Int. j. adv. multidisc. res. stud. 2022; 2(4):6-21

Received: 13-05-2022
Accepted: 23-06-2022

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

The Effect of Problem-Based Learning on Students' Critical Thinking Skills in Building Construction in Vocational Training Schools in Fako Division of the South West Region of Cameroon

[1] Lydia Enanga Awo, [2] Dr. Tante Charles, [3] Dr. Awandia Joseph

[1, 2, 3] PhD Research Student, Department of Curriculum Studies and Teaching, Faculty of Education, University of Buea, Cameroon

Corresponding Author: **Lydia Enanga Awo**

Abstract

The purpose of this study was to investigate the effect of Problem Based Learning (PBL) on Students Critical thinking Skills in Building Construction in Vocational Training Schools in Fako Division. The study was guided by a specific objective which is to investigate the effect of Problem-Based Learning on the critical thinking skills of male and female students. A hypothesis was deduced to guide the study. The study adopted a mixed methods research approach. The sequential explanatory research design was used. Five instruments were used in this study: a test and questionnaire were used to collect the main data from students while an interview guide, an observation checklist and documentary analysis were used to collect supporting evidence from the teachers, students and Vocational training Institutions respectively. The instruments were validated by two Heads of Department for Building Construction, an Educational Psychologist, a Data Analyst and two Supervisors who checked on the accuracy, content and adequacy of the instruments. The reliability of the test (0.880) and questionnaires (0.878) were tested using the Cronbach Alpha formula and the overall coefficient value stood at 0.880. The reliability of the interview and observation guide were ensured through key Informants. The population of the study was made up of 6 Vocational Training Schools in Fako Division consisting of 750 students and 73 teachers. A purposive sampling technique was used to obtain the sample of the study that was 120 students and 4 trainers (124 participants). The quantitative data collected were analysed using descriptive (mean and standard deviation) and inferential (independent Sample T-test) statistical tools. The results showed that the critical thinking mean achievement score for both the male (36.26) and female (34.41) final year students taught using the PBL approach did not significantly differ by gender. Based on the above results, the following recommendations were proffered; teachers should implement PBL in training their students. School administrators should ensure the strict and regular supervision on the implementation of Problem-Based Learning. Finally, the Ministry of Employment and Vocational Training should supply the much-needed material and financial resources to ease the implementation of PBL.

Keywords: Problem Based Learning, Competences, Building Construction, Vocational Schools

1. Introduction

Do you ever ask yourself, when you're teaching, how much are my students taking in; is there a better way to learn the same material; are they really learning to think for themselves and developing skills that will be useful later in life; or one of the worst questions how much will they remember after the test or examination? These are questions often asked by academics and they point to recurrent challenges across disciplines, programs and semesters of teaching (Cotton, 2011). Because all of this, in the learning event, learning approaches that show how to reach information sources, how to obtain knowledge, how to evaluate knowledge and how to acquire knowledge through life experiences, how to enhance skills of thinking and use it in problem solving can be applied. One of these learning approaches is called problem-based learning. Problem-based learning (PBL) was first implemented in a medical education curriculum by Toronto's McMaster University in the late 1960s. It is an innovative instruction strategy, which are student centered and not teacher oriented like classroom teaching. PBL is a learner-centered educational method, which learners are progressively given more and more responsibility for their own education and become increasingly independent of the teacher for their education. PBL produces learners can continue to learn on their own in life and in their chosen careers. The responsibility of the teacher in PBL is to provide the educational materials and guidance that

facilitate learning. PBL is based on real world problems. Many argue that PBL is a powerful and engaging learning strategy that leads sustained and transferable learning (Jones *et al*. 1996 and Stepien *et al*. 1993). PBL fosters the development of self-directed learning strategies, enhance student 'critical thinking and make it easier for students to retain and apply knowledge to new or unfamiliar situations. PBL deviates from conventional instructional mode by restructuring traditional teacher/student interactions toward active, self-directed learning by the student (Evensen & Hmelo 2000 and Maxwell *et al*. 2001). PBL as a pedagogical approach that has been proposed as a solution to address the challenge of producing nurses that are critical thinkers, life-long learners, and more equipped to handle the challenges of their ailing communities. Offers an innovative and engaging learner-centered approach enhancing nursing student's ability to think critically (Choi, 2004). PBL is implemented to engage the students in active learning. As principles for good practice in undergraduate education, presents students with a problem or situation to apply previous knowledge and acquire new knowledge. It has been recognized as an instructional method to increase motivation for learning, empower learners to conduct research, integrate theory into practice, and apply knowledge and skills to develop a viable solution to a defined problem (Savery, 2006) PBL is challenging, and enjoyable learning approach that has resulted from the process of working towards understanding or resolving a problem. PBL pedagogy, promotes learning through the concept of 'learning by doing', which creates an opportunity for students to learn by experiencing the process of problem solving. The teacher in PBL acts as a facilitator and responsible to monitor students' progress, stimulate their meta-cognition, sets the tone and plays a major role in setting group norms conducive to learning. In early work on PBL, the role of the facilitator was primarily to ask meta-cognitive questions such as "Why?" "How do we know that?" and "Is there anything else?" The facilitator was not advised to provide information or to directly evaluate student contributions. However, it is important for the facilitator to model reasoning with questions such as "Do you know what that means?" and "What are the implications of that?" By modelling this meta-cognitive approach, it is assumed that students will soon begin critically examining information in the same way (Wee, 2004). PBL operates in several major steps, as in the "Seven-jump" model (Maastricht PBL model). The steps can be summarized into three major stages namely; initial stage, PBL stage, and final stage (Masek & Yamin, 2010). In the first stage, the first activity involves a group formation, whether administratively or randomly assigning students into a small group during the first meeting session. The group is then presented with a PBL problem and they begin to analyze and understand the problem. Amongst the specific activities in this stage include; the formulation of learning objectives, identifying knowledge gaps, generating hypotheses, defining the learning issues and the concepts to be learned and this is mostly done by defining "what they know", "what they do not know" and further "what they need to know". In this case, the facilitator guides students to learn through the PBL process cycle (Hmelo-Silver 2004) [123]. The PBL stage begins with students performing an independent self-study. Students are expected to master the knowledge that relevant to the problem to be solved. Then, students conduct a group brainstorming and discussion session. They exchange and share their information with all the learning issues and hypotheses, and should reach an acceptable definition that is agreed upon by all members (Wee 2004). Meanwhile, the facilitator monitors the group's progress through direct observation and formative assessment. The direct observation involves coaching roles such as probing and questioning, in order to trigger students' meta-cognition. The facilitator then provides feedback immediately after formative assessment and always encourages students to keep up with self-assessment. In the final stage, students prepare for a project presentation and assessment during the last meeting session. Students partially present their proposal of solution. The facilitator evaluates students' work based on either group or individual presentation (Kolmos & Holgaard 2007). Optimizing patient care requires nurses to be expert clinical decision-makers and critical thinkers to recognize changes in patient conditions, to prioritize care, and provide effective nursing interventions (Jacobson *et al*. 2010). So, nursing and multidisciplinary college faculty enhancing student's success through improving critical thinking, student's knowledge acquisition, retention and to be independent learners. Thus, in the recent development of pedagogical approach, one new method that has been claimed promoting students' critical thinking ability is using problem-based learning (PBL) (Garcia & Pintrich 1992). This method is derived from constructivism and focuses on students' existing knowledge as a starting point in assisting them to construct and arrange new knowledge (Neimer *et al*. 2010). The students become an independent learner and critical thinker when they analyze, evaluate and synthesis information from a variety of sources and present their own justified interpretation. This is known as employing 'higher order thinking skills. Learning higher order cognitive abilities such as critical thinking (CT) has always been the ultimate goal of education (Spendlove 2008 and Sulaiman 2011). The concept of critical thinking in education was first discussed in the 1950ʺs. In the past 20 years, nurse educators have come to realize the importance of critical thinking in nursing education despite a consensus on the definition of critical thinking. More recently, the NLNʺs expectation is that evidence of critical thinking be provided as an outcome of nursing education (National League for Nursing Accrediting Commission 2008). Although the word critical can mean to find fault or to criticize, critical thinking is not a negative activity, it is a process where you ask questions, challenge assumptions, examine claims, and identify alternatives or answers. A super-streamlined conception of critical thinking Robert H. Ennis, define (CT) as the identification and evaluation of evidence to guide decision making. A critical thinker uses broad in-depth analysis of evidence to make decisions and communicate his/her beliefs clearly and accurately. CT is reasonable, reflective thinking that is focused on deciding what to believe and do. Critical thinking is the thoughtful, deliberate process of deciding whether you should accept, reject, or reserve judgment about a particular idea. It is also a measure of your confidence in the idea itself. Use critical thinking whenever you make a decision, solve a problem, take an action, or decide what to believe (Ennis *et al*. 2005). CT has two major dimensions: cognitive skills and disposition skills. Cognitive skills related to student's ability to engage in activities such as analysis, inference, evaluation, explanation and self-correction to problems, decisions or judgments. While

