

## Using WebQuest as a creative teaching tool at a science and technology university in Taiwan

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**ABSTRACT:** Although WebQuest has been used as an inquiry-based learning tool and a creative teaching strategy in primary and secondary schools in Taiwan, it has rarely been used in the general education offered by universities. The purpose of this study was to examine the impact of WebQuest learning activities on students' learning behaviour and cognitive change between two music appreciation courses at one university, using multivariate analysis of variance. Participants included a control group of 36 students and an experimental group of 35 from one university in central Taiwan. In a quasi-experimental design, all students were assigned to be experts in the final task, with and without WebQuest. The results showed that there was a significant difference between the two common factors of team integration and independent thinking. This proves that WebQuest can be used in music appreciation as a creative educational tool. It can promote learning effectiveness in music appreciation courses, and it can improve creative higher order thinking ability.

### INTRODUCTION

Students growing up in today's fast-food culture are getting used to searching the Internet for information because they think that it is more convenient than traditional library searching [1]. Morrison et al pointed out that Web-based inquiry would be very difficult due to the rapid change and the existence of ill-organised information on the World Wide Web [2]. Despite getting rid of the Web, teachers are advisers that support and scaffold students by bringing computer assisted teaching into the subject learning [3][4].

Music appreciation in Taiwan has been offered as part of the core curriculum in many undergraduate degree programs at colleges and universities [5]. According to the Introduction to the General Education Program, the Minister of Education has promoted the revolution and innovation in general education for ten years or so [6]. The idea is that general education should cultivate undergraduate students' higher order thinking skills and problem-solving ability to face the challenges of their future life. Regrettably, the focus of university introductory music courses is frequently on the topic of Western art music, even though students enrolled in such courses express a preference for other types and styles of music [7].

This situation resulted in the gap between students' demand and the instruction, and between the goal of general education and the teaching objectives of music appreciation. Several creative music appreciation courses had been designed by college instructors including composing with music software, developing Web-based instruction, on-line forum and transferring their teaching method into collaborative learning and project-based learning. At the same time, the content of the courses is interdisciplinary, like music and mathematics, music and culture etc. Little was known about the possibility of using WebQuest to be the creative teaching strategy in music appreciation.

The purpose of this study is to examine the effectiveness of the music appreciation courses offered using the WebQuest teaching strategy in Taiwan. The research question is to see if using WebQuest as a creative teaching tool can improve learning effectiveness, measured using a five-point Likert scale.

### RATIONALE

WebQuest, originated by Dodge and March in 1995, was considered to be an effective way to organise chaotic Internet resources and help learners gain new knowledge through a guided learning environment [8]. It has been widely used in subjects such as social science, biology, English and writing [8-16]. More recently many research reports have concluded that WebQuest can have a significant positive effect on higher order thinking [12][17-21].

The WebQuest model is based on constructivism, self-directed learning, collaborative learning, situated learning and scaffolded learning. It can be designed for use in either short-term or long-term instruction. The aim can be either to integrate knowledge to create new objectives or to use information to criticise from many perspectives. The resources on the Internet should be carefully selected by the instructor for both their credibility, and in order to include diverse perspectives on the topic being investigated. WebQuests have six attributes. These include an introduction to a complex problem, engaging doable and interesting tasks, a description of the process, multiple on-line sources and perspectives, followed by evaluation and conclusions.

Since music can be an important factor in creating a pleasant atmosphere for food service in restaurants, the task was based on a real situation. Through a simulated situation, students were requested to gather information about how to play rhythmic instruments, conduct musicians, choose proper situational music, make rhythmic instruments and draw rhythmic graphs, etc, from the Web. Six experts were engaged. They play musical roles, such as being the music maker, the music player, the music selector, the instrument maker, the music graph painter, and the conductor of a creative band at a wedding party. After searching the Web, they were guided in completing accomplishment work sheets describing how they thought creatively at the first step according to the information available on the Web, how the group discussed this, and finally how they should produce the entire performance, including how they changed their thoughts and how to be creative. After this, participants were required to complete a self-reported questionnaire about the learning effectiveness with or without a WebQuest strategy.

## METHOD

### Design

In this study, a quasi-experiment was conducted in a real-life setting. Questionnaires were distributed after three weeks. The subjects were randomly assigned to either the WebQuest group or the traditional course group. The university had been established from technology-oriented education perspective and, therefore, its appeal for male students was greater so far than its appeal to female ones. The gender distribution was the same in music appreciation.

The proportion of male students in the experimental group was 73% and 94% in the control group. This is a special phenomenon so the study did not investigate whether gender differences had any influence on learning effectiveness. Additionally, due to the arrangement of academic affairs, participants came only from departments of management, science and engineering, and electrical engineering and computer science. An independent samples *t-test* was used to compare students' self-scored questionnaires on their learning effectiveness with the average scores evaluated by two experts. Thirty-five students were in the experimental group, and the traditional group was composed of 36 students. Participants did not actually attend at the last class, so that 30 sets of questionnaire data were gathered from the experiment group and 34 from the control group.

