Chang, M. et al. (Eds.) (2019). Proceedings of the 27th International Conference on Computers in Education. Taiwan: Asia-Pacific Society for Computers in Education

Improving Summary Writing Performance via Theory-based Learning System

Chiou Sheng CHEW[a*], Wen-Chi Vivian WU[b] & Norisma IDRIS[c] & Er Fu LOH[d]
[a]*Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA, Melaka, Malaysia*
[b]*Department of Foreign Languages and Literature, Asia University, Taichung, Taiwan*
[c]*Faculty of Computer Science and Information Technology, University of Malaya, Kuala Lumpur, Malaysia*
[d]*Academy of Language Studies, Universiti Teknologi MARA, Melaka, Malaysia*
*cschew501@gmail.com

Abstract: While summary writing has been acknowledged by many scholars as an integral skill that builds the background knowledge of learners, and enhances writing outcomes, only a handful of theory-based online summary writing tools have been developed to date. In view of this, the Summary Writing-PAL (SW-PAL) was developed, rooted in several learning and education theories, in the attempt to assist ESL non-English majors in improving their summary writing skills. This study presents both the development and the evaluation of SW-PAL. The three primary features of SW-PAL are prior knowledge activation, summarising strategies instruction, and scaffolding. Prior knowledge activation applies a concept mapping tool as an advance organiser that activates the students' prior knowledge while comprehending the text. The worked examples tool is meant to aid students in acquiring the essential summarising strategies. The self-generated feedback provided by the tool serves as a scaffolding tool to assist students through the summarising process. Pre- and post-tests, as well as an interview session held with students, ascertained the effectiveness of the tool and perceptions of its users. The study outcomes revealed that the developed SW-PAL had managed to improve their summary-writing ability at a significant level.

Keywords: Summary writing, computer assisted learning, summarizing strategies, learning theories

1. Introduction

Most tertiary and secondary education institutions learning, particularly those established across ASEAN countries, view summary writing as a significant aspect of assessment to evaluate one's ability to comprehend texts written in the English language (Abdi, Idris, Alguliyev, & Aliguliyev, 2016; Idris, Baba, & Abdullah, 2011; McDonough, Crawford, & De Vleeschauwer, 2014; Wichadee, 2014). Students, due to poor text comprehension and summary writing skills, may end up rewriting parts of the original excerpt in a haphazard manner. Writing apprehension stems partly due to lacking of writing skills (Wichadee, 2014). Typically, summary writing is taught as follows: 1) identifying the main idea and deleting unimportant content (deletion); 2) identifying umbrella terms or general words based on the main idea and supporting details (generalisation); and 3) identifying and rephrasing the main idea to improve the sentence (construction). Students with exceptional summarising skills may better understand the text, and hence, produce better summaries.

1.1 Reading Comprehension

Comprehending reading texts simply refers to understanding the gist of the written texts by applying cognitive skills. In order to comprehend a text effectively, one would require good decoding skills (Kintsch, 1988) and prior knowledge (Best, Ozuru, Floyd, & McNamara, 2006). Activated prior knowledge aids learning, while the opposite hinders learning (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010). Prior knowledge is vital while reading a text to gain better understanding of the gist,

while summary writing has been proven to connect old and new knowledge effectively so as to enhance reading comprehension (Marzec-Stawiarska, 2016).

1.2 Summary Writing

The essentials of summary writing are generating a concise text comprising of only important information while discarding explanatory and supporting details from the original source. Summary writing skills are imminent to understand the gist of a text, which are tested across schools in ASEAN countries (Idris et al., 2011). The key to writing a good summary is by integrating important ideas into a single paragraph in accordance to summarising or macro rules. Brown and Day (1983) listed five macro rules for summarising a text, which are: elimination of unimportant information, deleting redundant information by rewording, and restating several vital sentences. Additionally, similar words are substituted with synonyms and the gist found in the source text is rephrased in the writer's own words (Idris et al., 2011; Lemaire, Mandin, Dessus, & Denhière, 2005). Despite introducing these strategies to the students, some continue to fail in writing exceptional summary (Idris et al., 2011; McDonough et al., 2014).

