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Curriculum Development Using Problem Based Learning Techniques

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ABSTRACT:
The ultimate purpose in designing a Curriculum should be to have an organized system of what is to be learned when an area of study is identified. The Curriculum Development should be designed in such a way that even the beginners are able to get a complete idea of the subject over a period of time on learning it. The curriculum should be as of that it should make him/her to get involved in knowing the further aspects of the subject and towards the end the student should be able to get a nut shell of the total arena.
The Indian form of education mainly rests on the material form that is been given to the instructors. Though the teaching instructors are left at their discretion to take the subjects and make the students knowledgeable, many people in the teaching profession avoid the technical strategy tools, which makes the learner interesting and focused. One such teaching strategy is "PBL" (Problem Based Learning).
Savery and Duffy, Finkle and Torp and many other authors describe that PBL is highly superior to the traditional learning methods. They have further argued that student's competencies are much higher with those who adopted PBL techniques. This research article focuses on curriculum development using problem based learning among the students who have opted management studies in the districts of Chennai. With the key concepts and the effects of PBL techniques the study proved to be a fit strategy to be implemented while developing the curriculum.

Keywords: *Curriculum development, Problem based learning, Innovative teaching tool, Teaching and instruction, Self - directed learning*

INTRODUCTION

The ultimate purpose in designing a Curriculum is to have an organized system of what is to be learned when an area of study is identified. The Curriculum Development should be designed in such a way that even the beginners are able to get a complete idea of the subject over a period of time on learning it. The curriculum should be as of that it should make him/her to get involved in knowing the further aspects of the subject and towards the end the student should be able to get a nut shell of the total arena.

The Indian form of education mainly rests on the material form that is been given to the instructors. Though the teaching instructors are left at their discretion to take the subjects and make the students knowledgeable, many individuals in the teaching profession avoid the technical strategy tools, which makes the learner interesting and focused. One such innovative tool in teaching is "PBL" (Problem Based Learning).

Description of PBL

Problem based learning (PBL) is a strategy adopted in instruction for a variety of

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pedagogical tactics wherever education is determined by thought-provoking, discovering open-ended problem, scholars work in small groups, use problem situation to express their individual knowledge intentions, learning is expedited by a instructor, courses don‘t exist, and lectures are minimal. Problem based learning pronounces practices that make students take a dynamic, task-oriented, and self-directed methodology to their own learning. PBL is not only about problem elucidating to a question relatively problems are used to attain information and upsurge understanding. PBL also conglomerates the attainment of knowledge with the development of other generic skills and attitudes, while teachers in conservative syllabi incline to flinch by providing information and then assume students to use the information to decipher problems, in PBL, the problem comes first; students work with an unfamiliar problem, state the problem, look for appropriate indications, scrutinize, amalgamate, and critique existing data, improve assumptions, and gather material to reconnoiter, and finally accomplish realities. Equivalent to other traditional curricula, PBL is deliberated as a technique of learning that morally compliments the students ‘privileges and independence to control their learning, to unfavorably contemplate, evaluate, and ascertain information while learning rather than being inertly stuffed with colossal sum of uninteresting particulars.

Literature Review

Barrow and Tamblyn (1980) contend that specialized run-through required skills in problem solving. The design of PBL purposes to enrich learners' problem solving skills.

Barrows (1986) labeled the innovative PBL as a category each reports one or some of the PBL characteristics which are learning, developing effective reasoning, self-directed learning, and increased motivation to varying degrees.

Savery and Duffy (1995) Problem-Based learning is an innovative teaching exemplary that can be used to edifice the development in the curriculum level. Finkle and Torp (1995) express problem-based learning as "a self-directed learning mechanism in curriculum development and teaching structure that concurrently develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem-solver provoked with variety of problems that reflects everyday problems."

Barrows (1996) lists the six physiognomies for the problem-based learning model engaged in the medical school:

1. Learning is student centered.
2. Learning occurs in small student groups.
3. Teachers are facilitators.
4. Problems form the novel focus and inducement for learning.
5. Problems are a tool for the development of clinical problem solving skills.
6. New information is acquired through self-directed learning.

