The outcomes of Students' engagement in External Consultancy Project in Oman: A Case of Project-Based Learning

Author/s:

Rakesh Belwal (1), Shweta Belwal (2), Azlinor Binti Sufian (3) and Amal Al Badi (4)

1 Rakesh Belwal, Professor, Faculty of Business, Sohar University, Oman,
rbelwal@su.edu.om

2 Shweta Belwal, Assistant Professor, Faculty of Business, Sohar University, Oman,
sbelwal@su.edu.om

3 Azlinor Binti Sufian, Assistant Professor, Faculty of Business, Sohar University, Oman,
asufian@su.edu.om

4. Amal Al Badi, Executive Assistant, Faculty of Business, Sohar University, Oman,
asbadi@su.edu.om

Abstract

Project-based learning (PBL) has been effective in engaging and motivating students for some targeted work. However, the extant literature on PBL gives more emphasis to learning through internal projects and there is a dearth of literature pertaining to the outcomes related to students' participation in external projects. Following the case study approach, this study aimed to explore the benefits of students' participation in an external research and consultancy (R&C) project. In-depth interviews were conducted with 10 research assistants, two research coordinators, and two project leaders involved in the project. The interviews were subjected to qualitative analysis using the Atlas.ti 8 software. The findings revealed both the academic and non-academic benefits of students' engagement in PBL. The academic benefits were mainly perceived in the area of understanding research, preparation of survey instrument, hands-on experience in collecting and enumerating data, and dealing with the missing data. The major non-academic benefits were technical, behavioural, and managerial. Students reflected a boost in thinking ability, communication skills, teamwork, self-confidence, time management, and money management while dealing with situations and interactions. Overall, the non-academic benefits of PBL were higher than the academic benefits.

1. Introduction

Local and international studies have shown that the education sector in the Sultanate of Oman faces a number of challenges. One of the challenges is related to the quality of education, which demands to equip students with 21st-century skills and competencies such as analytical thinking, problem-solving, creativity, innovation, and research (The Education Council, 2018). Consequently, the National Strategy for Education 2040 was prepared for the development of policies to reform the educational sector in Oman. The reforms envisaged sustainable development of the education sector through human resources, creation of a knowledge-based economy, and building of capacities and skills of individuals.

The National Strategy for Education delves heavily into four major elements, i.e. setting a new framework for education, capacity building, transfer of jurisdictions and responsibilities to educational institutions, and the adoption of an outcome-based approach (The Education Council, 2018). It sets the priority for the educational institutions in Oman to take pro-active strategies to achieve these targets. Out of six components on which this vision of education is based, supporting research, innovative and creative capabilities; promoting work ethics, and being effective in the world's knowledge economy is of operational importance. One of the strategies for capacity building is to adopt innovative methods for the individual and social development of students and life-long learning. This turns our attention to study the potential of project-based learning (PBL).

In line with the national priorities, this study assesses a recent experience of a team of researchers and students who were engaged in a research and consultancy (R&C) project work awarded by Oman Environmental Service Holding Company S.A.O.C (be'ah) – a government-owned company tasked with solid waste management in Oman – to Sohar University. The aim of this

study is to canvass the perception of students and academics about PBL and to assess the potential of PBL an extended teaching pedagogy.

2. Background settings

Sohar University in Oman won a research consultancy project in the month of January 2019. The project was secured through an online national bidding system known as Ejaad (www.ejaad.om). The setting of the whole project was therefore spontaneous and unbiased in all respect. The principal investigator (PI) formed a team of students to collect data from tyre shops producing End of Life Tyres (ELT) considered as environment wastes. In its remit, the project team had to collect data from shops (with an initial target of 3000) located in different parts of Oman within a close deadline of 45 days. The team comprised of a Co-Principle Investigator (Co-PI), two research coordinators (RCs) – graduate students who previously worked in research projects, and 10 research assistants (RAs) – 6 males and 4 females who were in their final year of Bachelor's degree. The students signed a contract as Research Assistants or Coordinators to take up the data collection work against a monthly salary on a pro-rata basis. Additionally, they were given per-diems to support their food and the Internet data pack. The students were expected to drive cars, travel to different regions, stay overnight, interact with government bodies (concerning tyre shops) and the attendants at the tyre shops (to collect data that included some information, photographs of the shop, and their GPS locations using a mobile app). They were also expected to take part in review meetings and share their experiences and opinions on the research related issues.

