以教師設計網路教學活動爲基礎探討學習活動與學習成就之關係

The Relationship between Learning Activities and Performance Based on Instructors' Design for Instructional Activities in Web-based Learning Environments

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摘　要

　　本研究之目的是爲探討網路平台之網路教學環境中，以教師設計教學活動爲基礎來探討學習活動與學習成就之關係。本研究之受測者爲研究所以上學生，這些受測者均曾修過一科以上之網路教學課程，而參與受測者之總人數爲 150 人。受測者依指示回答本研究之量化及質化問卷。

　　本研究之方法，係以量化研究爲設計基礎，並以描述性及比較性方法，來進行分析問卷所得之數據；而描述性分析，是爲探討受測者之基本資料。因此，本研究運用比較分析與描述性分析方法，進行探討學習活動與學習成就之關係。

　　依據問卷數據統計分析之結果及受測者之建議爲基礎，本研究之發現包含:

　　網路學習活動以討論版、個別的作業及討論室等活動最爲影響學生學習成就。本研究之結果，可提供多方面之觀點與建議，將有助於網路教學教師或網路平台之學習活動設計者之參考，使其設計或開發網路平台之學習活動及教材時，在網路教學的環境下，能有更多適合學生之網路教學課程活動之設計方法及教學法，以便提昇網路教學之學生學習滿意度。

關鍵詞：網路學習環境、網路學習活動、學生學習成就、網路課程

Abstract

　　The study was to probe into the Web-based learning activities influencing student performance based on instructors' design for instructional activities in Web-based learning environments. Participants of the study were students who had taken part in a Web-based course. The 150 participants conducted the survey. Each participant completed a quantitative and qualitative survey.

　　A quantitative research design was used in the study method. The study employed comparative and descriptive. Collected survey data were analyzed using descriptive and comparative statistics. The analysis of the study was to explore the demographic information and the relationship between learning activities and student performance.

　　According to the results of the data analysis, the results in the study include: proof that Web-based learning activities including discussion board, individual assignment, and chat room activities most influenced student performance. The results provide new viewpoints and opinions for Web-based instructors when designing or

developing Web-based learning activities and course materials for more suitable ways and pedagogies in order to assist learners who learn in enhanced Web-based learning environments.

Keywords: Web-based Learning Environments, Web-based Learning Activities, Student Performance, Web-based Courses

1. Introduction

Many researchers of Web-based learning activities have a proclivity to employ the Web in customary ways. These electronic courses often contain Web materials that lack any significant level of creativity or interactivity. (Dehoney & Reeves, 1999; Kearsley, 1998). Developers have guided their scholarship toward learning theories designed to stress the demand for learning within environments that supply active learning and elicit activities for students via the Web. Hence, the prevalent research probes into relationship between student learning activities and students' performance.

2. Review of Literature

Web-based Learning Activities

Hiltz (1994) and Simich-Dudgeon (1998) who found that self-discipline, self-direction, and good organizational skills were key factors in student success in a Web-based learning environment. Technology on this present day also provides an free system in which students are not limited to a classroom type of environment but are free to explore the resources provided by the Internet and are encouraged to take part in never-ending interactions and online learning activities (Khan, 1997). Therefore, designs of Web-based learning activities would influence student performance in Web-based learning environments.

3. Research Method and Data Analysis

The research tried to explore the relationship between Web-based learning activities and student performance. WBI supplies an extra choosing to pedagogy for learners who cannot attend classes on a campus. Learners can attend Web-based learning activities through Web-based learning environments without being present on campus. The research helped Web-based teachers in designing the Web-based learning activities for students.

(1) Research question

One research question guided the study:

What Web-based learning activities do students perceive as influencing their performance?

(2) Research Method

The study employed a quantitative research method. A quantitative instrument examined with descriptive and comparative methods were employed to explore Web-based learning activities and factors influencing performance based on instructors' design for instructional activities in the Web-based learning environments. Quantitative study is all about measuring the relationship between Web-based learning activities and student performance. The quantitative purpose was to explore the relationship between Web-based learning activities

and student performance. The study was used by descriptive and comparative statistics to analyze the survey data.