Camp (1996) PBL has been adopted in a variety of other professional schools, including architecture, business, law, engineering, forestry, political science, social work, and education.

Davis (1999) says PBL as a continuum of tactics that occurs between a fully problem-based curriculum at one end of the gamut and an information providing oriented curriculum at the other end passing through problem-oriented learning, problem assisted learning, problem-solving learning, problem-focused learning, problem-based mixed approach, problem-initiated learning, problem-centered learning, problem-centered discovery learning, problem-based learning, and task-based learning as examples.

Crosby (2004) the protagonist of the instructor as being a facilitator in PBL makes learning in PBL a self-directed process.

Antecedents of PBL

Problem-Based Learning (PBL) was first familiarized as a state-of-the-art medical instruction curriculum. At the McMaster University Faculty of Health Science, the PBL methodology was used all over its entire three-year program. The curriculum has been systematized in progressive units with early acquaintance to patients and case management. After McMaster's example, two medical schools, one Maastricht and the other in Newcastle, developed problem-based learning curricula. Later this was implemented in all areas of business and commerce education. However the application was not formulated for the entire

curricula, especially for the management learner's through distance mode. Hence the research article focuses on implementation of PBL technique in all areas of management education, who desires to obtain the degree through distance mode. This would ultimately make the learner's to tackle the real time problems easily.

Objectives of the Study

1. To identify the key concepts of PBL Techniques
2. To analyze the PBL effects on teaching & instruction
3. To scrutinize whether adopting of PBL technique in curriculum development is a fit strategy.

RESEARCH METHOD

A structured questionnaire was formulated based on previous studies and students who are undergoing MBA program through distance mode from the district of Chennai are selected for the study. The questionnaire included the basic profile of the respondents and the concepts related to the objectives of the study.

Data Collection

The designed questionnaire was given to the students undergoing MBA program through distance mode from the district of Chennai. The PBL technique was demonstrated using real time management problems and they were asked to rate the questionnaire on 5 point Likert Scale ranging from Highly Disagree to Highly Agree. 100 students who are undergoing MBA program through distance mode in the districts of Chennai was brainstormed about the PBL technique and the researcher conducted few classes for the selected students using PBL techniques and were asked to rate the questionnaire.

The questions were translated to the regional language verbally, for those who were not fluent in English language and made the respondents answer the questions. Since it was conducted in a classroom set up in 4 different places of Distance Learning Centre all the 100 questions was collected and analyzed.

To know the significant association between the demographic variable Age and the factors of PBL multiple comparisons with Tukey HSD test was used. To analyze the factors of problem based learning technique correlation was used to find out the extent of relationship among the other factors taken for the study. ANOVA was used to test the find the significant association between the variables considered for the study. To verify whether the distribution of the sample is same or different across the measures, the Friedman's Non-Parametric Test was conducted by setting Hypothesis. Linear regression analysis was carried out to find the F-ratio.

To frame a structured questionnaire based on previous studies students who are undergoing MBA program through distance mode from the district of Chennai are selected for the study. These students were brainstormed about the PBL technique and the researcher conducted few classes using PBL techniques and were asked to rate the questionnaire. The questionnaire included the basic profile of the respondents and questions related to the key concepts of PBL Techniques, the PBL effects on teaching & instruction, to find out whether PBL technique is a fit strategy in curriculum development.

RESULTS AND DISCUSSION

Tukey's Multiple Comparison test is unique of numerous tests that can be used to conclude a set of means that differ from the rest. Tukey's Multiple Comparison testis also entitled as Tukey's Honestly Significant Difference test or Tukey's HSD (table 1).

As Age will be the main factor in accepting any new strategy, this is compared with the other factors taken in for the study. The significant association between the demographic variable Age and the factors of PBL was found through, multiple comparison with Tukey HSD test and the result revealed that the highest and lowest bound values. The lowest bound value was found negative to all the variables and the highest bound was found positive at 95% level of significance (i.e) 0.05%), hence it could be interpreted as it has no significant difference in the opinion of the students irrespective of their age in connection with problem based technique (PBL) in the pursuance of their MBA through distance mode and hence the hypotheses is accepted.

