Effects of Copper Model in Blended Service Learning for the Enhancement of Undergraduate Academic Achievements and Critical Thinking

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Abstract - This study is aimed at comparing academic achievements and critical thinking skills between the groups undertaking blended service learning and typical learning. A cluster random sampling was employed to sample 62 students. The experimental and control groups respectively comprised 30 and 32 of them. The instruments were 1) a Copper Model lesson plan, 2) online instructional media on Computer and Information Technology, 3) a critical thinking measurement, and 4) an academic achievement measurement. Data were analyzed using mean (\( \bar{x} \)), standard deviation (SD), and one-way MANOVA.

Results concluded that the experimental group with blended service learning achieved higher academic achievements and critical thinking skills than the control group at the .05 significance level.

Keywords - Copper Model, service learning, blended learning, academic achievement, critical thinking skills

1. Introduction

The educational management of Thailand seeks to equip all learners with fundamental knowledge for future autonomous learning and self-development. In managing such a learning process, learners need to train their thinking skills, face authentic situations, and learn to take practical actions [1]. At the tertiary level, higher education institutions’ primary missions are to provide up-to-date academic services in response to social needs based on institutional expertise. These institutions coordinate with one another in networks [2] to offer pedagogies that match regarding the requirements of Thailand Qualifications Framework (TQF) in an effort to push learners towards five domains of the learning outcomes: ethics and morals, knowledge, cognitive skills, interpersonal skills and responsibility, and numerical, communication and information technology skills [3].

The Rajabhat University is higher education institutions for local development, intellectual empowerment, restoration of learning inspiration, and commendation of local wisdom. These institutions are with crucial educational objectives which provide academic services to the society, establish a sense of love and belonging with local communities, and promote in-community lifelong learning. The efforts are consistent with the principles of service learning, which are a type of education that involves community services for academic purposes [4]. Although the advancement of information technology now plays a vital role in instructions through online or blended approaches addressing individual learning differences in terms of thinking, interests, and learning capacities [5].

Critical thinking skills remain equally fundamental to the development of learners in the 21st century [6],[7]. Critical thinking is a process that incorporates consideration, problem-solving, and decision making through analysis, synthesis, and evaluation using reasons from credible information sources [8],[9],[10].

Existing instructional problems indicate that teaching has been too focused on contents rather than allocating learners the opportunities to practice think,
and analyze. Most learning measurements have been about grades, and these cause learners to miss necessary development to achieve desirable academic standards, e.g., rational, analytical, and critical thinking [3][11]. Hence, this study acknowledged the discussed dilemma and found the significance in examining outcomes from blended service learning. The instructional efforts are targeted at pushing learners towards autonomous development both in knowledge and critical thinking, offering a developmental guideline for effective tertiary teaching, and shape thinkers to further the development of the Thai communities and nation.

2. Research Objective

To compare academic achievements and critical thinking skills between the groups undertaking blended service learning and typical learning.

3. Research Hypothesis

Learners with blended service learning possess more optimal academic achievements and critical thinking skills than ones with typical learning.

4. Literature Review

4.1. Blended Service Learning (Copper Model)

Blended service learning or Copper Model is a synthesized instructional approach for this study based on concepts and theories from experts in Social Services and Blended Learning. Copper Model was synthesized, developed, and evaluated for quality by educational experts, and the model-suitability assessment indicated that the model was highly suitable. In brief, the model comprises five components: 1) Collaboration, 2) Preparation, 3) Process, 4) Evaluation, and 5) Reflection, which can be elaborated as follows:

1) Collaboration

The collaboration establishes a mutual understanding of social service activities where learners and instructors are obliged to work in cooperation. Instructors are required to promote the understanding of the essences of the course, including the identification of goals and objectives as well as the pedagogical organization which promote critical thinking skills among learners.

2) Preparation

The preparation gets learners ready to begin the service activities. Instructors and learners are required to investigate community needs, issues, or matters of interest that are in line with the objectives and goals of the curriculum or course.

3) Project management process

The process contains four steps as follows: 1) Project planning which determines the project duration, 2) Service operations, 3) Mid-operation evaluation and reflection via online communication and direct consultation with the instructors while the instructors simultaneously assess the learners during the activities, and 4) Reviews of operations/activities through brainstorming, discussion, commenting, and thinking as well as organize a presenting platform, for example, to offer an opportunity for learners to present their outcomes.

