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Is Problem-Based Learning Momentous in Augmenting the Industrial Capabilities of Graduates? A Literature Based Study

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Abstract

Educational management studies are now established as a way to infuse students with various pedagogic as well as didactic principles. The approaches are now switching from reading and lecture-based modes to analytical case-studies and problem-oriented learning methodologies. These inclusive development procedures are undertaken by educational institutions jointly in partnership with industry associates. This research paper highlights the consequences of learning practices in reducing the gap between corporate and academic entities through involvement in the problem-based learning methodology which is frequently utilized in business and medical studies at the Higher Educational Institutions (HEIs) of Pakistan. The paper investigates how the pedagogical method of problem-based learning is significant in meeting the changing needs of industry through enhancing the proficiency of graduates to manage corporate challenges in volatile external environments. The results lead us to conclude that problem-based learning at HEIs plays a substantial role in upgrading the potential of graduates to serve competitively in corporate sectors, thus realizing the inherent existence of strong ties between commercial and educational management sectors. Hence, PBL serves to be a more effective approach than the traditional teaching methodologies for producing better knowledge outcomes in terms of capable alumnae to

serve at commercial levels.
***Keywords*:** problem-based learning (PBL), graduates' competencies, industrial capabilities.

Introduction

The current era in the business world comprises unremitting changes and revolution. In order to cope with the fluctuating environmental conditions, corporate organizations opt for selecting and retaining highly competitive, capable and creative minded graduates (Dunlap, 2005; Dunlap & Grabinger, 2003). Agile firms prefer to have professionals who are highly skilled and competitive, have a sound competence of problem solving, team work, creative thinking and adaptation. The fundamental responsibility lies with the educational institutions to equip students with capabilities of solving practical problems and becoming self-efficacious (Hmelo & Evensen 2000). This concept is applicable to professionals and upcoming fresh graduates to be hired in business, medicine, engineering, law, agriculture and IT sectors. These fields of occupations demand greater levels of innovative learning and creative problem solving skills for the challenging purpose of managing the uncertainties of the external environment. Individuals are successful only when the academic institutions furnish and polish them as students with the key skills.

The academic sector can contribute by utilizing a problem-oriented approach of delivering persistent learning (Grabinger, Dunlap & Duffield 1997; Spector, 2003). The underlying mode of imparting knowledge to students provides them with the opportunity to apply practice-focused, contextualized, authentic, problem-based learning and real-world skills in their professions effectively (Spector, 2003). The pedagogical approach is referred to as Problem-based Learning (PBL) or Project-based Learning, an approach that is fundamental in facilitating skill advancement and content enlightenment (Boud & Feletti, 1991; Williams, 2001). PBL comprises context-specific modes of instructions through case-studies, cognitive training, anchored teaching and deliberate understanding (Williams, 2001). This methodology supports students to resolve complex glitches in practice via a systematic perspective of rectifying the critical matters.

One of the researches on Malaysian students found out that graduates who lack soft, problem solving and efficiency skills fail to meet any single criterion of getting admission for higher education or getting a good job in

the industry (Bernama, 2010). The reason behind this deficiency is scarcity of analytical ability or problem solving capability, which ultimately results in an increased rate of unemployment for such graduates (Bernama, 2010). In order to address this issue, Higher Education Commissions has laid stress on using PBL as a teaching mode to be introduced by academic institutions for improving the graduates' capacity of providing solutions to corporate problems (Abdul Kadir, 2013). While comparing the effects of PBL with non-problem-based learning, there have been found sharp differences among the problem resolving skills of fresh graduates. Moreover, motivation is one of the prime factors that is associated with generating an urge in students and graduates to learn the critical/analytical abilities needed to judge a situation (Abdul Kadir, 2013). Following the significance of PBL, the importance of student-focused learning moves hand in hand, keeping in mind the paradigm shift in teaching philosophy according to the industry's local and global needs (Hill, 2007). Such techniques involve engaging students in a number of activities that expose them to challenging situations to boost their ability of finding solutions to the complex troubles. Wijnia, Loyens, and Derous (2010) also highlighted the implication of PBL as the most desired method of learning and teaching and declared it as the most effective instructional mode of enabling students to learn conducive problem solving. PBL not only enables the graduates to capitalize upon providing resolutions to complicated glitches, but also enhances their skills of leadership, decision making and analytical cognition, thus making fresh graduates more marketable (Baharun & Suleiman, 2009).

