The Effects of Using Student Oriented Learning Management System (E-Solms) on Student's Motivation

Khairul Azhar Mat Daud

Faculty Technology Creative and Heritage, Universiti Malaysia Kelantan,Malaysia
E-mail : azhar.md@umk.edu.my Tel : +6013-9333919

Mohd Ali Samsudin

School of Educational Studies, Universiti Sains Malaysia,Malaysia
E-mail : alisamsudin@usm.my, Tel : +6019-3931793,

Abstract

Motivation is an important factor in learning and teaching environment to ensure students' continuous learning. In the adults learning style, Self Directed Learning (SDL) is the most popular method to be implemented. Nowadays in ICT era, online learning will replace the conventional or face to face learning by a variety of reasons. In this paper, authors identify and determine the appropriate learning instruction to be designed and embedded in online self directed learning based on online SDL model are developed by Song and Hill, 2007. The research respondents are comprised 239 diploma students in mechanical engineering course at polytechnic under Ministry of higher Education, Malaysia. This study identifies the effect of online self directed learning on students' motivation. Therefore, it can be concluded that online SDL can give positive impact on enhancement of students motivation. The finding of this research shows increase in the level of student motivation after implementation of online SDL (E-SOLMS).

Keyword: E-SOLMS, Self-Directed Learning, Motivation

1. Introduction

Rani (2000) states that the Internet is an ideal tool to stimulate self-learning instruction. Self-directed learning online is a learning resource that can foster a desire for students to learn independently and to strengthen the students 'level of motivation (Hartley & Bendixen, 2001). Nelson (2001) suggested that information and communication technology is used to enhance students' self directed learning, the development of meta-cognitive, self-efficacy and motivation. Rani (2000), found that to ensure success in self-directed learning online, students should be disciplined, motivated and have the basic skills needed to continue learning in a field. Thus, motivation is an aspect that should be viewed with more depth to enable students to self-directed learning at a high level of motivation.

2. Previous Research

Martinez (2003) stated that major problems exist when the process of teaching and learning to motivate students to maintain a good level. Many students feel bored while studying. These frustrations lead to their lack of attention to the teacher. This was one of the causes of low academic achievement. Rietz (2001) states that students quickly become bored and less motivated by the methods of teaching and learning-oriented teacher without contributing something in the process of learning.

Middlebrooks and Slupski (2002) states that students easily become bored and less motivated to learn because they do not understand the purpose, meaning and application of learning.

Middlebrooks and Slupski (2002) also states that the education system in the conventional or oriented teachers are still concerned with quantity than quality. As a result, the students produced a less motivated and less disciplined.

Nohria and Eccles (1992) states that students are not motivated to study because they did not have a opportunities to give their views, opinions, and not providing enough space for them to participate actively in the learning process. In general, based on the above findings and a brief review of information from the learning environment at the global level, the study will look at the impact of online teaching and learning that are designed, developed and implemented specifically for improving student learning motivation. Overall teaching and learning materials on-line is called E-SOLMS or Student Oriented Learning Management System.

Through this study, it's can assess the effect of using self-directed learning on-line on student learning motivation and thus provide empirical support in related research. The study will also be undertaken to strengthen the self-directed learning methods for online, and to provide human capital, or k-workers by means of student-oriented learning. Student-oriented learning model approach Song and Hill (2007) that self-directed learning on-line to encourage and train students to work in a group of classmates or different classes, different schools, districts, states or different countries (Collaborative Learning).

Through this research, teaching and learning online using the website E-SOLMS. Web E-SOLMS been planned, designed, developed and implemented to create an atmosphere of self-directed learning online. Web E-SOLMS also designed to create opportunities for interaction among students, lecturers and parents. Through continuous interaction with no limits in terms of time is expected the students to explore real world issues and practices among those executed during the learning process. Student-oriented learning methods for online can be helpful in producing workers who are knowledgeable and able to handle the challenges and pressures of work in the future.

