Ensuring learning gain using webeditor: an experiential learning approach

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Abstract. Student-centered learning is a wide-ranging teaching approach that involves replacing lectures with dynamic learning, incorporating self-paced learning courses and/or cooperative group situations, ultimately holding the student responsible for his own developments in education. This study aimed to ensure learning gain using WebEditor in light of the experiential learning approach. Specifically, it achieved the following objectives: a) determined the prior knowledge of BSIT students in HTML5 using Notepad and a Web browser, b) determined the individual student gain score or normalized gain and total average gain score after using WebEditor, and 3) determined if there is a significant difference between HTML5 coding skills using Notepad and Web browser and WebEditor. The study is quantitative and descriptive in nature. The study found that the total average gain score of all the student-participants after using WebEditor is 0.32 or a 32% learning gain. 86% of the student-participants had a positive gain, 7% had a zero gain, and also 7% had a negative gain which is the common case. The study concludes that the entire population on average gained 32 percentage points out of a possible 100 percentage points that they may have gained from pre to post assessment. Experiential learning helped the students fully learn new skills and knowledge using WebEditor. Moreover, all of them agreed that WebEditor is more efficient in displaying the output. Aside from their learning gain from using WebEditor, the performance of the participants in HTML5 coding indeed improved with the introduction of WebEditor in place of using a separate text editor (Notepad) and a Web browser.

1. Introduction

Student-centered learning is a wide-ranging teaching approach that involves replacing lectures with dynamic learning, incorporating self-paced learning courses and/or cooperative group situations, ultimately holding the student responsible for his own developments in education. The primary focus of the student-centered learning environment is need satisfaction while transmission of a body of knowledge is that of a subject-centered environment [1]. With the advent of technology, it is quite easier to overcome many barriers to implementing innovative alternatives [2].

Experiential learning is simply learning by doing but there is more to the process. In its simplest form, experiential learning means learning from experience or learning by doing. Experiential education first immerses learners in an experience and then encourages reflection about the experience to develop new skills, new attitudes, or new ways of thinking. [3].

An example of experiential learning is hands-on learning that might involve working with a trained carpenter to learn how to build a chair. In this case, the learner has gained some skills but has not taken part in experiential learning. The next step would involve taking time to reflect on the experience and compare chair-building to other building projects. Based on reflection, the learner would then develop...
new ideas about how best to go about building a chair, and return to chair building with new insights and ideas.

The same goes true with this study wherein hands-on learning involved HTML5 coding using Notepad and Web browser first. Experiential learning has not yet taken place at this point so the next step was to experience HTML5 coding using another tool. Therefore, when they were introduced to WebEditor, the learners then developed new ideas about how best to code HTML5 and return to HTML5 coding with new insights and ideas.

These scenarios prompted the researchers to experiment on the possibility that experiential learning be implemented at the Abra State Institute of Sciences and Technology. In this study, Notepad WebEditor was used to ensure learning gain through experiential learning among student-participants. This study aimed to ensure learning gain using WebEditor: An experiential learning approach. Specifically, it achieved the following objectives: 1) determined the prior knowledge of BSIT students in HTML5 using Notepad and a Web browser, 2) determined the individual student gain score or normalized gain and total average gain score after using WebEditor, and 3) determined if there is a significant difference between HTML5 coding skills using Notepad and Web browser and WebEditor.

1.1. Conceptual Framework

Figure 1 shows the conceptual framework of the study. Fourteen (14) third year BSIT students of the Abra State Institute of Sciences and Technology participated in the demonstration of their skill in HTML5 coding in the pre-assessment by performing what are being asked in the questionnaire through an individual hands-on assessment using Notepad and a Web browser and answering the additional question added to the pre-assessment questionnaire. It is divided into two parts: code snippet writing and constructing an HTML design. Questions aimed at measuring the HTML5 coding skills of the student-participants. To determine the individual student gain score or normalized gain and total average gain score, a post-assessment was administered using WebEditor.

WebEditor is an open-source portable application that runs through any Web browser which, as shown in Figure 2, allows input of (1) HTML (body) codes, (2) CSS codes, (3) JavaScript codes, and displays responsive (4) Output. The authors did not develop the application rather they made use of WebEditor since it is readily available and open source.

2. Methodology

2.1. Research Design

The study is quantitative and descriptive in nature. Since the study is concerned with the determination of the prior knowledge of BSIT students in HTML5 using Notepad and a Web browser and determination of the individual student gain score or normalized gain and total average gain score after exposition of the BSIT students to a WebEditor application that both accepts HTML5 input in the first
quadrant and displays responsive output in the fourth quadrant, the descriptive method is the most appropriate method to use. This type of research includes administration of a survey questionnaire.

