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Peculiarities of educational challenges implementing project-based learning

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Abstract

It has long been acknowledged that effective learning is grounded on opportunities to explore problems and think critically, thus creating solid base for knowledge economy development. In this vein, there have been concentrated reform initiatives across many content areas that have integrated authentic and student-driven instructional approaches. Within the context of the 21st century education paradigm, the acquisition and development of new competencies and technical skills require new authentic learning methods. The growing popularity of the project-based learning paradigm, is related to extended opportunities in terms of knowledge attainment, facilitating the acquisition of several transversal competences such as team work, search and collection of information and synthesis and analysis abilities. However, PBL learning strategies should be developed in compliance with the educational challenges faced by the new technique's implementation. In the light of this reasoning, this paper presents a literature review on PBL and discusses PBL's implementation opportunities and challenges faced by academic staff, business representatives and students. A key point is to highlight the concept of networking among teachers, students and the business sector.

Keywords: Knowledge-based Cooperation; Networking in Studies; Business and Science; Innovative Approach; Project-based Learning (PBL);

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1. Introduction

Information society is developing constantly and requires new approaches toward learning. Especially, new educational methods and tools becomes important in order to acquire and maintain the attention of younger generations – gen Y and gen Z, who are struggling with keeping attention for longer period of time reading text or concentrating on tasks (Gorsev et al. 2017; Sabaityte, Davidavicius 2017; Sabaityte et al. 2019; Damy & Plascencia, 2020). One of the modern tools, helping to achieve higher efficiency of educational process and knowledge transfer is project-based learning (further in this paper – PBL). PBL is defined as a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to a complex question, problem, or challenge (Bie.org, 2014). Blumenfeld et al. (1991) describes PBL as a comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems. PBL is often described more like a scheme or a philosophy of teaching and learning, rather than an educational strategy (Thomas, 2000). In fact, PBL should be seen an instructional model based on a constructivist approach to learning, which entails the construction of knowledge with multiple perspectives, within a social activity, allowing for self-awareness of learning in a context-dependent scenario (Tamim and Grant, 2013; Çevik and Üredi, 2016; Vanichvatana, 2020). Dierker et al. (2018) focuses on inquiry-based projects as the type of project-based learning and most commonly defined as an instructional approach based on authentic, real-world activities that are aimed at engaging student interest and enthusiasm. Analyzing PBL as process, it could be stated that it is important to provide students an answer to question or solve a problem, in order to allow students to face challenges that lead to answers, reflect on ideas, and make decisions that affect project outcomes.

PBL is and effective educational tool, which helps students develop deep thinking ability in order to apply knowledge, develop their communicational skills and also reasoning skills, and this method is more innovative, attractive in compare with traditional didactic approaches. Also, regularly using project-based learning tools, the systematic retention of project experiences enables students to compare various projects more systematically and highlight the most effective problem solving mechanisms, that leads to project risks reduce in the future and better practical managerial skills.

The implementation of PBL addresses the European Higher Education Area's (EHEA) call that urges students to be engaged in more autonomous work. Indeed, self-regulated educational process is seen as an effective pathway to involve digital-age learners, engaging them in real-life problems resolved through creative thinking. In this sense, PBL can also be seen as a management process, which comprises a set of complex endeavours based on challenging questions, research activities, decision making and creation of realistic and meaningful outputs (Blumenfeld et al. 1991; Thomas, 2000; Arce et al., 2013; Hutchison, 2016; Dierker et al. 2018; Kozikoglu and Onur, 2019). PBL as a tool could be characterized with a lot of advantages, but its implementation process faces some issues and challenges, this paper aims to address this issue by discussing some of the major challenges faced by PBL projects in order to make PBL implementation more smooth and effective process.

2. Relevance and Concept of Project-based Learning

The concept of PBL is very closely related to project itself. Some of the cases could be identified as PBL, but aren't. PBL in compare with project, requires collaboration and teachers guidance, are more process rather then product or results orientated, based on real world experience and problems,

learning occurs through the project and students chooses to determinate the outcome. From a holistic perspective, PBL enables the creation of an integrated multilayer context composed of elements such as educational content and activities, learners' practical experience and knowledge and cooperation resulting from research and educational networks of organizations and business companies. In this sense, the relationship between teaching and learning produces a new learning environment, which, ultimately, not only enhances overall educational capabilities, addressing the 21st century demands of education and the business world, but also puts in practice a culture of learning-organization (Lidón et al., 2011; Bell, 2014; Hutchison, 2016; de la Cruz *et al.* 2017).

