Research on the Influence of Computer Network Supported Cooperative Learning on Sentence Construction Skills of Elementary School Students

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Abstract - This study concentrates on the improvement of students’ sentence construction skills from using the sentence construction learning website, which is based on computer network, supported cooperative learning. Nonequivalent pretest-posttest control group design was adopted in this research. Different sentence construction learning methods served as independent variables, while discussions focused on their effects on dependent variables, such as use of words and punctuation, wrong words, predicates, and rhetoric ability. After both the experiment group and the control group took the sentence construction pretest, the teacher divided the students into heterogeneous groups according to results of the assessment, and the groups started a sentence solitaire activity. The result indicated that after using the website, students in the experimental group showed significant improvement in use of words punctuation, adjectives, adverbs, similes and metaphors.

Index Terms - sentence construction, web-based cooperative learning, learning together, sentence construction learning website

INTRODUCTION

Writing isn’t just a topic in Chinese language courses, but also an effective tool that benefits instructions in any academic subject, and an effective method that allows students to actively participate in learning. Following the development of psychology, patterns that have dominated the theory and practice of writing have shifted through three stages: among the earliest of them was the “stage model”, in which writings were analyzed as the product of linear stages; later on, with the development of cognitive psychology, research shifted its focus to the discussion of an individual’s mental process when writing, which is the “cognitive process model”; in recent years, the influence of social constructionism and situated cognition have caused research to again shift its attention to the social interaction process of writing, and was called the “social interaction model”. These three writing models have different assumptions on the development of “meaning”, and have different emphases on the interaction between writer, reader, and text [1]. Writing is an effective tool that benefits instructions in any academic subject, and also an effective method that allows students to actively participate in learning, relevant literature [2] indicates that writing across the curriculum has the following advantages:

1. It can enhance students’ writing skills: Writing is a complex activity; topics that can lead to writings are countless and complicated, writing activities caused by topics of academic subjects are beneficial to the writing skills of students.

2. It can enhance learning of an academic subject: Writing isn’t only a fundamental ability required for communication with other people, but also a method beneficial to learning, thinking, and discovering [3]. Writing activities of academic subjects are beneficial to students’ learning effects.

3. It can help students develop communication and discourse patterns for specific academic subject communities: Although there are some common patterns in communication and discourse, each academic subject community has its own unique academic language, and writing across the curriculum benefits students by helping them obtain communication and discourse patterns similar to specialists of specific fields.

4. It can be used as a method for integrating courses: Writing across the curriculum is a course integration method with writing skills as its core. This method not only saves teaching time, but also enhances overall learning effects.

However, Lo Hao-en pointed out: “According to a survey on Taipei City’s teachers and students, 98.6% of teachers believe that the Chinese language abilities of middle school students have worsened, and not one teacher believed that students’ Chinese language abilities have improved.” After summing up the opinions of different scholars, Chang Hsin-jen concluded that teaching activities before writing included: training basic writing abilities, teaching text structure, and teaching writing techniques: Writing abilities included: word choice, sentence construction, sentence organization, paragraph writing, and punctuation marks. In
order to improve writing ability, one can start from practicing word choice and sentence construction. Saddler, B. also believed that practicing sentence construction was an essential element of writing courses; a complete course should comprise large amounts of time spent on writing, teacher student discussions, small units to enhance sentence construction skills, sufficient demonstration and guidance, and selection of writing topics [4]. In recent years, writing instructions have taken on a new form, thanks to the popularity of computer technology and the internet. Weinberger, A. & Ertl, B. & Fischer, F. & Mandl, H. pointed out that computer network supported cooperative learning is a group learners engaged in a common task, discussing and learning from each other's perspectives through a text interface or video conference[5]. The usage of computer network supported cooperative learning makes students aware that this new skill is valuable, whereas activities of cooperative learning is beneficial to their learning content and technical abilities [6]. Cooperative learning has been widely used in elementary schools, but in the process of cooperative learning it is easy to discover defects in message passing, material organization, negotiations, and inter-activity [7]. The progress of computer network technology has made up for the above deficiencies; not only has it expanded targets, strategies, and methods of cooperative learning and deepened and broadened learning connotation, it has allowed learners to obtain multiple perspectives through the process of social negotiation, which can effectively elevate students’ learning achievements and learning motivation and nurtures their social concepts and skills, such as respecting others, communication ability, expression ability, and interpersonal relationships.