3. Hypotheses

According to this studies, the hypotheses to be test are listed below:

H1: There was did not have any significant relationship between the use of e-SOLMS and without uses e-SOLMS in learning process due to increase students' learning motivation

H2: There was did not have any significant relationship between the use of e-SOLMS and without uses e-SOLMS in learning process due to increase students' intrinsic goal orientation

H3: There was did not have any significant relationship between the use of e-SOLMS and without uses e-SOLMS in learning process due to increase extrinsic goal orientation

H4: There was did not have any significant relationship between the use of e-SOLMS and without uses e-SOLMS in learning process due to increase students' control of learning beliefs

H5: There was did not have any significant relationship between the use of e-SOLMS and without uses e-SOLMS in learning process due to increase students' task value

H6: There was did not have any significant relationship between the use of e-SOLMS and without uses e-SOLMS in learning process due to increase students' self-efficacy

4. Research Method

Quasi experimental methods used were intended to see the effects of self-directed learning methods for online through the application of the E-SOLMS to motivate student learning. The design of the pre and post test with control groups are used as proposed by Campbell and Stanley (1963). Figure 1 shows the flow of study procedures performed.
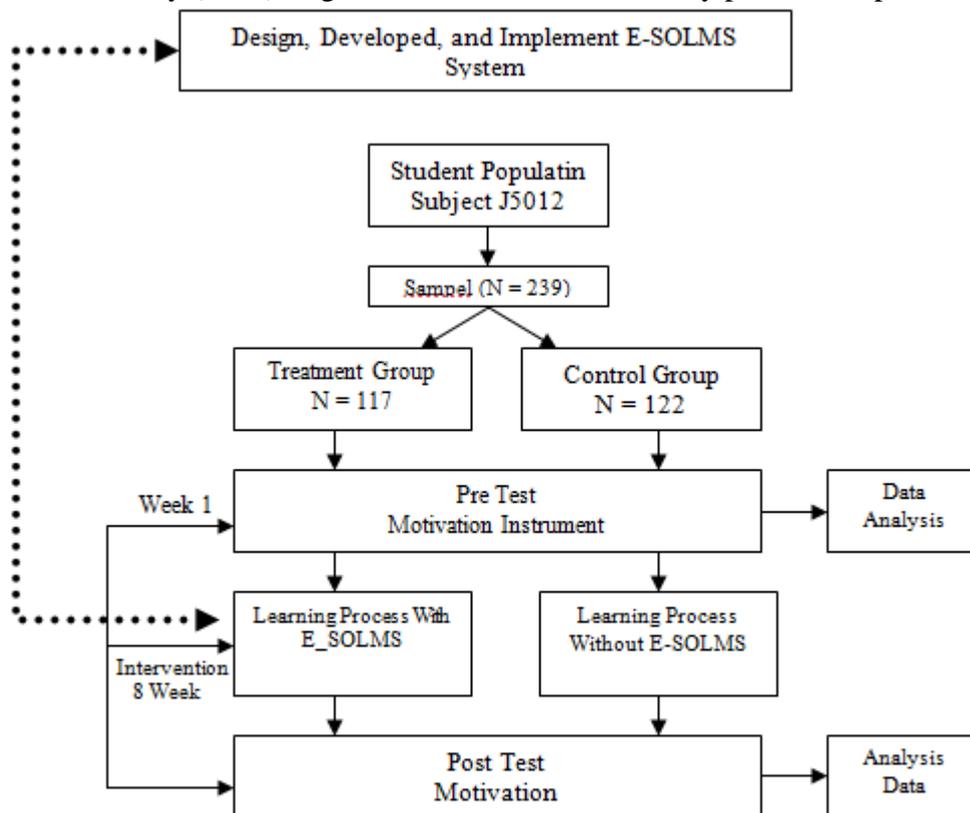

Figure 1. Research Procedure

ANCOVA analysis used in this study. Typically, data were analyzed based on increasing scores as the dependent variable. However, this approach does not take into account the differences in the mean pre-test scores among the sample. Controlling statistically for these differences, the data can be analyzed by analysis of covariance (ANCOVA) with pretest scores as the mean covariate (Hair, 1994), this approach was used to analyze the data obtained in this study.