dispositions are attributes or habits of minds integrated into students' beliefs or actions that are conducive to CT. Disposition skills also motivate students to use cognitive skills when engaging in higher order thinking such as problem solving, decision making and problem-based learning (Ennis *et al*. 2005). There are a variety of critical thinking disposition, namely: truth seeking, open mindedness, analyticity, systematicity, self-confidence, inquisitiveness and maturity (Facione *et al*., 2000). An Understanding CT help student to be purposeful, self-regulatory judgment which results in interpretation, analysis, and evaluation, as well as explanation of the judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and life. The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. Thus, educating good critical thinkers means working toward this ideal. It combines developing CT skills with nurturing those dispositions which consistently yield useful insights and which are the basis of a rational and democratic society (Rakhudu *et al*., 2012). Effectiveness in vocational education should result in profound and deep understanding of the material being presented. This does mean that learners are being able to remember, repeat and retain information, as well as they have developed the skills that allow them to find and use this information and to expand their thinking abilities. Because the students were more likely to acquire and retain information when that information was rehearsed or used to solve problems. In studying the curriculum of a nursing program, knowledge acquisition and retention by vocational students is play a primary concern of vocational training instructors, because when you read a book or article about something new, you have two main concerns: Retaining the new knowledge you just acquired and being able to access the new knowledge efficiently later on. What are methods you folks use to annotate what you learn? Knowledge acquisition is one of the most common variables of interest in evaluating PBL effectiveness that can be measured in a specific manner. Knowledge can be specific according to concepts, principles, and procedures (Meitner *et al*., 2005). Knowledge acquisition means the attainment of information due to instruction. Successful acquisition is measured by the amount of information the student is able to immediately recall based on predetermined learning objectives. Knowledge should extend beyond rote memory. For this study, knowledge acquisition is operationally defined as the score on a unit assessment administered after instruction (post-test). Knowledge retention means the maintenance of knowledge acquire through instruction for an extended amount of time. The amount of content retained signifies the level of thinking at which the student acquired the information. For this study, knowledge retention is operationally defined as the difference score on the unit assessment administered after instruction (follow-up post-test) (Anderson, 2007). While the importance of acquisition and retain of basic knowledge remains important as a fundamental goal in nursing education, the development of critical thinking has emerged as equally important to support nurses to solve problems effectively, and to provide the most appropriate intervention which will enhance the quality of care (Clifford *et al*. 2004). Can we find a balance with instructional strategies that facilitate the acquisition of basic knowledge yet develop and nurture critical thinking? So, the intention of this study to examine the impact of problem-based learning on students' critical thinking dispositions, knowledge acquisition and retention.

1.1 Research objective
To investigate the effect of Problem-Based Learning on the critical thinking skills of male and female students of Building construction of Vocational Training Schools of Fako Division of the South West Region.

1.2 Research question
What is the effect of Problem-Based Learning on the critical thinking skills of male and female students of Building construction of Vocational Training Schools of Fako Division of the South West Region?

1.3 Research hypothesis
Ho_2: There is no significant difference in the mean score of male and female critical thinking skill when taught using PBL in Building Construction of Vocational Training Schools of Fako Division of the South West Region in Cameroon.
Ha_2: There is a significant difference in the mean score of male and female critical thinking skill when taught using PBL in Building Construction of Vocational Training Schools of Fako Division of the South West Region in Cameroon.

2. Research design
A sequential explanatory research design was adopted for this study.

2.1 Area of study
This study was carried out in Fako Division of the South West Region of Cameroon.

2.2 Population of the study
The population of the study consisted of 750 students and 73 teachers giving a total of 823 students and teachers of vocational training schools (Government, Para-states, Denomination and Private) in Fako Division of the South West Region. The target population of this study was 650 students and 63 teachers amounting to 713 students and teachers 'of government and Para-states owned Vocational Training Schools in Fako Division of the South West Region. The accessible population of this study comprised of 550 students and 45 teachers of COIC-Buea and AVTC-Limbe given a total of 595 students and teachers of both gender offering the Setting out and elevation courses in Building Construction and the sample size of this study was made up of some selected 120 final year trainees and 4 teachers who were purposively selected from the Building Construction Department of two Vocational Training Schools which were COIC-Buea and AVTC-Limbe in Fako.

2.3 Sampling techniques
The study employed a purposive sampling technique.

2.4 Instruments for data collection

Five main instruments were used to collect data in the study which were: a Likert scale structured questionnaire (for the students), a Test (pre-test and post-test for the students), an interview guide (for the teachers), an observation Checklist for the practical test for the students and documents from Vocational Training Ministries and Institutions.

2.5 Data collection methods

The Researcher obtained an authorization from the Head of Department for Curriculum Studies and Teaching in the Faculty of Education, Department of Curriculum and Teaching from the University of Buea and took it to the Directors of COIC-Buea and AVTC-Limbe. The Directors on their part sent the Researcher to the Head of Department for Building Construction. For the Test, the Researcher used the first two weeks to book an appointment and also teach the trainers of the Department for Building Construction in the PBL approach. After teaching the trainers of Department for Building Construction in the PBL approach, the trainers then gave a pre-test to the students after which the marks were collected and kept. The trainers then taught the students for one month (twice every week). The experimental group (COIC-Buea students) were taught Setting out, foundation and elevation using PBL mean while the students of the control group (AVTC-Limbe students) were taught using the Traditional Learning Approach. At the end of the teaching a post-test (BCCAT) constructed in PBL was given to both the control and experimental groups and the marks saved and given to the researcher.

The observation of the students during practical while carrying on the test was done by the researcher, the research assistant and the trainers of Building Construction and at the end all scores were handed to the researcher meanwhile the researcher conducted the interview to the trainers.

Pertaining to the questionnaire, after the quasi- experiment was over, the researcher took out time again to teach the PBL strategy to the group of the final year students of building construction that were used as a control group in the quasi- experiment. This was to bring all the final year students at the same level of comprehension of the PBL approach process so that they all could answer the questionnaire without bias. After the teaching, the questionnaire was given to the students to take home and have ample time to answer. The researcher collected the answered questionnaire the next day.

2.6 Method of data analysis

The qualitative and quantitative methods were used in analysing the data for the study. The quantitative data were analysed using the descriptive and inferential statistical tools mean while the qualitative data were analysed using the thematic analysis approach.

3. Results

Research question: What is the effect of Problem-Based Learning on the critical thinking skills of male and female students' in Building construction of Vocational Training Schools of Fako Division of the South West Region?

Table 1: Comparing the Mean Achievement Score on the Critical Thinking Skills of Male and Female Taught Using the PBL

Gender		Analyze the work processes of setting out and elevation	Reflect on the use of necessary tools, equipment or machine involve setting out and elevation	Apply and synthesize the process of setting out a foundation and the elevation of a building	Evaluate your elevation using a five-point scale	Total test score
Male	N	38	38	38	38	38
	Mean	7.01	7.31	18.51	3.44	36.26
	Minimum	6	7	16	3	32.00
	Maximum	10	10	23	5	48.00
	Std. Error of Mean	.358	.276	.522	.154	.62702
	Std. Deviation	2.205	1.701	3.221	.951	5.17058
Female	N	12	12	12	12	12
	Mean	6.78	6.69	17.77	3.18	34.41
	Minimum	5	5	15	2	27.00
	Maximum	9	9	21	4	43.00
	Std. Error of Mean	.429	.582	.993	.271	.69830
	Std. Deviation	1.485	2.015	3.441	.937	3.95017

Comparing the mean achievement score of the critical thinking skill of male and female final year trainees in Building Construction, based on the ability to analyze the work processes of setting out and elevation of a building, the results show that, the critical thinking skill of the male mean score of 7.05±0.358 while that for the female is 6.75±0.429.

Based on the reflection of the use of necessary tools, equipment or machine involve in the setting out and elevation of a building, the results also show that the mean achievement score for the critical thinking of the male students is 7.39±0.276 while that for the female students is 6.67±0.582.

Furthermore, based on the application and synthesis of the processes involved in the setting out and elevation of a building, the results equally show that the mean achievement for the critical thinking skill of the male students is 18.71±0.522 while that for the female students is 17.75 ±0.993.

Finally, based on the evaluation of the elevation using a five-point scale, the results show that the mean achievement score for the critical thinking skill of the male students was 3.47±0.154 while that for the female students was 3.17 ±0.271. In conclusion, the results of the Post-test on setting out and elevation shows that the mean achievement score for the critical thinking skills of male students is 36.26±0.62702 while that for the female students is 34.41 ±069830.

Table 2: Evaluation of the Student Critical Thinking Achievement Score Taught Using PBL by Gender

			Gender		Total
			Critical Thinking Skill -Male	Critical Thinking Skill Female	
Evaluation	Average	n	1	1	2
		%	50.0%	50.0%	
	Above Average	n	25	23	48
		%	52.1%	47.9%	
Total		n	26	24	50
		%	52.0%	48.0%	
a. Method = Problem Based Learning (PBL)					

Chi-Square Test=6.597, df=1, P=0.010< 0.05

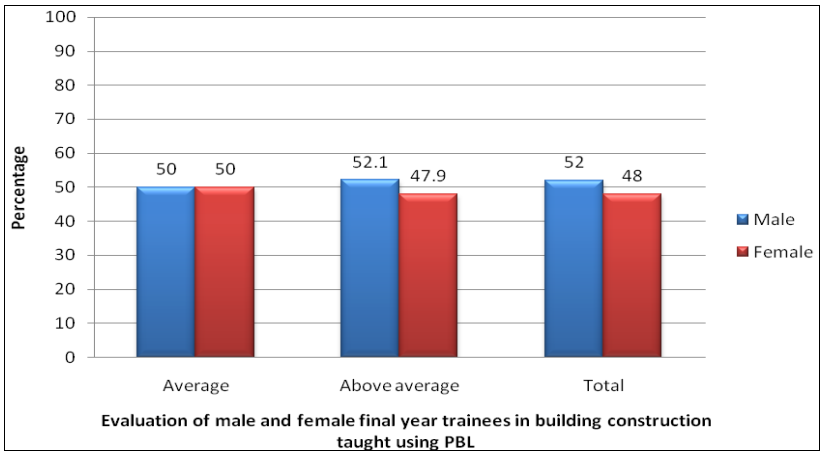

Fig 1: Evaluation of the Critical Thinking Skills of Male and Female Final Year Trainees in Building Construction Taught using PBL

Evaluation of the critical thinking skills of male and female final year trainees in building construction taught using PBL

Comparing the evaluation of the critical thinking skills of male and female final year trainees in building construction taught using PBL in the experiment.

The results show that the male and female students analyze, reflect, synthesis and evaluate almost the same with the male having a mean score of 52.0% while the female had a mean score of 48.0%.

