

# The student as prosumer. Open pedagogy for ICT education.

## Introduction

In the program of Fontys University of Applied Sciences, School of ICT, students are offered the possibility to specialize in several ICT subdomains. In the subdomain ICT&Lifestyle, the focus is on the integration of ICT within our everyday life and environment. In that domain, the topic Lifestyle Technology (LSTE) serves as the technological component of the ICT&Lifestyle semester, in which student study ICT technologies that enable them to implement their semester's overall project. At the 2013 student evaluation, the relationship between the subject's content and the overall project turned out to be too weak, causing decrease in student motivation. The lack of motivation was confirmed by our observations and analysis based on three main starting points of the flow theory (Csikszentmihalyi et al. 2005). Hence the course was redesigned during the next versions using (a) the three psychological needs of autonomy, competence and relatedness from the Self Determination Theory (Deci & Ryan, 2002; 2008), (b) the community of practice concept (Wenger & Trayner, 2015) and (c) open practice (Ouweland & Schuur, 2017).

The general idea was that the course should encourage students to make meaningful choices concerning the ICT technology they would study, resulting in more relevance for the student and the overall semester project. This resulted in a three step approach of (a) inspiration, (b) exploration and (c) application/innovation. The use of openly available resources was crucial for this concept since, due to the individuality of technological topics, a traditional approach would no longer be sufficient in handling all possible choices. Therefore students had to find their own learning material that would guide them through the three-step process.

The three steps were aligned with three assignments. The objective for the first assignment was to encourage students to describe and motivate their ICT technology choice from the perspective of their individual development and the overall semester project, let them discover inspirational examples (best practices) of the application in the ICT technology and to make an (risk) analysis on the available knowledge (the knowledge base) of the chosen ICT technology. For the second assignment, students had to find and study/reproduce (basic) tutorials of the chosen ICT technology. During the third assignment students had to design their own application within their ICT technology and describe it as a scenario, flowchart or class diagram. Furthermore students had to analyze their application to define what they needed to study and learn about the ICT technology (knowledge needs).

An example to illustrate this process. A student would select a Java Script library such as Three.js as ICT technology to study. In the first assignment, the student looks for meaningful and inspirational examples that used the Three.js library (e.g. an interactive 3D game in a browser). He or she would also look at the available resources such as the developer's website, tutorials, manuals, forums and code references available for mastering the technology. In the second assignment, the student would reproduce some of these resources (such as tutorials) to get acquainted in using the Three.js library. In the third assignment, the student realizes a new application using the Three.js library. During the realization the students were encouraged to (a) find (open) educational resources (b) participate in communities of practice and (c) use local experts and tutors at Fontys ICT to resolve their knowledge needs and realize their application. Afterwards students were asked to evaluate on their progress and the resources they had used. The three step approach was repeated during the semester so students studied at least two different ICT technologies and were able to improve their exploration and research skills during the semester.

In this approach students are in the lead, both in reuse of (open) educational resources and in creating or curating resources to share with future generation students, connected with the world outside the educational institution. This case of open pedagogy, where students are proactive users of (open) educational resources, we call proactive open pedagogy. To find out about the effectiveness of this type of open pedagogy, the results of three years students work were analyzed.

## **Results**

Due to the fact that the course was redesigned in multiple iterations during the period from 2014-2017, for this study we limited the results to the students (a) participating between 2015 and 2017 and (b) contributing to all three assignments. Therefore the group consists of 53 students (n=53) that chose a total number of 51 different ICT technologies to study based on 231 inspiration examples and projects.

Most ICT technologies were studied individually or in small groups (up to four students); although not necessarily at the same time. Only four ICT technologies were studied by larger numbers of students (between 6 and 17). A reasonable amount of student projects involved a combination of two (or more) ICT technologies increasing the number of studied ICT technologies even further.

Altogether students used 451 different (open) educational resources during their exploration and innovation. Most of these resources were found and used during the third phase where the students were looking for specific educational resources that matched their knowledge need for their innovation. These resources were described by the students and shared on an internal wiki (open tech wiki) for reuse by students in succeeding generations. Only ten of these resources were reused by two students and no more than two resources were used by three students. Although some ICT technologies were studied by groups up to 17 students no resources were reused by more than three students.

The biggest providers for educational resources were YouTube (104) followed by Arduino.cc (38), Instructables (32), processing.org (17) and Stack Overflow (10).