ANCOVA test was used to completely eliminate the differences between subjects in the group. ANCOVA is an extension of variance analysis and its application in this study to be fair when there is more than one dependent variable. This group of variables, as advised by Hair, Anderson, Tatham and Black (1998), has a simple relationship to each other, and there is reason to allow the conceptual relationship between these variables. In this study, the dependent variable is the motivation of students in the ANCOVA used to test the difference in this aspect of the factors of self-directed learning methods for online students and online without a run concurrently.

Because the treatment effects of studies involving humans, then, the possibility exists diversity of responses from one individual to another individual of the same treatment (Douglas, 2005). If the difference in response between individuals was not controlled, this difference becomes part of the experimental error is significantly increased mean square error. Consequently, tests performed statistical inference is difficult to detect real differences between the treatment groups and control groups (Douglas, 2005). Because of individual differences in the groups is the main cause for the existence of error variance, the full transfer of individual differences within groups before and after treatment, the test allows statistical inference to be sensitive and powerful at the maximum level (Stevens 2002). Therefore, ANCOVA tests used in order to control and transfer of individual differences within groups (Douglas, 2005). In this way, the interpretation of treatment effects of variable-dependent variable in the study can be made more precise and convincing.

4.1 Scope of the research

The main purpose of the research is to examine the effect of using self-directed learning system on-line (E-SOLMS) on the development of students' learning motivation. Compelled to motivation instrument developed by Pintrich (1993), construct test anxiety is not taken into account in this study because subjects J5013 project is subject to continuous assessment method in accordance with the development of students' performance over time and there are no exams or tests conducted. Therefore, this study used five motivational constructs that were adapted from instruments Pintrich (1993) such as i. intrinsic goal orientation (cronbach alpha = 0.7425), ii. extrinsic goal orientation (cronbach alpha = 0.8167), iii. task value (0.8167), iv. belief learning control (0.7452) and v. self efficacy (0.8263).

4.2 Sample

The research sample was 239 students of which 122 respondents were in the control group, while another 117 students in the treatment group. The study also involved interviews with students to obtain a depth of self-directed learning methods for the student-oriented teaching and learning for the subject project J5012.

5. The Result of Hypotheses Testing

The main effect of self-directed learning methods version of the post test mean scores were analyzed by one-way ANCOVA (One Way ANCOVA). Variable is the version method of self-directed learning, consists of two versions of the method of self-directed learning using E-SOLMS and methods of self-directed learning without the E-SOLMS. Dependent variable was the mean post test scores (motivation). Covariate was the mean pre-test scores.

5.1 The Results of Testing H1

Results of this analysis are shown in Table 1 for the dependent variable of motivation. Meanwhile, analysis of the motivation construct variables of intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, task value and self-efficacy are shown in Table 3, 5, 7, 9 and 11.

Table 1: One-Way ANCOVA for the score mean post test (motivation) and learning method and score mean pre-test (motivation) as a covariate.

Depended Variable : Score mean for post test

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Eta Square	Power of Observation
Corrected Model	58.567[b]	2	29.284	83.663	.000	.415	1.000
Intercept	399.278	1	399.278	1140.734	.000	.829	1.000
Score Mean for Pre Test	.516	1	.516	1.474	.226	.006	.227
Learning Method	56.760	**1**	56.760	**162.164**	**.000**	**.407**	**1.000**
Error	82.604	**236**	**.350**				
Total	3444.720	239					
Corrected Total	141.172	238					

   a.   Generate by alpha = .05
   b.   R square = .442 (Adjusted R square = .438)

Table 2 shows the main effect of teaching methods is significant with F (1.236) = 162,164, MKR = .350, p = 0.00. While the degree of strength of the relationship (effect size) between the methods of learning and score mean for post test is shown by the partial eta squared of 0.41. This shows the relationship between teaching methods and the score mean post test is high (Green, 1997). That means, once controlled the effects of score mean pre-test for self-directed learning found that the score mean post test for student's motivation by using the E-SOLMS (mean = 4.22), is higher than the score mean post test for student's motivation without using the E-SOLMS (mean = 3.24), as shown in table 2.

