative way.

They all provide means to share material through the Web and also, some form of metadata for these resources have wide accessibility.

This paper aims to describe the state of art in relation to the different strategies that favor the adoption of Open textbooks initiatives. It arises from a study conducted in the framework of the Latin Project (Latin American Open Textbook Initiative) funded by the ALFA III Programme of the European Union, which involves nine Latin American universities and three European universities.

These strategies are linked conceptually with the notion of innovation adoption, framed in models of social diffusion of innovations. According to this view "the invention of a new product or process occurs within what we call the techno-scientific sphere, can stay there forever. By contrast, innovation is an economic fact. The first introduction of an innovation transfers it to the techno-economic sphere as an isolated fact, whose future will be decided in the marketplace. In case of failure, may disappear temporarily or forever. The fact that it has the wider social consequences is the widespread adoption process [1].

Therefore, the diffusion process of technological innovations is as important as the process of creation of any technological system; moreover, it promotes the adoption of the system based on careful strategic planning. This diffusion process of innovations, has four main elements: 1) an *innovation* 2) that is *communicated* through certain channels, 3) in a given *period of time*, 4) between *members* of a social system [2].

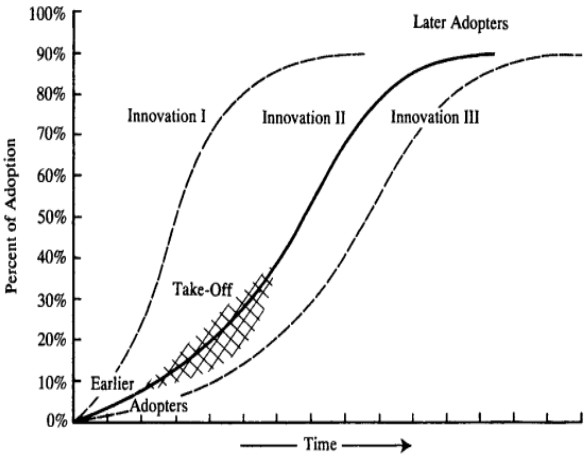

Fig. 1. The diffusion process (Rogers, 2003).

Fig. 1 shows how the adoption process of innovations, usually occurs over time. In this sense we speak of *innovativeness* as the ability of an individual, to adopt innovations. More specifically: innovativeness is the degree to which an individual or another unit of adoption, is relatively earlier in adopting new ideas, than another members of a system [2].

The classification of members of a social system on the basis of innovativeness, includes: a) innovators, b) early adopters, c) early majority, d) late majority and e) laggards.

In the process of social diffusion of innovations, we can distinguish two main phases: *Initial Phase*, involving processes such as discovery, persuasion and decision, and, the *Implementation Phase*, which involves the actual implementation, and adoption. An strategy to achieve the adoption of an innovation, involves defining a set of actions to be taken, aimed at incorporating enthusiasts in the initial phase, and getting the laggards, in the shortest period of time. For this study, differents open textbooks initiatives were reviewed. These initiatives were developed in varied institutional, geographical and cultural contexts, with differents degrees of depth in its implementation and social impacts. Based on this framework, we focused on identifying the actions performed in these strategies. The review of the

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studied cases, allowed us to abstract the existence of three kinds of dimensions: time-related dimension (processes / phases), social dimension (actors / contexts) and communication dimension (promotion and distribution).

In the following, the studied cases are described in Section II. Then, in Section III, the definitions and characteristics for each of the dimensions identified are detailed. Section IV provides details related to the initiative sustainability. Finally conclusions are provided in Section V.

II. Cases

In this section, we describe some of the study cases associated to open textbooks initiatives, developed in different contexts and with different degrees of implementation and evolution. The analysis was aimed to identify the components that made up the levels of implementation and adoption of these initiatives in various areas of intervention. For the purpose, we designed a systematized reading guide oriented to extract the most relevant aspects related to the *implementation* and *adoption* phases corresponding to the studied cases.

Regarding *implementation*, some of the aspects we tried to recognize were: how the initiative started and the motivations of it; who were the leaders and managers involved; which were the initiative costs and its funding; the recipients of the initiative; which was the scope of the initiative; the processes involved and the steps performed in these processes.

Regarding *implementation*, some of the aspects we tried to identified were: the communication strategy applied during different stages (beginning, generalization, institutionalization); the external promotion and dissemination of the initiative; types of media used and stakeholders; which were the politics handled to motivate the participation of authors, teachers and students and the kind of licensing used.