One of the prime objectives of education is to cope with and move along the advancements in understanding and knowledge to become prosperous in the professional world. However, this is only possible when instructors tend to impart learning actively rather than in a submissive manner (Khaliq, Alam & Mushtaq, 2014). This rigorous form of teaching and learning is labelled as Problem-based learning which is hardly implemented in Asian academic sector, particularly in Pakistan and India (Imtiaz & Asif, 2012). Nevertheless, PBL approach has been found to be implemented in medical and clinical studies where students and graduates are focused on health researches, but still there is a grave need for this method to be incorporated in business studies, social and management sciences, engineering, and IT (Summers & Dickinson, 2012). Academicians need to accomplish their objectives of boosting student

creativity, activating curiosity, deepening values, behaviors and norms and encouraging analytical thinking and capabilities of making strong judgments by using the PBL approach of instructing (Ravitz, Hixson, English & Mergendoller, 2012). In order to furnish students and graduates with real-world skills while stimulating innovation for intuitive decision making, PBL serves as a corner stone teaching methodology (Ravitz et al., 2012).

HEIs need to address the emerging challenges of the contemporary business era by delivering knowledge to students in such a way that makes them viable to work effectively in the corporate world while managing the impacts of the changing environment (Khan, Taqui, Khawaja & Fatmi, 2007).

The new trends in corporate world have led the education management industry to incorporate the PBL approach in making graduates readily employable in the job market across Pakistan (Khaliq et al, 2014). This study highlights the significance of PBL in making graduates more adaptable to the fast-paced environment and to work effectively at their workplace. Local and global corporate challenges emerging due to the increasing environmental uncertainties have set a huge responsibility on educational institutions for building the capacity of their students by exposing them to critical scenarios commonly faced by commercial enterprises. The aim is to let academic sector realize the importance of improving students' learning competency, problem solving ability and adaptability to manage the changing industry demands (Senge, 2000). Conforming to the need of improving innovative skills and increase excellence, PBL plays a critical role in producing competent graduates who can readily get employment and are able to perform productively (OECD, 2012). PBL, thus, serves as the most appropriate substitute of orthodox teaching methodology, usually based on emphasizing the content being taught rather than what is actually learned (Foray & Raffo, 2012). This innovative mode of teaching builds exchangeable skills of individuals focusing on the core knowledge particular to the discipline. It facilitates the individuals to embrace learning as a self-controlled process and to solve contemporary business problems, thereby, permitting them to stimulate prior knowledge and bring them into action for cracking down the authentic complications (Avvisati, Jacotin & Vincent, 2014).

This literature based study intends to deeply explore the significance

and dynamics of PBL in order to empower graduates to attain and improve their industrial proficiency and become productive members of their organizations in future.

2. Literature Review

Community development, social advancement and future economic prosperity in knowledgeable and literate communities highly depend upon creativity and innovation. People who pursue innovation, regarded as entrepreneurs or innovators in the business world, are needed to have a set of specific capabilities and skills that embraces innovation, usually comprising creative and critical thinking, technical and behavioral abilities (Avvisati et al, 2014). For gaining these abilities, HEIs play an instrumental role in equipping people with skills of creativity and innovation as well as polishing their existing skills (Kärkkäinen, 2012). However, keeping in view such strategic ideas, a question arises as which teaching methodology these HEIs should implement that will prove to be conducive for bringing effectiveness to the reinforcement of innovative skills and strengthening the current pool of abilities that enables them to think critically (Hoidn & Kärkkäinen, 2014). Keeping in view such external challenges, a new and practical form of teaching methodology has been derived from an established framework of philosophies that provide a solid foundation for effective learning and an instructional mode based on extensive research and exploration (Hoidn & Kärkkäinen, 2014). According to Avvisati et al. (2014), the underlying philosophies that support such instructional pedagogy include the following measures,