Table 2 : Score mean post test for learning motivation and standard error for each learning method

Dependent variable : Score mean post test (Motivation)

Learning Method	Mean	Standard Error	Confidence Interval Lower Limit	Upper Limit
Learning Process Without E-SOLMS	3.239[a]	.054	3.133	3.345
Learning Process With E-SOLMS	4.217[a]	.055	4.109	4.325

a. Assessed based on the covariate in the model: Score mean pre test (Motivation) = 2.4515

Analysis of students' learning motivation will be analyzed in greater depth with the effect that occurs for each construct. There are five learning motivation construct that is (i) Intrinsic goal orientation, (ii) Extrinsic goal orientation, (iii) Control of learning beliefs, (iv) Task value and (v) Self efficacy intrinsic goal orientation.

5.2 The Results of Testing H2

Intrinsic goal orientation

Table 3. One-Way ANCOVA for the score mean post test (intrinsic goal orientation) with the method of learning and score mean pre test (intrinsic goal orientation) as a covariate

Depended Variable : Score mean for post test

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Eta Square	Power of Observation
Corrected Model	66.017[b]	2	33.008	69.252	.000	.370	1.000
Intercept	411.047	1	411.047	862.376	.000	.785	1.000
Score Mean for Pre Test	.133	1	.133	.280	.597	.001	.082
Learning Method	65.074	**1**	65.074	**136.525**	**.000**	**.366**	**1.000**
Error	112.488	**236**	**.477**				
Total	3203.889	239					
Corrected Total	178.505	238					

    a.   Generate by alpha = .05

    b.   R square = .442 (Adjusted R square = .438)

This analysis showed main effects of self-directed learning methods by using E-SOLMS is significant with F (1.236) = 136,525, MKR = .477, p = 0.00. The degree of strength of the relationship (effect size) between the methods of learning score mean post test is shown by the partial eta squared was .37. This means learning method explains 37% of the variance of the score mean post test, after score mean pre-test was statistically controlled. This shows the relationship between teaching methods and the score mean of post test are high (Green, 1997). This means, once controlled the effects of score mean pre-test for self-directed learning found that the score mean post test for student's intrinsic goal orientation by using the E-SOLMS (mean = 4:09), is higher than the score mean post test for student's intrinsic goal orientation without using the E-SOLMS (mean = 3:04), as shown in table 4.

Table 4. Score mean post test for construct intrinsic goal orientation and standard error for each learning method

Dependent variable : Score mean post test (intrinsic goal orientation)

Learning Method	Mean	Standard Error	Confidance Interval	
			Lower Limit	Upper Limit
Learning Process Without E-SOLMS	3.045[a]	.063	2.922	3.169
Learning Process With E-SOLMS	4.092[a]	.064	3.966	4.218

a. Assessed based on the covariate in the model: Score mean pre test (intrinsic goal orientation) = 2.4515

5.3 The Results of Testing H3

Extrinsic Goal Orientation

Table 5.   One-Way ANCOVA for the score mean post test (extrinsic goal orientation) with the method of self directed learning and score mean pre test (extrinsic goal orientation) as a covariate

Depended Variable : Score mean for post test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig	Eta Square	Power of Observation
Corrected Model	82.327[b]	2	41.164	84.387	.000	.417	1.000
Intercept	419.204	1	419.204	859.381	.000	.785	1.000
Score Mean for Pre Test	1.658	1	1.658	3.399	.067	.014	.451
Learning Method	78.622	**1**	78.622	**161.178**	**.000**	**.406**	**1.000**
Error	115.120	**236**	**.488**				
Total	3494.938	239					
Corrected Total	197.448	238					

    a.   Generate by alpha = .05

    b.   R square = .442 (Adjusted R square = .438)

This analysis showed main effects of teaching methods is significant with F (1.236) = 162,178, MKR = .488, p = 0.00. The degree of strength of the relationship (effect size) between the methods of learning and score mean post test is shown by the partial eta squared of .41. This means learning method explains 41% of the variance of the score mean post test, after score mean pre-test was statistically controlled. This shows the relationship between learning methods and the score mean post test are high (Green, 1997). This means, once controlled the effects of score mean pre-test of versions of self-directed learning, found that the score mean post test for student's extrinsic goal orientation by using the E-SOLMS (mean = 4.30), is higher than the score mean post test for student's extrinsic goal orientation without using the E-SOLMS (min = 3.15), as shown in table 6.

