



Dynamic Framework for Project-Based Learning: Interrelate Students, Faculty and Industry, towards 21th Century Job Market

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Abstract

The researchers introduce a dynamic framework for effective Project-Based Learning (PBL) aligned with the needs of students, faculty, and industry towards graduating competitive generation for the 21st century job market. The framework represents a triangular beneficial interrelationship among three active parties: student, faculty, and industry where the student is placed in the center of all relationships and interactions. The research investigates the challenges of implementing PBL and explores its benefits from the point of views of the stakeholders, including students, faculty, and the industry. The results provide insights into the lack of clarity in the concept and impacts of PBL as an educational & learning strategy for the stakeholders, given the challenges faced by each of them. The research draws range of recommendations to government agencies and university management in order to facilitate, manage and improve the practice of PBL among the stakeholders while utilizing the opportunities, overcoming the challenges and maximizing the benefits.

Keywords: Project-Based Learning, 21th Century Job Market, Framework

1. Introduction:

Higher Education Institutions in Bahrain operate within a highly competitive educational environment. They compete to ensure quality of education and the employability of its graduates. The institutions differentiate themselves from its competitors by graduating generation who is capable to meet the demands of the 21st Century job market skills. Project-based learning (PBL) is a form of experiential learning strategy which is designed to improve the perceptions of learners towards the application of discipline-specific knowledge driving by effective interaction among student, faculty, and industry. The aim is leveraging the students' capabilities and orientations towards the 21st Century workplace.

2. Research Model:

The researchers introduce a dynamic framework for effective PBL aligned with the needs of students, faculty, and industry towards graduating competitive generation for the 21st Century job market. The research investigates the challenges and explore the benefits of the interactive relationships among the stakeholders, as illustrated in fig.1.

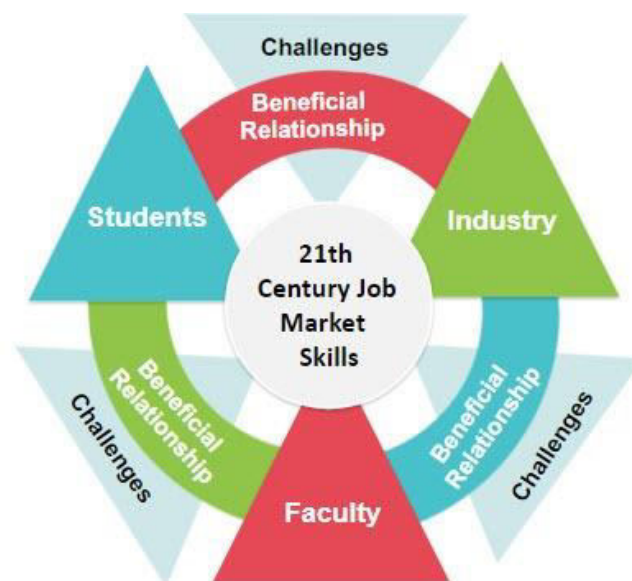


Fig.1 Dynamic Framework for Project-Based Learning

2.1 Project-Based Learning (PBL):

The Higher education graduates are required to succeed in today's information economy which is more reliant on skills. There is less necessity of memorizing basic facts and



technology has reduced the need for this ability in the educational process. Scholars consider PBL as one of the most effective active learning instructional practices which is actively engaging the students in real-world and meaningful projects for individuals and groups [5],[6]. It exposes students to real-world problems that require a blend of skills and knowledge to tackle; meanwhile responding to the student-centered approach. The role of the faculty is to help the student to build an interdisciplinary knowledge and constructive skills while completing a social activity that enables context-specific and self-awareness of learning and knowing [8]. PBL has many characteristics encompassing authentic assessment, content driven, complex tasks, critical thinking, clear objectives, and realistic outcomes towards real-life problems where student is directed, teacher facilitates and time is limited [7]. PBL is a high impact pedagogy contributing to creating and using knowledge in business-driven technology and information. Most of international and national accreditation authorities consider project-based learning as a criterion of quality of education.

