

EFFECTS OF GUIDED WRITING STRATEGIES ON STUDENTS' WRITING ATTITUDES BASED ON MEDIA RICHNESS THEORY

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ABSTRACT

The purpose of this paper is to develop different guided writing strategies based on media richness theory and further evaluate the effects of these writing strategies on younger students' writing attitudes in terms of motivation, enjoyment and anxiety. A total of 66 sixth-grade elementary students with an average age of twelve were invited to join the experiment for a period of twelve weeks. A repeated-measure one-way ANOVA analysis was utilized to examine the differences among the three strategies including a rich media guided writing strategy, lean media guided writing strategy, and pen-and-paper guided writing strategy. The findings of this study showed the rich media guided writing strategy had higher significant differences than the pen-and-paper guided writing strategy in terms of writing attitudes toward motivation, enjoyment and anxiety. However, there were no significant differences between the rich media guided writing strategy and lean media guided writing strategy in terms of motivation and anxiety. The findings imply that providing a web-based learning environment with high richness media could guide students to write and achieve more positive writing attitudes in terms of motivation, enjoyment and anxiety.

INTRODUCTION

The development of language skills affects a person's productive ability. Several researchers have demonstrated personal success in disciplines is strongly related to a person's writing ability (Lerstrom, 1990) and depends on good writing skills (Cho & Schunn, 2007). Specifically, good writing skills are required training since prior research has proven writing is an important part of the elementary school curriculum (Lidvall, 2008). However, most students are usually apprehensive toward writing activities, and writing instruction remains an area of low interest for those students (Lidvall, 2008; Clark, 2004). Besides, the lack of suitable learning strategies in writing results in low motivation for students (Yang & Chung, 2005; Lo & Hyland, 2007). To solve these problems, Lipstein and Renninger (2007) suggested students who are interested are more likely to develop a better understanding of writing, set writing goals, make use of various strategies, and seek feedback on their writing. Therefore, a better understanding of how to develop a suitable learning strategy or authoring tool to enhance students' writing interest and motivation is worth examining.

Many studies have been conducted on the relevant factors related to writing attitudes in terms of pedagogy and learning strategy. For instance, Brindley and Schneider (2002) pointed out writing instruction should evolve into a more effective set of techniques and strategies that include modeling, shared writing, guided writing, and interactive writing (Pinnell & Fountas, 1998; Routman, 1991). Regarding the learning strategy to improve writing, Lee (1994) showed how pictures can be used as an effective guided writing strategy to facilitate students' writing process and improve writing proficiency. More specifically, such instruction using pictures in a guided writing environment can assist beginning foreign language students to develop and improve their writing skills as well as lower their anxiety in terms of expressing themselves in the target language.

Additionally, several studies have examined the effects of technology on writing instruction (Yang & Chung, 2005; Ulusoy, 2006; Yeh & Lo, 2009). For instance, Yeh and Lo (2009) used online annotation services to support error correction and corrective feedback in the writing activity. Also, Yang and Chung (2005) developed and evaluated a web-based writing environment to encourage elementary students' writing. Their results showed, in such a writing environment, students who previously thought writing was difficult came to feel writing was much easier than before. Moreover, Drexler, Dawson, and Ferdig (2007) utilized blogging to develop elementary expository writing skills. Their results indicated blogging can improve students' writing attitudes in terms of motivation. In sum, a web-based learning environment can provide learners with instructional materials and

valuable knowledge free from the restrictions of time and space (Sun et al., 2008). The research mentioned above confirmed these benefits.

However, to the best of our knowledge, there is no study that has developed a web-based guided writing environment for elementary students. The present study attempted to combine a guided writing strategy and web-based learning environment to improve the writing environment for enhancing elementary students' writing attitudes. A major feature of the environment is web-based learning can integrate different media, such as text, picture, audio, animation and video to create various multimedia instructional materials and promote the writing interest and willingness of the learner (Gillani & Relan, 1997; Vichuda, Ramamurthy, & Haseman, 2001; Kuzu, Akbulut, & Şahin, 2007; Özdilek, & Özkan, 2009; Dalacosta, Kamariotaki-Paparrigopoulou, Palyvos, & Spyrellis, 2010). Moreover, many studies have claimed educational websites providing multimedia materials offer several instructional benefits (Neo & Neo, 2004; Liaw, Huang, & Chen, 2007; Chen & Liu, 2008).