(3) Research Design

Gall, Gall, and Borg (2003) defines causal-comparative research design as "the causal-comparative research design, the presumed cause is called the independent variable, and the presumed effect is called the dependent variable" (p.295). In the study, the comparative research design was employed to explore the relationship among variables. The factors related to the Web-based learning environments in the study were Web-based learning activities, which included discussion boards, chat rooms, case studies, e-mails, e-journals exploring homepages, group assignments, individual assignments, online quizzes, online examinations, watching video clips, online presentations, links to online resources, online surveys, and other activities. The instrument of *Learning Activities and Performance Questionnaire of Web-based Learning Environments* was used to examine the research question. A study survey explored the relationship, if any, of Web-based learning activities and factors influencing student performance. Dependent variable of the study was factors influencing performance. Each Web-based instructional course in the study was performed in Web-based learning environments or learning activities and then explored the relationship between Web-based learning activities and student performance. The study used quantitative surveys to obtain students' responses following the completed Web-based courses.

(4) Instrumentation

The research used a questionnaire for data collection. A *Learning Activities and Performance Questionnaire of Web-based Learning Environments* instrument designed by the researcher included 15 questions appraising Web-based learning activities and factors influencing student performance with Web-based learning activities.

(5) Data Collection and Procedures

Survey data were collected employing the quantitative questionnaire to explore the relationship of Web-based learning activities and the factors influencing student performance based on instructors' design for instructional activities within Web-based learning environments.

Homepage links of Web-based surveys were e-mailed via Microsoft Outlook. sixty paper-based surveys were handed directly to graduate students enrolled. Participants took the survey via Internet and/or hardcopy surveys. The online survey data were automatically sent to the database server of the survey homepages. The hardcopy surveys were returned to the researcher when participants finished the surveys. The researcher checked the returned rates of the surveys from participants who had replied to the survey and had followed up by sending reminders to participants who had not.

4.Data Analysis

In the study, the variables that represented Web-based learning activities and student performance based on instructors' design for instructional activities in Web-based learning environments were examined. The two variables included Web-based learning activities and student performance, which were computed employing the *Learning Activities and Performance Questionnaire of Web-based Learning Environments.* A model for data

analysis included Web-based learning activities and student performance which are represented as follows:

Figure 1. Model for Data Analysis in the study

Feedback loop
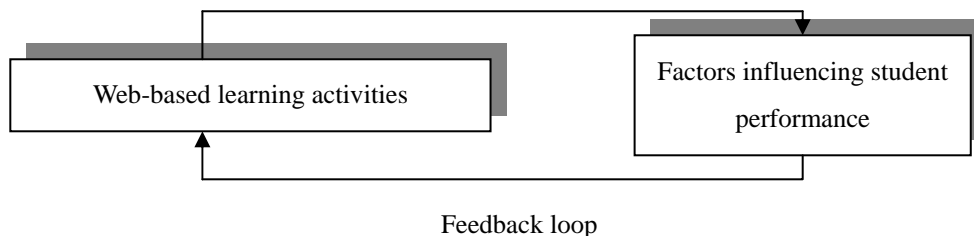
The descriptive method examined what Web-based learning activities students perceive as influencing their performance in Web-based learning environments.

The data analysis for the current study was segregated into two parts, demographic information and questionnaire items. The purpose of the study was to investigate student performance of the students engaged in different Web-based learning activities.

Demographics of Participants

The statistical data analysis of the study, descriptive and comparative statistics was calculated for each section of participant demographics. The statistics were estimated and multiple tables were made to show the results.

