

Examining Students' Perceptions on the Success of Open Data Education Based on PBL and Digital Technologies

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Abstract

With Open Data becoming more popular and more public bodies publishing their datasets, the need for educating citizens on how they can use them has become prominent. The current study is based on a pilot undergraduate module that aimed to facilitate the development of Open Data skills by students. The module used learning technologies (i.e. Moodle, Tableau) and followed a Problem Based Learning approach. A focus group methodology has been chosen in order to understand students' shared experience during the pilot. 'Tutor guidance', 'Open Data and PBL skills', and 'use of learning technologies' have emerged as the main themes from the preliminary analysis. While the students felt that they have gained various skills, they seemed unsure about their role in the PBL process and the importance of learning technologies.

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Introduction

The availability of public and other information to the general public promises significant added value and potential economic growth (Gurstein, 2011). The main aim of opening data is to allow its exploitation and re-use in ways that they can produce unforeseen services, products and start-ups that address existing economic and societal problems. Another significant benefit of open data is to allow public transparency, encourage citizens' engagement in policy making and improve public service delivery (Arzberger et al., 2004; McKinsey Global Institute, 2013).

A study by the Open Data Institute (2015), entitled "Supporting sustainable development with Open Data", describes three major benefits of Open Data for growth: It can "i) more effectively target aid money and improve development programs, ii) track development progress and prevent corruption, and iii) contribute to innovation, job creation and economic growth."

However, publishing and re-using Open Data requires a specific set of knowledge and skills set that are still lacking in the market, allowing only a limited percentage of Open Data experts to exploit Open Data (Davies, 2014; OECD, 2014; Open Data Barometer, 2015; Rubinstein et al., 2015; Stott, 2014). More specifically, the Open Data Barometer for 2014 points out that a "sustained investment in supporting and training a broad cross-sector of civil society and entrepreneurs to understand and use data effectively" is needed and that the "widespread availability of data skills training is also correlated with higher political impact" (Open Data Barometer, 2015). Existing efforts on Open Data education usually involve short workshops or a series of slides that present the basic concepts and do not allow practical experimentation or skills development. This calls for new opportunities in educating citizens on Open Data, so that they acquire knowledge on a wide variety of relevant topics and gain skills that will allow them to properly work with Open Data on any subject field. This can produce significant added value for economy and society.

The current paper discusses a pilot that took place as part of a project funded by Erasmus+ programme. One of the aims of the project is to understand whether combining a well-established participatory learning approach, such as Problem Based Learning (PBL), with learning technologies (i.e. Moodle, Tableau) can support Open Data education. More specifically, the project examines whether such a teaching method can result in skills development and student engagement in the context of Higher Education. The current paper aims to present some preliminary results regarding the students' perspective on their learning during the pilot.

The Pilot

The pilot took place in a Greek university and involved 11 undergraduate students that attended an optional module about Open Data. The module is part of a programme in the broader area of Computer Science and it is available for students in their fourth year of studies. The pilot included 13 workshops that covered various topics about Open Data, such as obtaining open data, scrubbing, analysis, and visualisation.

Moodle was the main platform used to support the module. Students were asked to join the platform in order to access the module's learning materials and complete various tasks, such as participating in-group discussions, evaluating the week's workshop, and storing material

that could help their team to solve the problem. In addition, they had to use Tableau, a data visualisation software, in order to analyse the Open Data on which their problem was based.

The online environment of the module (Figure 1) was designed in a way that could guide the students through the whole PBL process. The course layout followed the topic format available on Moodle, with each of the main PBL phases representing a separate topic. Our PBL approach, which follows the PBL model of Aalborg University (Khalid et al., 2012), consists of the following phases:

- Group forming – students had to use the wiki available under the ‘General’ section to add their name in one of the two groups available. Each group could have up to five students.
- Problem formulation – tools like the ‘Forum’, ‘Wiki’ and ‘Student Folder’ were available to students in order to exchange ideas and material that would help towards defining the problem. Students had to do their own research and use Open Data databases in order to find suitable data for their problem. The section also included the ‘Feedback’ tool that allowed students to evaluate the week’s workshop and a quiz that aimed to test their understanding of the concepts covered during the workshop.
- Task formulation – the ‘Checklist’ tool was available to students, so they could break the problem into smaller tasks.
- Data gathering – this phase included the collection of various resources that could help students in solving the problem. During this phase, students were also asked to complete quizzes and evaluation forms, like they did in the problem formulation phase.
- Analysis – students had to prepare short presentations of their progress on solving the problem. A forum was also available, so they could exchange views/discuss about issues they may have faced during the analysis stage of the Open Data.
- Design – students had to design a solution (i.e. start thinking how they could use the findings of their analysis, use visualisation techniques for the Open Data etc.).
- Implementation – group presentations around the implementation of the chosen solution based on the Open Data.
- Evaluation – group presentations around the evaluation of the solutions that the two teams developed based on the Open Data.
- Reporting – this is the stage where the students submitted their final reports.

