Innovation as a cross-cutting Competency in transforming Grey Literature as a tool in Training for Engineers

José Francisco Penido Xavier[1], Marina Rodrigues Brochado[2], Miriam Carmen Maciel da Nóbrega Pacheco[3]

[1]Department of Engineering and Technological, Cefet_RJ, Brasil
Email: jfpxavier@yahoo.com.br
[2]Department of Engineering and Technological, Cefet_RJ, Brasil
Email: marinabrochado@gmail.com
[3]Department of Engineering and Technological, Cefet_RJ, Brasil
Email: nobrega.miriam@gmail.com

Abstract— The aim of this work is to present a study which particulars the importance of storage of the content generated from searches of TCC's of graduate programs in engineering like Grey Literature of the higher education institutions in Brazil and submit the Institutions repository as innovation strategy to contribute to the development of transversal competence of the engineer. The study presents an aggregator mechanism to higher education emerging as lever of "innovation using the transversal competence in engineering and technology "noting-if the stimulation to the cultural creation and the development of scientific spirit and reflective thinking, encouraging the research and investigation. The main objective is to discuss about the need for a study to characterize the research that generate the work of completion of courses in Engineering higher education institutions in Brazil and submit the Institutional Repository), as a strategy for innovation in order to contribute to the development of transversal competence of the engineer. The discipline of projects of completion of course in engineering contribute so relevant to the professional future, once the same, while student, on the identification of a problem, learn how to get information from research, readings, reflections, discussions, among others, to respond to their needs, reducing uncertainty and promoting a new knowledge registered on the work of conclusion of course.

Keywords— Engineering; Grey Literature; Innovation; Institutional Repository, Learning.

I. INTRODUCTION

Among the purposes of higher education in most engineering courses, this work focused on investigation of the format of TCC's (work of completion course) and accomplish following purposes: a). Stimulate the creation and cultural development of the scientific spirit and reflective thinking; b). To encourage research and scientific research aimed at the development of science and technology and the creation and dissemination of culture, and thereby develop the understanding of man and the environment in which he lives; c). Promote the dissemination of the cultural, scientific and technical knowledge that constitute heritage of humanity and to communicate knowledge through teaching, publications or other forms of communication (Souza; Silva, 1997)

Second Coast (2006) the system of scientific communication has significantly suffered the impact of electronic media, most recently with regard to open access to scientific literature. In this sense, electronic scientific journals to open access and institutional repositories increases the dissemination of the research of exponential mode, maximizing its impact, its visibility and its advance.

To start the production process of an article, the specialist produces sketches of his ideas for comments among their peers. This procedure, originally made only between researchers, was enlarged and developed with the emergence of the archives and open access repositories. These technologies offer a more functional organizational structure of literature than the current existing organization in the process of revision among peers.

The Final Projects and the work of completion of courses (TCC's) higher education institutions should be considered as real "diamonds" with informational content that can be lost, due to lack of proper management of this

source of information. Petinar (2007), mentions that the open-access repositories, would allow all Community (academic or otherwise) to have access to the first research initiatives (monograph of graduation), elaborated and developed by graduate students, collaborating with the dissemination of scientific knowledge.

The specific problem of LC resulting of works and researches, that are generated by the work of completion course and the Final Projects of graduate in engineering, in addition to the graduations, in General, are normally delivered only printed and in digital form, catalogued and entered in the system by the Librarian, in general are not made available in electronic media only appearing cataloged information of the work, which ends up causing delay in search of that content. For a user (researcher, teacher and student) have access to Final Projects, is impractical. Another question is how the visibility of the scientific production of the graduate, and consequently on the part of researchers and teachers. This inoperative process transforms innovation in Grey Literature.

The Institutional Repository must contribute to the community to have access to the first research initiatives (TCC's and Final graduation Project), developed by undergraduate students. (Pertinari, 2007).
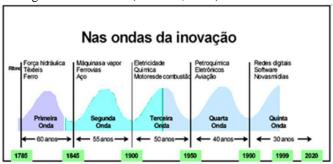

Fig.1- Technological innovation through the ages
Source: The Economist; Bussinger (2000).