3. Literature Review

PBL is widely believed to be a powerful teaching strategy that would enhance student motivation and promote self-directed learning where teachers act as facilitators (Blumenfeld *et al.*, 1991; Smith *et al.*, 2005). PBL focuses on a student-centred approach, as opposed to the teacher-centred approach. PBL allows learners to acquire knowledge through experience and enhances the teaching and learning process. Although John Dewey introduced the term PBL in 1897 through his philosophy of "learning by doing", it was only applied in practice during the 1960s in Health Sciences Education (Hitt, 2010).

The core of PBL rests in the notion that students gain interest in the real world problems and enter in the state of serious thinking given a problem-solving context. In PBL, "The teacher plays the role of facilitator, working with students to frame worthwhile questions, structuring meaningful tasks, coaching both knowledge development and social skills, and carefully assessing what students have learned from the experience" (David, 2008: 80).

PBL refers to any programmatic or instructional approach that utilizes multifaceted projects as a central organizing strategy for educating students (Ngoh, 2015). PBL is a methodology that emphasizes the construction of knowledge by problem-solving (LaFey *et al.*, 1998). Hung *et al.* (2012) summarize PBL as an instructional strategy that enables students learning by means of project work. PBL can take place both inside or outside classrooms (Efstratia, 2014).

PBL is an enquiry-based learning approach, which is also known as a research-based approach. Other than PBL, the enquiry-based learning approach also include problem-based learning (exploration of the scenario-driven learning experience) and investigation-based learning (fieldwork or case study adapted to discipline context). PBL provides students with the opportunity to bring together knowledge-based skills from a number of subject areas and apply them to real-life problems, thereby providing some context to the theory (CEEBL, 2007; Seman *et al.*, 2018).

The research shows that PBL improves the quality of teaching and learning, cognitive development, innovative problem solving, planning, communication, authentic research and self-directed learning (Yang and Cheng, 2010; Dehdashti, Mehralizadeh & Kashani, 2013). Students engaged in PBL reveal a higher intrinsic motivation, significantly higher critical thinking skills, and appreciate peer learning (Holmes & Hwang, 2016). Among additional benefits of PBL are enhanced engagements that stimulate curiosity and discovery, followed by motivation (Chu *et al.*, 2012), and advancement in perceptions of skills, the utility value of participation, and career aspirations (Beier *et al.*, 2019). PBL applies in STEM, Humanities, Business and other disciplines (Duke *et al.*, 2016; Siegel, 2000; Zhao & Zheng, 2014; Özpolat *et al.*, 2014; Duke *et al.*, 2016; Smith & Gibson, 2016; Young & Legister, 2018). PBL cultivates life skills (e.g. teamwork,

communication), discovery-based process, and interdisciplinary way to work together (Bowden *et al.* 2000; Chu *et al.* 2017). It does not only improve students' knowledge, understanding and transferable skills but additionally enhances professionalism and employability (Andersen, 2002; Moore, 2007; Neo & Neo, 2009).

3.1. PBL in the Context of the Education System in Oman

PBL is one of the teaching pedagogies under the umbrella of student-centred learning (SCL) and outcome-based education (OBE). The extant research in Oman reveals that the language, culture, lack of student exposure, exported teaching materials, poor perception of SCL in students, among others, are the major obstacles to SCL. The commonly held perception is that "Omani culture is rich in oral tradition, not reading" and that "students mostly read to pass examinations" Emenyeonu (2012). Highlighting a pedagogical deficiency, a study conducted on male students in the Gulf region reveals that some students face difficulty in communicating in English and are less attentive in classes (Abuid, 2014). Another study finds that Omani graduates from secondary schools find themselves unable to deal with the complexity of everyday life, which includes the ability to analyse and solve problems and being flexible, accommodative and self-directed (Sternberg, 1985).