PBL could be described as a new approach to teaching and learning that helps students to acquire the XXI Century skills, engaging students in investigation of real-world problems and challenges. The rapid development of information technologies led to project based learning development, using web 2.0 technologies to support students and teachers working on PBL (Sabaityte, Davidavicius 2017). In broad terms, the most significant objectives of the PBL approach include increased students' motivation; the training of valuable skills, such as planning and organization of the research-based learning process; encouraging creative thinking and social skills (Bell, 2014; Butvilas et al., 2016; Hutchison, 2016). According to Bell (2014), a student-driven and teacher-facilitated approach to learning rests on four core pillars, namely: (1) question-driven learning for knowledge building; (2) student choice-based research under the supervision of a teacher; (3) collaborative work and communication; and (4) focus on finding solutions to real-world problems. Students are actively involved in PBL through the use of real-world examples, collaboration with peers process, developing critical thinking and purposing solutions or making products.

As learning enablers, projects should be major component of the curriculum, which allow learners to encounter and get familiar with central concepts of the discipline. Students are encouraged to think out of the box, investigating problem-related environment through open-minded questions. They must craft diverse activities, individually and in teams, supporting an interdisciplinary approach. They also allow relationships between differentiated themes and topics to be established, embracing two or more disciplines (Butvilas et al., 2016).

Analyzing the essential elements of PBL, the scheme according to Lorin (2013) was created (Figure 1). The significant content is a core of a PBL, enabling certain knowledges and skills to gain. Content is examined by questions, leading students to a certain direction, but also leaving a space for their creativity demonstration through the element of students voice and choice. As it was mentioned above, PBL enables development of XXI Century skills, such as collaboration, communication, critical thinking, listening and etc. Another element of PBL is inquiry and innovation, enabling meaningful learning, more defined concepts and shapes. Last two elements of the PBL in the list are feedback and revision, and also publicity and presented product, as real-world competence and demonstration of the outcomes.

The uniqueness of the PBL approach not only offers greater flexibility to students but also transforms the teacher's role. Indeed, teachers undertake a new and prominent role of facilitators, who can overcome the boundaries of traditional classes. Thus, the PBL approach empowers teachers to apply different pedagogical tools, combining them in a way that allows the interest and motivation of students to be increased. Furthermore, it fosters a collaboration-based culture between teachers, requiring them to share knowledge and resources and overcome professional "silos", for instance. Analyzing PBL in association with traditional classroom teaching, the traditional tools could be

described as teachers assigning reading materials for students, lectures are very tied with textbook materials and even grading students on the basis of their ability to remember factual information. In PBL, teachers are resource providers, giving the base – providing input and language preparation, acting as facilitators and counselors, giving the support and guidance for students, and also acting as the co-learners – learning together with the students.