1.3 Relationship between Reading Comprehension and Summary Writing

The Zone of Proximal Development (ZPD), Transactional, Meaningful Learning, and Cognitive Load theories are significant upon assessing the correlation between reading comprehension and summary writing (Ausubel, 1963; Rosenblatt, 1988; J. Sweller, 1988; Vygotsky, 1978). Typically, transaction takes place between the source text and the students' prior knowledge. Activation of prior knowledge is essential to understand the gist of a text, which in turn, facilitates learning (Mason, Ariasi, & Boldrin, 2011). Vast prior knowledge enhances reading comprehension skills (Calisir & Gurel, 2003). Summary writing can only take place after understanding the gist of a text. In enabling students to write summary effectively, scaffolding must be integrated with ZPD and cognitive load should be decreased. A computer-assisted learning tool that addresses these issues may enhance the summary writing ability among students.

The conceptual framework displayed above motivated the researchers to build a theory-based computer-assisted summary writing learning tool called Summary Writing-Pal (SW-PAL) to aid students learn summary writing skills. The purpose of this study is two-fold. First, it determined if SW-PAL can improve the performance of students to write summary, and second, it analysed the perceptions of students who were exposed to SW-PAL.

The research questions of this study are listed in the following:

1. Is there a significant difference in ESL students' summary writing performance after using the SW-PAL?
2. What are the students' perceptions towards the use of SW-PAL?

2. The Summary Writing-PAL (SW-PAL)

The three primary components in SW-PAL are Prior Knowledge Activation (PKA), Summarising Strategies Instruction (SSI), and Scaffolding (SC). The first component, PKA, activates knowledge for students to understand the text effectively with the aid of their prior knowledge prior to summary writing. Here, the concept of mapping tool serves as an advance organiser to improve both text comprehension and summary writing (Sung, Liao, Chang, Chen, & Chang, 2016). The second component, SSI, exposes students to a range of summarising strategies through the use of worked example instructional approach. According to Sweller, Ayres, and Kalyuga (2011), the effect of split-attention may be obtained by integrating various information sources. The last component, SC, is a feedback tool that identifies strategies for the students to check their summary writing strategies. It is vital to ensure the correct use of summary writing strategies. This SC feedback tool assures that students learn and practice writing summaries independently, thus minimising the teacher's workload.

3. Methods

3.1 Subjects and research design

Twenty-five Malaysian undergraduate students, four males and twenty-one females, were exposed to SW-PAL to learn summary writing. A pre-test and post-test experimental design was adopted to assess the impact of SW-PAL on the performance of the subjects in writing summaries. This study took five weeks, with a week for pre-test, three weeks for SW-PAL intervention, and the final week for post-test.

3.2 Instruments

The scores retrieved from pre- and post-test determined whether the subjects had improved their performance in writing summary. The sample text was selected by using the Flesch Reading Ease (FRE) readability index. An expository excerpt was applied for both pre- and post-test, while the other text types had been used for the SW-PAL intervention period. Two worked examples of the summary were used for every text, along with a range of strategies for summary writing prepared via SW-PAL.

3.3 Procedure

A pre-test, six SW-PAL practice sessions, a post-test, and a semi-structured focus-group interview had been carried out for all the selected subjects in the study. The pre-test took place in the first week, which required the subjects to summarise a text after reading it. Next, six practice sessions were carried out between week two and week four to teach the subjects SW-PAL operation and summary writing via worked examples, as prepared by the instructor. The subjects practiced with a text for every 90-minute session. Lastly, the post-test was performed in the fifth week after completing the practice phase. All procedures implemented in the post-test were similar to those used for pre-test.