3.1 Testing of hypothesis

Ho: There is no significant difference in the mean score of male and female critical thinking skill when taught using PBL in Building Construction of Vocational Training Schools of Fako Division of the South West Region in Cameroon.

Ha: There is a significant difference in the mean score of male and female critical thinking skill when taught using PBL in Building Construction of Vocational Training Schools of Fako Division of the South West Region in Cameroon.

Table 3: Comparing Overall Critical Thinking Mean Scores for Significance Differences

Method	N	Mean	Std. Deviation	Std. Error Mean	Degree of freedom (df)	T- calculated value
Male critical thinking skill	38	36.26	5.17058	.62702	48	1.799
Female critical thinking skill	12	34.41	3.95017	.69830		

At Confidence interval of 95% and at df of 48, t-critical value is 1.960, P= 0.641>0.05, Mean difference= 1.85

Statistically, the results showed that the mean achievement score for the critical thinking skill for both the male and female final year trainees taught using the problem-based learning approach does not significantly differ by gender whereby the mean achievement score for the male is 36.26±0.62702 while that for the female students 34.41±0.69830. At df of 48, and 95% confidence interval, the t-calculated value is 1.799 which is less than the critical t-value of 1.960. Therefore, the hypothesis that states that there is no significant difference in the mean achievement critical thinking score of male and female (the Null hypothesis) when taught using PBL in Building Construction of Vocational Training Schools of Fako Division of the South West Region in Cameroon was accepted meanwhile the hypothesis which say that there is a significant difference in the mean achievement critical thinking score of male and female (the Alternate) when taught using PBL in Building Construction of Vocational Training Schools of Fako Division of the South West Region was rejected.

3.2 Qualitative findings

Table 4: Teachers opinion on when PBL was first introduce, courses taught using PBL and their awareness of PBL

Teachers opinion on when PBL learning was first introduced in their Institution	What are the courses that you have experienced with PBL Approach?	Do you know actually what PBL is?
2010	Setting out	Yes
2009	Excavation	
	Foundation building	
	Elevation	

Finding out from the four teachers interviewed for the study under building construction on when PBL was first introduce in their institution, findings showed that some of them said 2009 while others said in 2010.

Based on the courses that the four teachers have taught using the PBL, findings showed that setting out was one of the courses. Excavation, foundation building and elevation are other three courses that the four teachers have taught using PBL.

Furthermore, finding out from the four interviewed trainers in building construction if they know what actually PBL is, they all said yes.

Table 5: Trainers opinion about PBL

Themes	Quotations
Enhanced interaction	"It is a good method that helps children to learn better through interaction"
Enhanced engagement	It is a method that helps learners to be more engaged in their learning".
Enhanced learning	"It helps students to learn better". "It encourages student to learn

Based on the four trainers in building construction opinion about PBL, one of them said PBL is a good method that helps children to learn better through interaction. Another trainer said PBL is a method that helps learners to be more engaged in their learning. Furthermore, one of the trainers also said PBL helps students to learn better. Finally, one of the trainers also added that PBL encourage student to learn. From the opinions of the four trainers about PBL they said it enhanced students learning, increase their engagement as well as interaction.

Table 6: Trainers opinion on skills gain using PBL

Themes	Frequency
Problem solving	3
Critical thinking	3
Creativity	2
Communication	2
Team work skill/collaboration	2

Finding out from the four trainers what skills have they gain using PBL, problem solving and critical thinking skills were frequently mentioned followed by communication, creativity and team work collaboration skill. From this finding, it is evident that PBL has not only been beneficial to the students but, to the teachers also.

Table 7: Trainers opinion if PBL helps them to deliver new knowledge to the trainees

Themes	Quotations
Yes	"During demonstration and practical" "It helps during demonstration and practical work" "Yes, it helps while allocating them to work together". "Yes, during practical works".

Finding out from the four trainers in building construction if PBL helps them to deliver new knowledge to the trainees, they all said yes as depicted in their statements "During demonstration and practical", "It helps during demonstration and practical work", "Yes it helps while allocating them to work together". And "Yes, during practical works".

3.3 Discussion of results

The findings arrived at in this study are discussed in this section by examining the degree to which the current findings are corroborated by other research works as well as the difference that might have been observed. These findings are also linked up to the theories reviewed in the study in a bid to justify the relevance of the findings. This discussion is presented according to the specific objectives of the study.

Research question: What is the effect of Problem-Based Learning on the critical thinking skills of male and female students of Building construction of Vocational Training Schools of Fako Division of the South West Region?

Female were observed to be a demographic minority in industrial Building Construction) studies across the sampled vocational training schools. Out of the 120 respondent who completed the questionnaire only 30 were female. It was therefore deemed necessary to compare the critical thinking mean achievement score of male and female students. Critical thinking skills according to Atayo (2000) [16], is one of the fundamental skills in vocational training school that give birth to the other competencies therefore it was worth finding out the effect of PBL on the critical thinking skill of male and female because any teaching method or strategy is which gender bias should not bec recommended for teaching (UNESCO,2000). Findings revealed that there is no significant difference in the critical thinking mean achievement of students in vocational training education. Female and male students were observed to be actively involved in their learning when taught using the problem-based learning approach. the calculated t-value for this relationship was 1.96 which was significantly low to conclude that gender is a significant factor student acquisition of competencies.

This finding relative to the critical thinking skill by gender is corroborated by Kinzie *et al*. (2010) who surveyed the critical thinking skill acquisition pattern of male and female undergraduate in different types of baccalaureate-granting institutions. Descriptive statistics and hierarchical linear modelling showed that on balance, undergraduate women participate almost the same as their male counterparts in educationally purposeful activities. Male first year and senior students devote equal time and effort to academic challenge tasks such as working hard to meet expectations and spending time studying, senior males also participated equally in active and collaborative learning activities.

Amir, Saleha, Jelas, Ahmad, and Hutkemri (2014) [12] on their part also conducted a study aimed exploring students' involvement and competencies acquisition level in schools based on gender and age in Malaysia. Findings of the study revealed that involvement level in school differ by age but not by gender. Younger students recorded higher level of involvement as compare to elder ones. Female students reported to have the same level of involvement when compare to boys. This shows that critical skill acquisition is perceived differently by different age but the same by gender. As students grow older, they find that school activity is less interesting or fail to cater for their growth needs and hence need the school environment and teaching strategies to be motivating enough to keep them in school in order to acquire competencies.

The above reviews relative to critical thinking skill by gender confirm the observation by this study that gender is not a major factor in students acquisition of critical thinking skill in vocational training schools. The fact that female and male engage equally in the acquisition of critical thinking skill is also established but unfortunately there are very few female students in the Building Construction. Therefore, encouraging females to take up studies in vocational education and industrial studies in particular could be very good venture for the future.

4. Conclusion

In conclusion, findings of this study have shown that there is a significant strong, high and positive effect of problem-based learning on students' critical thinking skills in Building Construction of Vocational Training Schools of Fako Division of the South West Region in Cameroon. The degree of student critical thinking skills is determined by the extent of their active involvement within the learning process because it is through this that their skills are developed. This assertion is supported by the views of Fraser, Fisher and McRobbie (1996), and Hu and Kuh (2001) [127] and Kuh (2009) who state that learning involvement is the only true determinant of critical thinking skills in vocational schools.

4.1 Recommendations

Based on the findings derived from the study, the following recommendations were made to be implemented by stakeholders within the confines of available resources and further research data in a bid to increase students' competencies in Vocational Training Schools in Fako Division of the South West Region of Cameroon:

The Government should foster the development of skilled manpower through the supply of modern equipment required for training in Vocational training schools because this is the future of industrialization and inventions in the country. In COIC-Buea for example students of Wood work are trained using old and outdated machines which do not match up to modern technology. 21st century builders build with sophisticated machines such as gravel grinder, cement mixer etc and with this type of practice got, these students will not be able to fit into the job market and will be forced to operate by trial and error. This is especially pressing because the development needs are well-spelled out already in documents like the Growth and employment Strategy Paper.

Furthermore, they should expand the rural electrification programme so that Vocational training schools can have the possibility of conducting practical and even accessing the modern ICT learning resource in a way of simulation and modelling since as Vocational training is all about hands on training. In cases where hydro power cannot be immediately provided, alternative power sources such as the generator, or renewable energy sources like solar, bio-gas etc could be installed. At least, the solar energy costs less in terms of money and even environmental protection when compared to other sources.

In addition to this, the Government should do all to established Universities for graduates of Vocational training schools which can fine-tune their skills and specializations. The National Polytechnique in Yaoundé alone cannot handle all the graduate from Vocational training schools in Cameroon talk less of its accessibility to all willing to study. This is a potential demotivating factor because students are stranded after obtaining the Vocational Qualification Diploma. Only those from high socio-economic background can afford to receive further training and specialization out of the country.

More to this, the Government should also ensure that the certification of teachers for Vocational training education considers the original background of the teachers. Teachers of Vocation training schools should have a background in the field of specialization so that they can effectively facilitate learning and training for students. It will be impossible for a teacher to facilitate a skill in a learner if they themselves lack such skills.

Teachers should be encouraged to include students as much as possible in the planning of learning activities because this builds their confidence and stimulate their motivation. It is also important for teachers to provide as much support as possible to students by taking personal interest in their studies, communicate realness, acceptance and encourage their efforts.

In addition to this, teachers should adopt more progressive teaching strategies which allow students to manipulate equipment's, engage in projects, do brainstorming, interact with peers, solve problems, think critically, make genuine mistakes, and above all build an inventive/discovery spirit. The teaching strategy is usually the language of the workshop and as such teachers are also encouraged to fine-tune their skills through in-service training and seminar workshops. Teachers should expand the grouping of students for learning during lessons and not limit this to workshop practice.