Nevertheless, regarding the design of digital learning materials, Chang and Yang (2010) argued it sometimes too easy to assume multimedia provides a better learning environment, without considering the organization and distribution of the multimedia components. Therefore, the question of how to develop suitable instructional materials according to the unique characteristics of the subject matter is emerging as an important issue in web-based learning (Sun & Cheng, 2007).

The purpose of this study was to develop guided writing strategies in a web-based environment based on media richness theory and further to compare the effects of these guided writing strategies on students' writing attitudes. Our evaluation focused on answering the following question:

According to the proposed guided writing strategies, which strategy is more suitable for enhancing students' writing attitudes?

THEORETICAL FRAMEWORK

Some theoretical perspectives and related work indicating why this study would be beneficial and improve learning activities are briefly described with regard to guided writing strategies and media richness theory.

● Guided writing strategy

Kellogg (1988) pointed out proper writing strategies can enhance writing performance and reduce attentional overload. However, several researchers indicated, since writing is a complex task requiring the organization of several abstract ideas, instructors usually face tremendous challenges in developing a suitable writing strategy to assist students (Kieft, Rijlaarsdam, & Van den Bergh, 2008). Besides, to promote writing performance, the teacher plays an important role in helping students develop viable strategies for getting started, drafting, revising and editing (Silva, 1990).

According to prior research, Galbraith and Torrance (2004, p. 64) described two important views in terms of the practical implications of writing strategies as follows: (1) *Planning strategy*, in which writers "concentrate on working out what they want to say before setting pen to paper, and only start to produce full text once they have worked out what they want to say". Based on the planning strategy, the teacher could use available media (such as pictures, animations, and video) or instruments to assist writing and guide students who have some ideas to express before actually beginning writing. (2) *Revising strategy*, in which writers "work out what they want to say in the course of writing and content evolves over a series of drafts". According to this strategy, students can think of what they want to write by observing the media content and simultaneously revising their drafts.

As mentioned above, writing strategies on how to develop and formulate abstract ideas as well as use proper media or tools to assist pre-writing and successive tasks are critical issues. Guided writing is the most important factor in these strategies. Guided writing is an instructional writing context chiefly teaching the writing process through modeling, support, and practice (Tyner, 2004). Holdich and Chung (2003) indicated guided writing offers greater opportunities for young writers to make valuable connections between text, sentence and word level decisions and help children shape and redraft texts with particular criteria in mind. Most importantly, with such a writing strategy, the instructor should think how to guide young students into independent writing and help them discover their own abilities by providing opportunities for choice, peer response and further scaffolding (Oczkus, 2007).

In sum, the principle of the guided writing strategy is to provide instructional materials or relevant media to help students write. For example, in traditional writing instruction, the instructor generally guides student to express ideas by providing paper-based text, pictures or video media related to the writing subject. However, these media

have many shortcomings in terms of flexibility, accessibility, interoperability, reusability, and convenience. In contrast, the web-based learning environment could be more helpful in assisting instruction through providing greater functions and more recent content.

Therefore, based on the principle of the guided writing strategy and the benefit of web-based learning environment, this study adopted the advantages of both the web-based environment and multimedia technology to present these ideas. It is expected learners could obtain better learning performance through such a writing way.

● **Media Richness Theory**

According to prior research, media richness theory (MRT) is defined as “the capacity to process rich information” (Daft & Lengel, 1986, p. 560). The level of media richness might enhance user concentration. Media richness has been argued to play an important role in shared meaning and understanding (Daft & Lengel, 1984). Kishi (2008) defined media richness as the capacity of media to develop shared meaning, overcome different frames of reference, and clarify ambiguous issues in a timely manner. Daft, Lengel, and Trevino, (1987) indicated the richness of a media is based on the following four criteria:

- (1) Capacity for immediate feedback: This refers to the speed and quality of common interpretation transmitted through the medium. Generally, if a media could effectively facilitate interactions among the users and the system, the media has a higher level of feedback.
- (2) Capacity to transmit multiple cues: An array of cues, including physical presence, voice inflections, body gestures, words, and numbers, even graphic symbols, facilitate the conveyance of interpretation information. According to this criterion, multimedia content is superior to the text in expressing certain concepts and meanings.
- (3) Language variety: This means the level of concept conveyance. For example, numbers and formulas could provide greater precision; but natural language conveys a broader set of concepts and ideas. Also, compared with text-based content, multimedia content can play a vital role in helping students understand many difficult and abstract concepts. (Su, 2008).
- (4) Capacity of the medium to have a personal focus: This refers to either the conveying of emotions and feelings, or the ability of the medium to be tailored to the specific needs and perspectives of the receiver. According to this view, information has its value when it satisfies a person’s needs. In other words, if a user is familiar with a specific media content (especially in the context of schooling or the daily life of the user), he or she will have more feelings while observing such content.

