

The effects of information technology related curriculum based on hybrid style problem-based learning on career decision making self-efficacy of women's University students in Korea

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Keywords

Problem-Based Learning; Career Decision Making Self-Efficacy; Women's University Students; Information Technology related Curriculum

Abstract

The unemployment of university students has been emerging as a significant social issue in South Korea, making it more necessary for students to have the attitude and confidence to explore their future options. This study is to examine whether women's university students are actively committed to making decisions and having confidence in their career choices when applying Problem-Based Learning(PBL) to the Information Technology Curriculum. For the design of this study, two women's universities were selected: group A consisted of 'A University' students subjected to hybrid-style PBL and the group B consisted of 'B University' students subjected to traditional lectures and practices. A Nonequivalent Control Group Pretest-Posttest Design was utilized to analyze the experimental group and the control group with pretest questionnaires at the beginning of a semester and posttest questionnaires at the end of the semester.

From the study results it was confirmed that PBL has effects in improving the Career Decision Making Self-Efficacy of women's university students in terms of confidence in the ability to collect career information, awareness of career objectives, belief in planning & doing and self-assessment for choosing suitable careers for themselves. This study suggests that more problem-based learning curricula need to apply PBL to future information technology related curricula to help students make their own career decisions.

Introduction

The problem of University student unemployment is becoming a social issue in Korea. The Statistical Yearbook (the Korean Educational Development Institute) shows that the employment rate of University students has declined sharply since 2010 as shown in <Table 1>, has not recovered to date in 2016. The issue that University students aged 20-24 years old worried about is shown to be career relating to occupations. The area relating to 'career' represents the highest level of 30% in the student consultation results of the Student Counseling Center of Dong-A University in Korea for the period of 2008 to 2010.

To solve the problem of youth unemployment, the Korean government is implementing various policies. Universities have also been developing and implementing a variety of programs to increase the employment rate of graduates. However, the companies that hope to employ university graduates are in a dilemma, because it is not easy for them to find the good workers. Most of graduates are not ready to work immediately in the field when employed. They need new education and training to achieve productivity in industry. The companies have no money and time to spend for new employers but tend to strongly favor the experienced.

<Table 1> Employment rate of University graduates [Unit : %]

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
*Entire institutions of higher education	74.1	75.4	75.8	76.7	76.4	55	58.6	59.5	59.3	58.6
Technical Universities	83.7	84.2	85.2	85.6	86.5	55.6	60.7	60.8	61.2	61.4
Universities	65	67.3	68	68.9	68.2	51.9	54.5	56.2	55.6	54.8

* includes technical universities, universities, graduate schools, *etc.*

On the other hand, job seekers have the problem that it is not easy to decide what companies would be good to join. University graduates often quit their jobs, the employment which did not come to them easily, without staying for sufficient working periods; one of the biggest reasons is shown to be job dissatisfaction at the companies. Learning how to choose a job that suits them and how to improve their decision-making ability is an essential process for prospective university graduates; and it will be of great help if they can acquire this ability through the university curricula. The employability of university students will be further increased if they explore careers or prepare themselves to be equipped with the necessary knowledge, attitudes and skills to make the right career decisions. Applying Problem-Based Learning (Hereinafter referred to as PBL) to class operation is a part of ongoing efforts. PBL is an educational approach that enables learners to find and learn by themselves in the process of presenting problems derived from lives or jobs in unstructured form. As the problems presented in the study have similarities to the situation that learners will experience, the learners will have more interests and challenges in learning. The role of teachers in PBL is not to simply inject or transfer knowledge, but to guide and help the learners and have them solve problem by themselves. In South Korea, where employment is emerging as a significant social issue, efforts to identify and utilize the problems to be applied to classes in conjunction with employment can be of help to the student's career decisions. That is, when conducting a class as a process for students to solve problems, studying what effects PBL has on career choice and determination of students, especially women's university students, is meaningful as an effort to find a solution for youth unemployment.