Thus, it is appropriate for the Government of Oman to move forward to the OBE curriculum, which is evident in the National Strategy for Education 2040 (National Education Council, 2018). The greatest challenges facing the Ministry of Education is to benchmark its educational outcomes to international standards to enable Omani students to garner the technological skills necessary to operate in a globally connected world (Nasser, 2019). Educators in Oman, irrespective of any levels (K-12 or University Level) may embark on PBL, given the beneficial aspect of the PBL and Oman's requirement for OBE. To meet its aims and objectives, the study probes the following research questions:

1. In which areas do students find PBL useful or beneficial?

2. What kind of skills PBL builds among the participating students?

3. What sort of learnings do the participants gain from their peers and project supervisors?

4. Does students' engagement in PBL come across their academic achievement?

5. What do students like and what do they dislike in a typical PBL situation?

6. What challenges did they face and how do you overcome those challenges?

7. Will students be encouraged to participate in such a project?

4. Methodology

The research was conducted within an umbrella of a case study. The case here refers to students' engagement in a full-time external R&C project. The study used an exploratory research design and the qualitative analysis approach, taking note of a variety of probing mechanisms such as self-evaluation, observations, in-depth interviews, and focus groups.

The three principal entities of the team viz. PIs, RCs and RAs were interviewed by an unbiased team of two (one English and another Arabic speaker) who were not involved in the project. Structured interview schedules were developed in English and Arabic to conduct these in-depth interviews. The interviews were tape-recorded with prior consent, assuring anonymity. Students were permitted to speak Arabic, their first language, for clarity in expressions. The interviews were well detailed and ensured the adequacy of data. According to Morse (1994, p. 230), "In qualitative research, adequacy refers to the amount of data collected, rather than to the number of subjects as in quantitative research." The interviews in Arabic were transcribed and translated before data analysis by Atlas.ti 8 – A QDA software. Variables (codes) were conceptualized, assigned to quotations, and categorized based upon the concepts grounded in the data to develop related themes. Additionally, the Illustrative Method of QDA was used to anchor or illustrate theoretical concepts using semantic networks and empirical evidence.

5. Results

5.1. Academic benefits of PBL

Academically, the students were engaged in the field for data collection. They learned how to create questionnaires, how to approach people and take their informed consent, and how to collect, crosscheck, and validate data. "We used an app that be'ah provided to us to get information. We

collected data through it." [P11-RC1-M]. (This code in all its instances represents Person No., Designation, and Gender). The PI also validated the claims of students having benefited academically in the areas of research. "With this exposure, students can use SurveyMonkey or Google Forms for data collection." [D 14: P14-PI1-M]. Only one student doubt academic benefit, for he looked for academic benefits in the courses he studied. RCs who were involved in data analysis said, "We learned how to analyse data and reflect the findings." [P12-RC2-F].

5.2. Non-Academic benefits of PBL

Among other major learning from PBL were: the ability to manage or work in teams; taking responsibilities; managing time, contingencies, and schedule at home and at work; understanding modality for getting employed, employment contract and terms, professional norms for work and work ethics; and dealing with other parties, exchanging information, and building trustworthy relationships. "I gained more on the practical side. I visited different regions. I met many people there and interacted with them." [P10-RA-M].

Girls benefited uniquely from PBL. Some girls had never visited industrial areas, particularly the tyre shops. "We knew what a tyre means, not just the wheel! We knew different specifications of tyres, their makes and the vendors. [P2-RA-F]. As girls, we travelled long-distances by cars for the first time in Oman and visited places we would not imagine." [P2-RA-F]. One of the research coordinators mentioned that he learnt how to coordinate the team, assign groups to locations, and how to save time and money. "Professionally, we learnt time management and money management: how we can manage our resources, our money, where to spend where to go, book a hotel, rent a car, and how best can we use our budget." [P11-RC1-M].