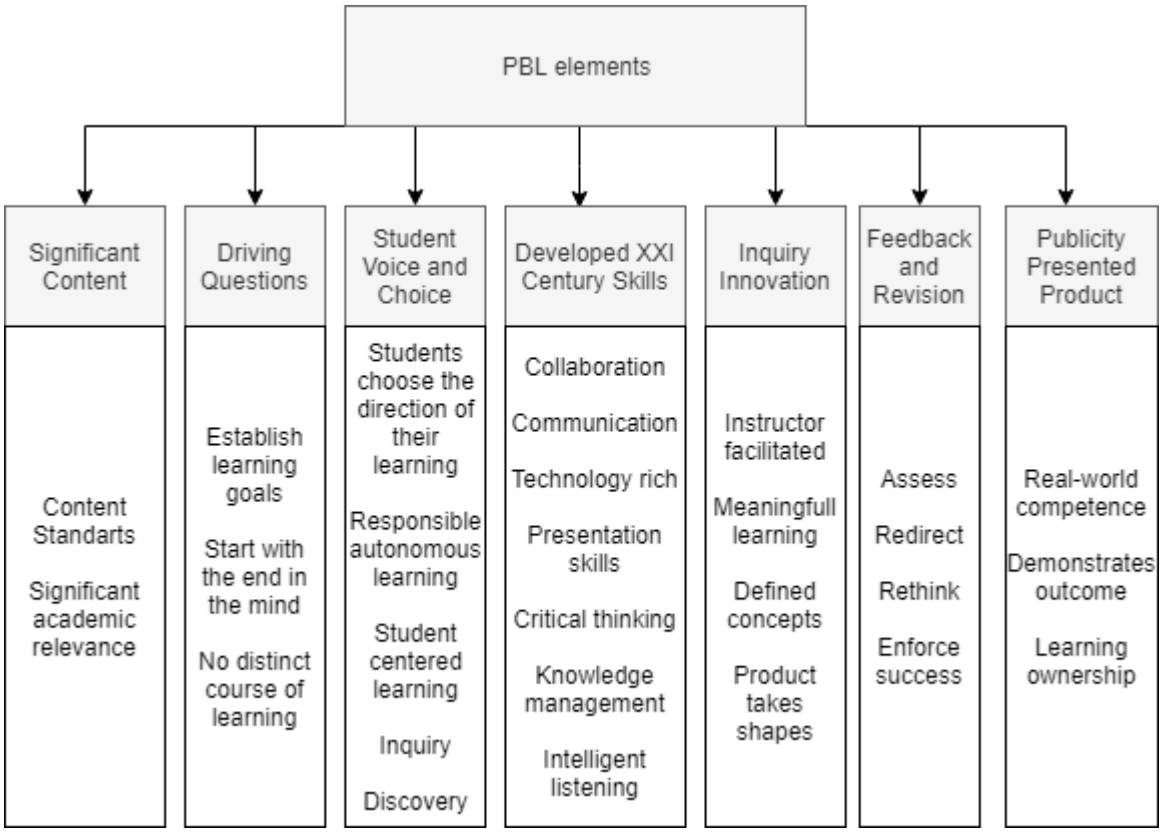

Figure 1. The elements of PBL (source: Lorin, 2013)

In could be noted that for teachers who are less familiar with technology-based environments, the 21st century project-based teaching can be a challenge. As recognized by Boss and Krauss (2007), the implementation of PBL transforms teachers in lifelong learners, forcing them to conduct more research and/or seek for advice from the business community, which in turn requires hours of planning. PBL also requires teachers to rethink and redesign students' assessment methods in order to reflect multiple achievements (see Bell, 2014; Butvilas et al., 2016; Hutchison, 2016).

Identifying the link between the PBL and teachers role, it is important to analyse PBL as the process in 3 stages:

- *Pre-project stage*. In this stage teacher play a role of a knower, helping students select a topic, generate ideas through the brainstorming/mind mapping, guiding students to formulate their project objectives and developing a contract/proposal for the group;
- *During-project stage*. In this stage teacher play the role of a consultant, a facilitator or a co-learner, helping students gather ideas, defining objectives, drawing up the schedule and providing input for

language skills. Teacher intervene if students' direction not practical, offer suggestions to solve problems and respond to requests from students.

- *Post-Project Stage*. In this stage teacher play the role of a commentator and appraiser. Teacher pays attention at what students learned during the project, share the reflection, provide a balanced picture of strengths and weaknesses, offers suggestions for improvement. In this stage teacher provides evaluation by collecting and analysing feedback from students, mentors, parents, educational institution authority and revise and improve the project.

The implementation process of PBL requires professional knowledge and deep understanding of the aim, taking project learning as an open learning curriculum, being familiar with the basic steps of the implementation.

3. Implementation Process of PBL

As it was analysed previously, the main objectives of the PBL approach include increased students' motivation; the training of valuable skills; encouraging creative thinking and social skills (Bell, 2014; Butvilas et al., 2016; Hutchison, 2016). The PBL could be also viewed as system of elements and their links: significant content, driving questions, students voice and choice, developing XXI century skills, inquiry innovation, feedback and revision, publicity presented product (Lorin 2013), analysing it through the stages: pre-project, during-project and post-project, highlighting the importance of teachers role in it.

As applying the PBL and use process orientated approach, the certain input and questions leads students through the knowledge attraction process. According to Levine and Mosier (2014), projects that require students to apply the knowledge and skills they learn should be the focus of the curriculum. In this sense, the PBL process should be organized taking into account an open-minded driving question that teachers use to connect content to current and relevant issues. Through this process, students should be able to develop their own questions to drive learning, as well as apply that knowledge to products they develop. In essence, PBL encourages students to play an active role in absorbing concepts and content, enabling them to develop new skills (Levine and Mosier, 2014). Since students can apply classroom content to real-life phenomena, PBL also facilitates career planning, technology use, student engagement, community connections, and content relevancy (cf. Levine and Mosier, 2014).