The purpose of this study is to examine what effects applying PBL to Information Technology related courses will have on the career decision-making efficacy of women's university students. The experiments applying PBL to them are necessary for more effective use of PBL in the future; the implications to be derived as the results of the studies will be expected to be a vital basis for the development of future curricula.

Theoretical Background

Career Decision-Making Self-Efficacy (CDMSE)

Career decision-making and career preparation acts are affected by cognitive variables like the self-efficacy of each person (Lent et al., 2002). Self-efficacy is a belief in one's ability to organize and carry out a series of acts required to conduct a certain task (Bandura, 1977); career decision-making self-efficacy is a concept related to how much confidence a student has in making a career decision for employment (Vinokur et al., 1991). (Hackett & Betz, 1981) defined career decision-making self-efficacy as an individual's belief in his/her ability to successfully conduct tasks related to career decision-making.

The career decision-making self-efficacy exerts an important influence on the choice of occupation or career path, effective decision-making, continual execution of plans and can be explained as an important variable that determines acts for achievements, career decision-making, and success in career (Luzzo, 1996). Career decision-making self-efficacy was shown to develop social-cognitive skills needed for jobs at employment preparation time and affect the possibility of employment (McArdle et al., 2007). It was confirmed that career decision-making self-efficacy is an

important variable in explaining the career choice process (Restbog et al., 2010); it was commonly shown in studies on career decision-making self-efficacy that students have the tendency to actively perform acts needed to achieve higher self-efficacy concerning career decision-making (Betz et al., 1996; Taylor & Betz, 1983).

Problem-Based Learning (PBL)

PBL is a pedagogical method designed to teach students a process to gain knowledge and experience by seeking solutions and finding answers by themselves through practical applications rather than the educational method of simply delivering knowledge to students through lectures by professors. PBL can thus be said to be a learning method in which learners think about how to solve problems and prepare solutions in collaboration with each other by forming small groups among fellow students and conducting collaborative learning in studying processes (Barrows, 1996). According to studies from 1970 to 1992 analyzing the effects of PBL, students were observed to do self-directed learning in PBL style classes and positive effects were observed in interests, motivation, attitude, class attendance, *etc.* (Vernon & Blake, 1993). PBL began to be introduced in South Korea in the 1990s and since then, related studies, such as comparative studies with traditional lecture-type classes, have begun to appear (Lee, 2013).

Despite the positive study results of PBL in many aspects, PBL has difficulties relating to the application of PBL to real classes. Vernon & Hosokawa conducted a questionnaire survey regarding PBL classes with professors who had participated in PBL classes and with professors who had not (Vernon & Hosokawa, 1996). The results suggested that PBL classes can have a positive effect on creating students' interests & motivation, reasoning abilities, clinical preparation and self-directed learning, but it might not be positive in the aspects of class efficiency, acquisition of basic scientific knowledge, and hours spent. Limitations of the class hours, discomfort of teachers and students unfamiliar with the PBL approach, *etc.*, are obstacles in conducting PBL classes (Torp & Sage, 2002). PBL is characterized by problems presented to students. Problems should not have a fixed answer and be ill-structured and complex containing situations. Learners will be able to collect information from a variety of sources and conduct discussions among them and prepare presentations on solutions. Though they are not sure of finding correct answers while preparing presentations, they can have experiences the process of exploring best decision-making through information collection, discussions, and the presentation preparation (Stepien & Gallagher, 1993). Professors participate in the discussion process and perform the role of mentor and guide (Barrows, 1996) and facilitate learning and perform the evaluation. The issues that are covered in PBL approximate real-world situations, necessitating an integrated approach to solving them (Delisle, 1997).

While there are some studies stating that PBL has positive effects on problem solving abilities, self-directed learning skills, participation improvement, information technology-related processes, analytical skills, learning ability, communication skills, *etc.* (Shin & You, 2014), there are also other studies showing different results (Hung, 2009). Hung was concerned about the excessive application of PBL without sufficient consideration of theoretical concepts (Hung, 2011). He elucidated that the hybrid class methods combining traditional methods and PBL can be applied easily to students unfamiliar with the PBL.