The language of all the found and used resources was English and all resources were found online. Considering the fact that the 2013 edition of LSTE offered the students only one single ICT technology, the open pedagogy proved to be extremely effective and caused an increase from one to more than 50 different ICT technologies being studied. Also students proved to be able to find more than 4 inspiring examples each and used an average of 8.5 resources to study the ICT technology of their choice, mostly during the phase of innovation.

To what extent students co-operated in one or more communities of practice cannot be derived from these figures alone. The number of students that studied a specific ICT technology doesn't imply that they studied the technology together due to the fact that they might belong to different generations.

## **Discussion**

The results of the study were evaluated against some of the main starting points of open educational resources: Wiley's 5R, Educational fit and the paradox of Wiley.

### *Wiley's 5R*

Wiley's 5R definition of open learning materials<sup>1</sup> (retain, reuse, revise, remix, redistribute) are considered to be fundamental characteristics of open learning materials. Nevertheless, the results show that reuse of educational resources as well as the other rights is no common practice among students who, most of the time, don't seem to notice any advantages of the 5Rs.

The lack of formal 5R rights also doesn't seem to hinder students in finding and using educational resources. Most resources don't meet some or all of the requirements of 5R or aren't clear about its rights.

Much more than the formal rights of 5R, the student's ability to define his/her knowledge needs and ability to find any resources at all seem to matter in a proactive open pedagogy. And because in many cases the resources are used as-is, the revise and remix characteristics are not important for the students.

### *Educational fit and the paradox of Wiley*

Wiley's paradox on reusability (2002)<sup>2</sup> rephrased by Wilson (2015) as –“the pedagogical effectiveness of a learning object and its potential for reuse are completely at odds with one another” - can be understood as the inverted relationship between the reusability of a learning object and its educational fit.

Since students need more educational fit during their third assignment when building their application the fact that they used most resources for that assignment seems to support the paradox.

However, the fact that students are able to find the resources they needed also tells us that the occurrence of the paradox doesn't hinder students in finding useful resources in which, by definition, the educational fit must be high (and thus the reusability low). The Wiley paradox seems to play an important role in the discussion on the efficiency of creating or developing open educational resources, but plays a less significant role when it comes to the proactive open pedagogy.

Nevertheless, during the evaluation interviews with six of the participating students it turned out that *not* the availability of (open) educational resources was decisive in finding material with a good to perfect educational fit *but* the students ability to analyze, define, describe and, in any internal or extern form of a community of practice, communicate about his or her knowledge needs.

This may be explained by the fact that the individual student is looking for an individual fit, where a teacher has to cope with a fit for in most cases comprising a larger set of learning objectives and a more diverse population of students.

### **Conclusion**

Due to the fact that in an open student proactive pedagogy the learning content is 'created' by the student and from a student's perspective some of the pitfalls, downsides, conditions and problems described in OER literature still *apply* but no longer *obstruct* the pedagogy and are successfully *bypassed* as a result of the pro-activeness of the students.

Therefore the open student pro-active pedagogy should focus on the student's pro-activeness, the ability to analyze and describe his/her knowledge needs and matching available resources. In other words, a successful open proactive pedagogy largely relies on the development of 21<sup>st</sup> century skills and not on formal OER requirements and deficits.

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<sup>1</sup> <http://opencontent.org/definition/>

<sup>2</sup> <http://opencontent.org/docs/paradox.html>

## REFERENCES

- Csikszentmihalyi, M. , Abuhamdeh, S. & Nakamura, J.** (2005), "Flow", Published in Elliot, A., Handbook of Competence and Motivation, New York: The Guilford Press, pp. 598–698
- Deci, E.L. & Ryan, R.M.** (eds.) (2002). Handbook of Self-Determination Research. New York: University of Rochester Press.
- Deci, E.L. & Ryan, R.M.** (2008). Handbook of theories of social psychology.
- Ouwehand, M. & Schuwer, R** (2017). Connecting OER to teachers via open pedagogy. Online available at: <https://conference.oeconsortium.org/2017/presentation/connecting-oer-to-teachers-via-open-pedagogy/>
- Wenger, E. & Trayner, B.** (2015). Introduction to communities of practice  
A brief overview of the concept and its uses. Available online at: <http://wenger-trayner.com/introduction-to-communities-of-practice/>
- Wiley, D.** (2002). The Reusability Paradox Online available at:  
<http://opencontent.org/docs/paradox.html>
- Wilson, G.** (2015). The Paradox of Learning Object. Available online at: <https://software-carpentry.org/blog/2015/04/the-paradox-of-learning-objects.html>