Table 1. Descriptive Statistics for Age Variable by Gender in the study, N = 150

Variable	*SD*	*M*
Females	10.09	36.19
Males	8.69	39.18
Age-Total Sample	9.72	37.13

For the survey data analysis, a total of 150 students finished the age related section in the research. Table 1 shows descriptive statistics for mean and standard deviation of students by age. The mean for the participants' age was 37.13 and the standard deviation was 9.72. In addition, the mean for the male participants' age was 39.18 and the standard deviation of the male participants' age was 8.69. The mean for the female participants' age was 36.19 and the standard deviation of the female participants' age was 10.09. The result showed the average age of the female participants was younger than the average age of the male participants.

Table2. Descriptive Statistics for Gender Variable in the study, N=150

Variable	*Percent (%)*	*N*
Female	66.0	99
Male	33.3	50
Missing value	.7	1
Total participants	100.0	150

For the survey data analysis, a total of 149 students finished the survey section related to gender. Table 2 shows descriptive statistics for the percent of the participants by gender. Females contributed the greatest number of responses. There were 50 male students and 99 female students who responded to the questionnaire. The survey sample was comprised of 66.0 percent female students, 33.3 percent male students, and 1 missing response for the question (.7%). As a result of the data analysis, it was determined that the population of the female participants was double the population of male participants.

Table 3. Descriptive Statistics for Experience of Students in Web-based courses in the study, N = 150

Web-based Course	*N*	*Percent*	*SD*	*M*
One course	45	30.0		
Two courses	23	15.3		
Three courses	25	16.7		
Four courses	23	15.3		
Five or more courses	32	21.3		
Missing values	2	1.4		
Total	150	100.0	1.53	2.86

For the survey data analysis, survey participants were needed to meet one conditional requirement, which was that participants had to have previously taken at least one Web-based class. As shown in Table 3, 45 students (30.0%) have taken one Web-based class. Twenty-three students (15.3%) have taken two Web-based classes. Twenty-five students (16.7%) have taken three Web-based classes. Twenty-three students (15.3%) have taken four Web-based classes. Thirty-two students (21.3%) have taken five Web-based classes. Two students (1.4%) did not provide a response to this question. All participants had taken at least one Web-based course and students who had taken only one course were the major group in the study. The average number of the Web-based courses was 2.86. In other words, each participant had taken an average of 3 courses and possessed a great deal of experience in taking Web-based classes.

Research Question

What Web-based learning activities based on instructors' design do students perceive as influencing their performance?

The question in the instrument explored the factors related to "the influences of Web-based learning activities." The influences of Web-based learning activities were defined as the following items of the question:

Which of the following Web-based learning activities do you feel most influences student performance? (Please check at least three activities for this check list table (Table 4))

Table 4. Web-based Learning Activities List for Influencing Student Performance

check	Activity Name	check	Activity Name
	Online examinations		Discussion board
	Watching video clips		Chat room
	Online presentation		Case study
	Links to online resources		E-mail

check	Activity Name	check	Activity Name
	Online survey		E-journal
	Exploring homepage		Other
	Group assignment		
	Individual assignment		
	Online quizzes		

As shown in Table 4, the checked items represented those for which students felt most likely to influence their performance. The score for each checked item was 1 and the score for non-checked items was 0. The activity that obtained the highest score represented the activity that students felt most influenced their learning performance.

Table 5. Descriptive Statistics for Influencing Student Performance by Web-based Learning Activities, N = 150

Variable	N	Frequency of Response	SD	M
Discussion board	150	88	.49	.60
Individual assignment	150	70	.50	.47
Chat room	150	63	.50	.44
E-mail	150	59	.49	.40
Links to online resources	150	56	.49	.38
Online presentation	150	35	.42	.23
Online quizzes	150	29	.41	.21
Case study	150	26	.38	.18
Group assignment	150	25	.37	.16
Exploring homepage	150	23	.37	.16
Watching video clips	150	21	.35	.14
Online examinations	150	17	.33	.12
E-journal	150	14	.29	.09
Online survey	150	11	.26	.07
Other	150	6	.20	.04