2.2 Job Market Skills of 21st Century

PBL framework in this research represents an active triangular interrelationship among three parties: student, faculty, and industry. The central goal of this relationship is the 21st century job market skills. The researchers identified 14 skills necessary to job market, namely, researching, decision making, organizing information, time management, autonomy, initiation, leadership, taking responsibility, problem solving, interpersonal attributes, technology agility, creativity/originality, self-evaluation, and communication. This range of skills are categorized into four broad sets of skills, namely Problem Solving & Decision-Making Skills, Leadership & Communication, Self & Team management skills, and Innovation, Creativity & Technology [1] [2] [3].

2.3 Beneficial Interrelations

All relationship and interactions among the stakeholders adhere to the principles of equity, transparency, accountability, and mutual benefit in order to facilitate and ensure effective and advantageous partnering [7]. In PBL model, faculty take a highly proactive role in directing the learning process and students' progression. They become partners with students throughout the learning curve; poor and passive pedagogue is a consequence of considering faculty as mere facilitators.

Using the appropriate strategy to interact with a specific student or group of students to achieve range of tasks shall empower students' thinking and questioning about their learning. In higher education context, the students are expected to promote their ideas, experiences, and expertise as well as mastering their process of learning [6]. PBL Model involves both students and faculty in real-world while taking learning and teaching responsibilities towards benefiting from industry technologies and practicing creativity, critical thinking, and application of multidiscipline knowledge. Solving real-life problems prepares students to compete in the job market; moreover, it helps them to identify their career objectives and preferences in real work context [5]. PBL activates the engagement of the student and faculty with the business community which develops and ensures up to date competencies as well as generates new opportunities for projects and future research. Connections with industry promote the faculty academic performance, career and self-satisfaction. Sustaining and developing active collaborations with industry expand the networks of faculty and students and expedite the engagement in real-life projects [8].

Development of products and services across various industries is an ongoing process where solutions are needed for wide range of real-life problems. Small and medium-size companies rarely have the sufficient resources to carry out needed research and development for the business continuity and growth. PBL with higher education institutions contributes to industry development and support in overcoming limitation in resources and creativity. The business which is collaborating with higher education institutions through PBL, benefits from the fresh minds and discipline-oriented knowledge of the student and faculty [9]. Most successful companies have realized that a team of students can do a good job in their attempts to find appropriate solutions of given problems which shall be reflected in developing problem-solving skills and competences [11].

2.4 Challenges Facing PBL

Despite the enormous benefits of PBL for the three parties, several challenges hinder the opportunity to conduct PBL and/or reduce the effectiveness of the process and outcomes. Some higher education institutions cannot meet the high expectations of the industry partner because of limited resources in terms of expertise, time and infrastructure. On the other side, some companies face difficulties in allocating staff and fund as well as identifying problems and desired outcomes from their side which



leads to unclear expectation, misunderstanding, superficial results and/or need for lengthy negotiation process. Usually, the companies have limited support staff and resources to facilitate interactions with higher education institutions within PBL Model, while the project time frame lacks flexibility due to implemented academic calendar and insufficiency of physical facilities [10].

3. Research Methodology

3.1 Questionnaire Design and Interviews

Three questionnaires have been designed to target students, faculty, and industry representatives in order to investigate the existing practices and challenges facing PBL Model. Consequently, range of questions were devolved to explore their approach and attitude toward PBL as well as anticipated benefits for all parties. Each questionnaire was divided into four parts, first part: general information, second: contribution of PBL to achieve 21st Century job market skills, third: benefit of PBL towards each party and fourth: challenges facing stakeholders to integrate PBL in practice.

Furthermore, structured interviews with the stakeholders were conducted in order to develop suggestion and recommendations to overcome the challenges and enhance the effectiveness of PBL application.

3.2 Samples and Statistics

Online questionnaire surveys have been implemented; 378 students, 375 faculty, and 152 industry representatives completed the surveys. Stratified random samples at a 95% confidence level, and an error rate of 5% were adopted.

Out of the total 378 students responded in the survey, 63.64% of students comprise age from 20-30 years, 57.3% of them are females, 50.8% study between year 2 and year 4 in their academic program. Out of the total 375 faculty responded in the survey 72% of faculty sample comprise between 30-50 years, 56.12% are male, 66.33% are specialized in humanities and literary studies, 62.24% have their experience in teaching more than ten years, all of the respondents have Ph.D. qualification.