5.2.1. PBL and confidence building

The team members reported that dealing with different people, communicating with them, and handing communication by resorting to a mix of languages boosted their confidence. One of them explained how he became self-reliant and learned how to spend 5 Riyals on meals for a day [P5-RA-M] whilst another narrated how the safety jacket from be'ah that he was wearing won respect

and fair treatment [P1-RA-M]. The female students benefited differently. One of them expressed, "We girls went to industrial areas and learned how to deal with the workers, interviews, and the language. We went to new places, mostly for the first time. When we could not find the destination, we relied on ourselves." [P3-RA-F]. Another girl said, "I was not used to this research team. I convinced myself to deal with this new group even if they had different thinking." [P4-RA-F]. One of the boys responded, "I found the shops myself without using the Google Map." [P7-RA-M] whilst another said, "I learned how to drive long distances (areas beyond 350 km), and plan my sleep and work schedule." [P10-RA-M].

5.2.2. PBL and thinking skills

PBL enabled students to develop thinking, logically and objectivity concerning research, environment, and sustainability issues. Students mostly used laddering to dig down the information. "We noted sometimes that there is no logic in their answers – that 80 cars visited for maintenance and the tyres replaced were less than the number of cars." [P3-RA-F]. One of them said, "I learned that tyres have an expiry and there are different sizes and quality of the tyres."[P1-RA-M]. Students said that they had to (i) think and understand all the problems they faced; (ii) learn about tyres and how shops work and replaced them, (iii) search and get to the tyre market and the shops in a systematic way, and (iv) receive and analysed data until they get the required information. The research coordinators experienced a higher level of critical thinking. According to one, "This project actually developed many things, my thinking ability. All the time, I was thinking about how to cover the targets, how to use our money properly, how to coordinate with the team and satisfy their conflicting demands." [P11-RC1-M].

5.2.3. PBL and communication skills

Everyone admitted that their exposure to this project improved their communication skills. It changed their outlook and removed nervousness. "We met many types of people, communicated with drivers, hotel owners and also the attendants in tyre shops." [P2-RA-F]. Students adjusted their language and conversational style to collect the information. "We dealt with people speaking different languages (Hindi/ Urdu, Bangla, or Malabari). So, we had to choose the simple words

that they understood." [P3-RA-F]. "We faced difficulties in dealing with them (in terms of language), understanding them and communicating with them." [P4-RA-F]. Overall, students gained communication skills that ranged from approaching people, introducing themselves, stating the purpose, seeking informed consent, convincing the respondents, and making use of some verbal and nonverbal communication to collect, record, and validate data.

5.2.4. PBL and English Skills

As stated earlier, PBL helped students in developing their communication skills where language played a major part. All the formal meetings with be'ah and the PIs took place in English and, as indigenous Arabic speakers, they benefited from such interactions. Students improved in English particularly by responding to queries, by learning new words, vocabularies, and terminologies, and by translating information for the PIs. One student expressed, "We had our contracts written in English. It was necessary for us to read them properly." [P3-RA-F]. A student from the Law Faculty stated, "I study in Arabic medium. In the beginning, I faced difficulty communicating in English, but I became more involved with the team later." [P4-RA-F]. Only two students had some reservations. One of them said, "Little use of English." [P9-RA-M] whilst another expressed, "English is what has developed but not much! Because most of our dealings were in Arabic and most of the people we met did not speak either Arabic or English." [P8-RA-M]. The students mostly gained in spoken English. However, RCs benefited in both spoken and written English. One of the PIs confirmed, "RCs were preparing the reports every day for whatever was happening." [P13-PI2-F].