As shown in Table 5, the designed activities receiving the highest scores were discussion board, individual assignment, and chat room. The scores indicated that the students believed these activities most influenced their performance. The activity of discussion board had a mean score of .60, which indicated that 60 percent of students preferred this activity. Additionally, the activities receiving the lowest scores were online survey, e-journal, and online examinations. These scores indicated that students believed that these activities least influenced their performance. The activity of online survey had a mean score of .07, which indicated that students found this to be the least preferable activity available from the table list. The highest mean score represented the activity that students felt most influenced their performance and the lowest mean score represented the activity that students felt least influenced their performance in Web-based classes. In other words, the discussion board activity was very important to student performance in Web-based classes, but online survey

activity was not. In addition, six participants selected the options of other activities. Their preferences for "other activities" were personalized responses via e-mail, PowerPoint, instructor access, combination of audio lecture with video/or PowerPoint, and combination of interactivity. The suggestions made by these six respondents were as follows:

Explicit written instructions from the professor and personalized responses to questions via email (Respondent #83, female)

Shared PowerPoint presentations for review (Respondent #86, female)

Instructor access (Respondent # 94, female)

Student prepared online presentations, combination of audio lecture with video and/or PowerPoint (Respondent #104, female)

I am currently involved in a class that using this combination of interactivity, and I find it a positive experience. I can review the audio lecture or other components whenever I need to review a concept. (Respondent #110, female)

This has been an effective learning approach for me, and PowerPoint notes posted on website (Respondent #114, female)

These suggestions and comments provided information indicating that students would like to participate in more interactive activities in Web-based classes. These participants liked using integration technology in Web-based classes. They also preferred to use integration technologies that were combinations of audio lecture with video and/or PowerPoint to support online presentation.

5. Summary

The research probed into the effects of Web-based learning activities and student satisfaction. Quantitative research methods were used in the study.

Review of Literature and Study Findings

The study attempted to examine the activities and pedagogies of WBI based on instructors' design that affect learning satisfaction and performance of students. This section describes the connections between the literature review and the results revealed in the study. Results related to the literature review are also presented in this section.

When addressing the literature review of Web-based learning activities related to the findings, Gagne and Shepherd (2001) stated that interaction between instructors and students is somewhat impeded in Web-based courses. Their position matched the results showing that instructors might need to provide more interactive learning activities for students in Web-based classes. Khan (1997) indicated that interactive technology delivers instruction to students, and Web-based learners are encouraged to participate in never-ending discussions and online learning activities. His observation supported the finding that participants prefer to participate in more interactive activities in Web-based classes. Additionally, Jensen (1996) stated that in order to adapt to the variety of learning styles, effective teaching has to involve all senses while addressing the learner needs in a variety of learning activities. His finding reinforced the position that activities should allow learners to contribute something to Web-based courses and then build on those contributions as the basis for the activities that follow.

The study results on student performance indicate that discussion board activities were more influential on student performance than other types of activities. Discussion board activities, the most influential student performance tool, involved interactive student-to-instructor and learner-to-learner communication in Web-based learning environments. Related to these results is Ryan's (2000) comment that "interaction with the online instructors using e-mail, telephone, or chat demands greater efficiency that opens oral discussion" (p. 82). Additionally, House (1999) noted that Web-based environmental variables had a causal influence on student performance. From his point of view, Web-based classes should provide more interactive learning activities for students. The results further revealed that educators needed to consider whether or not students understood the content when they communicated with their peers and instructors in Web-based classes.

Lee (2002) indicated that instructors can design appropriate course content to foster student learning in Web-based learning environments. Thus, Web-based instructors need to consider this concept when they design or create activities or pedagogies for Web-based classes.

6. Conclusions

The results of the study were divided into two areas: Web-based learning activities and student performance.