Teachers should be encouraged to improvise instructional materials for the benefit of their students as much as their skills allow them to do so. The localization of these learning materials has the potential of making learning more relevant to the students. Teachers should also learn to maintain the broken equipment if they can and seek help from their students where applicable. Teachers should also make the maximum use of materials and equipment's available during teaching rather than keep them some to rot. Teachers should be open to learning from more experienced colleagues who have good knowledge of the manipulation/functioning of equipment that they lack knowledge about.

While school authorities struggle to ensure that students are disciplined in school, parents should not abandon this task to the school alone. They should ensure that they keep the school-home liaison so that students can be properly followed up, and as well parents must watch out for the kinds of friends their children keep and sanction them when necessary at home. Students on their part should be encouraged to set and pursue clear learning goals because this is the only way through which they can acquire skills that will make them useful to the society.

For the Guidance Counsellors, since the problem of indiscipline, delinquencies and drug abuse are reported by teachers, school counsellors should take up the challenge of identifying these cases early in collaboration with the teacher and school administrators to provide a timely therapy to nip the danger at the bud. By so doing, the other students who are at high risk of being swayed away from their studies are also protected.

This study contributes to knowledge in that, it describes the current state of acquisition of competencies in Vocational training schools in Fako Division of the South west Region.

It highlights the keys reasons why the right strategies of teaching and learning are pressing need in Cameroon's educational system because the teaching determines and controls the quality of produce from any production unit. The study further posits that the focus should not only be on acquisition of competencies or performance but rather on the major direct determinant of competencies which is motivation to learning and the teaching strategies. The duty of educational authorities and stakeholders should therefore be to provide conditions that motivate and engage students as much as possible in learning for through this they develop the skill necessary for desired competencies.

The study also demonstrates the relevance of psychosocial support to students' learning. The precondition to effective learning is not actually intellectual readiness but psychological readiness and the social interactions that take place in the classrooms and workshops. The amount of appropriate teaching strategies and resources utilized may be of no significant use if the teacher does not believe in the learner and vice versa. The teaching process from this study should be holistic through teachers' effort to adopt an eclectic use of both technical support and psychosocial support strategies.

5. References

1. Abbing J. The effect of students' engagement on academic achievement in different stages of their academic career from a dropout perspective. Published bachelor thesis, University of Twente, 2013.
2. Abdullahi A. Science teaching in Nigeria: Atoto Press, 1982.
3. Abdu-Raheem BO. Availability, adequacy and utilisation of social studies instructional materials in Ekiti State Vocational Training Schools. Journal of current Discourse and Research. 2011; 3:242-255.
4. Ackroyd S, Hughes JA. Data collection in context: Longman, 1981.
5. Adnan NL, Karomiah W, Abdullah W, Awang Y. Would problem-based learning affect students' generic competencies? African Journal of Education and Technology. 2011; 1:1-14.
6. Ahmad AR. The unemployable Malaysian graduate. New Sunday Times, March 20, 2005. Retrieved on September 14, 2013, from: http://pgoh13.com/unemployable200305.php.
7. Al-Abdulrazzaq D, Al-Fadhli A, Arshad A. Advanced medical students' experiences and views on professionalism at Kuwait University. BMC Medical Education. 2014; 14(1):150.
8. Albanese MA, Mitchell S. Problem-based learning: A review of literature on its outcomes and implementation issues. Academic medicine: Journal of the Association of American Medical Colleges. 1993; 68(1):52-81.
9. Alias M, Hassan R. TVET Agency-Industry Collaboration: Addressing Diversity. Proceedings of the 2nd UPI International Conference on Technical and Vocational Education and Training Bandung, 4-5 December 2012, 2012, 1-10.
10. Al-Naggar RA, Bobryshev YV. Acceptance of Problem-Based Learning among Medical Students. J Community Med Health Educ. 2012; 2:146.
11. Amin MB. Trends in the demand for primary education in Cameroon: UPA, 1999.
12. Amir Saleha RA, Jelas ZM, Ahmad AR, Hutkemri. Students' involvement by age and gender: A cross-selectional study in Malaysia. Middle East Journal of Scientific Research. 2014; 21(10):1886.
13. Araz G, Sungur S. Effectiveness of problem-based learning on academic performance in genetics. Biochemistry and Molecular Biology Education. 2007; 33(6):448-451.
14. Astin AW. What matters most in vocational training schools: Four critical years revisited. Jossey-Bass, 1999.
15. Asma A, Lim L. Cultural dimensions of Anglos, Malaysian Management Review, December, 2000, 9-17.
16. Atayo A. Cameroon Educational System: Loving World Publishing House, 2000.
17. Babbie E. The Practice of Social Research (14.th ed.). Bost. Mass: Cen gage Learning, 2014.
18. Baharuddin N. Unemployed graduates: Pre and post 1997 crisis, Department of Statistics Malaysia, 2003.
19. Bandura A. Self-efficacy: The exercise of control: Freeman, 1997.
20. Barge S. Principles of Problem and Project Based Learning: The Aalborg PBL Model: Aalborg University Press, 2010.
21. Barrows HS. Is it truly possible to have such a thing as PBL? Distance Education. 2002; 23(1):119-122.
22. Barrows HS. Problem-based learning in medicine and beyond: A brief overview. New Directions for Teaching and Learning. 1996; 68:3-12.
23. Baxter MB, Young JL. Survey report: What do employers expect from high school graduates? NASSP Bulletin. 1982; 66:93-98.
24. Bazeley P. Qualitative Data Analysis with NVivo. Los Angeles; London: SAGE. Bell, S. (2010) Project-Based Learning for the 21st Century: Skills for the Future, The Clearing House. A Journal of Educational Strategies, Issues and Ideas. 2007; 83(2):39-43.
25. Bennett N, Dunne E, Carre C. Patterns of core and generic skill provision in higher education. Higher Education. 1999; 37(1):71-93. Retrieved from: http://www.jstor.org/stable/3448047
26. Berge ZL. Interaction in Post-Secondary Web-Based Learning. Educational Technology, January/February, 1999, 5-11.
27. Bernama. Punca graduan sukar dapat kerja. Kosmo, November 7, 2012, p25.
28. Besong JB. Possible opportunities for educational system efficiency and effective governance in Cameroon. International Journal of Managerial Studies and Research (IJMSR). 2014; 2(8):68-74.
29. Biggs JB. Teaching for Quality Learning at University: What the Student Does (2nd ed.). Maidenhead, Berkshire; Pa.: Society for Research into Higher Education: Open University Press, 2003.
30. Bligh J. Problem-based learning in medicine: An introduction. Post Graduate Medical Journal. 1995; 71(8):323-326.
31. Blumenfeld PC, Soloway RW, Marx JS, Krajcik M, Guzdial A, Palincsar. Motivating project-based learning: Sustaining the doing, supporting the learning. Educational Psychologist. 1991; 26(3-4):369-398.
32. Boekaerts M. Self-regulated learning: Where we are

today. International Journal of Educational Research. 1999; 31:445-457.
33. Bogden RG, Biklen SK. Qualitative Research for Education: An Introduction to Theories and Methods. Pearson, 2003.
34. Bokey L, Chapuis PH, Dent OF. Problem-based learning in medical education: one of many learning paradigms. The Medical Journal of Australia. 2014; 201(3):134-136.
35. Borthwick J, Wissler R. Postgraduate research students and generic capabilities: Online directions. Canberra: Department of Education, Science and Training Research Evaluation Programme, 2003.
36. Boud D. Problem-based learning in perspective. In D. Boud (Ed.), Problem-based learning in education for the professions. Higher Education Research and Development Society of Australia, 1987, 13-18.
37. Bouhuijs PAJ, Gijselaers WH. Course Construction in Problem-Based Learning. [De constructie van taken in problem gestuurd onderwijs.] Schooling [Vorming]. Journal of Adult Education [Tijdschrift Voor Volwasseneneducatie]. 1987; 36(1):26-40.
38. Bridges EM. Problem-based learning for administrators. ERIC Clearinghouse on Educational Management. Eugene, OR, 1992.
39. Briggs SR, Cheek JM. The role of factor analysis in the evaluation of personality scales. Journal of Personality. 1986; 54:106-148.
40. Brimer MA, Pauli L. Wastage in education a world problem: UNESCO, 1971.
41. Bruner JS. Models of the learner. Educational Researcher. 1985; 14(6):5-8.
42. Bruning RH, Schraw GJ, Norby MM, Ronning RR. Cognitive Psychology and Instruction. 4th ed: Prentice Hall, 2004.
43. Bryman A, Cramer D. Quantitative data analysis with SPSS 12 and 13, a guide for social scientists. Psychology Press, 2005.
44. Byrne B. Qualitative interviewing. In: C. Seale. ed., Researching Society and Culture, 2nd ed. The Alden Press, 2004.
45. Bligh J. Problem-based learning in medicine: An introduction. Post Graduate Medical Journal. 1995; 71(8):323-326.
46. Chakravarthi S, Nagaraja HS, Judson JP. An exploration of the strategic challenges of problem-based learning (PBL) in medical education environment: A paradigm shift from traditional lectures. Indian Journal of Science and Technology. 2010; 3:216-221.
47. Chapman WW. Modern Machine Shop's Guide to machining Operation: Hanser Gardner, 2004.
48. Cheng Hwa N. GMI Problem, Project and Production Based Learning (Pro3BL). Brochure, 2010.
49. Che SM. Technical and Vocational Education in Cameroon and critical avenues for development. Journal of Research in comparative and International Education. 2007; 2(4):333-345. Accessed on May 11, 2019. Doi: http://dx.doi.org/10.1086/446884.
50. Chetculi D, Griffiths M. The implication for students' self-esteem of ordinary differences in schools: The case of Malta and England. British educational Research Journal. 2002; 28(4):529-549.
51. Chickering AW. Commuting versus Resident Students: Overcoming the Educational Inequities of Living off Campus.
52. Clagett CA. Workforce skills needed by today's employers. Market analysis MA98-5. Largo, Prince George's Community College, 1997.
53. Clark LA, Watson D. Constructing validity: Basic issues in objective scale development. Psychological Assessment. 1995; 7:309-319.
54. Clarke A. Survey on employability. Industrial and Commercial Training. 1997; 29(6):177-183.
55. Clough P, Nutbrown C. A student's guide to methodology: Sage Publications Company, 2002.
56. Clore GL. Why emotions require cognition. P. Ekman & R. J. Davidson (Ed.). The nature of emotion: Fundamental questions Icinde: Oxford University Press, 1994, 181-191.
57. Coakes S. (Ed.). SPPS version 12.0 for windows: Analysis without anguish (Version 12.0 ed.). John Wiley & Sons Australia, 2005.
58. Cobb P, Bowers J. Cognitive and Situated Learning Perspectives in Theory and Practice. Educational Researcher. 1999; 28(2):4-15.
59. Coffin P. The Impact of Implementing Problem-Based Learning in a Thai University. Aalborg University, 2014.
60. Cook TD, Campbell DT. Quasi-experimentation: Design and analysis for field settings: Rand McNally, 1979.
61. Corbin J, Strauss A. Basics of qualitative research (3rd ed.): Techniques and procedures for developing grounded theory. SAGE Publications Ltd, 2008.
62. Cortina JM. What is coefficient alpha? An examination of theory and applications. J Appl Psychol. 1993; 78(1):98-104.
63. Crebert G, Bates M, Bell B, Patrick CJ, Cragnolini V. Developing generic skills at university, during work placement and in employment: graduates' perceptions. Higher Education Research & Development. 2004; 23(2):147-165.
64. Creswell JW. Qualitative Inquiry and Research Design: Choosing among Five Approaches (2nd ed.), Sage, 2007.
65. Cronbach LJ, Meehl PE. Construct Validity in Psychological Tests. Psychological Bulletin. 1955; 52(4):281-302.
66. Csapó B. (Ed.). Az iskolai tudás. Budapest: Osiris, 2002.
67. Curry P, Sherry R, Tunney O. What transferable skills should students develop during their time in college: Results of Modern Languages Students Survey. Trinity College, Dublin. This project is directed by the Steering Committee, 2003.
68. Dahl B. Analysing cognitive learning processes through group interviews of successful high school pupils: Development and use of a model. Educational Studies in Mathematics. 2004; 56(2):129-155.
69. Dahl B, Holgaard JE, Huttel H, Kolmos A. Students' Experiences of Change in a PBL Curriculum. International Journal of Engineering Education. 2016; 32(1(B)):384-395.
70. Dahlgren AM, Dahlgren LO. Portraits of PBL: Students' experiences of the characteristics of problem-based learning in physiotherapy, computer engineering, and psychology. Instructional Science. 2002; 30:111-127.