4) Evaluation

The evaluation comprises three stages: 1) a pre-course assessment which determines the readiness of learners at the beginning of the course, 2) a mid-course assessment, and 3) a final assessment.

5) Reflection

The reflection gives floors for learners to express their opinions in a class discussion, and the reflections are recorded in online journals.

4.2. Critical Thinking

Critical thinking refers to the ability to think clearly through a reasoning consideration in a process to come up with a decision on what to believe and what to do. Critical thinking also includes the ability to think freely and reflect ideas carefully [7][12][13]. An utilizable critical-thinking measurement includes the Cornell Critical Thinking Test Level Z. It is a standard instrument that is suitable for high school, undergraduate, and graduate learners. The measurement can evaluate six areas of thinking: 1) Deduction, 2) Conceptualization, 3) Credibility of Sources and Observations, 4) Induction, 5) Prediction in Planning Experiment, 6) Definition and Identification of Assumptions [14].

4.3. Academic Achievement

Academic achievement refers to various abilities of learners that emerge from teaching, practices, or experiences which transform their behaviors. Academic achievements can be measured in three dimensions: cognitive, affective, and psychomotor. According to Bloom's Taxonomy of Educational Objectives [15], an authentic assessment should be employed on learners’ specific behaviors to measure their academic achievements, and these include: 1) knowledge, 2) comprehension, 3) application, 4) analysis, 5) synthesis, and 6) evaluation.
5. Methodology

5.1. Population and Sample

Population: 118 undergraduates of Kamphaeng Phet Rajabhat University, Mae Sot Campus, who were enrolled in the five classes of Computer and Information Technology in Semester 1, Academic Year 2019.

Sample: Through a cluster random sampling, 62 undergraduates who were enrolled in Computer and Information Technology in Semester 1, Academic Year 2019, were selected while 30 were assigned into the experimental group, and the remaining 32 were assigned to the control group.

5.2. Instruments

The following instruments were assessed for quality:

1. Lesson plan: The Copper-Model lesson plan contains four units with an eight-week instructional duration. The four units were 1) History of the Internet, 2) Online Services and Social Media, 3) E-Commerce, and 4) Online Ethics and Security. The plan was evaluated by five experts and received a high-quality result (x̅ =4.40, SD = 0.64).

2. Online instructional media: The online media were developed based on the Copper-Model components in four learning units, including infographic presentations, handouts, interval quizzes, online chat rooms, and online journals. These media were evaluated for efficiency during their implementations in corresponding learning sessions and mid-lesson exercises. For formative and summative evaluation, the online instructional media were assessed by five experts and yielded a high-quality result (x̅ =4.35, SD = 0.52).

3. Academic achievement test: The test was designed using 80 four-option and multiple-choice response items. The IOC index ranged from 0.60 - 1.00, with a difficulty range of 0.23 - 0.73, and a discrimination range 0.22 - 0.89. The test was subsequently assessed for reliability using Kuder-Richardson 20, producing a score of 0.89.

4. Critical thinking test: The test was designed with 60 four-option and multiple-choice response items based on the theory of Cornell Critical Thinking Test Level Z. The five-expert evaluation yielded an IOC index range of 0.60 - 1.00 and a Kuder-Richardson 20 score of 0.83.

5.3. Data Collection

Data were collected with the following procedures:

1. An orientation was organized to offer suggestions on instructional tips for the blended service learning with Copper Model, roles of learners and teachers, and ways to utilize online instructional media.

2. Before starting a course session, according to the lesson plan, the sample in the experimental and control groups were tested using the academic achievement test and the critical thinking test.