a) A favorable and learning oriented environment for encouraging self-managed learning

b) Collaborative learning

c) Vitality of issues, practice, sense-making

d) Reproduction of knowledge and skill attainment

e) Significance of instructor in guiding for learning

f) Importance of unremitting comprehensive evaluation

There is a rising demand of exceedingly educated individuals who also contain a variety of skills and abilities and therefore, it is widely acknowledged that future graduates, employees and entrepreneurs need to

furnish them with a diverse range of competencies in order to meet the challenges of the changing external environment (OECD, 2010).

The pedagogical method that fulfills these contemporary teaching and learning needs is referred to as *Problem-based Learning* (PBL) or Project-oriented Learning and is regarded as one of the most advanced and learned approaches of teaching (Neville, 2009). The notion of PBL emerged from the field of medical and health science at McMaster University, Hamilton, Ontario, Canada after 1965 and it was founded by Howard Barrows and his co-workers (Barrows, 2000). PBL has been proved as the verified and operative methodology of teaching in the contemporary business as well as non-business world. Fortunately, the trend of using such a student-focused learning approach has also risen in Pakistan (Sada, Mohammad, Adnan, & Audu, 2015; Baig & Asad, 2003). The research paper involves discussion about the significance of PBL in improving the capability of existing students and graduates for becoming effective in industry and more marketable for job opportunities (Sada et al., 2015). Academic institutions are highly committed to nurture the philosophy of creativity, innovation, problem-solving environment and strategic learning for the receivers (O'Grady, Yew, Goh & Schmidt, 2012). The informative and innovative form of learned teaching equips students with strong rational and logical underpinnings that are essential for initiating students' cooperative and analytical capabilities, so that they become proactive and effective in accomplishing any task in the highly volatile business markets driven by consumer demands (Bansal & Kumar, 2012). Researches on PBL mode of instruction can help academicians and faculties to evaluate and bring advancement in the country's teaching practices and support frameworks while staying in touch with industry norms and strategic objectives of HEIs (Mossuto, 2009). Thus, PBL has been found instrumental in enabling students to become more analytical, confident, self-controlled and inquisitive than those who are taught through the conventional mode of teaching (Kolodner et al., 2003). HEIs strive to remain agile in progressing industrial, economic and academic settings while embracing the belief that an effective student-centered teaching and learning approach reflects whether the selected targets are objective, relevant, rewarding and are the source of holistic learning practice for the current as well as alumni graduates (O'Grady et al., 2012).

Our HEIs continue to stay responsive to the evolving educational and

economic landscape by staying closely connected with our industry partners, school communities and our growing alumni. We believe that a good education is also a reflective one that regularly evaluates its objectives and relevance so we may provide the most rewarding and meaningful holistic learning experience for our students. As environmental and corporate challenges continue to grow, alternate pedagogical approaches and changing demands of the workplace will continue to shape our approach to teaching and learning (Biggs, 2001).

2.1. Theoretical Underpinnings

The dynamics of using PBL in academia as a ground breaking mode of teaching for upgrading students' knowledge, skills and abilities, thus making them effective professionals in the industry, are supported by the learning theory named as *'constructivism'* (Hendry, Frommer & Walker, 1999). The theory of constructivism has a strong association with the PBL approach for coaching (Kemp, 2011). The PBL method is characterized as a form of student-focused learning or a "group-oriented" method of instructing students. Such methods are usually symbolized as constructivist, particularly used for guiding, learning and teaching students (Kemp, 2011). The phenomenon of constructivism supports learning theorists to analyze collaborated learning, which is one of the important aspects of PBL (Dixon, 2000). Those days have gone when the faculty used to deliver knowledge content to students while being zealous to their discipline and focused merely on earlier theoretical insights, particularly published by former authors (Wee & Kek, 2002). However, in the current scenario, identified by intense market competition, faculty members in academia are bound to implement student-focused methods of instruction; rather than sticking to conventional, commanding and protocol following statutes for teaching (Wee & Kek, 2002). The philosophy of using student-focused approach as the guiding mode of instruction emerges from the exploration of the theories of learning, which originate from the phenomenon of *Constructivism* (Savin & Major, 2004). It provides a deeper insight into the understanding of practicing PBL at HEIs (Holt, 2000).