It is worth mentioning that many teachers perceive PBL as beneficial to their students, thus motivating them to adopt the instructional approach in their classrooms. A national survey of public school teachers revealed that they were most likely to use PBL in their classrooms because they believe it teaches abilities beyond academic content (cf. Levine and Mosier, 2014), providing real-world competence, with the compliance of XXI century skills development, such as collaboration, communication, technology rich, critical thinking and etc. (Lorin 2013).

From the PBL implementation point of view, the process has to be initiated with a strategic decision, which should be taken by each higher education institution (Butvilas et al., 2016). Therefore, PBL should be implemented through a consistent approach, and there are important implementation phases to be considered: decision, preparation, the integration of PBL into study curricula and business sector involvement (see Table 1). In the Table 1 implementation process into the organization is described. Also, the PBL implementation could be viewed from the implementation of the certain PBL point of view, analysing teachers and business representatives role, defining certain activities in

the pre-project stage, during-project and post-project stages. It is important to analyse relevant real-world business case, combining theoretical base and practical input material, there it is important to have a relation between the teachers and business representatives.

Table 1. Stages of PBL implementation (Butvilas et. al. 2016)

No	Stage	Description of the stage
1	Decision	The managerial decision has to be made by the higher education institution administration and teaching staff
2	Preparation	During the preparation phase, some organizational changes are also foreseen. The main goal remains involving the business sector (i.e. social partners) in a more active manner
3	The integration of PBL into study curricula	In order to integrate PBL, the program committee revises the existing study programs. Eventually, the committee decides to move some of the programs to the modular structure of curricula. Thus, such a decision allows PBL to become a part of the study process in each semester.
4	*Business sector involvement*	It has to be stressed that this is one of the toughest stages. The implementation of PBL requires a lot of effort in order to show the business sector that this is a learning process, not a free labor force created especially for commercial purposes
5	*The preparation of teaching staff*	At this stage, the preparation and organization of original training courses for lecturers is required

As it was mentioned before, the implementation process of PBL requires links between the higher education institution administration and teaching staff and business sectors representatives, working together on core goals of the PBL implementation into the educational process, relevant material preparation, combining the theoretical base and practical input, and also it requires appropriate preparation for the teaching stuff, as teachers role in the 3 main stages of the PBL (pre, during and post) is defined as most important.

4. Advantages of PBL

Benefits resulting from PBL have long been acknowledged. For instance, Dewey (1938) emphasizes that “learning by doing has great benefit in shaping students’ learning. High-quality experiences, as well as continuity of experiences, are paramount”. During many years, the PBL methodology was implemented in fields of technical and engineering education. Nowadays, it is the worldwide preferred method in a wide range of courses and programs (Hutchison, 2016).

PBL enables not only knowledge transfer, but also could be viewed as new skills gaining tool, providing students possibility to gain critical thinking, collaboration, intellectual listening, communication skills, also enabling better employability skills.

PBL enables the use of web 2.0 technologies, such as social networks, forums, wikis and virtual educational portals. Working together with teachers, students can collaborate on the project and disseminate the results through creating groups, pages or websites, and also creating the awareness of the results (Sabaityte, Davidavicius 2017). Traditional media technologies are suitable for transferring information and knowledge to adult members of society. However, when the peculiarities

of providing knowledge to the younger generation are analyzed, the changes brought by the 21st century and the latest media technologies and their application in the learning process are becoming more relevant. In order to achieve accessibility, complexity and flexibility of the educational process, not only traditional media, but also new media technologies are used for implementation, which allows to transfer knowledge without limiting the geographic location of knowledge subjects and enabling greater inclusion through the use of gaming elements. Evaluating the opportunities of using traditional and new media in PBL, the added value of social media as an innovative learning environment through the following characteristics was distinguished: accuracy (evidence-based knowledge transfer, reliability, direct exchange of user experience, aggregation of information, openness of information), accessibility and accessibility (possibility to access information via mobile devices, enables sharing of information), balance (the impact of User Experience on balance of information), consistency (changes and innovations can be delivered to users through a pop-up message system), cultural competence (personalization of news and information in the area of consumer interest can increase the attractiveness of the broadcast platform), timeliness (providing information on the basis of information demand is an important element in sharing information, constant updates, social support when it is needed), understanding (the brand and the organization must match the individual level, social media web sites are characterized by excellent fitness for use, which enhances this effect).