Fourteen (14) third year BSIT students of the Abra State Institute of Sciences and Technology served as the respondents of the study. The sessions were divided into two three-hour duration which is the standard laboratory hours duration in a week. The post-assessment took place a week after the pre-assessment was administered in time with their succeeding scheduled laboratory session. The respondents were asked to demonstrate their skill in HTML5 coding by performing what are being asked in the questionnaire through an individual hands-on assessment and answering the additional question added to the pre-assessment questionnaire. To determine the prior knowledge of BSIT students in HTML5, a pre-assessment questionnaire was administered during the first session. It is divided into two parts: code snippet writing and constructing an HTML design using Notepad and Web browser. Questions aimed at measuring the HTML5 coding skills of the student-participants.

During the second session, participants then interacted with WebEditor, an application that both accepts HTML5 input in the first quadrant and displays responsive output in the fourth quadrant. The same questions in the pre-assessment were asked but this time, a different HTML coding tool, WebEditor, was used. To determine the individual student gain score or normalized gain and total average gain score, a post-assessment was administered. Moreover, a third part was added to the pre-assessment questionnaire to elicit their preferred tool(s) in HTML 5 coding because it was their first time to use WebEditor.

2.2. Data Analysis

To determine the prior knowledge of BSIT students in HTML5, frequency count and percentage were used. To evaluate the HTML 5 coding skills of the student-participants, Website Project rubric [4] developed by Portfolio Village was used as shown in Table 1. However, the design criterion was omitted because it is not evident in the skills to be demonstrated. To determine the individual student gain score and normalized gain of the student-participants, the following formula was used:

\[
\text{Gain} = \frac{\text{Post-test} - \text{Pre-test}}{100\% - \text{Pre-test}}
\]

Where: pre-test is the percentage of correct items on pre-unit test
post-test is the percentage of correct items on the post-unit test

The study used the normalized learning gain because using a pre-assessment/post-assessment model with calculation of normalized gain was found effective by [5] on a one-day introductory bronchoscopy curriculum.

| Points             | Concept                                           | Content                                           | Execution                                         |
|--------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| 1 – Not acceptable | The Website has no clear visual concept and does not relate to the task goals. | The Website has no appropriate content for the project goals and does not present sufficient quantity of output samples and related content. | The Website contained many spelling errors, many image errors, navigation errors, and had broken/missing content. |
| 2 - Needs improvement | The Website almost has a clear visual concept but does not relate to the task goals. | The Website almost has appropriate content for the task goals but does not provide sufficient quantity of related content. | The Website contained a lot of spelling errors and a lot of image/text errors (wrong size or scale, typographical, blurry or inappropriate images). |
| 3 - Good           | The Website has a clear visual concept that       | The Website provide has appropriate content for the | The Website contained only a few spelling         |
|                    |                                                   |                                                   |                                                   |
3. Results and Discussion

3.1. Prior Knowledge of BSIT Students in HTML 5 Using Notepad and a Web Browser

Figure 2 shows that 11 (or 79%) of the student-participants demonstrated a passing score while three (or 21%) of them failed in the pre-assessment. This implies that majority of the student-participants have adequate skills in HTML 5 using Notepad and a Web browser.

![Figure 3. Distribution of Remarks in the Pre-Assessment](image)

3.2. Individual Student Gain Score or Normalized Gain and Total Average Gain Score After Using WebEditor

Table 2 shows that the total average gain score of all the student-participants after using WebEditor is 0.32 or a 32% learning gain. This means that, in general, they gained 32 percentage points out of a possible 100 percentage points that they may have gained from pre to post assessment. This implies that experiential learning through WebEditor helped them fully learn new skills and knowledge because [6] states that it involves a few steps that allow students a hands-on, collaborative and insightful learning experience.

This findings is similar to that of [7] wherein the quantitative analysis revealed significant improvement of the learning outcomes when the technique is implemented using state-of-the-art teaching technologies and hands-on laboratory sessions.

Figure 4 shows that 14 (or 100%) of the student-participants passed the post-assessment and none of them failed. This means that experiential learning through WebEditor had a significant impact on their HTML 5 coding skills that from 79% passing rate in the pre-assessment, all of them already passed in the post-assessment.

As shown in Figure 5, it is notable that 12 (or 86%) of the student-participants had a positive gain, one (or 7%) had a zero gain, and also one (or 7%) had a negative gain which is the common case. This means that most of them have scored higher on their post-test than on their pre-test. Only one participant scored the same on his/her pre-assessment and post-assessment and also only one participant scored lower on his/her post-assessment than he/she did on his/her pre-assessment.