Barrows & Myers suggested a process of a total of five steps for the class design by PBL; (Class progression, Presentation problems, Stages after problems, Presentation, Conclusion and post-solution issues) (Barrows & Myers, 1993). They designed the classes to proceed in a hybrid format along with the progress of regular teaching curricula and PBL. The hybrid approach refers to the concurrent adoption of both the traditional process of knowledge delivery through lectures by professors and the process of solving problems by students themselves.

It is not easy to develop well-structured problems for PBL, and there are not enough classes to which PBL can be applied. Classes were designed in a hybrid approach is not yet familiar enough to both learners and instructors for the complete conversion of existing class methods to PBL.

Teachers asked learners to investigate either enterprise cases or solutions utilizing information technologies and information needed for job opportunities while providing the necessary knowledge in the curriculum like existing methods through lecturing. The companies investigated should be the ones that learners are willing to work for, and learners were allowed to choose them themselves.

The advantage of a hybrid approach was to make it possible to deliver, test, and objectively grade the necessary knowledge required by the regular curricula of schools. At the same time to make efforts for solving problems and to prepare for the presentation of the results are other advantages

Methods

Study Design and Objects

This study elucidates the effects of a hybrid style class applying PBL on the career decision-making self-efficacy of women's university students. Before starting the study, researchers selected students of B University similar to A university as study objects, who were taking Information Technology related courses. The curriculum that students of A Women's University as the study objects would take was a 'Software Engineering' course, which was designed in a hybrid style class. The curricula that students of B Women's University as comparative objects would take was 'ERP', 'Management and Computer', 'Office Automation (word processor)' courses; it was confirmed that the courses were administered in a computer lab. To verify the existence of a significant difference in career decision-making self-efficacy between the experimental group and the control group, researchers applied a nonequivalent control group pretest-posttest design utilizing pretests and posttests as in <Table 2>.

<Table 2> Pretests and posttests of the experimental group and control group

	Pretests	Applying Problem-Based Learning	Posttests
A Women's University (experimental group)	Career decision-making self-efficacy tests	O	Career decision-making self-efficacy tests
B Women's University (comparison group)	Career decision-making self-efficacy tests		Career decision-making self-efficacy tests

Tools

This study utilized a Career Decision Making Self-Efficacy Scale as a tool for measuring the confidence level of the students in the career decision-making. Taylor & Betz developed a Career Decision-Making Self-Efficacy Scale that could measure the conviction level of individuals to successfully achieve the tasks necessary for determining their careers in general (Taylor & Betz, 1983). This study used the revised version of Lee's adjusted 'The Short Form of Career Decision-Making Self-Efficacy Scale' applied by (Taylor & Betz, 1983) themselves to the situation of South Korea (Lee, 2001). As in <Table 3>, the scale consisted of 5 sub-factors (career information, setting goals, planning, solving problems, self-assessment) and a total of 25 items.

<Table 3> Career Decision-Making Self-Efficacy Scale

Factors	Details	Number of questions
Career information	The confidence that they can find a career in which they are interested and explore conditions required by the career specifically	5
Setting goals	The confidence that they can decide on their academic and career path with confidence and no regret	5
Planning	The self- belief that they can make a plan and do the plan on the higher education or career pathways.	5
Solving	The will that they will be able to cope with obstacles by themselves when	5

problems	facing obstacles on the course.	
Self-assessment	The confidence that they can clearly assess their abilities, values, desires and choose their careers that suit them	5
Total		25

Data Collection and Analysis Methods

This study was conducted for a total of 16 weeks on the students of A Women' University (the experimental group; PBL applied) and the students of B Women' University (the comparison group; PBL not applied). To conduct PBL class simultaneously with lectures and computer labs, each team consisting of 2-3 persons performed assignments for solving problems. The student number of the comparison group was 109, which was divided into 4 classes, where the teaching method consisted of general lectures and practices. To test career decision-making self-efficacy on the students of A Women's University and B Women's University during the same period, the pretests and the posttests were made using the same questionnaire

Evaluation

Homogeneity of Study Objects

Both the experimental group and the control group were derived from women's university students in South Korea. Ages ranged from 19 to 24; grades consisted of 2nd grade and 3rd grade <Table 4>. Students took courses from a Information Technology-related Curriculum ((Software Engineering, ERP, Management and Computer, Office Automation, etc.); classes were conducted in the classrooms where computer training facilities (personal computer units and a desk for the computers, beam projectors, lab software installation, etc.) were offered.