5.2.5. PBL and Teamwork

Students worked collectively in a team to plan and cover the targets in different regions. Any slippages brought them to a collective platform to work out a better plan. One of the girls said, "Each team had a list of shops to cover. We devised a way to flash the number of shops, once covered, immediately on WhatsApp to prevent any repetition." [P2-RA-F]. The spirit of teamwork was higher as the students consulted each other and worked accordingly. One girl explained, "We used to meet in the lobby and distribute the tasks." [P2-RA-F]. The PI confirmed, "The students

learned how to make effective teams." Additionally, they made sub-teams wherever needed and there was a healthy competition among the teams. "It was like a competition as well as motivation as they all competed to attain higher targets." [P13-PI2-F].

5.2.6. PBL and Time Management

PBL enabled students to learn the value of time. "Time management is the most important thing we achieved, and we noticed that it developed in us more." [P2-RA-F]. Since the project was for a very short duration, students had to be accountable on an hour-to-hour basis. "We worked quickly because the shops opened at 8:00 am and closed at 12 noon. This was a short time. We organized ourselves to cover as many shops in the morning shift and the remaining in the second shift starting 4:00 pm." [P3-RA-F]. Some of them had to change their routine to be on time; some felt that they got disciplined, which they were not before. "I was not time-disciplined before joining the project. I developed a schedule every day and followed it." [P7-RA-M]. There was a pressure to work and perform although not all of them liked working under pressure. One of the Research Coordinators said, "Had they not following the schedule, they would not have achieved their targets." [P13-S2-F]. The PI revealed, "Not all of them were very pertinent of time. Many times, we had to knock their door, push them out of their rooms, and direct them for breakfast. They adapted eventually." [P14-PI1-M].

5.2.7. PBL and Other Skills

Dominant on other skills were behavioural and other soft skills. Some students experienced a change in behaviour. "I did not wake up early; however, after the project, I started to wake up early daily." [P6-RA-M]. Furthermore, students reported a change in their outlook and appreciated the values and habits they experienced worth cherishing. Some of values and habits that they mentioned explicitly were: creativity, discipline, commitment, cooperation, empathy, following-up things, spirit of teamwork, kindness, valuing every team member and his/her competence, working diligently, self-reliance, use of mobile apps, finding solutions to any problem, working as a team, the art of motivation, and how to deal with people and convince them.

5.2.8. Learning from peers, RCs, and PIs

Besides amassing above skills, the students learned from their peer many things such as trust, discipline, patience, their style of dealing, technological knowhow like the use of Google Map, self-confidence, organizing time, managing difficulties, and common etiquettes like making the hotel beds and rooms. Students learned from their fellow coordinators who were the first line of authority, leadership styles, collective decision making, empathy, discipline, commitment, the diligence of work and time, time management, financial management, confidence and motivation to complete the task, and individual sensitivities, like respecting and dealing with female teammates. Additionally, constant engagements with the PIs helped them in learning things such as terminologies related to the research topic, how to follow-up work, how to motivate team members, maintain the spirit of competition, empathy, and parenting advice from non-parents. Furthermore, the students learned from the PIs specifics of doing research, setting up goals, chasing targets, approaches to resolve problems, a penchant for quality data, the inclination to work hard, and something about the culture outside Oman.

5.3. Likes, dislikes, and Challenges Faced

Travelling and visiting new areas, the breaks between work, teamwork and relationship building, the daily routine, frequent walking during data collection were the main things that students liked in the project. The girls liked their visits to industrial areas not customary in their culture. The PI said, "Students liked working independently, travelling independently, and driving independently the most." On the contrary, the students reported that they disliked getting up early in the morning, receiving advice from the morning, pressure from the project work, lack of opportunities to rest, travelling long distances, and the monotony caused by the repeating queries.