By transforming students' work habits, the implementation of PBL initiatives brings new learning-teaching experiences and intangible changes to the educational system (Thomas, 2000). This, in turn, allows students to acquire "new patterns of thinking, […] they learn how to capitalize on the wisdom of the group, and, most importantly, they continually learn how to learn together" (Boss, Krauss, 2007). In sequence, students demonstrate a greater interest, engagement and mastery approaching different types of disciplines, allowing PBL to be seen as a successful way of teaching the 21st century skills (Hutchison, 2016). Different studies have also reported that PBL initiatives have a positive impact on the development of higher-order thinking skills in specific groups of students. In particular, as Levine and Mosier (2014) note, students with low verbal ability – or with lack of previous content knowledge – learn more in PBL classes.

Professional learning of teachers differs from a peer-to-peer collaboration of students. In this domain, PBL brings together like-minded people forming teachers' learning communities. It enables the critical mass of educators who share the same goal to be increased. Innovative thinking teachers together can lobby, allowing teachers' isolation to be reduced through more extensive networking in – and outside of – the educational sector; improve time and resource management; increase shared responsibility; better cope with technological challenges; and gain more power promoting time needed changes in a systematic way.

From the business perspective, PBL is also source of a set of benefits (see Figure 2). Projects require real-life problems, and thus they are open doors for business organizations to better articulate and share business needs, and test new business ideas at a symbolic cost (Tamim and Grant, 2013). Being active players in the learning environment, firms can shape the teaching-learning process, specifying existing gaps in the education field, sharing special training modules, and launching internships to develop new talents for their own needs. PBL also enables firms to avoid investment risks related to retaining post-graduates.

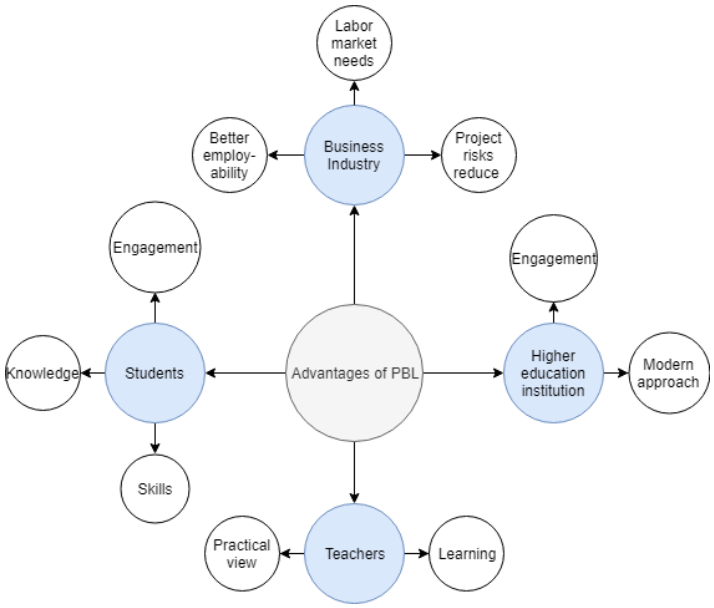

Figure 2. The benefits of PBL (compiled by authors)

The PBL could be characterized as not only knowledge, but also XXI century orientated skills gaining tool, helping students to achieve higher employability skills, providing possibilities to implement web 2.0 technologies into the educational process, enabling education and entertainment (edutainment) possibilities. The PBL is a tool changing the whole educational system, helping students gain greater interest and engagement. Viewing the advantages of the PBL from the business point of view, it could be noted, that students more actively gain knowledge about the real-world business problems and regularly using project-based learning tools, the systematic retention of project experiences enables students to highlight the most effective problem solving mechanisms, that leads to project risks reduce in the future and better practical managerial skills.