Table 6. Score mean post test for construct extrinsic goal orientation and standard error for each self directed learning method

Dependent variable : Score mean post test (Extrinsic Goal Orientation)

Learning Method	Mean	Standard Error	Confidance Interval	
			Lower Limit	Upper Limit
Learning Process Without E-SOLMS	3.151[a]	.063	3.027	3.276
Learning Process With E-SOLMS	4.302[a]	.065	4.174	4.429

a. Assessed based on the covariate in the model: Score mean pre (Extrinsic Goal Orientation) = 2.5094

5.4 The Results of Testing H4

Control of Learning Beliefs.

Table 7.   One-Way ANCOVA for the score mean post test (control of learning beliefs) by method of learning and score mean pre-test (control of learning beliefs) as a covariate

Dependend Variable : Score mean for post test

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Eta Square	Power of Observation
Corrected Model	43.527[b]	2	21.763	39.768	.000	.252	1.000
Intercept	500.946	1	500.946	915.372	.000	.795	1.000
Score Mean for Pre Test	.578	1	.578	1.056	.305	.004	.176
Learning Method	41.839	**1**	41.839	**76.451**	**.000**	**.245**	**1.000**
Error	129.153	**236**	**.547**				
Total	3639.438	239					
Corrected Total	172.680	238					

a.   Generate by alpha = .05
b.   R square = .252 (Adjusted R square = .246)

Table 8 shows the main effect of teaching methods is significant with F (1.236) = 76,451, MKR = .547, p = 0.00. The degree of strength of the relationship (effect size) between the methods of learning and score mean post test is shown by the partial eta squared of .25. This means learning method explains 25% of the variance of the score mean post test, after score mean pre-test was statistically controlled. This shows the relationship between teaching methods and the score mean post test are high (Green, 1997). This means that once controlled the effects of score mean pre-test of versions of self-directed learning, found that the score mean post test for student's control of learning belief by using the E-SOLMS (mean = 4.24), is higher than the score mean post test for student's control of learning beliefs without using the E-SOLMS (mean = 3:39), as shown in table 8.

Table 8. Score mean post test for construct control of learning beliefs and standard error for each learning method

Dependent variable : Score mean post test (Control of Learning Beliefs)

Learning Method	**Mean**	**Standard Error**	**Confidance Interval**	
			Lower Limit	**Upper Limit**
Learning Process Without E-SOLMS	3.397[a]	.067	3.265	3.530
Learning Process With E-SOLMS	4.237[a]	.069	4.102	4.372

a. Assessed based on the covariate in the model: Score mean pre (Control of Learning Beliefs) = 2.4184

5.5 The Result of Testing H5

Task Value

Table 9. One-Way ANCOVA for the score mean post test (task value) by method of learning and score mean pre-test (task value) as a covariate

Depended Variable : Score mean for post test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig	Eta Square	Power of Observation
Corrected Model	38.551[b]	2	19.275	59.495	.000	.335	1.000
Intercept	409.989	1	409.989	1265.462	.000	.843	1.000
Score Mean for Pre Test	.016	1	.016	.049	.825	.000	.056
Learning Method	37.846	**1**	37.846	**116.816**	**.000**	**.331**	**1.000**
Error	76.460	**236**	**.324**				
Total	3546.944	239					
Corrected Total	115.011	238					

a. Generate by alpha = .05

b. R square = .335 (Adjusted R square = .330)

Table 10 shows the main effect of teaching methods is significant with F (1.236) = 116,816, MKR = .324, p = 0.00. The degree of strength of the relationship (effect size) between the methods of learning and score mean post test is shown by the partial eta squared of .33. This means learning method explains 33% of the variance of the score mean post test, after score mean pre-test was statistically controlled. This shows the relationship between teaching methods and the score mean post test are high (Green, 1997). This means that once controlled the effects of score mean pre-test of versions of self-directed learning, found that the score mean post test for student's task value by using the E-SOLMS (mean = 4.19), is higher than the score mean post test for student's task value without using the E-SOLMS (mean = 3:39), as shown in table 10.