In the Latin American context were able to identify some incipient cases for the implementation of collaborative creation of texts. Between them, lies the Hipernexus case [3], which took place at the Universidad Pontificia Bolivariana and lasted two years and two months . It was a local project aimed at teachers and students, developed by a research group on education in virtual environments. A methodology for collaborative construction of electronic hypertext was designed to be used in the project, and a platform implementing it, was built. Another case that was studied was The Social Sciences Virtual Library of Latin America and the Caribbean, linked to CLACSO [4]. The initiative involved the incorporation of ISIS software, promoted by UNESCO, used to develop some databases, including bibliographic information about publications produced by CLACSO members, and ongoing research that were being developed by them. Both cases realize pilot experiences in the creation and use of texts, implemented at an early stage.

Most of the cases studied were located in the international context, having varying degrees of implementation. For example, the process for including e-books in China [5], showed us the way to have and adecuate sustainability and how they are used actually.

WriteProc [6] is an example of a collaborative writing framework, which uses Google Docs environment. It focuses in the performance of tools that users can use during writing process. The WriteProc framework utilizes both process and text mining tolos to analyze the process that groups writers follow; furthermore, it is integrated with Web 2.0 writing tools. Proposals integrating Internet-based tools have more dynamism, being more productive for writers.

On the other hand, Glosser [7] is a very helpful system for students, that supports collaborative writing, particularly for students writing academic essays. It supports the writing by scaffolding their reflection with trigger questions, and using text mining techniques, to provide content clues, that can help answer those questions.

RECOLED (REcording COLaborative EDitor) [8] is an XML-based collaborative editing environment that incorporates detailed logging of text editing actions. The main idea of this shared document editor, is that record text editing sessions, combined with speech recordings, can provide a valuable resource for post-meeting information, retrieval; therefore it supports the asynchronous phase of the writing process.

Another studied case was a technological internet-based framework, proposed by the University of Arizona [9], for an advanced collaborative writing tool, called Collaboratus,. The framework consists of seven different specialized tools proposing a process to make it more efficiently.

A relevant experience of an open textbook initiative in the state of Florida (USA) is Orange Grove Text Plus (OGT+)[1]. It is a joint initiative of the University Press of Florida and The Orange Grove, Florida's Digital Repository. The goal of this partnership is to reduce the cost of books to students by offering texts that are affordable, accessible, and adaptable to reader preferences.

The Community College Consortium for Open Educational Resources, which was founded by the Foothill-De Anza Community College District and the League for Innovation in the Community College, is a provider of free online educational resources. In april 2008, began the open-textbook initiative called Community College Open Textbook Project (CCOTP) [10]. This project was paid for, by a $530,000 grant to the Foothill-De Anza Community College District from the William and Flora Hewlett Foundation.

Many open texts are available from for-profit publishers such as Flat World Knowledge[2], Lulu[3], O'Reilly[4], and Textbook Media[5]. From these commercial providers of free textbooks, the two largest ones are Textbook Media and Flat World Knowledge. The "freemium" pricing strategy are used by both of them: some goods are given away for free, while premium services are available for a price (Anderson, 2008).

Some open textbooks are stored in repositories that are supported by some combination of government, university, and foundation sponsorship. Among these repositories, are CK-12[6], Curriki[7], OpenLearn[8] (UK), the California Open

[1] http://florida.theorangegrove.org/og/access/home.do
[2] http://www.flatworldknowledge.com/
[3] http://www.lulu.com/
[4] http://oreilly.com/
[5] http://www.textbookmedia.com/
[6] http://www.ck12.org/
[7] http://welcome.curriki.org/
[8] http://openlearn.open.ac.uk/

Source Textbook Project[9] and Rice University's Connexions.

Several initiatives focus on guiding and adoption. For example, the Community College Open Textbooks Collaborative[10] funded by The William and Flora Hewlett Foundation focuses on driving awareness on open textbooks already produced, including peer reviewing and mentoring for teachers [11].

The emergence of the Web 2.0 as a set of practices and tools for sharing user-generated content, has lead to reformulations of the traditional authoring and editorial processes of learning resources towards increased collaboration. The WikiBooks [12] initiative allows for full collaborative editing, in which the contributions of different authors are recorded at the level of short editing sessions, often affecting only a few sentences. This initiative was modeled after *Wikipedia*, but is not scaling at the same rate that *Wikipedia* is growing .