5. Pecularities of Implementing PBL

Implementing PBL into the educational process leads to the use of the PBL advantages on the one hand, increasing motivation of the students and more closely adaptation of study programs to the needs of labour market and business. But taking on a constructivist approach, adopting new instructional strategies, and managing, designing and assessing PBL are among the major challenges that teachers face when they choose to use PBL in their educational practices (Tamim, Grant 2013). Blumenfeld et al. (1991) pays attention at the adequate support of the teachers and students, during the PBL implementation process in order to get better results. The results of the research conducted by Poonpon (2017) highlights the need of adjustment of the implementation plan and an addition of instructional activities regarding study module presentation practice for future implementation.

Tamim and Grant (2013) state, in addition, that some of the challenges faced are also related to the conflict PBL brings to the deep-seated beliefs of teachers in their approach to teaching, as well as the degree of balance needed between student- and teacher-control over the activities (see also Thomas, 2000). As pointed out by the authors, as teachers get introduced to PBL, they need time to adopt the constructivist approach of PBL.

Other studies on PBL (e.g. Levine and Mosier, 2014) identify three distinct areas of implementation challenges for teachers: (1) creating a culture of collaboration and teamwork in the classroom; (2) adjusting from a directive to a facilitative role; and (3) scaffolding student learning. Other barriers to implementation include the fact that classrooms sometimes feel disorderly, project planning is time-consuming, and authentic assessments are difficult to design and implement. Additionally, teachers struggle to incorporate information and communication technologies (ICTs) as a cognitive tool (Levine and Mosier, 2014).

In light of this reasoning, teachers need to be flexible and tolerate the ambiguity created by the student-centered approach. Also, they should promote an environment of inquiry and challenge, which is a key aspect to gaining an intrinsic value of learning (Tamim and Grant, 2013). It is worth noting, however, that teachers might not find it easy to do so. For example, in assisting first grade teachers to move from the traditional approach to teaching to a PBL approach, teachers usually feel that they would not be able to complete the required curriculum because of the time needed to spend on projects. Indeed, as pointed out by Tamim and Grant (2013), they are concerned about losing control both over the topic and the students' behavior. As a result, teachers have difficulties in giving their students the time needed to build their skills. Following this, teachers have to be motivated, open to change in their teaching practices, and allow for flexibility in planning the experiences of their students.

Freedman (2013) provides more complex overview of peculiarities related to PBL implementation, but also focusing on the implementation process and its importance. The core of the PBL is problem statement, and it is important to come up with a rich problem, and in this stage the participation of the business entitles matters. The problem should reach enough to solve it by using project method, and in this pre-project stage, academical stuff should be involved in the discussion with business. Another peculiarity related to the PBL pre-project stage is to ensure that everyone has the opportunity to develop the same skills, maybe not necessarily in one project, but certainly over the course of the year. Freedman (2013) also highlights the importance of the accurately assessing of the learners. For example, if 5 students are involved in the project, how to assess them on the quality of the outcome? Teacher should have prepare the tools in advance. The methods of the monitoring who did what and keeping the written record of that, letting students to have a log what they did at the beginning and the end of the each lesson, and individual talk with each of them in order to figure out, if they have done what they said. The control and methods planed in advance and used by the teachers are also part of the quality implementation and risks reduction of the PBL.

The peculiarities of the implementing PBL in the educational process are more related to the pre-project stage and actively involvement of teaching stuff and business representatives, in order to ensure quality input material and strategies for PBL application. The PBL as an educational tool has many opportunities to provide more high involvement of the students into the educational process, but the positive results could be achieved only with the appropriate trainings for the teachers, including strategies for creating a culture of collaboration, methods for adjusting from a directive to a facilitative role and tools or scaffolding student learning. As project based learning implementation and realization proceses are time-consuming, the addequite time resources should be alocated and provided for teachers in order to successfuly implement the pre-project stage.

6. Pecularities of Stakeholders Integration Using PBL

The succesful inegration of the PBL srategies and methods is based on closely relations between the stakeholders, which could be identified as studies, business and science. These 3 main stakeholders could be seen as a triangle of such elements which problematic aspects are widely discussed in a contemporary world. The integration of those elements and the synergy created boost the contries' economy, the level of innovation, business sector activities, the prestige of higher education, etc. However, one need to be prepared for challenges posed by the integration of those elements. Therefore, good practices should be discussed and desirably implemented.

The first experience spins around the differences of using and interpreting PBL. We observe that PBL is often used both as a study method (i.e. innovative one) and as a study strategy. Albeit we should not argue this duality here, it is noteworthy look at this phenomenon considering the PBL implementation level (see Figure 3).