3. Course sessions proceeded, and they were based on the Copper Model lesson plan covering all four units in eight weeks. The pedagogy was administered as follows:

<table>
<thead>
<tr>
<th>Copper Model</th>
<th>Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration</strong></td>
<td>The instructor promotes an understanding of social service activities and the course. Learners examine the unit content through online media, review them in class an hour before the class begins (online), summarizes the course content using a mind-map via an online tool known as Coggle (online), examine case studies from videos (Youtube), and present the findings in front of the class (F2F).</td>
</tr>
<tr>
<td><strong>Preparation</strong></td>
<td>Learners get ready to begin their field social service activities by identifying community needs, issues, or matters of interest that are in line with the objectives and goals of the curriculum or course. After the collaborative field-survey, the learners take notes of the findings in their online journals.</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>A service project is formulated at this phase following these steps: Step 1: Project planning Step 2: Service operations Step 3: Evaluation and reflection during operations via online communication and direct consultation with the instructors while the instructors simultaneously assess the learners during the activities Step 4: Operational reviews through brainstorming, discussion, commenting, and thinking as well as organize a presenting platform, for example, to offer an opportunity for learners to present their outcomes</td>
</tr>
</tbody>
</table>
Copper Model Learning Activities

Evaluation

The evaluation comprises three stages: 1) a pre-course assessment which determines the readiness of learners at the beginning of the course, 2) a mid-course assessment, and 3) a final assessment. All evaluation sessions use the following primary instruments:

- an academic achievement test,
- a critical thinking test,
- a group observation,
- an investigation of online journals,
- an assessment of class workpieces, and
- an assessment of online exercises.

Reflection

Reflections occur based on the data as appear in online journals and the findings from the field survey. These reflections should authentically address community contexts, issues, and needs.

4. Upon completing the four learning units within the designated duration, the experimental and control groups were tested using the academic achievement test with 80 response items in 120 minutes and the critical thinking test with 60 response items in 90 minutes.

5. Score data from both tests were analyzed with a one-way MANOVA.

6. Results

The data on academic achievements and critical thinking skills among the undergraduates in Computer and Information Technology were analyzed. The results were compared in groups between the experimental with Copper Model and control with a normal session. In this study, the MANOVA’s test of assumptions was conducted as follows:

Table 2. Results of MANOVA’s test of assumptions

<table>
<thead>
<tr>
<th></th>
<th>Normal Distribution</th>
<th>Pearson's Correlations</th>
<th>Box’s M Test (Sig.)</th>
<th>Bartlett’s Test (Sig.)</th>
<th>Levene’s Test (Sig.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental</td>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achievement</td>
<td>.122</td>
<td>.878</td>
<td>.288**</td>
<td>.878</td>
<td>.593</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>.211</td>
<td>.466</td>
<td></td>
<td></td>
<td>.726</td>
</tr>
<tr>
<td>Results</td>
<td>Normality</td>
<td>Normality</td>
<td>.288 &lt; α</td>
<td>Sig &gt; α</td>
<td>Sig &lt; α</td>
</tr>
</tbody>
</table>

Sig. = .00, α = .05

From Table 2, when the dispersion was tested, Shapiro-Wilk indicated a normal dispersion across four groups at the .05 significance level. The Box’s M test indicated no significance (Sig > α). Pearson’s correlation coefficient of the dependent variables, i.e.,

Table 3. A comparison of post-course means and standard deviations for academic achievements and critical thinking skills

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>N</th>
<th>( \bar{x} )</th>
<th>SD</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement</td>
<td>Experimental</td>
<td>30</td>
<td>61.40</td>
<td>5.93</td>
<td>14.38</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>32</td>
<td>55.65</td>
<td>5.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>Experimental</td>
<td>30</td>
<td>47.23</td>
<td>4.51</td>
<td>7.26</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>32</td>
<td>44.09</td>
<td>4.64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 suggests that, in general, the experimental group produced higher academic-achievement and critical-thinking scores than the control group at the .05. Dimensionally, the experimental group yielded an academic-achievement mean of 61.40 (SD = 5.93), which is higher than the control group with a post-course mean of 55.65 (SD = 5.98). Similarly, the experimental group earned a mean critical-thinking score of 47.23 (SD = 4.51), which is higher than the control group with a post-course mean of 44.09 (SD = 4.64). Based on these results, it can be concluded that learners of Computer and Information Technology in the experimental group who were exposed to Copper-Model blended service learning earned higher scores in academic achievements and critical thinking than those in the control group with typical learning sessions.
7. Discussion