In research on the application of computer network supported cooperative learning to writing, Shaaban proposed the web-based multimedia writing classroom, establishing a website learning environment for teachers and students to develop writing courses[8]. Teachers assigned writing topics and provided reference and links to relevant websites. After reading the information provided, students used e-mail or forums for communication and discussion; they then proceeded to online writing and publishing via group cooperation, and even to appreciation and assessment. Research findings show that this learning environment can help teachers solve difficulties in teaching, help students overcome their fear of writing, arouse students’ interest in writing, and improve students’ writing abilities. A study conducted by Joanna, Crosier and John indicated that a computer network supported cooperative learning environment makes law school students even more active in writing and willing to share their writings with the same generation over the internet, which will help them gain good grades when writing their thesis[9].

The purpose of this study is to plan and establish a sentence construction teaching website that can satisfy the elements of web-based cooperative learning, use this website to instruct fourth grade students on sentence construction, and discuss its influence on students’ sentence construction abilities.

**Method**

I. Participants

Fourth graders from an elementary school in Taipei City were selected for experimental teaching, students of the experimental group used computer network supported cooperative learning, namely a sentence construction teaching website; students of the control group used conventional cooperative learning. Each group comprises 30 students for a total of 60 students.

II. Experimental design

This study uses the quasi-experimental design “nonequivalent pretest-posttest control group design” and explores “the influence of computer network supported cooperative learning on the sentence construction ability of elementary school students”. Different methods for learning sentence construction are independent variables and dependent variables include word choice, punctuation marks, wrong characters, word usage, and figure of speech. The influence of different methods on dependent variables is discussed after students undergo an eight week course, receiving instructions for a total of 320 minutes.

III. Materials

Research tools used by this study comprise pretests and posttests, a questionnaire on the sentence construction teaching website, and the sentence construction teaching website itself.

- **Pretest and Posttest Questions**
  Questions of the pretest and posttest select words and expressions suitable for fourth graders, and asks about who, what, when, and where; each test has ten questions. For validity, three elementary school Chinese language teachers with over three years of teaching experience were asked to verify whether if questions of the pretest and posttest were suitable for fourth graders. Adjustments were made to the pretest and posttest based on the opinions and suggestions of these teachers. For reliability, alternate-form reliability estimation was used. Two tests that had different questions but were similar in nature, content, and difficulty were made, one was used as the pretest and the other was used as the posttest. The correlation coefficient of the two tests is .701, p=.000, achieving .01 level of significance.

- **2. Sentence Construction Teaching Website**
  This sentence construction teaching website is based on computer network supported cooperative learning. It divides students into heterogeneous groups of five according to their pretest scores. Each group tries to pass
this website’s three levels, which are basic sentence construction, sentence construction from an image, and sentence construction with figure of speech; five complete sentences are required to reach the next level. Questions of each level are based on whom, what, when, and where, group members have to follow the question’s instructions, starting from a basic sentence and then adding modifiers, such as adjectives and adverbs, to make the sentence more complete. After finishing the three levels, group members can review the sentences they constructed and vote on the best sentence.

IV. System Introduction

This system features a three level sentence construction game for children to play, the three levels are basic sentence construction, sentence construction from an image, and sentence construction using figure of speech. Before using the system, learners must first register and set their own personal account and password. Functions of this website include number of logins, pretest score, group information, and querying and modifying the user’s personal information. Students who successfully register and login will first have to answer ten questions to test their sentence construction ability; their score will be used by the administrator for heterogeneous grouping. In order to reach the next level, students need to cooperate with members of their group and complete sentences according to each question’s instructions. After the three levels are complete, a webpage showing all sentences made by each group will be displayed, and students can vote on which sentence they think is the best. The sentence construction process of each person can also be looked up here, giving students the chance to learn from one another. If any member can’t complete their own sentence, the whole group won’t be able to reach the next level. When this occurs, other group members can use the chat room to provide aid. Usage procedures are as shown in Fig. 1.

RESULTS

I. Analysis of the experimental group and control group’s pretest and posttest scores

The experimental group and control group scored an average of 91.4 and 92.3 points on the pretest and an average of 96.1 and 93.7 points on the posttest respectively; the scores of both groups improved after experimental instructions. After using a paired t-test on pretest scores of the experimental group and control group, the value of t(58)= -1.273, p>.05 didn’t reach level of significance, which shows that there is no significant difference in the pretest scores of both groups. However, after using a paired t-test on posttest scores of the experimental group and control group, the value of t(58)= 2.746, p<.05 reached level of significance, which means that there is significant difference between posttest scores of both groups, as shown in Table 1. Thus we know that students of the experimental group scored better in the posttest than students in the control group.

II. Analysis of the experimental group’s pretest and posttest scores

The experimental group’s p values for punctuation marks, adjectives, adverbs, and figure of speech were all below .05, which indicates significant difference in these four dimensions between the two test scores of these 30 students. This shows that the experimental group’s ability to use punctuation marks, adjective, adverbs, and figure of speech improved after computer network supported cooperative learning on the sentence construction teaching website. However, no significance could be observed in “wrong characters” after experimental instructions. Results are as shown in Table 2.