71. Davis MH, Harden R. Problem Based Learning: A practical guide, AMEE Medical Education guides no 15, University of Dundee, 2005.
72. Demarco, M. Growing an optics manufacturing equipment business by offering services. Laser Focus World. 2013; 49(9):28-29.
73. Dench S, Perryman S, Giles L. Employers' Perception of Key Skills. The Institute for Employment Studies Report 349, 1998.
74. Department of Statistics, Malaysia. Statistics Labour Force. Ministry of Human Resources, 2011.
75. Dewey J. The reflex arc concept of psychology. Psychology Review. 1896; 3:357-370.
76. Diem KG. A Step-by-Step Guide to Developing Effective Questionnaires and Survey Procedures for Program Evaluation & Research. Rutgers Cooperative Research & Extension, 2002, 1-6.
77. Dodd L. The Impact of Problem-Based Learning on the Information Behaviour and Literacy of Veterinary Medicine Students at University College Dublin. 2007; 33(2):206-216.
78. Dolmans D, Gijselaers W, Moust J, Grave W, Wolfhagen I, Vleuten C. Trends in research on the tutor in problem-based learning: Conclusions and implications for educational practice and research. Medical Teacher. 2002: 24(2):173-180.
79. Doolittle PE. Constructivism and Online Education. In 1999 Online Conference on Teaching Online in Higher Education. Virginia Tech, 1999.
80. Doolittle PE, Hicks D. Constructivism as a Theoretical Foundation for the Use of Technology in Social Studies of Technology in Social Studies, 2003, 3104.
81. Doppelt Y. Implementing and assessment of PBL in a flexible environment. International Journal of Technology and Design Education. 2003; 13:255-272.
82. Du XY, Graaff E de, Kolmos A. (Eds.). Research on PBL Practice in Engineering Education: Sense Publishers, 2009.
83. Duffy TM, Cunningham DJ. Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), Handbook of research for educational communications and technology: Simon & Schuster Macmillan, 1996, p177.
84. Dunlap JC. Problem-based learning and self-efficacy: How a capstone course prepares students for a profession. Educational Technology Research and Development. 2005; 53:65-85.
85. Education Council. Recommendation of the European Parliament and the Council of 18 December 2006 on key competencies for lifelong learning. Brussels: Official Journal of the European Union, 2006. [30.12.2006]
86. Eichhorst W, Rodriguez-Planas N, Schmidl R, Zimmermann KF. Training Systems Around the World A Roadmap to Vocational Education and Training Systems Around the World. IZA DP No. 7110, 2012.
87. Elliott AC, Woodward WA. Statistical analysis quick reference guidebook with SPSS examples. 1st e: Sage Publications, 2007.
88. Engineering Accreditation Commission. Criteria for accrediting engineering programs, 2003. Retrieved from: http://www.ece.tamu.edu/Undergrad/ABET/EC2000Criteria.pdf
89. Engineers Australia. G02 Accreditation management system – Education programs at the level of professional engineer – Accreditation criteria guidelines. Canberra, Australian Capital Territory: Engineers Australia, 2005.
90. Fang N. Using Computer Simulation and Animation to Improve Student Learning of Engineering Dynamics. Procedia - Social and Behavioral Sciences. 2012; 56(Ictlhe):504-512.
91. Faryniarz JV, Lockwood LG. Effectiveness of microcomputer simulations in stimulating environmental problem solving by community college students. Journal of Research in Science Teaching. 1992; 29(5):453-470.
92. Fejes JB. A tanulási motiváció új kutatási iránya: a célorientációs elmélet. Magyar Pedagógia. 2011; 111(1):25-51.
93. Forrest K, Cramp P. Essential guide to generic skills. Hoboken, NJ, USA: BMJ Books, 2008.
94. Fruchter R. Computer integrated architecture/engineering/ construction project-centred learning environment. Proc. ACADIA Conf., 1996, 235-242.
95. Fruchter R. Roles of computing in P5BL: Problem-, project-, product-, process-, and people-based learning. AI EDAM. 1998; 12:65-67.
96. Fullan M. The new meaning of educational change (3rd edition). Teachers College Press, 2001.
97. Gackowski SJ. Case/real-life problem-based learning with information system projects. Journal of Information Technology Education. 2003; 2:357365.
98. Ganefri. The Development of Production-Based Learning Approach to Entrepreneurial Spirit for Engineering Students. Journal Asian Social. Science. 2013; 9(12). ISSN 1911-2017 E-ISSN 1911-2025
99. Gentry JW, Burns AC, Putrevu S, Hongyan Y, Williams LA, Bare T, *et al*. Motivating students: An initial attempt to operationalize the curiosity gap model. Developments in Business Simulation and Experiential Learning, 2001, 28.
100. Ghasemi A, Zahediasl S. Normality Tests for Statistical Analysis: A Guide for Non – Statisticians. 2012; 10(2):486-489.
101. Gibb J. Generic Skills in Vocational Education and Training: Research Readings. National Centre for Vocational Education Research (NCVER), Adelaide, 2004.
102. Glaser B, Strauss AL. The discovery of grounded theory: Strategy for qualitative research. Chicago: Aldine, 1967.
103. Golafshani N. Understanding reliability and validity in qualitative research. The Qualitative Report. 2003; 8(4):597-606. Retrieved on Oct. 16, 2014, from: http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf
104. Goldberg DE. Change in engineering education: One myth, two scenarios, and three foci. Journal of Engineering Education. 1996; 85(4):107-116.
105. Graaff de E, Bouhuljs PAJ. Implementation of Problem-based Learning in Higher Education (Amsterdam, Theses Publishers), 1993.
106. Graaff de E, Kolmos A. Characteristics of problem-based learning. International Journal of Engineering Education. 2003; 19(5):657-662.