Students face certain challenges, mostly time and distance related while working on the project. Some challenges were related to their visits to the remote areas where they find access to mosques and restaurants difficult. Spending their first night away from their home, adjustment issues with others during the initial days, finding tyre shops, and chasing the targets was some other reported challenges. However, despite these challenges and difficulties, all the students liked their working

on the project and all of them expressed a desire to participate in such projects in future and to recommend other students to participate. The main motivators were the lived-in experience, affinity with the team, travel opportunities, stipend, training certificates, research knowledge, and the development of skills.

6. Discussion

The outcomes shared above indicate that PBL has much to do with the practical aspects of learning. Although students cited certain benefits in the academic domain such as knowledge and awareness (like Homes & Hwang, 2016), these benefits were limited to the discipline of survey research. In line with the past researchers, this research also found that students developed skills such as thinking (The Education Council, 2018), English speaking (Abuid, 2014), time management, planning (Yang & Cheng, 2010), confidence building, communication (Chu *et al.* 2017), and behavioural (Homes & Hwang, 2016). They gained self-learning opportunities from situations and interactions (Smith *et al.*, 2005; David, 2008; Blumenfeld *et al.*, 1991; Andersen, 2002; Neo & Neo, 2009; Seman *et al.*, 2018). This type of learning takes an upper edge in PBL. Figure1 below conceptualizes the overall benefits emerging out of this PBL case. It can be held that PBL helps in creating learning, knowledge & awareness, and skills & competencies among the participants by throwing them over different challenges/ situations. The exposure to PBL leads to certain feelings (most likely positive) among the participants that may further motivate them to repeat the experience.
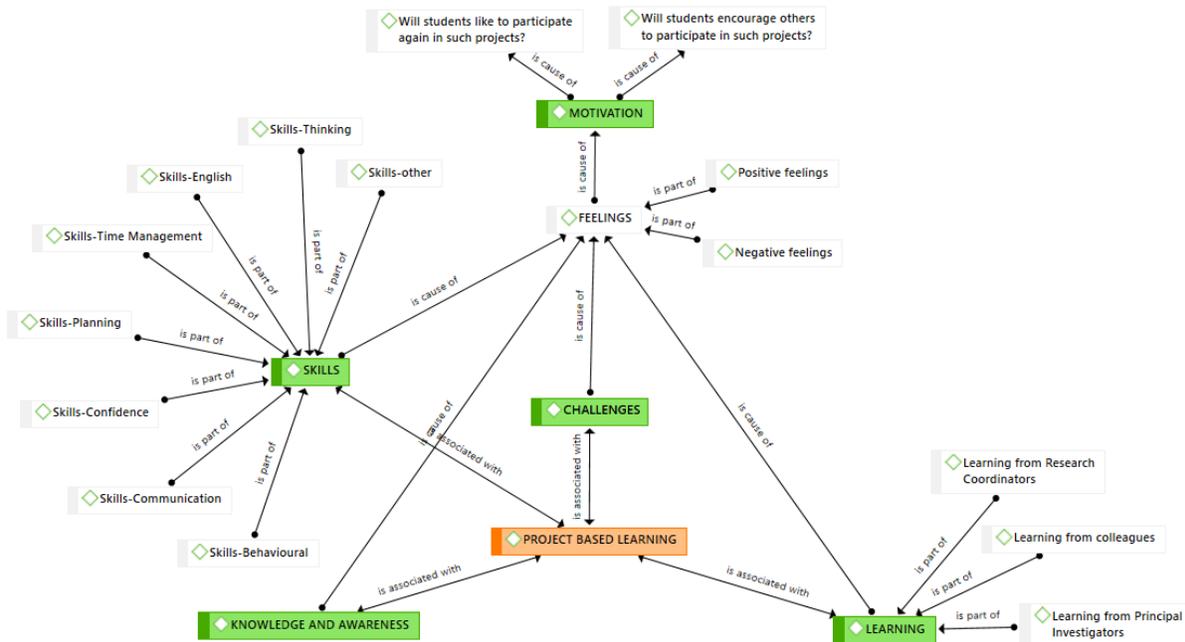
Figure 1. A Conceptual Framework Explaining the Merits of Project-Based Learning