It should be considered that PBL as a method requires the integration into the study process of several subjects. In the case of education-business-science, such integration doesn't create complications, as the success is mainly determined by the teacher's personal characteristics (e.g. entrepreneurship, relations with business, participation in European projects, etc.). Looking through the organizational perspective, such implementation is seen as an attractive way to employ teachers and sustain them. However, from the operations management point of view, we might observe weak relationships between using PBL and the higher education institution's strategy. In most cases, the change of a teaching staff leads to some qualitative changes, which force PBL to be seen as a strategy. In this case of PBL implementation possibilities, it is also important to clearly plan the tools used in the pre-project, during-project and post-project stages of the PBL, clarifying the methods and tools could be used in order to succesfuly implement PBL as part of the particular study module.

Integration of PBL as a separate subject, which is quite easy to be identified. In this sense education-business-science integration depends on each higher education institution's strategy. For instance, Universities of applied sciences mainly use such a way of implementing PBL as a way to cooperate with local business sectors; research-oriented Universities integrate students into separate research departments (units or labs) in order to develop different project-based activities. Thus, business interests and expectations to transform European Credit Transfer System (ECTS) into real and obvious actions and products might be identified as one of the main unsolved challenges. Projects incorporated to the study syllabus, could use the experience from the PBL as a study method for specific subject, encoring better experience of the teaching stuff using this method. In order to gain more employable skills for students, in this phase more active relation between the education and business should be developed.

Integration of PBL as a strategy. In this case education-business-science synergy and its outputs are directly determining the quality of PBL's implementation. From the operations management perspective, it leads to changes at all levels of the study process. Also, such a strategy means the shift from the old paradigm to a new one – based on innovations and creativity. At the strategic level, the PBL strategy is taken as a new way foreseeing structural changes within higher education institutions, along with a clear link to higher education institution quality system and the standards and guidelines for quality assurance in the EHEA.

The second experience is related to the differences between PBL's results and expectations toward it. As noted by Tamim and Grant (2013) and Levine and Mosier (2014), while implementing PBL, the results are mainly directed toward the context of the project itself.

International perspective. In practice, such a context also exists – continuous consultations with social partners and follow-up of the dominating global trends – clearly indicating that the employer bodies require a broader range of skills rather than specific industry knowledge. As such, the social partners recommend using the framework of employability skills, which includes: communication, teamwork, problem-solving, critical thinking, initiative and entrepreneurial behavior. In terms of professional requirements and labor market needs, insights of the social partners are taken as important guidelines to form the program objectives and learning outcomes. It is also worth mentioning that the lead trends and strategies involve the country's future economic growth, and the European Union (EU) Agenda (i.e. Lisbon Agenda 2000) largely focuses on techno-scientific innovation and global competitiveness, as essential means for societal progress in terms of innovation (Levidow and Neubauer, 2014).

