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OPEN EDUCATIONAL RESOURCES (OER) IN GAS AND PETROLEUM ENGINEERING EDUCATION

1. INTRODUCTION

The problem with today's education is that most educators are still teaching the way they were taught in the past, but the students aren't like in the past.

The education of the 21th century is in a deep changing process, with a lot of changes in the technology market, in the industry and in social life. The profile of the students nowadays is different from the generations in the past, both in terms of interest in digital technology, as well as through the easy access of the virtual world.

"Generation Z", as stated in a recent survey by American and European sociologists, is living in a total symbiosis with the digital universe. According to the surveys, two billion of the people born after 1995 grew with the Internet and were determined to build a life in correlation with it, far away from the rules and standards of their predecessors. For this generation, going to college is no longer a sign for a successful career. Learning can take place everywhere, preferably in the virtual environment.

All these arguments widen our interest for open educational resources and give it more power, as it might be the antechamber of future schools.

OER appeared more than 10 years ago on the education market. The discussion about OER took place for the first time in 2002, at the UNESCO Forum. OER is defined as "any educational resources (teaching projects, training materials, manuals, videos, multimedia applications, multimedia files that can be distributed on the Internet and any other materials that have been designed to be used in teaching and learning) which can be accessed free of charge by teachers and students, which do not charge for any license or rights of authors." UNESCO has become and remained the main international institution concerned with the OER topic, steadily contributing with different points of view and facilitating an international dialogue about this issue.

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In 2012, UNESCO organized the World Congress for Open Educational Resources (OER), which ended with the adoption of the Paris Declaration on OER. As worded, the definition of open educational resources show that they "are educational learning materials and research that are in any medium, digital or otherwise, which is in the public domain or were made available in a free license, allowing free access, use, adaptation and redistribution by others without restrictions or with limited restrictions."

Open Educational Resources produce a major change in education, very pleasant for Z generation, which today finishes their specialty studies, if they have taken the traditional way. In the past, experts in education were responsible for designing the curriculum, courses and learning materials. Today, with this type of resources we move to another type of learning, where the age, place of the world and the financial possibilities are no longer relevant to having access to educational materials, regardless of the specifics and/or form in which it is posed. Moreover, we have access to more teachers (tutors), to different flexible forms of education and can contribute effectively to the development of learning resources because of the way educational resources are licensed as free.

The search subjects for OER are not only courses and courseware, but materials and data. The target users are not only learners (end users) but at the same time, content developers and course providers (teachers and/or wholesalers).

OER are connected with the freedom of the access. This means a material that can be downloaded from the internet is OER, if the user is can download it for free, to adapt it, modify it, reuse it, etc. and does not use it for commercial purposes.

So, the "Openness" idea means that knowledge must be disseminated and shared freely all over the world, via the Internet. The "Openness" concept includes two aspects, which are free availability and as much as possible, few restrictions on the use of the resource, regarding technical, legal or the financial aspects.

According to Li Yuan, Sheila MacNeill and Wilbert Kraan [9], "Openness exists in different 2 forms and domains and has different meanings in different contexts. For exemple in the social domain it is fundamentally motivated by the expected social benefits and by ethical considerations related to the freedom of use, contribution and sharing. Openness in the technical domain is characterized by access to source code and/or access to interoperability standards or the standards process."

Both digital and printed material are attributed to OER, even though the digital environment is one that promotes it stronger.

2. ABOUT AVAILABLE LICENSES

I mentioned earlier about freedom of access to OER. Often, when we take a material from the internet, we are interested to know about the copyright restrictions and about the license of the material. Copyright comprise refer to the right of the author to decide on reproduction of the materials (no matter if it is audio or video), the right to distribute the material, the right to publish the materials. In the case of open educational resources, their authors have the opportunity to waive part or all such rights, so anyone can access them, adapt or distribute.

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In the 6 licenses specify whether permitted or distribution of materials, modifying them and using them for commercial or noncommercial purposes.

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Fig. 1. Creative Commons licenses

But be careful to use OER! Even if the license allows redistribution and adjustment of the material for free, we are obliged to mention the original author of the material, because this is a moral right, which the author can't give up.

Teachers, students and other target group looking for OER should not have difficulties finding the OER, but they might be confronted with problems regarding their quality and relevance. The issue of the quality of resources is fundamental for the use of OER. According to Neil Butcher [2] "In the OER environment, quality assurance will be assisted by the development of such repositories, which will provide at least the first levels of quality assurance".

3. OPEN LEARNING RESOURCES

Another concept specific to the future of schools is Open Learning. This is an approach which encourages learning experiences and online activities. It help students to remove the barriers of learning in order to target success in an education and training system centred on their specific needs.