7. Conclusions

PBL is an engagement oriented innovative approach to learning within or outside the educational institutions. It exposes students to a real-life situation and emphasizes interdisciplinary learning. This research followed the case study approach to explore the benefits of students' participation in an external research and consultancy (R&C) project. The findings revealed a dominance of non-academic benefits over the academic benefits to students engaged in PBL. Understanding research, preparation of survey instrument, hands-on experience in collecting and enumerating data, and dealing with the missing data were the major academic benefits. The non-academic benefits were technical (awareness of environment and sustainability issues, knowledge of vehicle industry etc.), behavioural (relationship building, adjusting to others, self-discipline etc.), managerial (time and cost management, travel planning and sorting out the logistics etc.). This research found that students developed skills such as critical thinking, English speaking, time management, money management, planning, confidence building, communication, behavioural and others. Another benefit of PBL was the self-learning while facing different situations and challenges on the ground.

Furthermore, students learned from the two-way interactions collective decision-making, WhatsApp communication strategies, and managing time and adversities. Overall, the non-academic benefits of PBL were higher than the academic benefits where participants learnt more about professionalism and managing real-life situations.

Acknowledgement:

References

Abuid, B.A. 2014. A student participation assessment scheme for effective teaching and learning. *Learning and Teaching in Higher Education: Gulf Perspectives*, 11 (1), http://lthe.zu.ac.ae/index.php/lthehome/article/view/109/87.

Andersen, H. 2002. Experiences from a pedagogical shift in engineering education. *Global Journal of Engineering Education*, 6 (2), 139–144.

Beier, M., Kim, M., Saterbak, A., Leautaud, V., Bishnoi, S., & Gilberto, J. 2019. The Effect of Authentic Project-Based Learning on Attitudes and Career Aspirations in STEM. *Journal of Research in Science Teaching*, 56(1), 3-23.

Blumenfeld, P.C., Soloway, E., Marx, R.W., Krajcik, J.S., Guzdial, M., & Palincsar, A. 1991. Motivating project-based learning: sustaining the doing, supporting the learning. *Educational Psychologist,* 26 (3-4), 369-398.

Bowden, J, Hart, G, King, B, Trigwell, K & Watts, O. 2000. Generic capabilities of ATN University Graduates. Canberra: Australian Government Department of Education, Training and Youth Affairs.

Centre for Excellence in Enquiry-Based Learning (CEEBL). 2007. The University of Manchester, Retrieved from http://www.campus.manchester.ac.uk/ceebl/ebl/

Chu, R., Minasian, R., & Yi, X. 2012. Inspiring Student Learning in ICT Communications Electronics through a New Integrated Project-Based Learning Approach. *International Journal of Electrical Engineering Education*, 49(2), 127-135.

Chu, S.K.W., Zhang, Y., Chen, C., Chan, C.K., Lee C.W.Y., Zou, E., & Lau, W.   2017. The effectiveness of wikis for project-based learning in different disciplines in higher education. *Internet and Higher Education*, 33, 49–60.

David, J. L. 2008. What Research Says About…/ Project-Based Learning. *Educational Leadership Teaching Students to Think*, 65 (5), 80-82. http://www.ascd.org/publications/educational_leadership/feb08/vol65/num05/Project-Based_Learning.aspx

Dehdashti, A., Mehralizadeh, S. & Kashani, M.M. 2013. Incorporation of Project-based Learning into an Occupational Health Course. *Journal of Occupational Health,* 55 (3), 125–131.

Duke, N., Halvorsen, A., & Strachan, S. 2016. Project-based learning not just for STEM anymore. *Phi Delta Kappan*, 98(1), 14-19.

Efstratia, D. 2014. Experiential education through project-based learning. *Procedia-social and behavioral sciences*, 152, 1256-1260.