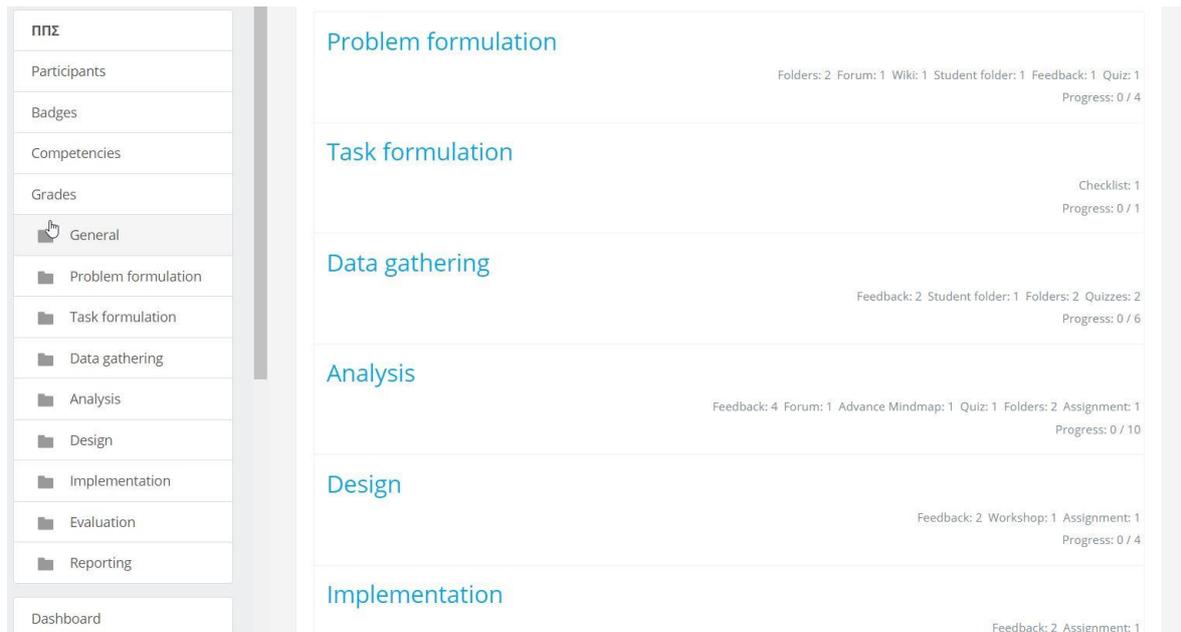


Figure 1. The module's online environment

Preliminary findings

A focus group, which included five of the nine students that actively participated in the module, was conducted at the end of the pilot to understand the students' perspective of the module. While this is an ongoing project, the preliminary analysis of the focus group revealed some interesting themes.

Students felt that they needed more guidance by the tutor in order to complete the project. Although self-directed learning is one of the skills that students are expected to develop as part of the PBL experience (Hmelo-Silver, 2004), a reluctance to take initiatives can be justified by their previous learning experience, which was lecture-based. As Ridgway (2016) explains, inertia is a common challenge for reforming curriculum, as it is easier to continue current practices, and existing curriculum structures and assessment systems can pose additional barriers. Thus, it is necessary to explain to the students their role in the PBL method and move their attention from the assignment and marking to the learning process itself. The instructor will need to make it clear to the students that they are expected to take initiatives and that guidance in this case will not be about telling them what they have to do, but it will take the form of feedback that will help them to develop their skills further.

Regarding the skills they developed, the students appeared hesitant. Although they referred to skills that are traditionally linked to PBL, such as interpersonal and group skills, problem solving, and knowledge building (Pearson et al., 2007), they also mentioned difficulties in working with others and felt unsure about their ability to complete advanced tasks with Open Data. The development of other skills (i.e. time management, presentation skills, and data analytic skills) was also described by students throughout the discussion, even though these skills were not named explicitly. Theoretical knowledge about Open Data was also considered as a positive outcome of the module, although some of the students expressed a preference for practical activities over theory. This shows the existence of 'theorists' (i.e. learners that are motivated by exploring how theories are related to experience) and 'activists' (i.e. learners that they feel that their learning is more effective when they are talking, making, or doing something) (Moore et al., 2007, pp. 68–70) in the focus group. This may explain why some of the students felt unsure about the Open Data skills they had

developed and may pose a challenge for instructors that want to follow the PBL approach, as the method is based on practice. Thus, consideration should be given to how the instructor can create a learning environment that will facilitate the development of Open Data skills, even from students that fall into the category of ‘theorists’.

Another interesting concept discussed was about the use of technology as part of the learning process. Students’ view about how technology can be utilised within the classroom was limited; the first technology that came to their mind was the Internet as a way to find information. Another interpretation that was given to the phrase “the use of technology in learning”, was about including the concept of using technology in the contents of a module. Although the use of learning technologies in Greek universities is generally limited, it is still surprising that students in the area of Computer Science could not think of any other ways of incorporating technology in teaching. And while they expressed a positive attitude towards technology in general and described it as a necessary tool, without which they would not be able to learn about Open Data, their attitude towards Moodle was neutral at best. It seems that the chosen format for the online environment of the module confused the students instead of helping them to follow the PBL approach. This may be related to the overall confusion about how PBL worked, mentioned above. However, even tools which purpose was clear to the students (e.g. Forum) were not used as they found alternative ways of communication (e.g. face to face, phone calls, Facebook messenger etc.) more effective and more ‘direct’. This seems to be in line with Technology Acceptance Model (TAM) that suggests that factors like ‘Perceived Usefulness’ and ‘Perceived Ease of Use’ affect the attitude toward using the technology under examination and in turn, Attitude affects Behavioural Intention to use the technology (Davis et al., 1989).

Next steps

The analysis of a focus group is dictated by the research aims of the study and there is no ‘one-size-fits-all’ approach (Barbour, 2014). In our case, thematic analysis, which is “the process of identifying themes in the data which capture meaning that is relevant to the research question” (Willig, 2014), is deemed as more suitable for understanding the views that students have about the adopted learning method. We will follow the two step approach suggested by Liamputtong (2011, p. 173): a) read through the transcript in order to make sense of the data, and then b) examine the transcript to identify ‘patterns of meaning’. Additional focus groups will be conducted to capture the student experience with the other pilots of the project.

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¹ <http://www.odedu-project.eu>

² <http://www.pbl3-project.eu>

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