Open learning has as inspiration point, Experiential Learning – Kolb [10] (Fig. 2). This experiential learning allows students to construct their own meaning by the 4 steps presented by Kolb in his Learning Style Model.
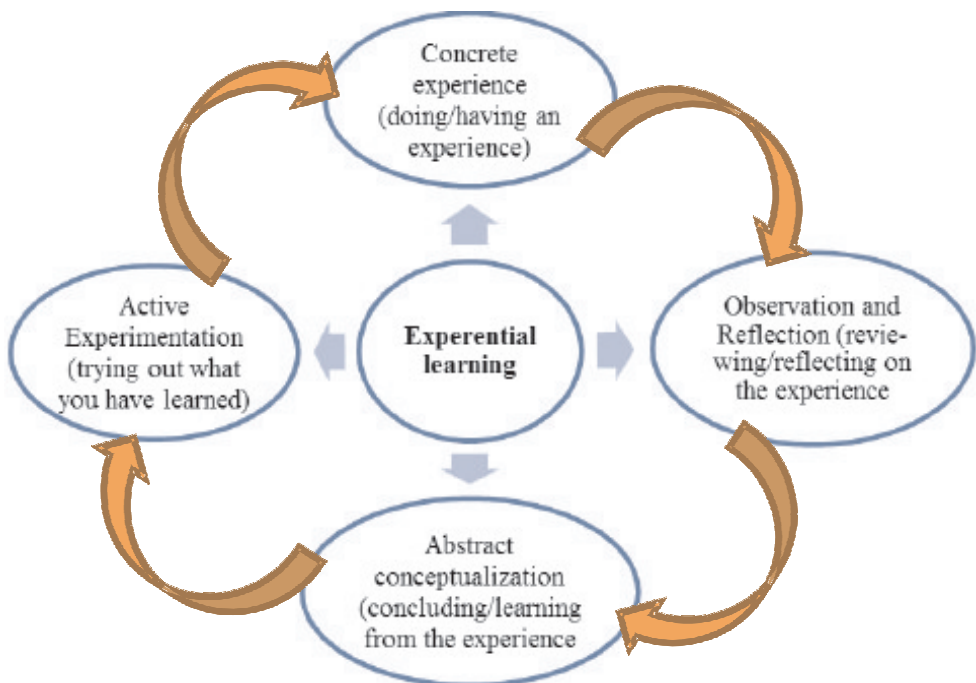
Fig. 2. Experiential Learning Cycle Kolb [10]

Open learning needs is based on some key principles [1]:

– The learning opportunity should be *lifelong* and should encompass both education and training.
– The learning process should be *centred on the learners,* and to build on their experience.
– The learning process must encourage independent and critical thinking.
– Learning provision should be *flexible* so that learners can increasingly choose where, when, what and how they learn, as well as the pace at which they will learn.
– *Prior learning, prior experience* and *demonstrated competencies* should be recognized so that learners are not unnecessarily barred from educational opportunities by lack of appropriate qualifications.

4. GAS AND PETROLEUM ENGINEERING AND OER

On internet you can find a lot of OER about Gas Engineering and Petroleum Engineering (Fig. 3 and 4). Most of them respect the same presentation, as follow:

1. The goal(s) of OER: *The goal of this course is to obtain…*
2. Subject:
3. Material Type:
   – Lecture Notes
   – Readings
   – Video Lectures
4. Provider: University of…
5. Author: You can find here general information in order to introduce the courseware and some hints about it.
   Other important dates about the course are:
6. Subject area
7. Education level
8. Material type
9. Conditions of use
10. Content sourse
11. Media format
    – Text/html
    – Video etc
12. Educational use:
    – Curriculum/Instruction
    – Professional Development

As an example the Petroleum Engineering course offered by Delft University of Technology [5] is presented under Creative Commons remix and share. So we can use these materials for our teaching activities, but we still have to respect the conditions of use and specify the source.

Fig. 3. An example the Petroleum Engineering course

Another example can be found on the Open University/Open Learn platform [6] where open resources, very useful for the teaching and lectures, can be found for free. Professor could insert part of these materials during the teaching process as an example, or can take over some of the reflections from the contents of the course, or they can use on of the issues found on this platform as homework.

Fig. 4. An example (Open University/Open Learn platform)

Using conditions are specified on the site: Creative Commons – Attribution-Non Com-mercial-Share-Alike.

One of the biggest platform for open Courseware si Massachussetts Institute of Technology, who's offers in terms of courses [7] on different subject and for different level of study (undergraduate/master/PhD) with Creative Common license are huge. Anyone can find here different versions in various languages, different audio/video courses, courses with subtitles, online textbooks and so on. It is even allowed to download the course materials without enrollments; it is presented the syllabus, calendar, lecture notes, as well as labs and materials to study for the midterm exam.

5.   CONCLUSIONS

The time of teaching the classical way is over. We must offer a modern and innovative way of teaching, more appropriate for the actual and future student's needs and expectations. The professor has therefore the possibility to inspire himself or to use materials from a big variety of Open learning and educational resources and even open courseware. Used and reused in the classroom by the teacher because of its free license and the contribution of this good educational materials can assure a vivid atmosphere around the lesson.

Therefore, professor nowadays is getting new task, to be able to find the most and sort through useful open learning and open educational resources, in order to increase the motivation for learning of the his students and to improve his teaching abilities adjusted to the students' needs and preoccupations.

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