107. Graaff E de, Kolmos A. Process of Changing to PBL. (E. de Graaff & A. Kolmos, Eds.) Management of change: Implementation of Problem-based and Project-Based Learning in Engineering. Rotterdam/Taipei: Sense Publishers, 2007a.
108. Graaff E de, Kolmos A. History of Problem-Based and Project-Based Learning. Management of change: Implementation of Problem-based and Project-Based Learning in Engineering. Rotterdam/Taipei: Sense Publishers, 2007b.
109. Graaff E de, Kolmos A. (Eds.). Management of change: Implementation of Problem-Based and Project-Based Learning in Engineering. Sense Publishers, 2007bc.
110. Greene JC, Caracelli VJ, Graham WF. Toward a conceptual framework for mixed- method evaluation designs. Educational Evaluation and Policy Analysis. 1989; 11:255-274.
111. Guba EG, Lincoln YS. Fourth generation evaluation. Sage, 1989.
112. Gunuc S, Kuzu A. Student engagement scale: Development, reliability and validity. Assessment & Evaluation in Higher Education, 2014. Doi: 10.1080/02602938.2014.938019.
113. Gunuc S. Determining the role of technology in student engagement and examining of the relationships between student engagement and technology use in class. (Unpublished doctorate thesis). Anadolu university, 2013.
114. Guoqiang C. Levels of application of computer simulation in engineering disciplines education. ICETC 2010 - 2010 2nd International Conference on Education Technology and Computer. 2010; 2:117-120.
115. Hammersley M, Atkinson P. What is ethnography? Ethnography, Principles in practice (3rd ed). Routledge, 2007, 1-19.
116. Harper SR, Quaye SJ. (ed.). Student Engagement and Motivation in Higher Education. Routledge, 2009.
117. Harun NF, Yusof KM, Jamaludin MZ, Hassan SAHS. Motivation in problem-based learning implementation. Procedia - Social and Behavioral Sciences. 2012; 56(0):233-242.
118. Harvey L. New realities: The relationship between higher education and employment, 2000. Retrieved on December 16, 2014 from: http://www.qualityresearchinternational.com/ese/relatedpubs/New%2520Realit ies.pdf.
119. Hassan B, Mohd Zaidi O, Zainal M, Abang Abdullah AA, Badrulhisham AA, Abdul Hamid H, *et al*. The Future of Engineering Education in Malaysia, a report by the Department of Institutions of Higher Education Management, Ministry of Higher Education, Malaysia, 2007.
120. Hassan, Hasliza. Ciri-ciri Kualiti Pelajar Untuk Keperluan Pekerjaan Pada Masa Kini. Seminar Antara Industri dan Institusi Pendidikan Awam Universiti Kebangsaan Malaysia. Bangi, 2002.
121. Heidenhain J. User's Manual ISO Programming: iTNC 530. Heidenhain. Traunreut, Germany: Heidenhain GmbH, 2004.
122. Heidenhain J. User's Manual: CNC Pilot 4290. Heidenhain. Traunreut. Heidenhain GmbH, 2010.
123. Hmelo-Silver CE. Problem-based learning: What and how do students learn? Educational Psychology Review. 2004; 16(3):235-266.
124. Hmelo-Silver CE. What do We Know about Problem Based learning? Current Status and Future Prospects, 2nd International Problem based Learning Symposium, 2009, 2-19.
125. Hoidn S, Kärkkäinen K. Promoting Skills for Innovation in Higher Education: A Literature Review on the Effectiveness of Problem-based Learning and of Teaching Behaviours", OECD Education Working Papers, No. 100, OECD Publishing, 2014.
126. Holsti OR. Content Analysis for the Social Sciences and Humanities. Reading, Addison-Wesley, 1969.
127. Hu S, Kuh GD. Being (Dis) Engaged in Educationally Purposeful Activities: The Influences of Student and Institutional Characteristics. Paper presented at the American Educational Research Association Annual Conference. Seattle, WA, 10-14 April, 2001.
128. Hwang SY, Jang KS. Perceptions about problem- based learning in reflective *journals among undergraduate nursing students*. Taehan Kanho Hakhoe Chi. 2005; 35:65-76.
129. IFAO. Practical CNC Training – For Planning and Shop. Hanser, 1985.
130. ILO. Global Employment Trends for youth, 2004. Information available in: http://www.ilo.org/wcmsp5/groups/public.retrieved 09-06-2019
131. Imran I. In S. Majumdar (Ed.), Emerging Challenges and Trends in TVET in the Asia-Pacific Region. Sense Publishers, 2011, 119-132.
132. Ismail A, Hassan R. Issues and Challenges of Technical and Vocational Education & Training in Malaysia for Knowledge Worker Driven, 2013-2015.
133. Ismail R, Yussof I, Sieng LW. Employers' perceptions on graduates in Malaysian services sector. International Business Management. 2011; 5(3):184-193.
134. Izwan M, Zurairi A. Young, jobless Malaysian grads a RM500m strain on taxpayers. The Malaysian Insider. 2012, October 9.
135. Jackling B, Watty K. Generic Skills. Accounting Education. 2010; 19(1-2):1-3.
136. Johnson B, Christensen L. (Eds.). Educational research: Quantitative, qualitative, and mixed approaches (3rd ed.). Los Angeles: Sage, 2008.
137. Johnson RB, Onwuegbuzie AJ. Mixed Methods Research: A Research Paradigm Whose Time Has Come. Educational Researcher. 2004; 33(7):14-26.
138. Jonassen DH. Thinking Technology: Context is everything. Educational Technology. 1991; 31(6):35-37.
139. Jonassen DH. Computers as cognitive tools: learning with technology, not from technology. Journal of Computing in Higher Education. 1995; 6(2):40-73.
140. Jonassen DH, Henning P. Mental models: Knowledge in the head and knowledge in the world. Educational Technology. 1999; 39(3):37-42. Retrieved from: http://dl.acm.org/ft_gateway.cfm?id=1161198&type=pdf&CFID=73283678&CFTOKEN=84354209
141. Jonassen DH, Peck KL, Wilson BG. Learning with Technology: A Constructivist Perspective. Merrill/Prentice Hall, New Jersey, 1999.
142. Jones A. Rediscipliningeneric attributes: The disciplinary context in focus. Studies in Higher Education. 2009; 34(1):85-100.
143. Jones B, Valdez G, Nowakowski J, Rasmussen C.

Designing learning and technology for educational reform. Oak Brook, North Central Regional Educational Laboratory, 1994.
144. Jones EA. Identifying college graduates' essential skills in reading and problem solving: Perspectives of faculty, employers, and policy makers. University Park, PA: National Center on Postsecondary Teaching, Learning, and Assessment, 1997.
145. Jong, de T. Learning and instruction with computer simulations. Education & Computing. 1991; 6:217-229.
146. Kalpakjian S, Schmid SR, Sekar KSV. Manufacturing Engineering and Technology (7.th Ed.). Upper Saddle River. Pearson, 2014.
147. Kamsah MZ. Developing generic skills in classroom environment engineering students' perspective. In Conference on Engineering Education (CEE 2004), 2004. Retrieved from: http://eprints.utm.my/580/1/A_M.Z_kamsah_student%27s.pdf.
148. Kanapathy V. Building Malaysia's IT society. Raffless Review. 2001; 5(1):1-14.
149. Khir, Kamal. Training Approach for the Employability of Graduates: Critical Graduate Competencies in the Changing World, Paper presented at National Conference on Continuing Technical Education & Training 2006, Challenges in Technical Education and Training: Enhancing Employability among Graduates 28-29 July 2006, The Katerina Hotel, Batu Pahat Johor, 2006.
150. Kief B, Waters TF. Computer Numerical Control. Macmillan/McGraw-Hill, 1992.
151. Kjersdam F, Enemark S. The Aalborg Experiment – project innovation in university education, Aalborg University Press. Denmark, 1994.
152. Kolmos, A. Reflection on project work and problem-based learning. European Journal of Engineering Education. 1996; 21(2):141-148.
153. Kolmos A. Problem-Based and Project-Based Learning: Institutional and Global Change. In O. Skovsmose, P. Valero, & O. R. Christensen (Eds.), University Science and Mathematics Education in Transition, 2008, 261-280.
154. Kolmos A. Problem-based and project-based learning. In University science mathematics education in transition, Edited by: Skovsmose, O., Valero, P. and Christensen, O. R, London: Springer, 2009, 261-280.
155. Kolmos A, Fink FK, Krogh L. The Aalborg Model-Problem based and project organized learning. In Kolmos, A., Fink, F. K. and Krogh, L. (Eds). The Aalborg PBL Model: Progress, Diversity and Challenges. Aalborg University Press, 2004, 9-18.
156. Krippendorff K. Content Analysis: An Introduction to Its Methodology. Newbury Park, Sage, 1980.
157. Krutetskii VA. The Psychology of Mathematical Abilities in Schoolchildren, The University of Chicago, 1976.
158. Kuric I, Košinár M, Cisár M. Measurement and Analysis of CNC Machine Tool Accuracy in Different Location on Work Table. Manufacturing System. 2012; 7(4).
159. Kvale S. Interviews: An introduction to qualitative research interviewing. Thousand Oaks, Sage, 1996.
160. Leatham-Jones B. Introduction to Computer Numerical Control. Singapore: Longman, 1986.
161. LeCompte MD, Goetz JP. Problems of reliability and validity in ethnographic research. Review of Educational Research. 1982; 52(1)31-60.
162. Lee KH, Quek AH, Chew SB. (Eds.). Education and work: the state of transition. Faculty of Education, University of Malaysia, 2001.
163. Lewandowski S, Bolt S. Box-and-whisker plot. In N. J. Salkind (Ed.), Encyclopedia of research design (pp. 105-108). SAGE Publications Ltd, 2010.
164. Lewin K. Resolving social conflicts; selected papers on group dynamics. Gertrude W. Lewin (red.). Harper & Row, 1948.
165. Li H, Du X, Stojcevski A. Educational transformation to PBL- what has changed. In R. Gabb (Ed.), Proceedings of the 2nd International Research Symposium on PBL. Victoria University Press, 2009.
166. Lincoln YS, Guba EG. Naturalistic Inquiry. Beverly Hills. Sage Publications, 1985.
167. Little P, Ostwald M, Ryan G. (Eds.). Research & development in problem-based learning. University of Newcastle, 1995, 3.
168. Lucas B, Spencer E, Claxton G. How to teach vocational education: A theory of vocational pedagogy, (December), 2012, 133. Retrieved from: http://www.skillsdevelopment.org/PDF/How-to-teach-vocational-education.pdf
169. MacDonald S, Nink C, Duggan S. Principles and Strategies of Translation. Centerville, 2010. Retrieved from: http://usir.salford.ac.uk/8865/
170. MacKenzie J, Polvere R. Chapter 4 TVET glossary: Some key terms. In R. Maclean, & D. Wilson (Eds.), International handbook of education for the changing world of work. Springer Science Business Media B.V, 2009, 59-76.
171. Mahamd Adikan FR, Said SM, Mekhilef S, Abd Rahim N. Initial Efforts in Implementing Problem Based Learning (PBL) In Teaching Engineering. Proceedings of the 9th World Conference on Continuing Engineering Education, 2004.
172. Maurer H, Neuhold C. Teaching and Learning the European Union. In S. Baroncelli, R. Farneti, I. Horga, & S. Vanhoonacker (Eds.), Teaching and Learning the European Union: Traditional and Innovative Methods, 2014.
173. Mayer RE. The promise of educational psychology: Learning in the content areas. Columbus, Merrill, 1998.
174. McKeachie WJ. The need for study strategy training. In C. E. Weinstein, E. T. Goetz, & P. A. Alexander (Eds.), Learning and study strategies: Issues in assessment, instruction, and evaluation. San Diego. Academic Press, 1988, 3-9.
175. McLoughlin C, Oliver R. Problem-based learning (PBL): Developing learning capability through the WWW. Open, Flexible and Distance Learning: Challenges of the New Millennium. Selected Papers from ODLAA, 1999, 292-300.
176. Michaelsen L. Getting started with team-based Learning. In L. K. Michaelsen, A. B. Knight and L.D. Fink (Eds.). Team-Based Learning: A transformative use of small groups. Westport, Praeger, 2002.
177. Miles MB, Huberman MA. Qualitative Data Analysis (Second ed.). Thousand Oaks, Sage Publications, 1994.
178. Ministry of Higher Education, Malaysia. Modul Pembangunan Kemahiran Insaniah (Soft Skills) untuk