Emenyeonu, O. C. 2012. Student-centered learning in Oman: Challenges and pitfalls. *International Journal of Learning & Development*, 2(5), 243-254. http://www.macrothink.org/journal/index.php/ijld/article/view/2549 (retrieved May 2019).

Hitt, J. 2010. Problem-Based Learning in Engineering. *Master Teacher Program*, Center for Teaching States Military Academy, West Point, NY.

Holmes, V., & Hwang, Y. 2016. Exploring the effects of project-based learning in secondary mathematics education. *The Journal of Educational Research*, 109(5), 449-463.

Hung, C.-M., Hwang, G.-J., & Huang, I. 2012. A Project-based Digital Storytelling Approach for Improving Students' Learning Motivation, Problem-Solving Competence and Learning Achievement. *Educational Technology & Society*, 15 (4), 368–379.

Laffey, J., Tupper, T., Musser, D., & Wedman, J. 1998. A computer-mediated support system for project-based learning. *Educational Technology Research and Development*, 46(1), 73-86.

Moore, A. 2007. PBLE: Project Based Learning in Engineering. *Higher Education Academy Project* 43/99. Available online at http://www.heacademy.ac.uk/projects/detail/projectfinder/projects/pf1611.

Morse, J. M. 1994. Designing funded qualitative research. In N. Denzin and Y. Lincoln (eds.), Handbook of qualitative research, Thousand Oaks, CA: Sage, pp. 220–235.

Nasser, R. 2019. Educational Reform in Oman: System and Structural Changes. [Online], *IntechOpen*, DOI: 10.5772/intechopen.84913. Available at: https://www.intechopen.com/online-first/educational-reform-in-oman-system-and-structural-changes.

Neo, M., & Neo, T. K. 2009. Engaging students in multimedia-mediated constructivist learning-student's perceptions. *Educational Technology & Society*, 12(2), 254–266.

Ngoh, N. 2015. Stem Pedagogy: Teaching STEM through Project-Based Learning. University of Bridgeport Faculty Research Day.

Özpolat, K., Chen, Y., Hales, D., Yu, D., & Yalcin, M. 2014. Using Contests to Provide Business Students Project-Based Learning in Humanitarian Logistics: PSAid Example. *Decision Sciences Journal of Innovative Education*, 12(4), 269-285.

Seman, L. O., Hausmann, R., & Bezerra, E. A. 2018. On the students' perceptions of the knowledge formation when submitted to a Project-Based Learning environment using web applications. *Computers & Education*, 117, 16-30.

Siegel, C. 2000. Introducing Marketing Students to Business Intelligence Using Project-Based Learning on the World Wide Web. *Journal of Marketing Education*, 22(2), 90-98.

Smith, K. A., Sheppard, S. D., Johnson, D. W., & Johnson, R. T. 2005. Pedagogies of engagement: Classroom-based practices. *Journal of Engineering Education*, 94(1), 87-101.

Smith, P., & Gibson, L. 2016. Project-Based Learning in Colleges of Business: Is It Enough to Develop Educated Graduates? *New Directions for Teaching and Learning*, 2016(145), 41-47.

Sternberg R. J. 1985. *Beyond IQ: A Triarchic Theory of Human Intelligence*. Cambridge, England: Cambridge University Press.

The Education Council. 2018. The National Strategy for Education 2040 (Executive Summary), Sultanate of Oman, Retrieved from
https://www.educouncil.gov.om/downloads/Ts775SPNmXDQ.pdf

Yang, H. L., & Cheng, H. H. 2010. Creativity of student information system projects: from the perspective of network embeddedness. *Computer & Education*, 54(1), 209–221.

Young, J., & Legister, A. 2018. Project-Based Learning in International Financial Management. *Journal of Teaching in International Business*, 29(1), 76-87.

Zhao, K., & Zheng, Y. 2014. Chinese Business English Students' Epistemological Beliefs, Self-Regulated Strategies, and Collaboration in Project-Based Learning. *The Asia-Pacific Education Researcher*, 23(2), 273-286.