<Table 4> Comparison of homogeneity between the experimental group and the control group

Variables	Experimental group (A)		Control group (B)		Total	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Age	20.91	0.97	20.40	0.94	20.64	0.99
Grades	3.00	0.00	2.68	0.47	2.83	0.38

Validity and Reliability Analysis

For the criterion for the reliability of the details in the questions about problem-solving abilities used in this study the coefficient of Cronbach's Alpha was set to a value greater than 0.7. This was based on the fact that, if the alpha coefficient is above 0.7 in the analysis level of the general organizational units, the reliability of the measurement is known to have no problem (Nunnally, 1978). For the alpha coefficient of career information, setting goals, planning, solving problems, and self-assessment as the specific measurement items of career decision-making self-efficacy used in this study, pre-education values and post-education values were shown as in <Table 5>.

Principal component analysis and Varimax methods of orthogonal rotation were used for factor analysis. In this study, loading factors more than 0.3 were considered to meet goodness of fit and some measured parameters below 0.3 have been removed.

<Table 5> Validity and Reliability Analysis

Factors	Measurement Variables	Loading Factor				Cronbach's Alpha				Remarks
		Experiment		Control		Experiment		Control		
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Career information (factor 1)	Information on career of interests	.415	.689	.684	.591	.704	.803	.683	.790	Removed 1 variable (information on graduate school)
	Employment tendency	.682	.755	.648	.511					
	Salary	.687	.746	.468	.609					

	Personal networks in interested areas	.699	.669	.320	.837					
Setting goals (factor 2)	Majors	.520	.594	.574	.409	.834	.791	.809	.885	
	Occupation	.702	.627	.673	.792					
	Lifestyle	.450	.444	.694	.737					
	No regret	.680	.442	.514	.535					
	Selectable	.490	.707	.726	.753					
Planning (factor 3)	Resume	.814	.836	.705	.814	.699	.750	.771	.841	Removed 2 variables (5 years plan) (choosing graduate school)
	Company suited the aptitude	.380	.338	.518	.332					
	Employment procedure	.804	.765	.756	.636					
Solving problems (factor 4)	Changing the choice	.787	.842	.737	.711	.756	.799	.741	.780	Removed 2 variables (changing graduate school) (overcoming obstacles)
	Adjusting the career path	.769	.824	.753	.809					
	Preparing alternatives	.827	.821	.616	.779					
Self-assessment (factor 5)	Evaluating abilities	.778	.769	.700	.399	.815	.872	.870	.849	
	Ideal occupation	.424	.809	.812	.660					
	Value priority	.798	.544	.763	.769					
	Sacrifice and selection	.672	.507	.757	.622					
	Lifestyle	.721	.618	.758	.549					

The removed measurement variables were the ones related to pursuing an academic career path directly upon graduation or going to graduate school; the variables were not meaningful to most of the study objects who wanted to get jobs and, in addition, the questionnaire results of the variables were not appropriate in terms of the standard of the loading factors. The measurement item of '5 year plan' was also removed from planning; it was the question about whether students were able to plan out the coming 5 years. The item of 'overcoming obstacles' was removed from the factors of solving problems because it did not meet the standard of the loading factor; it was the question about whether students continued to work toward goals in difficult situations.

Hypothesis Testing

The results of the comparison of the details between the PBL-applied experimental group and the control group learned from general lectures were as shown in <Table 6>.