One of the distinguishing features of PBL is 'student-centered' teaching which comprises a greater extent of dialogue/negotiation among learners, a deep focus on ideas brought into discussion by students and an increased student control in directing the learning subject or theme

(Richardson, 2003). PBL consists of different types or tasks such as discussion, study, action and problem elaboration tasks; wherein each activity results in a different learning experience for students (Gilbert & Foster, 1997). The difference can be analyzed between a study task, in which students relate and merge their independent knowledge, attitudes, beliefs and behaviors to emphasize critical problems related to societal values and norms, and a problem elaboration task which gives an opportunity to students to formulate and implement studies on a diverse group of activities to identify group processes, framework, norms and problems (Gilbert & Foster, 1997). Researchers have found that PBL is closely associated with the dynamics of group work and group processes, thus PBL serves to nurture a resolute dialogue between instructors and learners in order to ensure deep effective learning (Marincovich, 2000). Interpreting the theory of constructivism in the perspective of PBL, there exists four major types of groups including instructor-directed learning group, cooperative learning group, impulsive learning group and achievement oriented learning group (Savin & Major, 2004). Various learning models have been studied in the light of constructivism that are effective during team work and collaborative organizational culture. Moreover, the desired learning is accomplished when work and tasks are characterized by cooperative and communicating processes (Savin & Major, 2004).

2.2. Role of PBL in Designing Mental Models

PBL, theorized or conceptualized through the lens of constructivist theory, can be elaborated as a collective procedure of learning which is characterized by dynamic knowledge development rather than simple processing of information and emphasizes the ongoing activities (Hmelo, 2004). PBL serves to be a type of background or circumstantial learning, since the ideas, mechanisms, philosophies and principles are explored in the framework of the background information of a visible situation, stimulating and applicable, that recognizes the importance of implementing the understanding in future contingencies to come (Schwartz & Bransford 1998). This pedagogical approach works best with the idea that learning develops the significance of meaning and polishes the notion of authenticity (Schmidt, De Volder, De Grave, Moust, & Patel, 1989). It has been realized that with improved PBL, individuals are more capable of executing the learned concepts in the practical world. Thus,

major theorists of this concept narrate PBL as one of the intellectual constructivist methods of teaching or instruction (Schmidt, 1993). Therefore, PBL is instrumental in facilitating students and graduates to develop adaptive thought processes that explain how to act in the real scenarios (Neville & Norman, 2007). It stimulates and challenges the students to understand the phenomena in the real world through team work, arguments and discussions, without supervision of an instructor, with the aim to assist learners to develop cognitive schema to resolve the underlying problem (De Grave, Schmidt, & Boshuizen, 2006). PBL empowers students and learners to utilize resources that would help to deepen their understanding (Silen & Uhlin, 2008). Thus using this approach as a device for learning the key tactics of enriching knowledge and wisdom (Silen & Uhlin, 2008). With the help of PBL, understanding advances rapidly as a consequence of excavating technical energies and preventing students from letting their knowledge become obsolete or outmoded. Thus, the underlying method prefers the art of learning as compared to focus on what is being learned and ultimately this sound skill enables the students and graduates to get ready for strategic learning (Juul, Brunner, Katzenellenbogen, Silverstein & Christakis, 2001).