In recent years, several studies proved media richness positively influences e-learning. Shaw et al. (2009) explored the effects of hypermedia, multimedia and hypertext to increase information security awareness among the three awareness levels of perception, comprehension and projection in an on-line training environment. Their results demonstrated the degree of media richness and the improvement of security awareness levels were positively correlated. Liu, Liao and Pratt (2009) presented a framework to study users’ acceptance of streaming media for e-learning. Their results indicated the concentration of the users was stimulated by the course materials developed using rich media. Moreover, based on MRT, Sun and Cheng (2007) examined the effectiveness of multimedia instructional material design, as well as media on a learner’s performance and satisfaction. They suggested the use of rich media (high richness media or rich information) should suit the characteristics of the course unit under consideration in e-learning.

In sum, each media has some outstanding characteristics and the developer and designer of an e-learning environment should adopt a suitable medium to support the corresponding learning activities in e-learning. Therefore, the above view motivated the authors to evaluate the effect of different guided writing strategies on writing attitudes. According to MRT, this study designed three strategies, including a rich media guided writing strategy (RM-GWS), lean media guided writing strategy (LM-GWS), and pen-and-paper guided writing strategy (PP-GWS), and compared their effect on writing attitudes.

RESEARCH VARIABLES AND MODEL

To compare the effects of the proposed guided writing strategies on students’ writing attitudes, three major factors are proposed as follows.

● **Motivation**

Ryan and Deci (2000, p. 69) indicated “Motivation has been a central and perennial issue in the field of psychology, for it is at the core of biological, cognitive and social regulation”. Motivation can be thought of as the needs, wants, interests and desires propelling individuals in a particular direction (Jeffrey, 2009). It is a

psychological attribute enticing students to learn as well as to complete learning activities (Green & Sulbaran, 2006). For the educational field, motivation has been identified as a critical factor affecting learning (Lim, 2004). Lack of motivation can be a major obstacle preventing learners from concentrating on the given instruction (Jeamu, Kim, & Lee, 2008).

In previous research, many studies have been conducted on the influential factors related to learning performance such as motivation. For example, Lo and Hyland (2007) looked at young ESL writers in Hong Kong and implemented a new ESL writing programme designed to enhance students' motivation. The programme aimed at making the writing tasks more relevant to students by introducing topics related to their lives and social world and by providing a real audience and a real purpose for writing. The findings indicated the new programme enhanced students' engagement and motivation. Most importantly, Neo and Neo (2009) indicated students could improve their critical-thinking, creativity and presentation, as well as heighten their motivation when engaged in a multimedia-mediated learning environment. Based on the above evidence, the present study expected a guided writing strategy with rich media will more positively affect motivation. Therefore, the following hypothesis is proposed.

H1: The RM-GWS writing environment can enhance learners' motivation more than the LM-GWS and PP-GWS writing environments.

● **Enjoyment**

Davis, Bagozzi, and Warshaw (1992) explained enjoyment refers to the extent to which the activity of using a computer system is perceived to be personally enjoyable in its own right aside from the instrumental value of the technology. Enjoyment was also proved to induce perceptions of ease of use with subjects, thus enhancing technology adoption (Venkatesh, 2000). Thong, Hong, and Tam (2006) indicated perceived enjoyment is another important user belief that can lead to successful information technology usage. Prior studies have also confirmed the importance of perceived enjoyment in explaining information technology acceptance (Thong, Hong, & Tam, 2006).

Additionally, Fu, Wu, and Ho (2009) explored the development of a productive learning atmosphere in the context of web-based learning. As a result, they suggested teachers must create a classroom atmosphere to encourage learner engagement in collaborative learning, which will in turn enhance students' enjoyment of learning. Besides, Chatzoglou et al. (2009) dealt with the prognosis of employees' intention to use a web-based training process by extending the technology acceptance model using enjoyment. The structural equation modeling indicated enjoyment directly affects employees' intention to use web-based training. Specifically, Liaw, Huang, and Chen (2007) examined both instructors' and learners' attitudes toward e-learning usage. The above results indicate multimedia instruction can significantly affect the enjoyment of e-learning.

Therefore, this study attempted to use perceived enjoyment as an influential factor for writing activity. Further, this study considered a writing strategy with rich media will more positively impact the perceived enjoyment of a writing activity. Thus, the following hypothesis is proposed.