As a remarkable consequence from the review of cases mentioned earlier in this section, worth mentioning the identification and abstraction of three kinds of dimensions: *time-related dimensions* (processes / phases), *social dimensions* (actors / contexts) and *communication dimensions* (promotion / diffusion). In the next section, details about them are provided.

III. Dimensions

In Section III.A information relative to social dimensions called *actors* and *contexts* and its relationship, is provided. Then, in Section III.B time-related dimensions called *processes* and *phases* are analysed. Details about communication dimensions called *promotion* and *diffusion* are presented in Section III.C.

A. Social Dimensions

1) Contexts and actors

Following the review of various initiatives were identified different *contexts*. Within them, a set of actions are implemented by the *actors* involved in the adoption strategies, according to the roles they carry out, and how they operate in these roles.

Fig. 2 shows the taxonomy associated to social dimensions contexts and actors, which are described below. Also, the interrelationships between these social dimensions, are reflected.

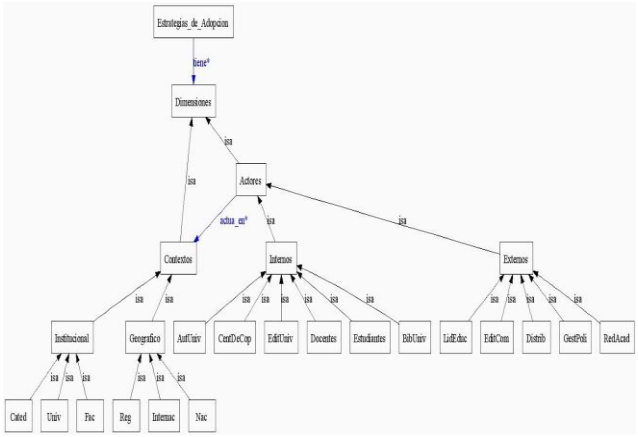

Fig. 2. Taxonomy associated to social dimensions.

[9] http://www.opensourcetext.org/

[10] http://www.collegeopentextbooks.org/

Contexts: are physical environments or conditions, in which actors perform a set of actions, according to the roles they assume. It can be considered two kinds of contexts :

Geographical contexts: spaces associated with the grouping of territorial sectors, among which, may be considered International, National or Regional contexts.

Institutional Contexts: areas related to various institutional levels; according to the considered scope, may be considered University, Faculty and Professorship as institutional contexts.

Actors: those people who assume different roles, to perform the activities related to the production of educational resources, in which they are involved. Based on the actions taken, the actors can be:

Internal actors: those actors operating within an university institution to which they belong, in which they carry out activities to promote the initiative and its adoption in that context. Internal actors include: Teachers, University Authorities, Students, University Presses, University Libraries and Copy Centers.

External actors: those actors working externally to an university institution, doing activities to promote the initiative and its adoption in that context. External actors include: Educational Leaders, Commercial Publishers, International, National or Regional Academic Networks, Political Managers and Distributors.

Finally, Fig. 2 shows that the relationship "acting" formalizes the fact that the actors perform their actions, within the possible strategies chosen, in different types of context. For example, the Legislative Power, an *external actor*, can establish legal frameworks in the *national context*, for the formal adoption of books in higher education, generated through Open Textbooks Initiatives. Moreover, a teacher, an *internal actor*, may include a book as a relevant literature, generated through initiatives such as we are dealing with.

B. Time-Related Dimensions

1) Processes

The *processes* for the adoption of the initiatives are varied, ranging from the quality assurance of the products to proselytizing efforts. It is proposed to group these processes into three main groups: authoring, diffusion and promotion.

Authoring processes refer to those designed to ensure the quality of processes and products issued from the initiatives, to establish a clear framework for authoring recognition and setting up a licensing policy consistent with the objectives of the initiative, such as free movement of knowledge and reuse of material.

Diffusion processes are related to actions to raise awareness of the initiative on a broad level. These processes include the identification of individuals and institutions that could serve as a vehicle for dissemination, the means by which the message will be communicated and the content that will be transmitted through them.

Promotion processes relate to actions to promote participation in the initiative, focusing on operational aspects of the creation, use and reuse of the contents.