First, while the hypothesis that students who participated in PBL classes could improve their confidence with regards to their ability to search for career information showed a significant difference in the experimental group ($t=-2.16$, $p=0.033$), the hypothesis did not show any significance in the control group ($t=1.39$, $p=0.168$). Therefore, the hypothesis was supported. Second, for the hypothesis with regards to the confidence in setting goals, the experimental group showed a significant difference between before PBL-application and after PBL-application ($t=-2.20$, $p=0.030$); the control group showed the opposite results ($t=2.08$, $p=0.040$). In other words, in the tests conducted in the beginning of the semester and in the end of the semester, the control group showed lower confidence in setting goals ($p<0.05$) in the beginning of the semester than in the end of the semester. This result suggests that the confidence in setting goals was decreasing more with time. Third, in the belief with regards to planning and doing, the experimental group showed a significant difference ($t=-2.36$, $p=0.020$); the control group showed an insignificant change. Fourth, the conviction that students could solve problems by themselves showed a slightly improved value in the mean, but both the experimental group and the control group showed insignificant change. Fifth, for the confidence that students could evaluate the occupations that suited themselves, the

experimental group showed a significant difference even though not conspicuous ($t=-1.97$, $p=0.052$), but the control group showed insignificant change.

<Table 6> Comparison between pretest and posttest by the t-test

Factors	Group classification	Pretest		Posttest		Difference analysis		t	p
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation		
Career information	Experiment	4.15	0.98	4.47	1.09	-0.32	-0.11	-2.16	0.033
	Control	4.45	0.93	4.27	0.99	0.18	-0.06	1.39	0.168
Setting goals	Experiment	4.55	1.04	4.85	1.01	-0.30	0.03	-2.20	0.030
	Control	4.85	0.94	4.59	4.59	0.26	-3.65	2.08	0.040
Planning	Experiment	3.89	0.97	4.21	1.06	-0.32	-0.09	-2.36	0.020
	Control	4.35	0.95	4.24	1.00	0.11	-0.05	0.92	0.358
Solving problems	Experiment	4.51	1.08	4.87	0.87	-0.36	0.21	-0.29	0.839
	Control	4.57	0.95	4.61	0.95	-0.04	0.00	-0.28	0.781
Self-assessment	Experiment	4.87	0.87	5.13	0.91	-0.26	-0.04	-1.97	0.052
	Control	4.93	0.95	4.78	0.91	0.15	0.04	1.32	0.189

The results of this study indicated that students who took PBL-applied classes showed a significant difference in mean value of the abilities before education versus after education in terms of the factors of career information, setting goals, planning, and self-assessment than students who took general-lecture-centric classes. However, the study did not prove that self-conviction would improve in the factor of solving problems.

Concluding Remarks

This study designed and carried out PBL-applied classes to examine the effects of PBL on career decision-making self-efficacy of women's university students. It was shown that, after applying PBL, the students of the experimental group could improve their confidence to find information on job opportunities and the career that they wanted. This could be attributed to the fact that the problems (or tasks) assigned to them during class hours were to investigate IT solutions that the companies where they would want to work were using to manage companies; and in the process, the salary levels and the working conditions of the companies could be identified simultaneously.

Women's universities that want to increase the employment rate of university graduates need to actively consider using PBL in an Information Technology-related Curriculum. While every university has a variety of employment support programs in operation, the most important curricula and class methods are not changing that much. PBL can be an alternative for improving current ways of class operation and be expected to produce the effect that students can take the initiative in their career decisions.

The results showed that the confidence that students evaluated their abilities more clearly and selected an occupation to meet their expectations was improved through PBL. This might be the most important element in their career choice to know about what they are interested in and what they can do best. We suggest that PBL enables students to improve their confidence in self-assessment and to evaluate their abilities and values properly.

Will and Confidence in solving problems are somewhat different from problem-solving abilities; this study measured both will and confidence focusing on self-efficacy. If students do not feel difficulties or obstacles in the process of solving problems, it is not easy to measure whether will and confidence in solving problems are improved or not. The self-efficacy of students differs from the abilities of students so it is necessary to develop a new PBL-applied class design in a way that enables students to improve their self-efficacy as well as their problem-solving abilities. The topic of PBL classes have effects on the improvement of problem-solving abilities requires additional studies in the future.