H2: The RM-GWS writing environment can enhance learners' enjoyment more than the LM-GWS and PP-GWS writing environments.

● **Anxiety**

Writing anxiety can be defined as the following "fear of the writing process that outweighs the projected gain from the ability to write" (Thompson, 1980, p.121). Writing anxiety has also been termed composition anxiety. Students with less writing ability may feel uncomfortable, gradually creating a sense of anxiety. In general, the students often feel apprehension in composition class, which often interferes with their ability to learn how to write effectively (Clark, 2004). Besides, students with high writing anxiety also considered writing unrewarding or punishing and approached it with negative attitudes (Daly & Shamo, 1978).

According to past research on writing anxiety, the following common characteristics of writing anxiety have been identified (Daly & Miller, 1975; Daly & Shamo, 1978):

- (1) Learners are frightened by the demand for writing competency.
- (2) Learners fear negative evaluation of their writing.
- (3) Learners avoid writing whenever possible.
- (4) When learners are forced to write they behave destructively.

The above points show why students feel apprehension toward writing. To deal with these problems, a few studies have proposed relevant learning strategies to reduce writing anxiety. For example, Öztürk and Çeçen (2007) examined the effects of portfolio keeping on the writing anxiety of students. The results showed using a portfolio in instructional practice could enhance the collection of students' work, demonstrating their efforts, progress, and learning achievements. Besides, for such learning strategies, teacher-student and peer collaboration could reduce writing anxiety and trigger communication by giving more opportunities to share reflections. Atay and Kurt (2007) examined the effects of peer feedback on the writing anxiety of Turkish prospective teachers of English. Their results at the end of the study showed the peer feedback group experienced significantly less writing anxiety than the teacher feedback group. Overall, to the best of our knowledge, little research has been conducted on developing learning strategies to reduce writing anxiety.

Therefore, a better understanding of how to develop a suitable learning strategy or authoring tool to reduce students' writing anxiety is worth investigating. To this end, this study considered a writing strategy with rich media would reduce writing anxiety. The following hypothesis is proposed.

H3: The RM-GWS writing environment can reduce learners' writing anxiety more than the LM-GWS and PP-GWS writing environments.

Based on the above analyses, this study proposed a research model and three major hypotheses related to the effects of different guided writing strategies on students' writing attitudes in terms of motivation, enjoyment and anxiety. Here, the research model is described in Figure 1.

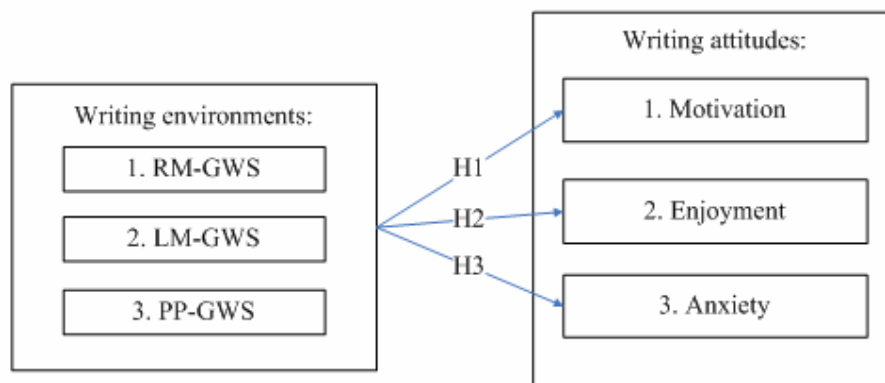


Figure 1: Research model.

IMPLEMENTATION OF WRITING ENVIRONMENTS

Regarding the proposed writing environments of this study, the development software included Adobe Flash CS3 and Photoshop CS3 to create animations and images, respectively. The Flash ActionScript 3.0 and ASP.NET 3.5 were selected as the client and server writing environment development language, respectively. Additionally, IIS 6.0 was used as the Web Server, and Microsoft SQL Server 2005 was used as the system database. The platform was a web-based environment for personal computers, in which learners could access the platform resource through the relevant browser software, for example IE (Internet Explorer), through the Internet. All students had their own username and password. They could login in to the writing environment system with their username and password.

According to our proposed guided writing strategies, this study examines three different writing environments. Specifically, RM-GWS and LM-GWS belong to a web-based writing environment; however, PP-GWS is a conventional writing environment. The implementation of the three writing environments is described in the following subsections.