2) Authoring

Quality Assurance (QA) is one of the most sensitive aspects when deciding the adoption of a material to be used in

education [13] . QA is performed at two different times: during editing and once the product has been released. QA during editing aims to ensure the quality of the writting process, performing both technical and pedagogical reviews by the editing team [3]. Technical reviews are basically peer reviews designed to verify that the contents have no misconceptions and have a complete covering of the content. Pedagogical revision is aimed at producing educational materials that are efficient when transmitting knowledge.

Additionally to revisions made during the editing process, revisions are made once the text has been finished. This review is similar to which is performed in a normal editing process where one or several authors deliver the completed manuscript to be validated by others. In this category we find the reviews made by experts in the field, eventually from within the institution [14] and the "social review", understood as the acceptance of the book by the community.

Authorship acknowledgement in collaborative book publishing becomes more diffuse than in traditional book building. The issue of determining who are the authors of a collaborative book becomes difficult as the writing of the book is opened to the participation of different people who represent different roles. Besides content generators, these roles we can include idea generators, reviewers, technical advisors, etc. [9]. Even in cases in which there are only authors-writers, the degree of involvement is variable: some can write a lot of the text while others may only write a paragraph. The same happens when considering derivative works.

Strategies surveyed allow us to infer the following alternatives: (1) to consider all participants as authors of the entire book, independent of their degree of participation, (2) to recognize authorship independently, according to participation in parts. This is usual in books of papers, in which there exist authors for each chapter of the book, (3) to distinguish different categories of authors, giving greater weight to those who participated to a greater extent, but without prejudice to the work of secondary ones, (4) to recognize the existence of experts (not writers) that provide guidelines or supervised the work of writing. In this case these experts become the "intellectual authors" of the book, as opposed to the "material authors" who are responsible for writing it and (5) to recognize as authors only from higher levels of authorial categories, and appointing experts or secondary authors as contributors to the book.

Along with quality control, the definition of authorship has a major impact on the motivation of authors to participate in collaborative work. It is expected that a potential author is more likely to participate in the publication of a book if (1) his work is duly recognized and (2) the final product is of good quality. The visibility of the work in a dynamic environment where there exist a free flow of knowledge can lead to rapid and founded reputation to an author, at the same time that the affiliated institution gains prestige. It is however necessary that the institutions promote an atmosphere of sharing between the authors to encourage the production of open books [14], as well as a recognition scheme to reward the efforts focused in this activity [13].

License of the produced material. Once developed, the material should be released to the public, under a licensing scheme that defines what can be done with it, in terms of distribution, selling and modification. In the traditional publishing business licenses that retain all rights are applied to most of the textbooks. This causes publishers to focus their efforts primarily on books that (1) are used widespread and (2) the public is willing to pay. This produces that editorial efforts move away from niche books or from those whose the public can not pay a high price for them. The motivation of university presses, unlike commercial publishers, is twofold: firstly, it is interested in radiate the knowledge produced within the universities, and secondly, to obtain a profit. However, in reality this situation is not observed, as the book's production costs are not usually covered by the poor sales they have, and irradiation is not met due to the low volume of readers that they have [14].

The use of free licenses promotes a more free distribution of texts. One of the most common and most mature licensing schemes is Creative Commons (CC), which has been operating for 10 years and is used in various initiatives related to open books [5], [13]. CC is an alternative to traditional copyright, which allows licensing original works, granting permission to third parties, by defining in a simple way what they can do with this material.

3) Phases

The temporal dimension in the innovation adoption process is a key factor in the analysis and strategic planning. In this dimensión, is possible to identify three *phases* for which we proposed the designation of *Initial Phase*, *Generalization Phase* and *Institutionalization Phase*.

A variety of strategies to adopt Open Textbooks Initiatives that can be placed in these phases, were identified from the studied cases; they are detailed below:

4) Initial phase

- Collaboration of advanced students, who assume an important role in achieving the goal, giving their support and collaboration in the work of the strategy launch.
- Collaborative text, seeking to enrich the content of the writings by the group assigned to this task through a participatory way.
- A recognized teacher is selected to guide participants in the process of creating a book.