This study has a limitation in that it assumed that higher career decision-making self-efficacy would lead to higher employability. There is a need to empirically analyze whether students who obtained higher self-efficacy would achieve a higher employment rate upon graduation.

References

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, pp. 191-215.
- Barrows, S. B. (1996). Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning*, 68, pp. 3-12.
- Barrows, H. S. & Myers, A. C. (1993). Problem-based learning in secondary schools. Unpublished monograph. Springfield, IL, Problem-based Learning Institute. *Lanphier high school and Southern Illinois University Medical School*.
- Betz, N. E., Klein, K. L., & Taylor, K. M. (1996). Evaluation of a Short Form of the Career Decision-Making Self-Efficacy Scale, *Journal of Career Assessment*, 4(1), pp. 47-57.
- Delisle, R. (1997). How to use problem-based learning in the classroom, *Association for Supervision and Curriculum Development*, Alexandria, VA.
- Hackett, G. & Betz, N. (1981). A self-efficacy approach to the career development of women, *Journal of Vocational Behavior*, 18(3), pp. 326-339.
- Hung, W. (2009). The 9-step problem design process for problem-based learning: Application of the 3C3R model. *Educational Research Review*, 4(2), pp. 118-141.
- Hung, W. (2011). Theory to Reality: A Few Issues in Implementing Problem-Based Learning. *Education Technology Research & Development*, 59, pp. 529-552.
- Lee, Jeong-Mee. (2013). The Effects of Problem-Based Learning on Self-Regulated Learning Ability in LIS Education: Based on Cognitive and Motivational Components. *Journal of Korean Library and Information Science*, 47(4), pp. 60-67.
- Lee, Eun-Jin. (2001). Effects of career-planning group counseling for multi-potential university students. Dissertation. Yonsei University.
- Lent, R. E., Brown, S. D. & Hackett, G. (2002). *Social Cognitive Career Theory in Career Choice and Development* (fourth edition), Jossey-Bass, San Francisco.
- Luzzo, D. A. (1996). Exploring the relationship between the perception of occupational barriers and career development. *Journal of Career Development*, 22(4), pp. 239-248.
- McArdle, S., Waters, L., Briscoe, J., & Hall, D. (2007) Employability during unemployment: Adaptability, career identity and human and social capital, *Journal of Vocational Behavior*, 71, pp. 247-264.
- Nunnally, J. C. (1978). *Psychometric method*, McGraw-Hill, New York, 1978.
- Restbog, S. L., Florentino, A., & Garcia, P. (2010). The mediating roles of career self-efficacy and career decidedness in the relationship between contextual support and persistence, *Journal of Vocational Behavior*, 77(2), pp. 186-195.
- Shin, S. & You, D. (2014). Effects of Hybrid Style Problem-Based Learning in Food Service Entrepreneurship Subject - Focusing on Problem Solving Skills, *Journal of the Korea Contents Association*, 14(6), pp. 453-365.
- Stepien, W. & Gallagher, S. (1993). Problem-based learning: As authentic as it gets. *Educational Leadership*, 50(7), pp. 25-28.
- Taylor, K. M. & Betz, N. E. (1983). Applications of self-efficacy theory to the understanding and treatment of career indecision, *Journal of Vocational Behavior*, 22(1), pp. 63-81.
- Torp, L. & Sage, S. M. (2002). *Problem as Possibilities: Problem Based Learning for K-16 Education* (2nd Eds.) *Association for Supervision and Curriculum Development*.
- Vernon, D. & Blake, R. L. (1993). Does problem-based learning work? A meta-analysis of evaluative research, *Academic medicine*, 68(7), pp.550-563.

- Vernon, D. & Hosokawa, M. (1996). Faculty attitudes and opinions about problem-based learning, *Academic Medicine*, 71(11), pp. 233-238
- Vinokur, A. D., Van Ryn, M., Gramlich, E. & Price, R. (1991). Long-term follow-up and benefit-cost analysis of the Jobs Program: A preventive intervention for the unemployed. *Journal of Applied Psychology*, 76(2), pp.213-219.
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