Institute Pengajian Tinggi Malaysia. Universiti Putra Malaysia, 2006.
179. Ministry of Higher Education, Malaysia. The National Higher Education Strategic Plan (2007-2010), Putrajaya, 2007.
180. Mitchell J. E-business and online learning: connections and opportunities for VET, 2003. Retrieved from: http://www.ncver.edu.au/popups/limit_download.php?file=research/proj/nr1F05. Pdf.
181. MITI. Third Industrial Master Plan: Performance and Challenges of Industrial Development, Ministry of International Trade and Industry, 2006.
182. MITI. Pelan Strategik Tahun 2008 - 2012, Ministry of International Trade and Industry, 2008.
183. Mohd Fahmi Z. Revisiting the Principles of Qualifications Framework: The Case of the Malaysian Qualifications Framework, 2012.
184. Mohd-Yusof K, Hassan SAHS, Phang FA. Creating a constructively aligned learning environment using cooperative problem-based learning (CPBL) for a typical course. Procedia - Social and Behavioral Sciences. 2012; 56(0):747-757.
185. Mohd-Yusof K, Helmi SA, Phang FA, Mohammad S. Future Directions in Engineering Education: Educating Engineers of the 21st Century. ASEAN Journal of Engineering Education. 2015; 2(1):8-13.
186. Mohd-Yusof K, Phang FA, Syed Ahmad Helmi. How to develop engineering students' problem-solving skills using Cooperative Problem Based Learning (CPBL). World Congress of Engineering Education (WCEE), Qatar on 7-9 January 2013, 2013.
187. Molnár É. A tanulás értelmezése a 21. században. Iskolakultúra. 2010; 20(11):3-16.
188. Molnár Gyöngyvér. A tudás alkalmazása új helyzetekben. Iskolakultúra. 2001a; 11(10):15-26.
189. Molnár Gyöngyvér. Az életszerű helyzetekben történő problémamegoldás vizsgálata. Magyar Pedagógia. 2001b; 101(3):347-372.
190. Moust JC, van Berkel HM, Schmidt HG. Signs of Erosion: Reflections on Three Decades of Problem-based Learning at Maastricht University. Higher Education. 2005; 50(4):665-683.
191. Nandi PL, Chan JN, Chan CP, Chan P, Chan LP. Undergraduate medical education: Comparison of problem-based learning and conventional teaching. Hong Kong Med J. 2002; 6:301-306.
192. NCVER (National Centre for Vocational Education and Research). At a glance: defining generic skills, national centre for vocational education research. Australia National Training Authority, 2003.
193. Nelson LM. Collaborative problem solving. In C. M. Reigeluth (Ed.), Instructional theories and models: A new paradigm of instructional theory (2nd ed.) Mahwah, Lawrence Erlbaum Associates, 1999, 241-267.
194. Neo M, Neo KTK. Innovative teaching: Using multimedia in a problem-based learning environment. International Forum of Educational Technology & Society. 2001; 4(4):19-31.
195. Neo M, Neo TK. Engaging students in multi mediated constructivist learning: Students' perceptions. Educational & Technology. 2009; 12(2):254-266.
196. Neo TK, Neo M. Engaging Students in Problem Based Learning (PBL) in a Malaysian Classroom - A Constructivist Approach, PBL Conference, 2005.
197. Newby TJ, Stepich DA, Lehman JD, Russell JD. Instructional Technology for Teaching and Learning: Designing Instruction, Integrating Computers, and Using Media (2nd ed.), Merrill, 2000.
198. Noordin MK, Nasir AN, Arsat M, Wahid A, Zulkifli RM. Industrial Perspective in Generic Skills for Construction Engineer Selection. Department of Technical and Engineering Education, Faculty of Education, Universiti Teknologi Malaysia. Johor, 2009.
199. Noordzij G, Te Lindert A. The effects of goal orientation and quality of problems on students' motivation in a problem-based learning environment. Poster presented at the self-determination theory conference, Gent, 2010.
200. Norman G. Likert scales, levels of measurement and the laws. Adv in Health Sci Educ. 2010; 15:625- 632.
201. NSPE. Engineering education issues: Report on surveys of opinions of Engineering deans and employers of Engineering graduates on the first professional degree. NSPE Publication No. 3059, November, 1992.
202. Nunnally JC. Psychometric Theory - 25 Years Ago and Now. American Education Research Association. 1975; 4(10):7-14.
203. Oketch MO. To Vocationalize or Not to Vocationalize? Perspectives on Current Trends and Issues in Technical and Vocational Education and Training (TVET) in Africa. International Journal of Educational Development. 2007; 27:220-234. Doi: http://dx.doi.org/10.1016/j.ijedudev.2006.07.004
204. Oliver KM. Methods for developing constructivist learning on the web. Education Technology. 2000; 40:5-18.
205. Orlich DC, Harder RJ, Callahan RC, Gibson HW. Teaching strategies. A guide to better instruction (6th ed.). Houghton Mifflin, 2004.
206. Ostwald M, Kingsland A. (Eds.). Research & development in problem-based learning. PROBLARC: University of Newcastle. 1994; 2.
207. Othman H, Buntat Y, Sulaiman A, Salleh BM, Herawan T. Applied Mathematics cans Enhance Employability Skills through PBL. International Conference on Mathematics Education Research 2010 - ICMER 2010 Malacca, Malaysia, Dec 13-14. Procedia Social and Behavioural Sciences. 2010; 8:332-337.
208. Papert S. Mindstorms: Children, computers, and powerful ideas. Basic Books, 1980.
209. Paris SG, Paris AH. Classroom applications of research on self-regulated learning. Educational Psychologist. 2001; 36:89-101.
210. Park C. Engaging students in the learning process: The learning journal. Journal of Geography in Higher Education. 2003; 27(2):183-199.
211. Piaget J. The origins of intelligence in children: International Universities Press, 1952.
212. Posner GJ. Analysing the curriculum, (3rd Ed.) McGraw Hill, 2004.
213. Pearce P, Foster F. A university travel: backpacker learning. Tourism Management. 2007; 28(5):1285-1298.
214. Piaget J. The origins of intelligence in children. International Universities Press, 1952.
215. Piaget J. Forord. In: Bärbel Inhelder; Hermine Sinclair & Magali Bover: Learning and the development of