By using the Grading Rubric for summary (Desoiza, 2011), two ESL lecturers assesses the summaries retrieved from both pre- and post-test. The Grading Rubric was composed of five criteria: main ideas, accuracy, words and style, organisation, and length. Next, the marking scheme had four-level grading: exemplary (4 points), proficient (3 points), adequate (2 points), and needs to improve (1 point). Upon summing the scores for every criterion, score for cumulative summary performance was retrieved (5-20 points). Lastly, the scores were assessed using paired samples t-test.

3.4 Semi-structured focus-group interview

Five subjects were selected for a semi-structured focus-group interview by adhering to the interview protocols devised by the researchers. The interview was performed for several purposes, including: (1) to assess their learning experiences with SW-PAL, (2) to determine if they liked the SW-PAL features, and lastly, (3) to gain feedback about SW-PAL features. The interview was recorded, transcribed, and analysed in accordance to qualitative study design.

4. Findings

4.1 Effectiveness of SW-PAL

Research question 1 determined the effectiveness of SW-PAL in improving the summary writing performance displayed by the subjects. The descriptive statistics (see Table 1) showed that the mean score of the post-test (M=12.88) exceeded the mean score of the pre-test (M=10.04) significantly. Based on the paired-sample t-test (see Table 2), the mean variance between pre-and post-test was 2.84; reflecting significant improvement among the subjects at 5%, $t = -11.70$, and $p < 0.005$. Hence, SW-PAL had significantly enhanced the students' performance in their summary writing.

Table 1

Descriptive statistics of subjects

Test	N	Mean (M)	Std. Deviation
Pre-test	25	10.04	2.09
Post-test	25	12.88	1.72

Table 2

Paired-Sample t-test between Pre-test and Post-test scores of subjects

Test	Mean Difference	t	df	Sig. (2-tailed)
Pre-Test Score – Post-Test Score	-2.84	-11.70	24	.000

4.2 Students' perceptions towards SW-PAL

Research question 2, which refers to students' perceptions towards SW-PAL, was addressed via semi-structured focus-group interview. The subjects admitted that they felt motivated to use the tool and agreed that the SW-PAL had greatly aided and enhanced their performance in writing summaries. According to them, the concept mapping was helpful in logically organising thoughts and concepts before they proceeded with summary writing, besides activating their prior knowledge while reading the text. The subjects claimed that they preferred applying the worked examples in order to learn the various strategies to write a summary effectively. As for the feedback tool, the subjects found it beneficial in checking their summary writing strategies.

5. Discussion and Conclusion

A theory-based computer-assisted learning tool called SW-PAL was successfully developed to aid summary writing, by integrating three primary aspects, namely: concept mapping, worked examples, and feedback features. This study determined the effectiveness of SW-PAL in enhancing the subjects' summary writing performance, including their perceptions towards the SW-PAL features.

A total of 25 ESL undergraduate students participated in this study to assess the developed SW-PAL via pre-test post-test experimental design. The study outcomes revealed that SW-PAL was indeed an effective tool that enhanced the subjects' ability to write summaries. In fact, the findings are in agreement with those reported in several past studies (Chiu, 2015; Wade-Stein & Kintsch, 2004), which highlighted improvement in language learning through the use of learning tool.

The subjects claimed that they preferred using SW-PAL for summary writing, particularly the worked examples that exposed them to a range of summary writing strategies. A few subjects admitted that they had anxiety at the initial stage when using the concept mapping, which served as advance organiser to activate their prior knowledge. The subjects also found the feedback tool beneficial in improving their language proficiency. The intent of the researchers is to perfect this developed SW-PAL in future.

A number of limitations were detected in this study. First, the sample size in this study (25 subjects) is insufficient to generalise the efficacy of SW-PAL to other populations. Second, the impacts of SW-PAL could be generalised merely to ESL population that share similar attributes, but not other ESL students with varied English language proficiency, age group, and learning institutions (university, college, matriculation, foundation). Lastly, the validity of the study outcomes is questionable due to the short empirical period – merely five weeks.