According to [8], a positive gain score indicates that the post-test score was greater than the pre-test score; a negative gain score indicates that the post-test score was less than the pre-test score. A zero gain
score indicates that the post-test score is equal to the pre-test score. Student-participant 5 demonstrated the highest gain of 45 percentage points out of a possible 60 percentage points that he/she may have gained as shown in Figure 6. Therefore, he/she gained 0.75 (or 75%) of the potential percentage points he may have gained from pre to post test. On the other hand, student-participant 9 may have gained up to 15 percentage points, but rather lost 20 percentage points (or 133%) of what he/she may have gained.

Table 2. Individual Student Gain Score/Normalized Gain

| Student-Participant | Pre-assessment | Post-assessment | Student Gain Score/Normalized Gain | Classification of Gain |
|---------------------|----------------|----------------|-----------------------------------|------------------------|
|                     | Raw Score | Percentage | Remarks | Raw Score | Percentage | Remarks | |
| 1                   | 14       | 70         | Passed   | 16       | 80         | Passed   | 0.33 | Positive  |
| 2                   | 14       | 70         | Passed   | 15       | 75         | Passed   | 0.17 | Positive  |
| 3                   | 10       | 50         | Passed   | 17       | 85         | Passed   | 0.70 | Positive  |
| 4                   | 11       | 55         | Passed   | 15       | 75         | Passed   | 0.44 | Positive  |
| 5                   | 8        | 40         | Failed   | 17       | 85         | Passed   | 0.75 | Positive  |
| 6                   | 15       | 75         | Passed   | 15       | 75         | Passed   | 0.00 | Zero      |
| 7                   | 12       | 60         | Passed   | 13       | 65         | Passed   | 0.13 | Positive  |
| 8                   | 11       | 55         | Passed   | 13       | 65         | Passed   | 0.22 | Positive  |
| 9                   | 17       | 85         | Passed   | 13       | 65         | Passed   |-1.33 | Negative  |
| 10                  | 10       | 50         | Passed   | 17       | 85         | Passed   | 0.70 | Positive  |
| 11                  | 11       | 55         | Passed   | 17       | 85         | Passed   | 0.67 | Positive  |
| 12                  | 8        | 40         | Failed   | 15       | 75         | Passed   | 0.58 | Positive  |
| 13                  | 11       | 55         | Passed   | 17       | 85         | Passed   | 0.67 | Positive  |
| 14                  | 8        | 40         | Failed   | 14       | 70         | Passed   | 0.50 | Positive  |
| **Total Average Gain Score** |       |            |          |           |             |          | 0.32 | Positive  |

Figure 4. Distribution of Remarks in the Post-Assessment

Figure 5. Distribution of Normalized Gain

Figure 7 shows that 14 (or 100%) of the student-participants prefer to use WebEditor in HTML 5 coding. All of them agreed that WebEditor is more efficient in displaying the output because there is no need for them to save the document as HTML and view the page in a Web browser. The process often times causes them not to view the page because Notepad appends the default .txt file extension name if the file type has not been changed to All Files and if .html extension name has not been appended.
3.3. Difference between HTML5 Coding Skills Using Notepad and Web browser and WebEditor

Table 3 shows that there is a significant difference between the HTML5 coding skills of the participants using Notepad and Web browser (pre-assessment) and WebEditor (post-assessment). It is indicated by the probability associated with t-value of 0.002 at 0.05 level of significance. This further affirms that aside from their learning gain from using WebEditor, the performance of the participants in HTML5 coding indeed improved with the introduction of WebEditor in place of using a separate text editor (Notepad) and a Web browser.

**Table 3. Difference between the Pre-Assessment and Post-Assessment**

| Pair 1            | t-value | df | Probability associated with t-value |
|-------------------|---------|----|------------------------------------|
| Pre-assessment    | -3.945  | 13 | 0.002                              |
| Post-assessment   |         |    |                                    |

4. Conclusion

Majority of the student-participants have adequate skills in HTML 5 using Notepad and a Web browser. The entire population on average gained 32 percentage points out of a possible 100 percentage points that they may have gained from pre to post assessment. Experiential learning with the use of WebEditor helped the students fully learn new skills and knowledge using WebEditor. Moreover, all of them agreed that WebEditor is more efficient in displaying the output. Aside from their learning gain from using WebEditor, the performance of the participants in HTML5 coding indeed improved with the introduction of WebEditor in place of using a separate text editor (Notepad) and a Web browser.

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