2.3. Process of Learning through PBL

After understanding the characteristics and dynamics of PBL, it becomes imperative to know what student learn using student-focused learning and the entire process of learning using problem-based pedagogical teaching technique, while moving forward to explore the association between students' learning activities and their consequences (O'Grady et al., 2012). The process of PBL involves exposing students to an unknown problem during the investigation of the problem. As students are not prepared a prior for resolving the problem, they prefer to work in teams to develop the logic, designing the hypotheses, nurturing each other's viewpoint and exploring specific gaps using background knowledge in the light of presented problem statement (Yew, Chng & Schmidt, 2011). Following this activity, the next phase is to work through the self-study method which is based on individual learning rather than team work, to focus on the issues of learning while working in team (Yew & Schmidt, 2012). After the process of self-study, the next step is the reporting phase where students rejoin each other in the form of team to discuss and share the conclusions while rectifying their earlier thoughts

and descriptions which emerged from learned concepts (Hmelo & Barrows, 2008). Thus, the process is repeated in a cyclical manner, each time a new problem is analyzed or the underlying problem is consistently discussed to provide strategic solutions (Schmidt et al, 1989). The instructor's role is to act as a facilitator for guiding students, co-constructing insights/understanding through negotiation, idea sharing and discussion, and finally helping them out in passing successfully through all the three phases of PBL (Hmelo & Barrows, 2006). Using PBL in a cyclical way seems more like an intellectual apprenticeship which involves students who practice and learn through the modeling of thinking and learning strategies that challenge them to search out solutions for existing problems (Schmidt & Moust, 2000).

The PBL method involves students getting engaged in solving the problem related to an issue. Therefore, the nature of this activity makes it more of an initiation of a comprehensive learning process. Students or learners tend to develop a form of conceptual framework that is referred to as 'FILA table' (Bigelow, 2004; Tan, 2003). The word FILA stands for 'facts', 'ideas', 'learning issues' and 'action plan', respectively (Hmelo, 2004). Table 1 illustrates the framework of FILA Table.

Barrows and Wee (2007) introduced the above mentioned process and flow of activities known as FILA. The development and implementation of PBL involves a series of activities that lead the learners to reach the solutions for core problems. The process starts when students encounter a triggering problem (Barrows, 2000), followed by the next step in which students probe more information from the instructor regarding the issue or

Table 1
FILA Table

F (Facts)	I(Ideas)	L(Learning Issues)	A(Action Plan)
Evidence depending upon the problem/task provided to the learners who write down the fact through collected information.	Students generate testable statements (hypotheses) about the solution of the problem/task.	Learners, in parallel, keep record of the questions for advance study to find out more.	Strategies or actions needed to resolve the task or problem.

problem (Savery, 2015). Furthermore, the students proceed with identifying the related concepts and learning problems by means of the FILA framework. The respective tasks are delegated to different students on the basis of learning issues that are divided among the students for them to work individualistically. Afterwards, student collect the data to reach ultimate findings and share them with their peers, which eventually reflects their verdicts or conclusions (Masek & Yamin, 2011). In this process, students first hypothesize the origins of problems, gather the relevant information, seek to enhance insights about the learning issues and finally move for implementation of the action strategy (McKee, Goodridge, Remillard & D'Eon, 2010). Figure 1 demonstrates the process of PBL.

2.4. Effectiveness of Problem-based Learning

The success, effectiveness and significant outcomes of the PBL approach can best be explained when compared with the conventional forms of learning or instruction such as textbook reading, lecturing or topic discussions in classrooms, where the lecturer or demonstrator is responsible for delivering the lecture content with minimum or no student participation (Armstrong & Fukami, 2009). PBL has been regarded as one of the must studied and tested pedagogical revolutions in the academic. Results obtained from prior studies conducted by Yew, Chng and Schmidt (2011) and Schmidt, van der Molen, te Winkel and Wijen (2009) have led to the conclusion that PBL is an effective approach for student learning and an excellent mode of instruction for instructors, especially with the objective of strengthening innovation (Strobel & Van Barneveld, 2009). While using PBL, the key stakeholders accomplish the significant outcomes of attaining knowledge and educational success, thinking in a rational and sensible way through the application of key concepts, learning effective behavioral and social skills (Yew et al., 2011; Schmidt et al., 2009).