Correlation discusses to a comprehensive discussion of statistical relationships encompassing dependence. Correlations are advantageous since they can show an analytical

affiliation that can be subjugated in practice. The factors of problem based learning technique was taken up in this study were correlated to find out the extent of relationship among these factors and the result was shown in table 2.

The correlation results show that all factors like key concepts for PBL, Effects of PBL on Teaching and instruction and FIT strategy of PBL were correlated with each other at 1% level of significance. The correlations showed that all the factors were positively correlated as the revealed 'r' value is statistically significant at 1% level of significance. Key Concepts were found to have highest correlation (r = 0.822) with Fit Strategy. The three factors considered were found to have moderate to high correlations with each other. The lowest correlation was found between Key concepts and PBL Effects on teaching and instructions. The correlations results indicated that the respondents who are measured on difference dimensions expressed their opinion about the PBL on dimensions were significantly related to each other.

Table 1: Multiple comparisons with Tukey HSD test

Multiple Comparisons							
Tukey HSD Test							
Dependent Variable	Age	Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
KEY CONCEPTS	20-30	31-40	-0.12932	1.16752	0.993	-2.9083	2.6496
		above 40 years	-1.89855	2.34975	0.699	-7.4915	3.6944
	31-40	20-30	0.12932	1.16752	0.993	-2.6496	2.9083
		above 40 years	-1.76923	2.47756	0.756	-7.6664	4.1279
	above 40 years	20-30	1.89855	2.34975	0.699	-3.6944	7.4915
		31-40	1.76923	2.47756	0.756	-4.1279	7.6664
PBL EFFECTS ON TEACHING & INSTRUCTION	20-30	31-40	1.76366	1.03712	0.210	-0.7049	4.2322
		above 40 years	-0.75942	2.08730	0.930	-5.7277	4.2088
	31-40	20-30	-1.76366	1.03712	0.210	-4.2322	0.7049
		above 40 years	-2.52308	2.20084	0.488	-7.7616	2.7154
	above 40 years	20-30	0.75942	2.08730	0.930	-4.2088	5.7277
		31-40	2.52308	2.20084	0.488	-2.7154	7.7616
FIT STRATEGY	20-30	31-40	0.04181	0.80780	0.999	-1.8809	1.9645
		above 40 years	-1.10435	1.62576	0.776	-4.9740	2.7653
	31-40	20-30	-0.04181	.80780	0.999	-1.9645	1.8809
		above 40 years	-1.14615	1.71420	0.782	-5.2263	2.9340
	above 40 years	20-30	1.10435	1.62576	0.776	-2.7653	4.9740
		31-40	1.14615	1.71420	0.782	-2.9340	5.2263

Table 2: Correlations and dependence

Correlations			
	Key concepts	**PBL Effects on teaching & Instruction**	**Fit strategy**
Key concepts	1	0.474**	0.822**
PBL effects on teaching & instruction	0.474**	1	0.477**
Fit strategy	0.822**	0.477**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Analysis of variance (ANOVA) is an assortment of statistical models used to scrutinize the variances between group means and their concomitant procedures. ANOVA delivers a statistical test of whether or not the means of several groups are equal, and therefore generalizes the t-test to more than two groups (table 3).