The main objective of this study is to assess the worked examples of SW-PAL. Future investigations may examine the impacts of concept mapping and feedback aspects or even their combination on the summary writing performance amongst a range of subjects, besides ESL students.

Additionally, this study calls for more assessments that analyse the intelligent feedback in SW-PAL, so as to enhance the ability of writing summaries.

Acknowledgements

We would like to thank all the people who prepared and revised previous versions of this document.

References

Abdi, A., Idris, N., Alguliyev, R. M., & Aliguliyev, R. M. (2016). An automated summarization assessment algorithm for identifying summarizing strategies. *Plos One*, *11*(1), e0145809.

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: Seven research-based principles for smart teaching*. John Wiley & Sons.

Ausubel, D. P. (1963). Cognitive structure and the facilitation of meaningful verbal learning. *Journal of Teacher Education*, *14*(2), 217–222.

Best, R., Ozuru, Y., Floyd, R., & McNamara, D. (2006). Children's text comprehension: Effects of genre, knowledge, and text cohesion. *Proceedings of the 7th International Conference on Learning Sciences*, 37–42. Retrieved from http://portal.acm.org/citation.cfm?id=1150040

Brown, A. L., & Day, J. D. (1983). Macrorules for summarizing texts: The development of expertise. *Journal of Verbal Learning and Verbal Behavior*, *22*(1), 1–14.

Calisir, F., & Gurel, Z. (2003). Influence of text structure and prior knowledge of the learner on reading comprehension, browsing and perceived control. *Computers in Human Behavior*, *19*(2), 135–145.

Chiu, C. (2015). Enhancing reading comprehension and summarization abilities of EFL learners through online summarization practice. *The Journal of Language Teaching and Learning*, *1*, 79–95.

Desoiza, R. A. (2011). *Pictorial map effects on learning how to summarize*. *Doctoral dissertation*. University of San Francisco.

Idris, Baba, & Abdullah. (2011). Identifying students' summary writing strategies using summary sentence decomposition algorithm. *Malaysian Journal of Computer Science*, *24*(4), 180–194.

Kintsch, W. (1988). The role of knowledge in discourse comprehension - A construction integration model. *Psychological Review*, *95*(2), 163–182.

Lemaire, B., Mandin, S., Dessus, P., & Denhière, G. (2005). Computational cognitive models of summarization assessment skills. *Proceedings of the 27th Annual Conference of the Cognitive Science Society (CogSci'2005)*, 1266–1271.

Marzec-Stawiarska, M. (2016). The influence of summary writing on the development of reading skills in a foreign language. *System*, *59*, 90–99.

Mason, L., Ariasi, N., & Boldrin, A. (2011). Epistemic beliefs in action: Spontaneous reflections about knowledge and knowing during online information searching and their influence on learning. *Learning and Instruction*, *21*(1), 137–151.

McDonough, K., Crawford, W. J., & De Vleeschauwer, J. (2014). Summary writing in a Thai EFL university context. *Journal of Second Language Writing*, *24*(1), 20–32.

Rosenblatt, L. M. (1988). Writing and reading: The transactional theory. *Reading and Writing Connections*, *20*(fall), 153–176.

Sung, Y. T., Liao, C. N., Chang, T. H., Chen, C. L., & Chang, K. E. (2016). The effect of online summary assessment and feedback system on the summary writing on 6th graders: The LSA-based technique. *Computers and Education*, *95*, 1–18.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, *12*(1), 257–285.

Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. *Cognitive Load Theory* (Vol. 1).

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. *Mind in Society The Development of Higher Psychological Processes*, *Mind in So*, 159.

Wade-Stein, D., & Kintsch, E. (2004). Summary street: Interactive computer support for writing. *Cognition and Instruction*, *22*(3), 333–362.

Wichadee, S. (2014). Developing reading and summary writing abilities of EFL undergraduate students through transactional strategies. *Research in Education*, *92*(Nov 2014), 59–71.