PBL has been found as the most emergent form of learning since it promotes operational teaching attitudes and behaviors in HEIs that are instrumental in enabling current students and graduates to enhance their employability for the best employers (Hallinger & Lu, 2011). According to Ramsden (2003), the effectiveness of PBL greatly depends upon the support and effort of the instructor. The positive outcome of PBL at HEIs in the form of skills and competency enhancement of graduates for

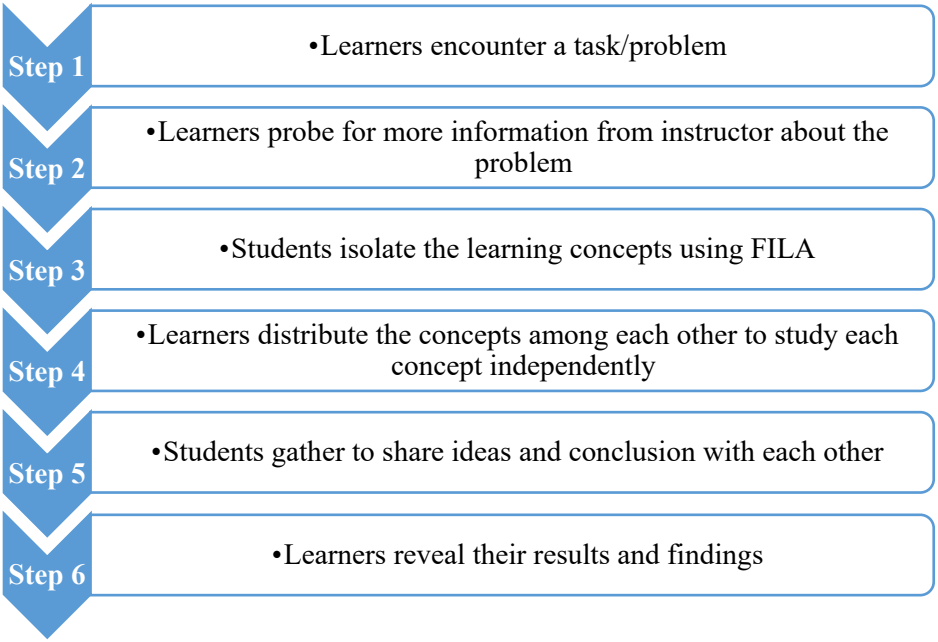

Figure 1. Process of PBL

becoming readily marketable are based on a number of factors. These factors include quality, clarity and the extent of explanation of the content by the instructor, encouragement of learners for boosting their interest, degree of concern and admiration for students and their learning, applicable evaluation and student feedback, perfect goals and intellectual stimulation to improve the quality of task outcomes, permitting students to exercise total control on learning by providing them independence and empowerment and finally knowledge sharing through discussions and negotiations (Nelson et al., 2011; Devlin & Samarawickrema, 2010).

3. Conclusion

Learning and teaching at HEIs is a way forward to facilitate students to furnish themselves with a diverse range or variety of knowledge, skills and abilities that are essential for them to think and act innovatively and meet the changing needs of the knowledge economy (Hoidn & Kärkkäinen, 2014). PBL is the pedagogical approach that is known best for boosting the innovative and creative capabilities of the learners, that is what todays' industry and organizations demand (OECD, 2012). Thus, this approach enables them to master numerous capabilities making them competitive

and long-standing learners to deal with any kind of uncertain situations. The conclusions have also been supported by earlier researchers such as Wiek, Xiong, Brundiers and van der Leeuw (2014) and Williams (2001). It would be wise to deduce that PBL is thus an effective teaching method for amplifying KSAs, capacity and competencies of the academic graduates that are heavily demanded by the industry to effectively perform professional practices.