Table 10. Score mean post test for the construct task value and standard error for each learning method

Dependent variable : Score mean post test (Task Value)

Learning Method	Mean	Standard Error	Confidance Interval	
			Lower Limit	Upper Limit
Learning Process Without E-SOLMS	3.397[a]	.052	3.295	3.499
Learning Process With E-SOLMS	4.198[a]	.053	4.094	4.302

a. Assessed based on the covariate in the model: Score mean pre test (task value) = 2.4296

5.6 The Result of Testing H6

Self Efficacy

Table 11. On-Way ANCOVA for the score mean post test (self efficacy) of learning method and the scores mean pre test (self efficacy) as a covariate

Depended Variable : Score mean for post test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig	Eta Square	Power of Observation
Corrected Model	74.608[b]	2	37.304	93.655	.000	.442	1.000
Intercept	381.484	1	381.484	957.743	.000	.802	1.000
Score Mean for Pre Test	.926	1	.926	2.325	.129	.010	.330
Learning Method	72.659	**1**	72.659	**182.415**	**.000**	**.436**	**1.000**
Error	94.002	**236**	**.398**				
Total	3384.278	239					
Corrected Total	168.611	238					

    a.   Generate by alpha = .05

    b.   R square = .442 (Adjusted R square = .438)

       Table 12 shows the main effect of teaching methods is significant with F (1.236) = 182,415, MKR = .398, p = 0.00. The degree of strength of the relationship (effect size) between the methods of learning and score mean post test is shown by the partial eta squared of .44. This means learning method explains 44% of the variance of the score mean post test, after score mean pre-test was statistically controlled. This shows the relationship between learning methods and the score mean post test are high (Green, 1997). This means that once controlled the effects of score mean pre-test of versions of self-directed learning, found that the score mean post test for student's self efficacy by using the E-SOLMS (mean = 4.23), is higher than the score mean post test for student's self efficacy without using the E-SOLMS (min = 3.13), as shown in table 12.

Table 12. Score Mean Post Test for self-efficacy construct and Standard Error for Each Learning Method

Dependent variable : Score mean post test (self-efficacy)

Learning Method	Mean	Standard Error	Confidance Interval Lower Limit	Upper Limit
Learning Process Without E-SOLMS	3.127[a]	.057	3.015	3.240
Learning Process With E-SOLMS	4.232[a]	.058	4.117	4.347

a. Assessed based on the covariate in the model: Score mean pre test (self efficacy) = 2.4819

       According to the findings of the analysis above, it shows that self-directed learning on-line has a positive impact on enhancing students' learning motivation.

6. Summary and Concluding Remarks

       The finding showed that the student's motivation are increased when they learn with online self directed learning are support by e-student oriented learning management system (e-SOLMS). Student motivation naturally has to do with students' desire to participate in the learning process. But it also concerns the reasons or goals that underlie their involvement or noninvolvement in academic activities. Although students may be equally motivated to perform a task, the sources of their motivation may differ (Synteta, P., 2002). The term MOTIVATION TO LEARN through e-SOLMS has a slightly different meaning and diciplines in engineering methods involved (Synteta, P., 2002). It is defined by others as "the meaningfulness, value, and benefits of academic tasks to the learner--regardless of whether or not they are intrinsically interesting" (Hermine Marshall 1987). Other notes that motivation in on-line self directed learning concept is to learn the characterized by long-term, quality

involvement in learning and commitment to the project development process of engineering learning (Carole Ames 1990). Therefore, the development of e-SOLMS underlie by on line self directed learning concepts has succeeded in assisting the students to increase their learning motivation in learning processes. Students are given an authentic problem scenario where they are motivated to solve the problem that would change students' perception on mechanical engineering course which is previously considered as a subject that is isolated and not integrated with other courses. This may cause students to overlook the relationship between the mechanical engineering concepts and everyday life. On line SDL is an effective vehicle for the students to have deep learning about any concept in mechanical engineering which helps them to improve their skills in self directed learning approach and increase their motivation. Thus, e-SOLMS are applied on line self directed learning using SDL approach will benefit students in diploma mechanical engineering whose are registered for project development of mechanical engineering subject - J5012 as well as consumers that are interested in the field of mechanical engineering project development subject. This web system be seen as a motivation to integrate information and communication technology in teaching and learning process and in everyday life.