The aim of this work is to present the discussion of how the RI must contribute to the development of innovation in undergraduate program in engineering, based on the search engines that do not allow that despise the contents of research of technological innovation that are formed by TCC's and Final Projects of undergraduate courses in engineering.

The search for novation is an investigation imbued with difficulties to achieve. Let her get lost is not consider its importance. The ranges of the waves that classify innovation from the point of view of research, are approximately ten years. The waves of innovation of Bussinger, starting in 1785, with the emergence and predominance of the use of hydraulic forces, textiles and iron. Then, until the beginning of the 20th century, appears

the second wave, with the predominance of steam engines, the railroads and the extensive use of steel.

II.   THE REPOSITORY (IR) AS AN INSTRUMENT OF INNOVATION

Scientific and technical activities are responsible for the production of knowledge that will become, after registered, on scientific and technical information. Second, Le Coadic (2013), conversely, activities, only come true by this information.

Considering that this lever must move freely to produce knowledge, if there is a treatment of the sources of information produced by the University, you lose the knowledge. In this context, the University's Mission is the socialization of knowledge, the democratization of education that with programs of citizen class and team Enactus, incubators, junior consultancy. The University of RI's scientific production is available to socialize knowledge and democratize quality scientific information in relation to society.

The Enactus Cefet / RJ team has been conducting social entrepreneurship projects for 13 years. Enactus is a worldwide non-profit organization made up of young college students, teachers and business leaders who aim to develop social projects using the positive power of business. It enables progress through entrepreneurial practice - the program has more than 70 teams in Brazil struggling to empower socially vulnerable communities - anchoring its principles in the practice of sustainable development.

Access to information creates possibilities for changes within society. "Therefore, the access to information and knowledge is regarded as a fundamental component to the exercise of citizenship in a democratic context" (Vitorino; Piantola, 2011).

The fact that this knowledge is not available to society, defined as Grey Literature:

"(...) the term Gray Literature is used to designate non-conventional documents and almost published, produced in the areas of Government, academics, business and industry. (Gomes; Marin; Sharma, 2000)"

Machado (2005) mentions the peculiarities of Grey Literature are: do not have records on the intelligence agencies, not through commercial sources, have simple production mechanisms, are in universities, research centers and reach a small audience. Campello (2000), reinforces that although universities and colleges, research fostering agencies, ministries of education and of science and technology is committed to disseminating these publicaions, its visibility is still very restricted.

III. THE CONSTRUCTION OF INSTITUTIONAL REPOSITORIES AS EFFECTIVE INSTRUMENT FOR INNOVATION IN ENGINEER TRAINING

The discipline of projects of completion of course in engineering contribute so relevant to the professional future, once the same, while student, on the identification of a problem, learn how to get information from research, readings, reflections, discussions, among others, to respond to their needs, reducing uncertainty and promoting a new knowledge registered on the work of conclusion of course. This work also demonstrated that as guidelines of higher education have contributed to the future student in professional terms, because there is no process of teaching and learning, the commitment to develop on individual an investigative and reflective side doing the same, in front of a particular problem or challenge in his professional life, evaluate possible solutions based on scientific units, reproducing consciously or unconsciously, the steps taken at graduation when it developed its TCC.

The visibility of scientific and technological knowledge through the RI, demonstrates that the globalized world produces, at a pace never seen before, a huge range of scientific and technological knowledge. As a result, there arises the concern with its dissemination, availability and preservation. To Rocha (2006), the change in search processes and use of information generated faster and more efficient forms of information retrieval. The media as paper and magnetic metallic surface disintegrate or may become unrecoverable, and the digital objects minimizes the action of time on the physical media. With this, ensure the availability of information, however, these must not be left in obsolete formats for long periods, requiring updating.