### Courses

The experimental group took the course based on WebQuest. Details of the group are shown in Table 1. This course included six phases: introduction (20 minutes), task (30 minutes), process (100 minutes), resources (100 minutes), evaluation (30 minutes), and conclusion (20 minutes) [17]. At the same time, to meet the rule that there should be one computer for every ten students, the experimental group had four wireless on-line computers installed in the classroom [22].

### Instruments

The effectiveness of the WebQuest teaching strategy was designed to test if WebQuest worked well from both the experimental and control groups. The questionnaire included independent thinking, team integration, creativity generation and prompt problem-solving. The overall alpha was 0.90 suggesting that these scales had high reliability.

## PROCEDURE

Before the experiment, the researchers distinguished between how the WebQuest and the traditional teaching strategies should be carried out and how they should be used to produce the instructional materials, including multimedia and task assignments. Both courses were carried out over four weeks. The actual procedure and activities for the two courses are shown in Table 1. When the courses finished, all participants were asked to answer according to the same scale. Finally, data were collected to test, if a significance difference between the two groups by *t-test* existed.

## RESULTS

The statistical analysis compared the results of the effectiveness of the WebQuest questionnaire between the experimental and control group. Table 2 shows that there were significant group differences at the 0.05 significance level in independent thinking and team integration. However, the means for the experimental group's idea generation and prompt problem-solving were higher than those from the control group.

## DISCUSSION AND SUGGESTIONS FOR FUTURE STUDY

The primary goal was to determine whether providing WebQuest would improve learning effectiveness in music appreciation. From the questionnaire, an independent sample *t-test* indicated that only independent thinking and team integration could be improved by using WebQuest.

The results were consistent with findings that are critical of adopting WebQuest as a panacea for all manner of educational ills [23]. Foshay and Bergeron argue that putting content on a webpage is not a guarantee of learning [24]. There is a big difference between information and instruction, but it may not necessarily mean that one can teach with it. Instructors must be aware of the teaching process and provide guidance after the Web searching phase to ensure that students' knowledge is efficiently constructed. Furthermore, a three weeks' short-term WebQuest teaching strategy may be enough to encounter and integrate some knowledge, but absolutely not enough to promote higher order thinking skills.

Table1: Contents of the course with a WebQuest strategy.

Phase	Activity Contents
Introduction	Expert Modelling: Wedding Band Performance
Task	Create Wedding Band on Your Own Six expert-worksheets per group Questions in the worksheet are: 1. According to the Web-based inquiry, my role play should be... 2. Continuing from question one, which websites can influence or inspire me to make such creative decisions? 3. After discussion with our whole group, what doable and integrated decisions were made?
Process	Every student was asked to select one of the six roles: the music selector, the music instrument maker, the music performers, the music rhythmic graph painter, the conductor and the music DJ. Inquiry activity in the classroom, and accomplish three major questions in the worksheet. Rehearsal and teacher advice. Formal performance in simulated situation.
Sources	Websites are categorised in three major directions, including the introduction of percussion and its performance in Chinese and Western classical and modern music, the rhythmic notation of Chinese and Western music, the use and forms of the conductor in the band. The websites were selected by the instructional designer from the National Headquarters of the Taiwan Traditional Art, National Digital Archives Program and Oxford Music On-line, etc, to avoid possible breaches of copyright.
Evaluations	Group worksheets were scored by two expert teachers and based on the rubrics because there were no standardised answers. The evaluation included the personal creative opinion, the integration of the performance, the integration of the worksheet, the performance conformity and each item was ranked from poor, average, fair to excellent.
Conclusions	WebQuest effectiveness questionnaire written by participants.

Table 2: Summary of *t-test* of the effectiveness of WebQuest between the experimental and control group.

	Group	N	Mean	SD	<i>t</i>	$\eta^2$
Independent thinking	experiment	30	23.00	2.91	2.14*	.07
	control	34	21.44	2.90		
Team integration	experiment	30	25.17	3.59	3.84*	.20
	control	34	21.56	3.88		
Idea generation	experiment	30	18.67	2.90	1.52	-
	control	34	17.68	2.32	(n.s.)	
Prompt problem-solving	experiment	30	14.70	2.62	0.94	-
	control	34	14.18	1.82	(n.s.)	

\*p < .05

The findings raise the question about how researchers should address teaching methods to improve the achievement of music appreciation in universities of Taiwan. However, there may be conceptual differences between general background knowledge and experiences that one would need to consider when undertaking further research. Current research in the introduction of music provides evidence only about students' learning effectiveness. More research is needed on the ways that teaching strategy combined with Web-based technology can be used to observe the students' higher order thinking ability.

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