Out of the total 152 industry professionals responded in the survey; 52.83% are from governmental organizations and 47.17 are from private sectors with more than 100 are full-time employees.

Cronbach's alpha for students, faculty, and industry respectively were calculated as 0.83, 0.79, and 0.86, which indicates internal consistency and high reliability of the sample. The descriptive analysis, Multivariate Analysis of Variance (MANOVA) for the difference between the three groups of means and a Scheffe Test as Post-Hoc test were used in statistical analysis to derive significant results from the surveys.

4. Study Results

Figure 2 illustrates the average responses of students, faculty and Industry representatives towards the role of PBL in developing the four broad skills set of 21st Century Job Market. The average responses of the three parties ranged between 1.74 and 2.74 where 1 reflects disagreement, 2 reflects cannot determine and 3 refers to undecided. Such uncertainty towards the role of PBL in developing major skill sets demonstrates the deficiency in perceiving the impact and contributions of PBL.

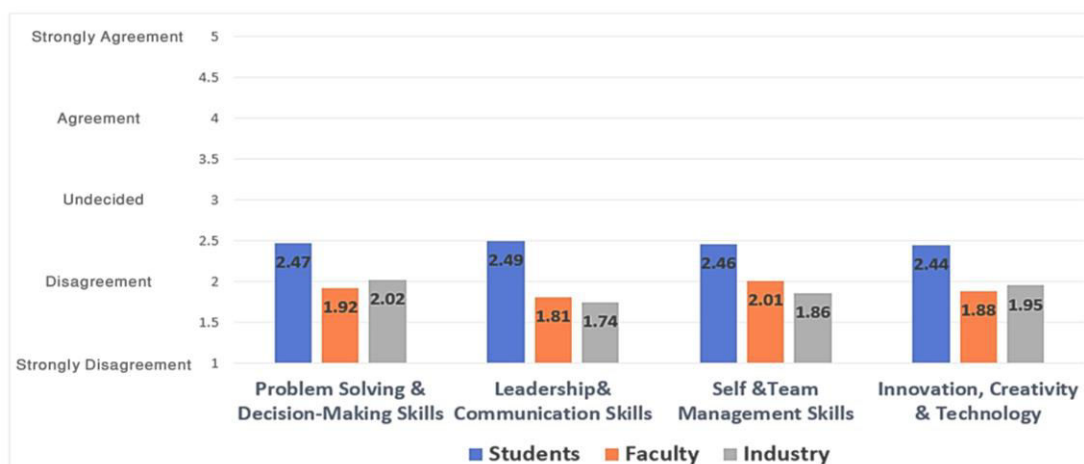


Fig.2 Average Responses of Students, Faculty, and Industry Representatives towards Impact of PBL in Developing 21st Century Job Market Skills



MANOVA test was used to examine the differences in the average responses among the three parties as presented in table 1.

Table (1) MANOVA Test for 21st Century Skills Sets among Students, Faculty & Industry Representatives

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Groups	Problem Solving & Decision-Making Skills	.515	2	.257	20.766	.002
	Leadership& Communication Skills	.919	2	.459	35.422	.000
	Self &Team Management Skills	.588	2	.294	7.168	.026
	Innovation, Creativity & Technology	.557	2	.279	22.797	.002

Following section shows the results of the statistical analysis of the survey.

Table 1 demonstrates that the level of significance is less than 5% in all variables which proves statistically significant differences in the four skill sets according to the three parties; students, faculty, and industry representatives. ScheffeTest indicates that the difference is maximum for the students followed by the industry representatives, and the least differences are in faculty responses which means that the students considered PBL helps them to acquire 21st Century skills rather than faculty and industry representatives.