cognition. Harvard University Press, Cambridge, 1974.
216. Popper K. The logic of scientific discovery. reprinted (2004) by Routledge, Taylor & Francis, 1959.
217. Pumphrey J, Slater J. An assessment of generic skills needs. Skills Dialogues Report No. 13. Nottingham: Dfes, 2002.
218. Quek AH. Learning for the workplace: A case study in graduate employees' generic competencies. Journal of Workplace Learning. 2005; 17(4):231-242.
219. Quek AH. Career choice and vocational fitness. Asian Psychologist. 2000; 2(1):56-58.
220. Rahman S, Mokhtar SB, Mohd Yasin R, Mohd Hamzah MI. Generic skills among technical students in Malaysia. Procedia Social and Behavioral Sciences. 2011; 15:3713-3717.
221. Ramlee M, Faridah K, Ruhizan MY, Norzaini A, Hamidah YA, Wahab M, *et al*. K-Economy and globalisation – are our students ready? Journal Personalia Pelajar Bil, 2008, 1-23.
222. Ranjit SM. Make yourself employable: How graduates can hit the ground running? Kuala Lumpur: TQM Consultants Sdn. Bhd, 2009.
223. Rasul MS, Ismail MY, Ismail N, Rajuddin MR, Abd Rauf RA. Importance of Employability Skills as Perceived by Employers of Malaysian Manufacturing Industry. Journal of Applied Sciences Research. 2009; 5(12):2059-2066.
224. Razali NM, Wah YB. Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. Journal of Statistics Modelling and Analytics. 2011; 2(1):21-33.
225. Republic of Cameroon. Education Sector Strategy 2013-2020. Republic of Cameroon, 2015. Accessed: 17 June 2014.
226. Resnick LB, Klopfer LE, (Eds.). Toward the thinking curriculum: Current cognitive research. Alexandria, ASCD Books, 1989.
227. Richardson V. Constructivist Pedagogy. Columbia: Teacher College Record, 2003. Retrieved from: http://www.users.miamioh.edu/shorec/685/readingpdf/constructivist pedagogy.pdf
228. Rogal SMMM, Snider PD. Rethinking the lecture: The application of problem-based learning methods to a typical context. Nurse Education in Practice. 2008; 8:213-219.
229. Ryan G. (Ed.). Research & development in problem-based learning. PROBLARC: University of Newcastle. 1993; 1.
230. Sada AM, Mohd ZA, Adnan A, Audu R. Effects of Problem-Based Learning in Teaching and Learning of Technical and Vocational Education and Training. 2015; 5(5):5-7.
231. Sahin S. Computer Simulations in Science Education: Implications for Distance Education, (July), 2006.
232. Salih, M. Realising sustainable development in higher education through soft skills. Indian Journal of Science and Technology. 2008; 1(5):1-9. Retrieved from: http://indjst.org/archive/issue5/oct08maria.pdf.\
233. Sanson-Fisher RW, Lynagh MC. Problem-based learning: A dissemination success story? Medical Journal of Australia. 2005; 183(5):258-260.
234. Savery JR. Overview of Problem-based Learning: Definitions and Distinctions. Foundational Research Bulletin. 2009; (7):1-10.
235. Savin-Baden M. Problem-based Learning in Higher Education: Untold Stories. The Society for Research into Higher Education and Open University Press, Buckingham, 2000.
236. Savin-Baden M. The challenge of using problem-based learning online. In M. Savin-Baden & K. Wilkie (Eds.), Problem-based learning online. Buckingham, Open University Press, 2006, 3-13.
237. Schmidt HG, Moust JH. Factors affecting small-group tutorial learning: A review of research. Problem-based learning: A research perspective on learning interactions, 2000, 19-52.
238. Schroder HM. Managerial competences: The key to excellence. Dubuque, Kendall-Hunt, 1989.
239. Schwartz PL, Egan AG, Heath CJ. How one school obtained the benefits of problem-based learning with revolution. Academic Medicine. 1993; 68:612-613.
240. Seng L, Mohamad FS. Online learning is it meant for science courses? Internet and Higher Education. 2002; 5:109-118.
241. Servant V. Online Edition – Specially formatted for PDF readability. PBL in Singapore: A Survey of Student-Centred Education in Higher Education in Singapore's Higher Education Institutions, 2012a.
242. Servant V. PBL in Indonesia: A survey of student-centred education in Indonesian Higher Education Institutions. Promethea Education Consulting, 2012b.
243. Shakir R. Soft skills at the Malaysian institutes of higher learning. Asia Pacific Education Review. 2009; 10(3):309-315.
244. Shapiro SS, Wilk MB. An Analysis of Variance Test for Normality (Complete Samples) Biometrika. 1965; 52(3-4):591-611.
245. Shernoff DJ, Csikszentmihalyi M. Flow in schools: Cultivating engaged learners and optimal learning environments. R. Gilman, E. S. Huebner, & M. Furlong (Ed.) Handbook of Positive Psychology in schools Icinde. New York: Routledge, 2009, 131-145.
246. Shernoff DJ, Csikszentmihalyi M, Scheider B, Shernoff ES. Student engagement in high school classrooms from the perspective of flow theory. School Psychology Quarterly. 2003; 18(2):158-176.
247. Sheskin D. Outlier. In N. J. Salkind (Ed.), Encyclopedia of research design. Thousand Oaks, SAGE Publications Ltd, 2010, 980-981.
248. Shinde VV, Inamdar SS. Problem based learning (PBL) for engineering education in India: Need and recommendations. Wireless Personal Communications. 2013; 69(3):1097-1105.
249. Shivasheshadri M, Arunadevi M, Prakash CPS. Simulation Approach and Optimization of Machining Parameters in Cnc Milling Machine Using Genetic Algorithm. International Journal of Engineering Research & Technology. 2012; 1(10).
250. Sibley J, Ostafichuk P, Roberson B, Franchini B, Kubitzv K, Michaelsen LK, 1943. In Sibley J. (Ed.), Getting started with team-based learning / jim sibley and pete ostafichuk (Elektronisk udgave. -First edition; Elektronisk udgave ed.) Sterling, Virginia: Stylus Publishing, 2014.
251. Simpson TL. Dare I oppose constructivist theory? The Educational Forum. 2002; 66:347-354.
252. Singh P, Thambusamy R, Ramly A, Abdullah IH, Mahmud Z. Perception Differential between Employers

and Instructors on the Importance of Employability Skills. Procedia - Social and Behavioural Sciences. 2013; 90:616-625.
253. Skinner EA, Belmont MJ. Problem-Solving Skills in the classroom: Reciprocal effect of teacher behaviour and student's Problem-Solving Skills across the school year. Journal of Educational Psychology. 1993; 85:571-581.
254. Smagorinsky P. If meaning is constructed, what is it made from? Toward a cultural theory of reading. Review of Educational Research. 2001; 71(1):133-169.
255. Smith PR, Pollard D. The role of computer simulations in engineering education. Computers & Education. 1986; 10(3):335-340.
256. Stadler-Altmann U. Students self-concept: An empirical approach. Bad Heilbrunn: Klinkhardt, 2010.
257. Steinberg S, Kincheloe J (Eds.). Students as researchers. Falmer, 1998.
258. Stemler S. An overview of content analysis. Practical Assessment, Research Evaluation. 2001; 7(17). Retrieved June 30, 2016 from: http://PAREonline.net/getvn.asp?v=7&n=1.
259. The Engineering Professors Council. The EPC engineering graduate output standard. Coventry, The Engineering Professors Council, 2000. Retrieved June 4, 2014 from: http://www.epc.ac.uk/uploads/output_standards/epc_egos_pbwg_200202.pdf
260. Tambo LI. Cameroon national educational policy since the 1995 forum. Limbe: Design House, 2003.
261. Tanner B, Bottoms G, Bearman A. Instructional Strategies: How Teachers Teach Matters. Southern Regional Educational Board, Atlanta, 2000. Retrieved in 16th of June, 2019 from: http;//publications.sreb.org
262. Technical Committee for the Elaboration of the Sector Wide Approach/Education, Cameroon: Draft Document. MINEDUB – MINSEC- MINEFOP-MINSUP, 2006.
263. Tinto V. Leaving college: Rethinking the causes and cures of student attrition. Chicago, IL; The University of Chicago Press, 1987.
264. Tlusciak-Deliowska A. The role of teachers' school students' achievement and school satisfaction, 2007.
265. Tom S. Managing Energy and Comfort. ASHRAE Journal. 2008; 50(6):18-26.
266. Thomas DR. A general inductive approach for analysing qualitative evaluation data. American Journal of Evaluation. 2006; 27(2):237-246.
267. Thomas JW. A review of research on PBL, 2000. http://www.bobpearlman.org/BestPractices/PBL Research.pdf (accessed February 27, (2014).
268. Tong LF. Identifying essential learning skills in students' engineering education. Proceedings of HERDSA 2003, Canterbury, New Zealand, 2003. Retrieved from: http://surveys.canterbury.ac.nz/herdsa03/ayes.htm
269. Tripathy S, Dudani S. Students' Perception of the learning environment in a new medical college by means of the DREEM inventory. Int J Res Med Sci. 2013; 1(4):385-91.
270. Ulseth R, Johnson B. Iron Range Engineering PBL Experience. Project Approaches in Engineering Education, 2015, 55-63.
271. UNESCO. Third International Congress on TVET, Transforming TVET: Building skills for work and life, in Shanghai, People's Republic of China, 13-16 May 2012, 2012.
272. UNESCO & ILO. Technical and Vocational Education for the Twenty-First Century: ILO and UNESCO Recommendations, UNESCO, Paris and ILO, Geneva, 2002. http://unesdoc.unesco.org/images/0012/001260/126050e.pdf
273. UNESCO. Revised recommendation concerning technical and vocational education (2001). In: UNESCO, ed. Normative instruments concerning technical and vocational education. Paris: UNESCO, 2005.
274. UNESCO. Third International Congress on TVET, Transforming TVET: Building skills for work and life, People's Republic of China, 13-16 May 2012, 2012.
275. UNESCO-EFA. Building skills in the Informal Sector. UNESCO, 2012. Accessed: 02 August, 2021.
276. UNEVOC. Convention on technical and vocational education, 1989. http://p19035.typo3server.info/fileadmin/user_upload/pubs/conv-e.pdf
277. University of Western Australia: Careers Advisory Board. Generic skills survey, 1996. Retrieved December 12, 2013 from: http://www.csd.uwa.edu.au/tl/ skills/report.html.
278. Vassu B. Development Phases of the National Qualifications Frameworks in Perspective: Malaysia. (Asia-Europe meeting (ASEM): TVET symposium, Berlin, Germany, 27-28 February 2012). Selangor, MQA, 2012.
279. Vries M de, Schmidt H, Graaff E de. Dutch Comparisons: Cognitive and Motivational Effect of Problem-Based Learning on Medical Students, New directions for Medical Education, 1989, 231-38.
280. Walker A, Leary H. A problem-based learning meta-analysis: Differences across problem types, implementation types, disciplines, and assessment levels, The Interdisciplinary Journal of Problem-based Learning. 2009; 3(1):12-43.
281. Walton H. Small group methods in medical teaching. Medical Education booklet -1, Reproduced with the permission of ASME, 12 Queen St, Edinburgh, EH2 1JE, 1999.
282. Weinstein CE, Mayer RE. The teaching of learning strategies. In M.C. Wittrock (Ed.), Handbook of research on teaching (3rd Ed.). New York: Macmillan, 1986, 315-327.
283. Wilson BG. Metaphors for instruction: Why we talk about learning environments. Educational Technology. 1995; 35(5):25-30.
284. Winterbotham M, Vivian D, Shury J, Davies B. UK Commission's Employer Skills Survey 2013: UK Results, 2014.
285. Woods DF. ABC of learning and teaching in medicine: problem-based learning. British Medical Journal. 2003; 326:328-330.
286. Wubbels T. Cross-national study of learning environments. In Fisher D. L. (Ed.), The study of learning environments. Perth, Curtin University of Technology. 1993; 7:112-120.
287. Yeo R. Problem-based learning: Lessons for administrators, educators and learners. International Journal of Educational Management. 2005b; 19:541-

551.
288. Yildirim Z. Hypermedia as a Cognitive Tool: Student Teachers' Experiences in Learning by Doing. Educational Technology & Society. 2005; 8(2):107-117.
289. Zimmerman BJ. A social cognitive view of self-regulated academic learning. Journal of Educational Psychology. 1989; 81:329-339.