Table 3: Association between the PBL variables and the demographic variables

Table showing the association between the PBL variables considered and the demographic variables					
Sl. No.	**Variable Name**	**Gender**	**Marital Status**	**Experience**	**Age**
			(using Paired sample "t" test)		**(using One way Anova)**
01.	Under PBL Technique the instructor integrates in &around a problem or problems	15.174**	15.965**	14.729**	2.370
02.	Students are empowered to take a responsible role in their learning	13.035**	12.383**	12.028**	0.132
03.	Instructor guides, and support students' initiatives	6.690**	6.601**	6.163**	1.322
04.	Problems were used as a stimulus for students to start the learning process	18.315**	17.513**	16.614**	1.284
05.	PBL aims to motivate students to participate in the learning process and to help foster problem solving skills	10.380**	9.472**	9.246**	1.554
06.	New information is acquired through self-directed learning	9.041**	8.900**	8.105**	0.394
07.	PBL, students are encouraged and expected to think both critically and creatively with multi-directional interactions with the problem, the peers, the resources, and the instructor.	14.377**	13.630**	13.389**	0.655
08.	Learners as constructors of their own knowledge	16.058**	13.946**	13.164**	5.952**
09.	Puzzlement as being stimulus and organizer for learning	14.992**	13.973**	13.446**	0.100
10.	Faculty as consultants and cognitive models to support scaffolding	12.215**	12.135**	11.378**	0.182
11.	Activation of prior-learning via the problem	9.534**	8.603**	8.219**	4.145**
12.	students can recall what they have learned better in the context in which it will be used	9.041	8.900**	8.105**	0.394
13.	Meets the Demands of Instructional Goals	15.174**	15.965**	14.729**	2.370
14.	Helps the instructor to recognize the gap between theories and how to learn and teach	6.690**	6.601**	6.163**	1.322
15.	Students' enthusiasm, background and learning habits are considered before employing PBL into the classroom	14.992**	13.973**	13.446**	0.100
16.	Optimizes student's learning & understanding level	10.380**	9.472**	9.246**	1.554
17.	PBL process can help prepare students to face the real time challenges	10.952**	10.109**	10.085**	1.890

** 1% level of significance: * 5% level of significance

In order to find the significant association between the variables considered for the above study with the demographic variables like Gender, Marital Status and Experience, paired sample "t' test was carried out and from the result, it was seen that all the variables were found statistically significant at 1% level of significance.

In respect of Age, one way ANOVA analysis was carried out and from the result, it was seen that all the variables were not statistically significant except 1) Learners as constructors of their own knowledge 2) Activation of prior-learning via the problem as they are statistically significant at 1% level of significance.

A ranking is a liaison amid a set of items such that, for any two items, the first is either 'ranked higher than', 'ranked lower than' or 'ranked equal to' the second. By reducing complete measures to a sequence of ordinal numbers, rankings make it probable to estimate multifaceted evidence conferring to certain benchmarks (table 4).

Table 4: Rank analysis

Ranks				
	Mean Rank	**Level of Rank**	**Friedman Test Statistics**	
Problems were used as a stimulus for students to start the learning process	11.56	1	**Chi square value**	**Significance**
PBL, students are encouraged and expected to think both critically and creatively with multi-directional interactions with the problem, the peers, the resources, and the instructor.	10.54	2	162.414**	0.000
Under PBL Technique the instructor integrates in &around a problem or problems	10.42	3		
Meets the Demands of Instructional Goals	10.42	4		
Students are empowered to take a responsible role in their learning	9.99	5		
Learners as constructors of their own knowledge	9.93	6		
Puzzlement as being stimulus and organizer for learning	9.68	7		
Students' enthusiasm, background and learning habits are considered before employing PBL into the classroom	9.68	8		
Faculty as consultants and cognitive models to support scaffolding	9.24	9		
PBL process can help prepare students to face the real time challenges	8.93	10		
PBL aims to motivate students to participate in the learning process and to help foster problem solving skills	8.40	11		
Optimizes student's learning & understanding level	8.40	12		
New information is acquired through self-directed learning	7.68	13		
students can recall what they have learned better in the context in which it will be used	7.68	14		
Activation of prior-learning via the problem	7.57	15		
Instructor guides, and support students' initiatives	6.44	16		
Helps the instructor to recognize the gap between theories and how to learn and teach	6.44	17		

In order to verify whether the distribution of the sample is same or different across the measures, the Friedman's test (a Non-Parametric Test) was conducted with the following Hypothesis;

H_0: Distribution is same across the repeated measures.
H1: Distribution across the repeated measures is different.

Further, the chi square value resulted through Friedman tests were found statistically significant at 1% level of significance which revealed that the opinion of the students in connection with PBL technique were found same and thereby null hypothesis is accepted. From the Friedman Test results, mean rank of the variable was also analysed and listed in the table. From the above table, it was noticed that highest mean was found with" Problems were used as a stimulus for students to start the learning process (11.56)" and the lowest mean was found with" Helps the instructor to recognize the gap between theories and how to learn and teach (6.44).