（1）Web-based Learning Activities

The results based on research question one showed that the activities of discussion board, individual assignment, and chat room were the most influential activities on student performance. The participants selected the categories online survey, e-journal, online examination, and other as the activities that were the least influential activities on student performance. The participants indicated a need for increased interaction between instructors and students in the learning activities of discussion board, individual assignment, and chat room. The participants thought that the discussion board, individual assignment, and chat room activities needed more interaction than the activities of online survey, e-journal, and online examination.

Additionally, respondents made suggestions and comments to explain why they liked or disliked using Web-based learning. They felt that instructors should train their students to be proficient when using the tools of Web-based classes. The online syllabus, course instructions, and timeline in Web-based classes were viewed as necessary and popular features. They also thought that instructors should more closely monitor online communications. The instructor is responsible for ensuring that students participate and contribute to online activities and for ensuring that Web-based conversations are meaningful. In addition, instructors also needed to devote more time to the preparation of Web-based classes. Overall, instructors should monitor the interaction responses when they use chat rooms. This will ensure that students understand the information being communicated and it will provide an opportunity for enhanced student performance. Additionally, instructors might need to provide more interactive learning activities for students in Web-based classes. This observation matched with the position of Gagne and Shepherd (2001) that interaction between instructors and students is somewhat impeded in Web-based courses.

Furthermore, discussion board activities were very important in influencing students as they learned in Web-based classes, but online survey activities were not. Additionally, the participants commented that they would prefer to participate in more interactive activities in their Web-based classes. The results supported the

literature review that interactive technology delivers instruction to students, and Web-based learners are encouraged to participate in never-ending discussion and online learning activities (Khan, 1997).

(2) Student Performance

In response to research question one; some participants commented that the types of Web-based learning activities used have a direct influence on student performance in Web-based courses. The students in the current sample preferred more interactive Web-based learning activities. The study results indicated a student's desire for more interaction communication when the activities of discussion board, individual assignment, and chat room are used. According to the results, discussion boards, individual assignments, and chat rooms had the greatest impact on student performance. Contrarily, respondents did not provide similar feedback regarding the activities of online survey, e-journal, and online examination. It should be noted that discussion board, individual assignment, and chat room activities were more influential on student performance than the online survey, e-journal, and online examination activities.

These results supported the observation made by Ryan (2000) that "interaction with the online instructors using e-mail, telephone, or chat demands greater efficiency that opens oral discussion" (p. 82). Paulsen (1995) provides four types of activities for a computer-mediated communication circumstance: a. one-alone, b. one-to-one, c. one-to-many, and d. many-to-many interaction and learning activities. Additionally, instructors had to consider whether students knew the content meaning or not when they communicated with their peers and instructors in Web-based classes. In other words, Web-based classes should provide more interactive learning activities for students. The study results supported the literature review that Web-based environmental variables had a causal influence on student performance (House, 1999).

7. Recommendations

The results provide viewpoints and opinions for Web-based teachers when they design or create Web-based learning activities. Additionally, the results might encourage Web-based instructors to consider such influential factors when designing or creating Web-based learning environments. The following recommendations were based on the results from the responses of the participants in the study:

Discussion board, individual assignment, and chat room were the activities that respondents felt most influenced their overall performance. Online survey, e-journal, and online examination were least influential on student performance. Hence, instructors should employ the former activities in Web-based classes in order to enhance overall student performance.

8. Recommendations for Further Study

Further study is needed in the areas of Web-based learning activities, student performance, student satisfaction levels, and student learning styles based on instructors' design for instructional activities in Web-based learning environments. The following recommendations are provided as possible areas of research for further study:

(1) Further research should be conducted to determine, by gender, age, and ethnicity, which factors influence a student's decision to enroll in Web-based courses.

(2) Further research should be conducted to compare the differences in student performance on each Web-based learning activity based on each learning style preference and to investigate the effect of diverse learning styles on students in Web-based classes.

(3) Further research should be conducted to determine the relationship of student performance and student satisfaction based on the Web-based learning activities.

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