4.1 PBL and Student's Stand

The students' average responses towards getting benefits of applying PBL ranged from 2.3 to 2.61 with SD ranged from 1.07 to 1.10. As perceived by the students, their participation in project work results in better class attendance and taking greater responsibility for self-learning than traditional classroom activities. This further provides opportunities for collaboration among students amidst diverse culture and background. The students' average responses towards getting benefits from industry through PBL ranged from 2.48 to 2.39 with SD ranging from 1.14 to 1.13. Mean values reflect students' perception of getting benefits from industry through PBL with respect to exploring the skills and knowledge needed in job market, identifying skill gap and building a relationship with prospective employers. The student survey results show that there are set of challenges encountering PBL. The most noted challenges are:

- Certain projects demand extended time to conduct in depth study (49.73%);
- Difficulty to work within a team (44%); extra workload (41.08%),
- Challenge in terms of prior knowledge, experience and competencies (38%),
- Lack of financial resources allocated to conducting projects (36.22%);
- Deficiency of accurate and valid industry data (31.35%),
- And weakness in industry support and cooperation (28.65%).

4.2 PBL and Faculty's Stand

The faculty average responses towards getting benefits of implementing PBL with their students ranged from 1.69 to 1.88 with SD ranged from 0.85 to 0.92 which includes the following aspects:

- Opportunities to build effective relationships with students,
- Introducing range of new learning opportunities to the classroom,
- And awareness about the gap in the job market skills.

The faculty's average responses towards the benefits they get from PBL with industry ranged from 1.96- 1.88 (Disagreement) with SD ranged 0.85-0.93. They highlighted the following benefits:

- Connections within the business community,
- Provide insight into industry needs,
- Keep them updated with current and latest industry trends the field,
- Create several opportunities to engage in and expand scholarly activities and research projects.

The faculty's average responses towards PBL as a successful Teaching & learning practice was 1.86 (Disagreement) and SD 0.82 which is reflected in the following results:

- Lack of contact with the industry and difficulties to transfer practical knowledge (37.57%),
- Inappropriate learning facilities which limits implementation of PBL (36.51%)



- Difficulties in collaborating with colleagues to initiate and develop interdisciplinary projects (35.98%),
- Consuming time to design, support, and report which cause delaying their schedule,
- Overload work for implementing PBL (31.75%)
- Insufficient attention, institutional support, and cooperation from the university units (30.16%),
- Lack of training on PBL (64.80%),
- And absence of Guidelines or Policy & procedures for PBL (40.82%)

4.3 PBL and Industry's Stand

The average responses of the industry representative towards PBL benefits ranged between 1.70 and 2.02 with SD between 0.77 and 0.86. The following benefits have been identified:

- Getting fresh external eyes on the company processes;
- Obtain valuable results and information from the final project results,
- Accessing unbiased "out-of-the-box" thinking models,
- Engaging in a dynamic dialogue with faculty and students out of company's established patterns which usually ends up with revealing unexpected ideas or outcomes
- Getting job-ready skilled graduates and minimize the mismatch between academia and industry.

Particular benefits were highlighted by small industries, such as access to university facilities and expertise and reaching the reflections of latest researches and consultancy, the mean ranged between 1.67 and 2.13 (Disagree) with SD between 0.75-0.84.

The most critical challenge hinders industry's support to PBL is the unwillingness to release the operational and that received 55% of the companies' responses. Other challenges are as follows:

- Project time frame lacks flexibility due to the rigid academic calendar (53.85%),
- Extensive collaboration demanding significant amounts of time (38.46%),
- Lack of industry clarity towards desired outcome and actual need (38.46%),
- Limited manpower resources to facilitate interactions in PBL (25.00%),
- High expectations that could go beyond the educational practice and capabilities (23.08%),
- And mismatch between company interest and project theme (17.31%).

Regarding policy for collaboration with Universities, 47.17% of industries do not have such policy.

Conclusion

The research examined the dynamic framework for effective PBL. The results revealed the lack of clarity in concept and benefits of PBL as a teaching & learning strategy for the stakeholders, given the challenges faced by student, faculty, and industry. There is a crucial need to support the universities' convictions about the importance of implementing PBL to develop 21st Century job market skills. Higher Education Authority Bodies, various Ministries such as Labor, Industry and Trade Ministries should integrate their efforts to encourage industry sectors to cooperate with universities in carrying out projects and applied research. Parallely, Universities should develop and implement effective PBL mechanism that guides both faculty and students while conducting projects with industry. Appropriate training, workload management and evidence-based evaluation should be deployed to sustain and ensure beneficial PBL with industry.

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