Linear regression is an methodology for demonstrating the rapport between a scalar dependent variable *y* and one or more explanatory variables denoted *X*. Linear regression was the first type of regression analysis to be deliberated scrupulously, and to be used widely in real-world solicitations (table 5).

Table 5: Linear regression analysis

Dependent Variable	Independent Variables	Regression Coefficients (B)	Std. Error	R Value	R^2 Value	F Value	't' Value
Effects of PBL Technique	Key concepts	1.995	0.095	0.904	0.817	437.083**	20.907**
	PBL Effects on Teaching and Instruction	1.893	0.157	0.772	0.596	144.530**	12.022**
	Fit Strategy	2.810	0.153	0.880	0.775	336.647**	18.348**
	Number of Samples	100					

Regarding the antecedent effects of PBL technique on curriculum development, linear regression analysis was carried out and from the result, it was seen that the F-ratio was found to be 437.083, 144.530 and 336.647 respectively for key concept of PBL, PBL effects on teaching and instruction and Fit strategy. This indicates that the results of the regression model is statistically significant as the 'p' value is less than the significant value (P=0.01). In addition, Beta coefficients were also calculated in order to know the importance of the variables considered in this study and listed in the above. It was also noted that the coefficient of the determinant (R^2) was found to be 0.817, 0.596 and 0.775 respectively. This indicates that the changes in unit increase in the independent variable noticed in this study explained the changes in the dependent variable (i.e) PBL effect on curriculum development to the tune of 81.7% through key concept, 59.6% through PBL effects on teaching and instruction and 77.50% through Fit Strategy and all the factors were highlighted as significant predictors and have positive effect on in the development of PBL on Curriculum of the students as the 'p' value is statistically significant (P<0.01).

To analyze the PBL implementation in education system, Multiple Comparisons with Tukey HSD test was used and the study interpreted as it has no significant difference in the opinion of the students irrespective of their age in connection with problem based technique (PBL) in the pursuance of their MBA through distance mode. Hence students of all age groups are ready to accept the new learning strategy.

Key Concepts were found to have highest correlation with Fit Strategy. Paired sample "t' test indicated that all the variables were found statistically significant at 1% level of significance.

Ranking Analysis indicated the highest mean was "Problems were used as a stimulus for students to start the learning process (11.56)" and the lowest mean was found with "Helps the instructor to recognize the gap between theories and how to learn and teach (6.44). This analysis proves that the learner groups are prepared for a contemporary approach whereas the instructors are to be equipped.

All the factors emphasized in the study shows as significant forecasters and have positive result on in the progress of PBL techniques while designing a Curriculum.

Scope for Further Study

The next step of the study could be continued in identifying the ways and means by which the instructors could be moulded to adopt the strategy as the lowest mean was found with" Helps the instructor to recognize the gap between theories and how to learn and teach (6.44).

CONCLUSION

The study proves that PBL is transference to a new scholastic stratagem that reduces the usage of resources, time and efforts, hence moving from conventional curricula to PBL would be vindicated. The efficiency of PBL against traditional curricula in terms of students 'competencies before and after their

qualification will certainly enhance the following conclusions when compared to students learning in conservative curricula:

- ✓ Communication skills and interpersonal relationships
- ✓ Humanistic abilities, principled, and proficient deliberation
- ✓ Critical thinking skills and capacity to analyze information
- ✓ Responsiveness towards psychosocial, cultural, and economic aspects
- ✓ Life-long learning skills and critical appraisal techniques of available literature
- ✓ Utilization of learning resources, resource allocation, literature searching strategies, and more use of library
- ✓ Management skills that includes decision making, negotiation skills, problem detection and solving skills, team work, planning, organizing, continuous quality improvement
- ✓ Self-confidence, internally motivated, and have high satisfaction
- ✓ Find PBL as a joyful, stimulating and relevant learning experience

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