References

[1]   Abas. Z, 2009. "E-Learning in Malaysia: Moving Forward in Open Distance Learning", *International Journal on E-Learning, 8*(4), pp. 527-537. Chesapeake, VA: AACE.

[2]   Alessi S. M., & Trollip, S.R, 2001. "On-line self directed learning", *Boston*: Allyn and Bacon.

[3]   Alexander, S., & McKenzie, J, 1998. "An evaluation of information technology projects in university learning", in Gunasekaran, A., McNeil, R. D,. & Shaul., *E-learning: research and applications,* 34(2). New York: Mc Graw-Hill Book Company.

[4]   Bendixen, L. D. & Hartley, K, 2003. "Successful learning with hypermedia: the role of epistemological beliefs and metacognitive awareness". *Journal of Educational Computing Research*, 28, pp.15-30.

[5]   Caine, R. N., & Caine, G, 1991. "Making connections: teaching and the human brain". Alexandria, Va: Association for supervision and curriculum development.

[6]   Campbell D. T., & Stanley, J. C, 1963. "Experimental and quasi-experimental designs for research on teaching" in N. L. Gage (Ed.), *Handbook of research on teaching,* (pp. 77-85). Chicago: Rand McNally,.

[7]   Candy, P. C, 1991. "Mirrors of the mind: personal construct theory in the training of adult educators". Manchester: University of Manchester.

[8]   Douglas C. M, 2005. "Introduction to statistical quality control". (5th Edition). New York: John Wiley and Sons Publisher.

[9]   Fadzilah Ariffin, 2001. "Penggunaan teknologi dalam menambah nilai bahan sumber". Kertas kerja yang dibentangkan dalam Seminar Kebangsaan Penggunaan Bahan Sumber Pendidikan Dalam Pengajaran dan Pembelajaran pada 27-29 Jun 2001, di Kuala Lumpur.

[10] Florin Martin, 2008. "Blackboard as the Learning Management System of a Computer Literacy Course". *MERLOT Journal of Online Learning and Teaching*. 4(2)

[11] Grow, G. O, 1991. "Teaching learners to be self-directed". *Adult Education Quarterly Journal*, 42(3), ms. 125-149.

[12] Hair, J., R.E. Anderson, R.L. Tatham, & W.C. Black, 1998. "Multivariate data analysis (5th Edition) New Jersey: Prentice-Hall.

[13] Hannafin, M. J., Hill, J. R., Oliver, K., Glazer, E., & Sharma, P, 2003. "Cognitive and learning factors in web-based distance learning environments". in. M. G. Moore, & W. G. &erson (Eds.), *Handbook of distance education* (pp. 245–260). Mahwah, NJ: Lawrence Erlbaum.

[14] Hartley, K. & Bendixen, L. D, 2001. "Educational research in internet age: examining the role of individual characteristics". *The Journal of Educational Research*, 30(9), pp. 22-26.

[15] Hill, J. R., Wiley, D., Nelson, L. M., & Han, S, 2003. "Exploring research on internet-based learning: from infrastructure to interactions", in D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*, (pp. 433-460). Mahwah, NJ: Lawrence Erlbaum.

[16] Honebein, P.C, 1996. "Seven goals for the design of constructivist learning environments", in Brent G. Wilson (Ed.), *Constructivist learning environments: case studies in instructional design*, (pp. 11-24). Englewood Cliffs: Educational Technology Publications.

[17] Harris, M. dan Wilson, V, 2003. "Designing the Best : A Review of Effective Teaching and Learning of Design and Technology". *International Journal of Technology and Design Education.* 13, pp. 223 – 241.

[18] Hsiang-Ann Liao, 1993. "Adoption of a course management system at a college campus: the implication of diffusion of innovation". *International Journal Of Instructional Technology and Distance Learning*, 2(10).

[19] Krynock, K.,& Robb, L, 1999. "Problem solved: how to coach cognition". *Journal of Educational Leadership*, 57(3), pp. 29-32.

[20] Martinez J.R, 2003. "Academic locus of control, achievement motivation and academic self efficacy: Prediction of academic achievement in hispanic and non-hispanic middle school children". New Jersey: Prentice-Hall.