DISCUSSION

I. “Wrong (Chinese) characters”

Results of the independent samples t-test and dependent samples t-test done on the experimental group showed no significant difference in the “wrong characters” dimension. It was observed in the teaching process that students often concentrated only on whether or not sentences were smooth and clear when they were making sentences on the sentence construction teaching website. When students use the Chinese phonetic input method, numerous characters with the same sound will appear, and the correctness of characters is easily neglected when students are only concerned about speed. Tai divided wrong characters inputted by students into the following nine categories: 1. Forming of dialect; 2. Mistake; 3. Assumed; 4. Habitually increased the strokes of a character; 5. Unsure whether or not to reduce strokes of a character; 6. Learning disability; 7. Not focused, mistook the character for another; 8. Misled by Kanji; 9. Misled by simplified Chinese. This experimental instruction has found that wrong characters were mainly caused by students not being focused, mistook the character for another, habitually added strokes to a character, and were unsure whether or not to reduce strokes of a character. Future instructions should be directed towards utilizing teaching resources to improve students’ understanding of the shape, sound, and meaning of Chinese characters and reduce the rate of wrong characters.

II. “Punctuation marks”, “Adjectives”, “Adverbs”, and “Figure of speech”

Students believe that their ability to use punctuation marks improved after using the sentence construction teaching
website. This could be because sentences comprise fewer words than compositions, which require the use of many different sentence patterns and punctuation marks. Only commas and periods are frequently used in sentences and students rarely make mistakes. Adjectives and adverbs were more frequently seen in student sentences after using the sentence construction teaching website. Language textbooks already place great emphasis on the usage of adjectives and adverbs, and this could be the result of students applying what they’ve learned in the teaching website. Students learn to use figure of speech when they are in the third and fourth grades. Yet, appropriate use of figure of speech is easier said than done. In the process of experimental instructions and actual instructions, students were deeply troubled by the use of figure of speech because they lacked creativity and life experiences. Therefore, appropriate use of figure of speech is a true challenge for fourth graders, and they require more imagination and creativity practice in daily life if they are to master its use.

**Conclusions**

A computer network supported cooperation environment can enhance students’ ability to solve problems; support from peers will allow them to easily acquire and share abundant resources, which is beneficial to learning. Moreover, computer network supported cooperative learning is a teaching method based on the needs of learners. In the process of web-based cooperative learning, this study has found that receiving aid from peers or providing assistance can both solve problems. Some fourth graders are not as proficient in Chinese typing, members of the same group that are better at typing will help them so the whole group may proceed to the next level, and the purpose of cooperation is achieved in the process.

Writing is expressing oneself in written form, and it reflects on students’ ability to express their thoughts and emotions and ability to think. Integrating computer technology with writing instructions is a key to the development of such abilities. This study has designed a sentence construction teaching website based on the theory of computer network supported cooperative learning. In order to understand the effect of computer network supported cooperative learning and conventional cooperative learning on students’ sentence construction ability, quasi-experimental design is used with students who learn sentence construction via the sentence construction teaching website as the experimental group and students who learn sentence construction via conventional classroom teaching as the control group. Research findings indicate that the sentence construction teaching website can improve students’ ability to use “punctuation marks”, “adjectives”, “adverbs”, and “figure of speech”. Students gave positive responses to the sentence construction teaching website’s content and the sense of interaction. The sentence construction teaching website is a fresh new channel for learning sentence construction that makes students extremely motivated.

**References**

Table 1: Pretest and posttest scores of the experimental group and control group

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
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<tr>
<td></td>
<td>91.4</td>
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<td>Experimental Group</td>
<td>92.3</td>
<td>4.76</td>
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<td>(N=30)</td>
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*p<.05
Table 2: T-test of pretest and posttest scores for each dimension of the experimental group

<table>
<thead>
<tr>
<th>Item</th>
<th>Samples</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Correlation coefficient</th>
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<th>p value</th>
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<tr>
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<td>1.83</td>
<td>1.859</td>
<td>.348</td>
<td>2.926</td>
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<td>1.137</td>
<td>-.050</td>
<td>2.765</td>
<td>.010*</td>
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<td>1.834</td>
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<td>Pretest – Posttest</td>
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<td>4.63</td>
<td>3.358</td>
<td>.082</td>
<td>-7.357</td>
<td>.000*</td>
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<td>.07</td>
<td>.254</td>
<td>.260</td>
<td>-5.019</td>
<td>.000*</td>
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<td>.573</td>
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<tr>
<td>Pretest – Posttest</td>
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<td>.03</td>
<td>.183</td>
<td>-.337</td>
<td>-2.693</td>
<td>.012*</td>
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*p<.05