Generalization Phase

At this stage, the strategy has been selected and proceed to determine the defined actions, directed to each involved actor. During this phase, we have the following actors:

- Committee of peer reviewers, which will be responsible for checking the desired quality of the final product.
- Teachers and students create, use, evaluate, constantly throughout the project development process.
- Pilot program, allowing users to begin to have a first contact with the system.
- Training tasks

5) Institutionalization phase

This phase will occur after generalization, when institutions and authorities understand the benefits of the initiative. In this phase it is necessary to consider the following:

- Integration with institutional library systems and university presses, which enable to work in a joint and coordinated manner;in this way, learners can access information in a timely manner by providing all the

necessary facilities.
- Roles and functions institutionalized

C. Communication Dimensions

1) Promotion

The term *advocacy* refers to actions performed by institutions and individuals to promote adoption, authoring and publishing open textbooks, and the actions taken to facilitate the process.

In the various initiatives discussed, the promotion and diffusion processes were different, but some actions could be identified with varying degrees of similarity.

One of the first steps identified was clustering. This fact, includes organizations and individuals of all levels, interested in promoting some or all of the objectives of the initiative. These clusters can include teachers, students and parents, as well as parliamentaries, administratives and entrepreneurs. Onother example of grouping occurs between initiatives already formed, which unite to strengthen or create a new project.

These groupings, after organizing themselves, form committees or boards to develop documents and memoranda, as well as policies and laws, for promoting the use of open textbooks. An example of this action is the Open Access Textbook Task Force (OATTF), who developed a series of recommendations.

Another action identified regarding promotion, is the support in the development of open and collaborative resources and licensing issues, carried out by the involved institution, ensuring in turn the quality of them for teachers and students. In that sense, it is vital to generate policies in this regard, emphasizing the benefits of these tools. At the same time it is important to train teachers on them, through workshops or courses. It is clear, that the ways to promote the use, depend largely on the circumstances of each institution.

The institution must be aware of the strategic advantages (efficiency, rentabiity, impact) between derived-collaborative material generation with respect to new-individual material, and set up policies that make the efforts flow in that sense.

A starting point for creating a culture of sharing development must be defined. Historically, knowledge tends to be protected by institutions and people. Initial actions include inviting colleagues to share slide shows, lecture notes, assignments and tests. Lowering expectation of what constitutes an Open Educational Resource (not an entire book, but a chunk of information), can also make people less reluctant. Sharing tests and assignments, also help to reduce plagiarism an re-use of this material.

2) Diffusion

Regarding the dissemination of the different initiatives analyzed, is also diverse its enforcement. In the various initiatives, were used one or more media for dissemination. From traditional media (radio, television, press), to share face to face through a chat, whether in person or online. In other initiatives launched recently, social networks were also used.

A more detailed actions can be seen in [15]. They also offer different recommendations when developing an open textbooks initiative . emphasizing the importance of a proper web presence through social networks; at the same time is necessary to perform regular updates of its content, advertising events, activities, publications, legislation, or the results of a survey. This is important for web positioning as well as to maintain the interest of those seeking information about open textbooks.

IV. Sustainability

An important point in these initiatives, is sustainability of the same, as all have expenses. The main costs identified are:
- Design and implementation of the platform where you create, read, edit and export the texts
- Wages of those responsible for maintaining and disseminating the platform
- Salaries of teachers, researchers, or students who produce texts
- Printing on paper the pruceded texts and adaptation to other formats

To cover these resources have different financing methods have been implemented [15]. The most commons are:
- Sale of printed books, audio formats and different versions for phones and tablets.
- A book version of free publicity (freemium), with the possibility of a paid version without advertising.
- Internal or external funding of projects, competitions, scholarships, etc.
- Contributions from philanthropic foundations
- The subscription model (monthly or yearly). Students subscribe for a small fee that enables you to download content.
- Each participating institution pays a fee, enabling students to be able to use the tool
- Through donations,i.e., the model called Fundraising. Contributions from individuals or institutions interested in collaborating with the initiative.
- Crowdfunding. Unlike Fundraising in this funding model, who used the platform are involved to a greater extent than the other ones.

V. Conclusion

The main result derived from the analysis of the studied cases was the possibility of extracting a set of characteristics, which we have called *dimensions*, intrinsically related to the strategies to be implemented for the adoption of an Open textbook initiative.

The success in the adoption process, is strongly linked to the proper choice of instances to be assigned to these dimensions. Therefore, based in the review of the strategies which have been already used, future research in the Strategies Area of the Latin Project should be addressed to determine the proper choice of the mentioned dimensions particularized for the Latin American context.

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