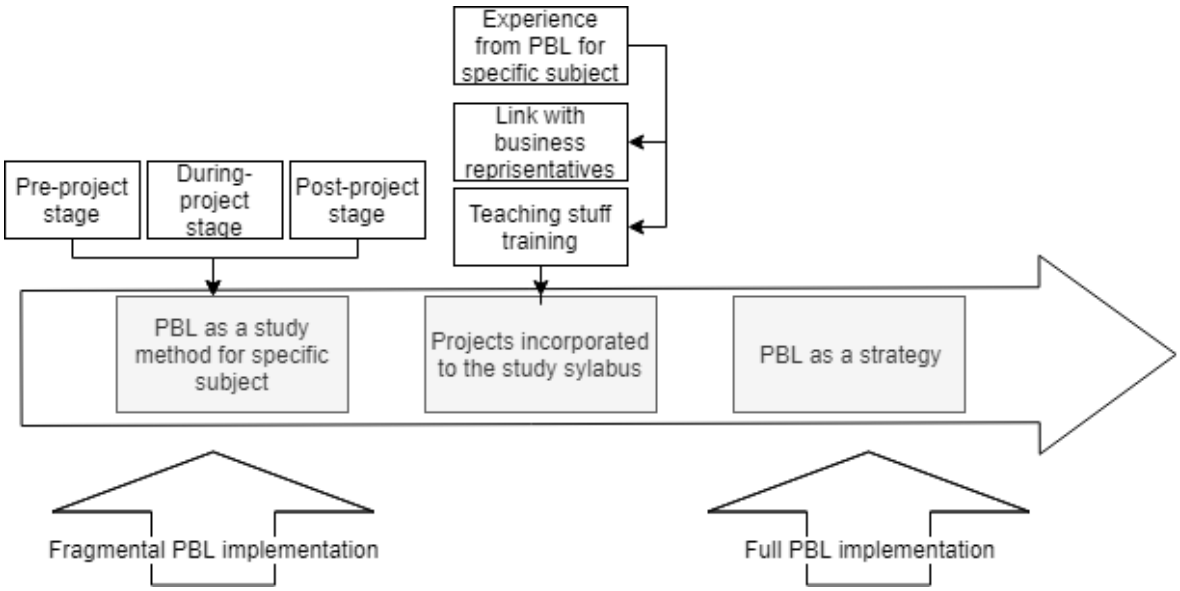

Figure 3. The Ways of Using and Interpreting PBL (compiled by Authors)

7. Conclusions

The recent global economic crisis and the efforts to recover from it have accelerated a new approach toward science, technology and innovation, as key to securing smart, sustainable and inclusive growth. Although social sciences in EU agendas have played different roles for a long time, in recent years they have been embedded in the EU Agenda framework, demonstrating a new approach. It is emphasized that Social Sciences and Humanities (SSH) can make their contribution where they are most needed, meaning that they can provide the necessary knowledge and understanding to tackle societal challenges (Geoghegan-Quinn, 2013).

At this point, we shall state that making use of the wide range of knowledge, capabilities, skills and experiences already available in SSH will enable innovation to become embedded in society (Vilnius

Declaration, 2013). New competencies in teamwork and collaborative problem-solving are increasingly in demand by employers, but there are hard questions behind these 'soft skills'. In practice, the new approach regarding the role of the SSH is expressed in the current ambitious cross-cutting theme of Responsible Research and Innovation (RRI), in Horizon 2020, the most important EU program for research and development (R&D). Indeed, it is assumed that industrial modernization in Europe requires the successful commercialization of new innovations, the industrial exploitation of innovative manufacturing technologies and processes, and innovative business models (cf. Forsberga et al., 2015), which are also influenced by transformational developments in ICTs.

Overall, PBL is a student-centric methodology that allows opportunities to be extended to all the participants in the educational environment. The projects themselves are seen as a major part of existing study programs that involve a wide range of tools and the aspects necessary for a successful professional training. The PBL concept, in itself, is based on the close networking of students, research and educational institutions, and business organizations. Indeed, within the PBL concept, learning is approached as a managed process, managed through projects that comprise a set of complex endeavors and activities, oriented toward real-life problem solving. Through PBL, students and teachers, as well as business partners/companies gain different benefits, which all together create favorable conditions for addressing the challenges of a changing society in this day and age.

PBL as a tool could be characterized with a lot of advantages, but its implementation process faces some issues and challenges. The PBL could be characterized as not only knowledge, but also XXI century orientated skills gaining tool, helping students to achieve higher employability skills, providing possibilities to implement web 2.0 technologies into the educational process, enabling education and entertainment (edutainment) possibilities. The PBL is a tool changing the whole educational system, helping students gain greater interest and engagement. Viewing the advantages of the PBL from the business point of view, it could be noted, that students more actively gain knowledge about the real-world business problems and regularly using project-based learning tools, the systematic retention of project experiences enables students to highlight the most effective problem solving mechanisms, that leads to project risks reduce in the future and better practical managerial skills.

The peculiarities of the implementing PBL in the educational process are more related to the pre-project stage and actively involvement of teaching stuff and business representatives, in order to ensure quality input material and strategies for PBL application. The positive results of the PBL realization could be achieved only with the appropriate trainings for the teachers, including strategies for creating a culture of collaboration, methods for adjusting from a directive to a facilitative role and tools or scaffolding student learning. As project based learning implementation and realization processes are time-consuming, the adequate time resources should be allocated and provided for teachers in order to successfully implement the pre-project stage.

The scheme of the Ways of Using and Interpreting PBL is developed and described in the paper. Peculiarities of PBL implementation are viewed as the integration of the studies, business and science, and the synergy created to boost the countries' economy, the level of innovation, business sector activities, the prestige of higher education, etc.

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