[21] Mayo, P., Donnelly, M. B., Nash, P. P. & Schwartz, R. W, 1993. "Student perceptions of tutor effectiveness in problem based surgery clerkship". *Journal of Teaching and Learning in Medicine*, 5(4), pp. 227-233.

[22] Mayer, C, 2007. "What really matters in the early literacy development of deaf children". *Journal of Deaf Studies & Deaf Education*, 12, pp. 411-431. http://jdsde. oxfordjournals .org/. Retrieved at 5 Ogos 2008.

[23] Middlebrooks, A.E., Slupski, Z.G, 2002. "Take an "ism" field trip: service-learning for grown-ups". Chicago : American Association for Higher Education Annual Conference.

[24] Nelson, C, 2001. "Academic achievement and customer satisfaction: rival measures of school quality?". Presented paper at The Annual Meeting of The American Evaluation Association, di St. Louis, MO.

[25] Nohria, N., & R. Eccles, 1992. "Networks and organisation". Boston: Harvard Business Press.

[26] Piskurich, George M, 1993. "Self-directed learning". San Francisco: Jossey-Bass.

[27] Pintrich, P.R, 1993. "Realibility and predictive validity of the motivated strategies for learning questionaires (MSLQ)". *Journal of Educational and Psychological Measurement*, 53(3), pp. 801-813.

[28] Pintrich, P. R, 2000. "The role of goal orientation in self-regulated learning". in M. Boekaerts, P.R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation*, (pp. 451-501). San Diego, CA: Academic Press.

[29] Rani Varghese Mathai, 2000. "The use of the internet to foster self-direction learning in community and technical college math and natural science classess". Disertasi Sarjana. Universiti Sains Malaysia. Unpublished.

[30] Ravenscroft, A, 2005. "Content, communication and communities: what can we use and reuse?" Paper presented in Conference on Innovations in the Reuse of Electronic Learning Materials: Enabling Communities of Practice at Cambridge-MIT-OU Knowledge Research Network (KRN), pada 23 September 2005, di United Kingdom Open University.

[31] Rietz T.A, 2001. "Students' perception of motivation: the importance of student-teacher relationship". America: National Lewis University Press.

[32] Siti Fatia Mohamad Ali & Hasyamuddin Othman, 2006. "Kajian terhadap motivasi instrinsik dan ekstrinsik untuk memotivasikan pelajar teknikal dalam pembelajaran di Politeknik". Disertasi Sarjana Pendidikan. Universiti Tun Hussein Onn Malaysia (UTHM). Unpublished

[33] Song, L, 2005. "Adult learners' self-directed learning in online environments: process, personal attribute, and context". Athens: The University of Georgia.

[34] Song. L & Hill, J.R, 2007. "A conceptual model for understanding self-directed learning in online environments". *Journal of Interactive Online Learning*. 6(1). www.ncolr.org/jiol. Retrieved at 15 Mac 2008

[35] Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H, 2004. "Improving online learning: student perceptions of useful and challenging characteristics". *Internet and Higher Education Journal*, 7(1), pp. 59-70.

[36] Stevens, J, 2002. "Applied multivariate statistics for the social sciences".(3th Edition). New Jersey: Lawrence Erlbaum Associates Publishers.

[37] Stewart, R. A, 2007. "Investigating the link between self-directed learning readiness & project- based learning outcome: The case of international masters students in an engineering management course". *European Journal of Engineering Education*, 32(4), pp. 453-465.

[38] Stipek, D.J. 1993. "Motivation to learn: from theory to practice" (2nd Edition). Massachusetts: Allyn and Bacon.

[39] Vonderwell, S., & Turner, S, 2005. "Active online learning and student experiences in an online course: a case study". *Journal of Technology and Teacher Education*, 13(1), pp. 65-84.

[40] Zimmerman, B. J, 1990. "Self-regulated learning and academic achievement : an overview". *Journal of educational Psychology*. 25 (1), pp. 3 – 17.

[41] Zimmerman, B. J., Bonner, S., & Kovach, R, 1996. "Developing self-regulated learners: Beyond achievement to self-efficacy". Washington, DC: American Psychological Association.