IV. THE CONSTRUCTION OF THE INSTITUTIONAL REPOSITORY (IR)

The construction of an institutional repository involves steps of planning, deployment and operation. These three phases are interdependent and consist of activities that must be met in order that the construction initiative of the institutional repository is successful. Of course, this is not the only way to build institutional repositories, but the proposed scheme covers relevant aspects that should be considered in this kind of venture. This document will stop the discussion of some aspects of the proposed phases for Leite (2009), seeking to present a set of best practices for the creation and management of institutional repositories.

a) Planning

In step is very important to develop and implement an institutional policy for the operation of the institutional repository. The operating policy should reflect decisions taken throughout the store planning. It is recommended that this policy is in line with those already in effect in the library and in the institution.

b) Definition of Institutional Repository policies

The policy should address the objectives of the repository, must contribute to the definition of the service, determine the formation of the team responsible for the implementation and maintenance of the repository and on the deadline set for the deposit in the repository. It must also contain the kind of material that will be deposited, as well as those who are not part of this system. The repository operation policy also should establish, who should make the deposit, the responsibilities in the workflow, and all other aspects that institutions consider that should come to contribute/ensure their operation of the repositories.

c) Structure of the institutional repository

Is in the planning phase should be designed the information architecture of the repository. It is understood as information architecture, in this case, the Organization of content. Each institutional repository organizes content in a way that best fits your needs by adjusting the structure of the RI to the operation as a whole.

d) Institutional Repository deployment

The deployment step must be observed the following aspects: the metadata that have the purpose of register of journal articles; papers presented at academic events; Book chapters; Book and according to purpose of this study, registering also the contents of TCC's of engineering and also establish rules for standardizing the most used document formatting.

The ideal scenario is that intellectual production of the institution were stored and could be freely distributed on the Internet. However, the copyright of the content assets, especially most articles published in scientific journals, are the property of scientific editors. It is interesting to understand the aspects of copyright in order to avoid problems.

V. CONCLUSION

The research points to promote evaluation with statistical basis proposed institutional repository model, because, as any information system, you will need to go through some benchmark for comparison, in order to improve fragile aspects and identify their points of success and opportunities for improvement, considering mainly the aspects that will be used as indicators of quality.

The open access repositories allow the whole community (academic or otherwise) has access to the first research initiatives (TCC of graduate), elaborated and

developed by students, collaborating with the dissemination of scientific knowledge. The Institutional Repository (IR) is a strategic instrument, contributing to that the community has access to the research developed by graduate students, through its Work of conclusion of course (TCC's), transforming contents considered as Grey Literature (LC) in scientific research as knowledge production.

REFERENCES

[1] Campello, B. S. (2010). Perspectivas de letramento informacional no Brasil: práticas educativas de bibliotecários em escolas de ensino básico.Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação, 15(29), 184-208.

[2] Costa, S. (2008). Abordagens, estratégias e ferramentas para o acesso aberto via periódicos e repositórios institucionais em instituições acadêmicas brasileiras| Approaches, strategies and tools for open access through journals and institutional repositories in Brazilian.Liinc em Revista,4(2).

[3] Gomes, S.; L. Rébel; Literatura Cinzenta. Fontes De Informação a Pesquisadores. Universidade de Minas Gerais. 2000.

[4] Guimarães, A. Apresentação. Huntley, Lynn Tirando a Máscara: Ensaios sobre o Racismo no Brasil. S.Paulo. Paz e Terra, 2000

[5] Fonseca e Sá, M. I. Impactos do Movimento do Acesso Livre na Comunicação do Conhecimento. U.del Tachira, 2010.

[6] Le Coadic, Y. A Ciência da Informação.Brasília. Briquet de Lemos/Livros, 1996

[7] Machado, G. W. (2007). A transformação do conhecimento em produtos e serviços: a literatura cinzenta e as teses do PPGEP (Doctoral dissertation, Universidade Federal de Santa Catarina, Centro Tecnológico. Programa de Pós-Graduação em Engenharia de Produção.)

[8] .PETINARI, V. S. (2007). Repositórios digitais de acesso livre de monografias na área da ciência da informação..

[9] Souza, P.; Silva, E. Entender e Aplicar a LDB. S. Paulo, 1997.

[10] de Araújo, E. A., & Rocha, M. M. V. (2007). Educação continuada de profissionais da informação: perfil de ação de bibliotecários de instituições de ensino superior privado no município de João Pessoa/PB. *RBBD. Revista Brasileira de Biblioteconomia e Documentação*, *3*(2), 89-99.

[11] Vitorino, E. V., & Piantola, D. (2009). Competência informacional–bases históricas e conceituais: construindo significados. *Ciência da Informação*, *38*(3)..