The results indicate that learners of Computer and Information Technology in the experimental group who were exposed to Copper-Model blended service learning earned higher scores in academic achievements and critical thinking than the ones in the control group with conventional learning methods at the .05 significance level. This implicates that Copper Model and blended service learning can effectively enhance academic achievements and critical thinking skills. More in detail, the Copper Model was administered as follows:

Collaboration: The collaboration was between the learners, the instructor, and community members. Instructor introduced the concept of service learning through social service activities and tasked the learners to go out for a field survey in an effort to identify the problems and needs that exist in their communities or the community-enterprise groups and OTOP groups within their communities. The learners were asked to select only the ones that were in line with the contents of the course: Computer and Information Technology. The instructor also introduced case studies to the class for learners to brainstorm ideas and discuss findings. The learners were tasked to think through the writing of mind-maps via Coggle and present these insights in front of the class. Furthermore, the learners also examined the contents through online media (Google Sites), participated in online discussion forums, logged their learning with online journals, and exchanged ideas via Padlet. These activities were consistent with [16], suggesting that learning is crucial in promoting the thinking process. When learners review stories, they begin managing knowledge, and blended learning can ignite the learning itself and permit learners to improve their learning abilities.

Preparation: The learners surveyed community areas, addressed the issues and needs of communities in OTOP or community enterprise groups, as well as worked in collaboration to brainstorm ideas and solve problems for the communities. The learners and the instructor jointly prepared the project by assembling documents and scheduling tasks. Project stakeholders regularly coordinated with the communities and reported the results via the online journals. These courses of action were consistent with the concept in [17] which discussed the emphases of community needs, interests, and problems when preparing for social service activities. Congruently, [18] reported that blended learning offers learners more sense of involvement with communities than regular classroom sessions.

Process: The process contained four steps:

Step 1) Project planning - Learners learned to write a project and determine its duration. Step 2) Operations - Based on the identified issues and needs, measures were taken to improve online sales channels for community products, including Facebook Pages and promotional videos. Step 3) Mid-operation Evaluation and reflection - A communication channel was established using a discussion board where for the instructor to assess the learners during the activities. Step 4: Operational reviews - Learners, in a group, jointly brainstormed ideas, discussed findings, and presented the work in class.

The organization of social service activities is in line with the concept of [19],[20], which stated that projects for social service activities have to be developed in steps starting from planning, activity organization, outcome presentation, and learner assessment.

Evaluation: There were three forms of evaluation. 1) The pre-course assessment: The instructor tasked the learners to take the academic-achievement and critical-thinking tests before the course to determine their knowledge levels. The derived results were further employed as a guideline to develop and manage the learning process so that the learners could be suitably equipped with the knowledge and skills based on the learning objectives. 2) The mid-course assessment: The instructor conducted this assessment amid the teaching management by asking the learners to do end-less exercises, examining weekly task submissions, and tracking the social service progress. The measurements included an observation form for individual and group assessment, a job submission check, and an investigation of learners’ completion of exercises. 3) The final assessment: This assessment was conducted similarly to the pre-course assessment. Learners’ results on academic achievement and critical thinking were determined if they meet the designed goals and objectives. This concept is congruent with [21],[22], who suggested time-interval, objective-based, goal-based, pre-project, and post-project assessments.

Reflection: Reflections occurred after the learners finished the social service activities as the instructor tasked them to discuss the results as a class, review their recorded online journals, and shared experiences. The learners raised opinions and shared attitudes towards the applications of classroom technological theories in practices in boosting sales through online channels of the community products for the community enterprises. The concept of reflection is consistent with [16],[23], who stated that keeping learning logs is an essential facilitating factor that improves learning and thinking processes. When learners reviewed stories, they began
managing knowledge as well as reflecting on attitudes and past experiences. Writing a summary with this approach is a blend between a traditional mean and online media to record activities.

8. Conclusion

The implementation of the Copper Model in blended service learning in improving undergraduate academic achievements and critical thinking was found to be practical, and this notion is in line with the findings from many educational philosophers. Authentic field practices offered learners crucial learning opportunities to connect classroom theories with real-world problem-solving in their communities. Furthermore, the learners were also given an opportunity to use online platforms to work together and reviewed the learning contents. This means that Copper Model in blended service learning was proven to be beneficial in learning, effective as a developmental measure for critical thinking, responsive to the university goals, and usable as national policies for educational development.

References