The PBL method of learning and teaching is an efficacious and functional mode of developing field-specific skills that can be exchanged with other members for promoting innovation and to become successful in the industry. The notion can be established that students guided through PBL techniques tend to be more successful in their respective profession and application of knowledge at workplace than those taught with conventional teaching practices. Industries and organizations in the current era of business transformation prefer to select and retain only those individuals that are rich in critical thinking, creativity and have an innovative mindset. This also encourages the development of distinct behavioral and social skills including awareness, motivation, self-assurance, team-work, problem solving and self-controlled learning. Such competent professionals consistently demonstrate outstanding performance than those instructed through traditional teaching modes such as lectures and exercises and thus tend to be retained by organizations for longer terms. These consequences lead the HEIs to implement PBL for innovative learning and undertaking practices that make the learners of today the most preferred graduates to be readily hired by market leading organizations tomorrow. It has been concluded that HEIs in Pakistan need to adopt PBL by shifting a conventional curriculum-based learning process to a student-centered learning process and this verdict has also been supported by Loyens (2014).

Education, scholarship and learning through problem or project-oriented learning are instrumental in producing key assets in the form of skills, abilities, knowledge and competencies that eventually improve the productive and industrious capacity of the learners, thus enabling them to become prolific human capital in the industry. The critical aspect of attaining effective outcomes of PBL is the deployment of highly trained and skilled instructors and teachers, who bring forth the real essence of this pedagogical approach and facilitate the learners to the maximum and

enhance their employability. Such highly trained and developed instructors can help students learn the essential skills that make them employable and practice those skills at their jobs in the future. Using this innovative technique of teaching, learners become self-controlled and self-directed in developing the key aptitude and proficiency that is highly needed to secure employment in the industry. Students not only master academic capabilities but also capitalize upon the crucial assets of interpersonal skills, contingent behaviors, critical and analytical thinking and communication that make them the best fit for jobs in the market. On the contrary, the lack of these KSAs due to the absence of student-focused understanding and PBL approach leads to obstructing the fresh graduates in finding the best prospects of jobs in the industry and catering the needs of external stakeholders, effectively.

Industry practitioners or employers rigorously search for those organizational members who are highly motivated and enthusiastic to work in teams. Thus, PBL facilitates the individuals to develop the skill of working in teams as this practice itself is based on the activities of resolving complex problems in self-managed teams. This greatly increases the probability of fresh graduates to become the most preferred candidate to be selected by an innovative organization that is market leader and is resilient in uncertain environmental situations. Such outcomes of PBL also assist HEIs to develop strong connecting ties with industry, thereby, strengthening the academia-industry linkages. This bonding between the two entities is the key to gain and sustain competitive advantages at both ends. Teaching through case studies provides theoretical, philosophical and practical foundations for students' and graduates' consequent management and administration careers. The basic goal of this pedagogical learning approach is to realize how to analyze and investigate business problems, reconcile different perspectives with each other, decide the sequence of actions, and persuade others to be able to successfully exercise the management profession. This process is itself an evidence of the establishment of a bridge between academia and industry.

4. Future Recommendations

There is an increasing focus on PBL to be implemented as an obligatory teaching and learning methodology for improved academic knowledge as well as insights about industry. The impact of PBL approach is life-long, as this dynamic technique tends to enhance a diverse range of

competencies for creativity and innovation along with hands-on experience about industry. There is still room for further investigation using quantitative techniques and measurement methods. Further studies can be advanced in different ways given below.

- Determining the effect of circumstantial variables/factors on the effectiveness of PBL on competency development of students or graduates. The situational factor can involve elements such as culture, background knowledge etc.
- A quantitative comparison can be made by analyzing and comparing the beneficial outcomes of traditional and pedagogical teaching methods.
- An empirical study can be conducted by comparing the phenomenon of PBL and its outcomes in the context of Pakistani HEIs and international HEIs.
- Explanatory studies can be undertaken that involve the investigation of the impact of teachers'/instructors' training on the significant outcomes of PBL.

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