● RM-GWS writing environment

According to the criteria of MRT, this study attempted to develop a writing environment with RM-GWS. In this environment multimedia technology is mainly used to convey a rich media message. The main advantage of rich media learning experiences for the learners includes the potential to provide better simulations of real-life contexts for connecting their experiences to more deeply enhance conceptual thinking for writing. To achieve the above advantages, the teacher has to think how to provide suitable materials related to learning the subject as a medium of guided writing based on the principle of the guided writing strategy.

Moreover, this writing environment also provides a personalized user interface for enhancing the flexibility, usability, and power of human-computer interaction for elementary students. After logging in to the system, learners can freely integrate various media content, and further plan the overall structure of their articles.

Figure 2 shows the RM-GWS writing environment. Regarding the user interface of the main screen, several multimedia components such as animation, images, and sound are provided to guide writing. Different object types are available through clicking “Object type selection buttons”. The multimedia object types include scenery, roles, animals, and others arranged in the media bank, as shown in Figure 3(a). The learner can choose any multimedia objects by clicking the small pattern in the grid of the right menu (media bank) as well as dragging and putting the object into the design area, as shown in Figure 3(b). Meanwhile, the learner can freely move, resize, rotate, duplicate, and delete any multimedia objects in the design area of the main screen. Basically, there are four pages in the main screen to show the learner’s ideas. During the writing activity, the learner can type text into the writing area located in the lower part of the main screen. Note, these multimedia objects contain images and animations embedded with sound effects. Besides, the content of these objects was created from learners’ real-life surroundings.



Figure 2: The RM-GWS writing environment.

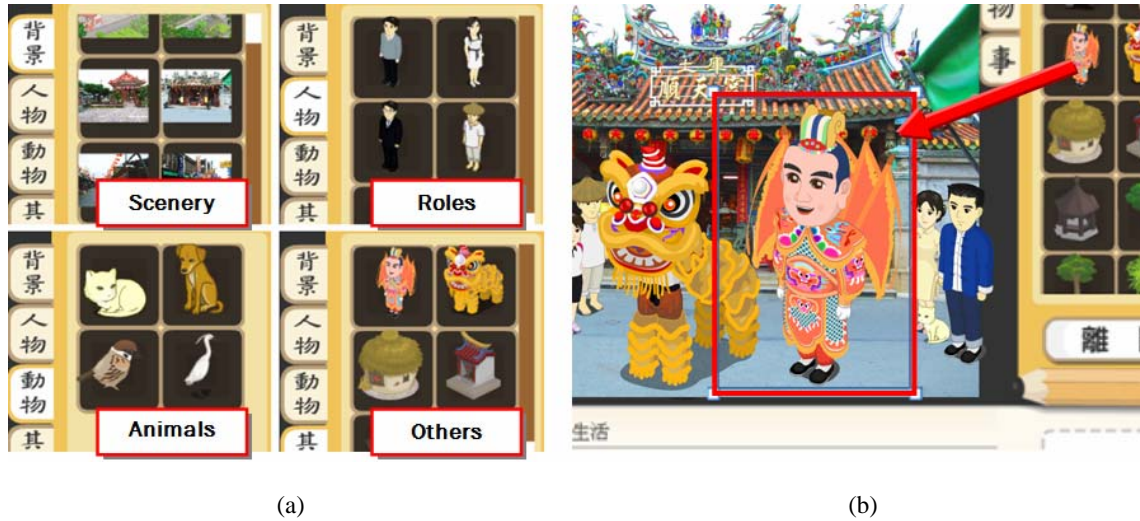


Figure 3: The user interface of the operating multimedia objects.

● LM-GWS writing environment

In contrast to the RM-GWS writing environment, the LM-GWS writing environment mainly provides text-based learning materials related to the learning subject for learners' writing. In this environment learners can observe specific words or sentences regarding real-life contexts and concepts to acquire inspiration and proceed with their writing. It is predicted learners are able to write more vivid, original and connotative articles through prompting from realistic situations.

Besides, from another writing perspective, forming abstract ideas from the learning experience can be satisfying for learners but some learners may find it difficult to form abstract concepts, and would therefore require various supports, for example, specific keywords, idioms, phrases and sentence examples. According to the above view, the text-based content could help learners to form these abstract ideas.

Figure 4 shows the LM-GWS writing environment. Several words such as roles, animals, events, scenery, Chinese idioms, and other phrases describing the scenery are provided to help students construct their ideas and guide writing by the instructor. Learners not only can use these provided materials to link their real-life experiences, but also can be engaged in forming their own ideas and creativity regarding the article. Similar to the RM-GWS writing environment, the learner can type content into the writing area located in the lower part of the main screen.

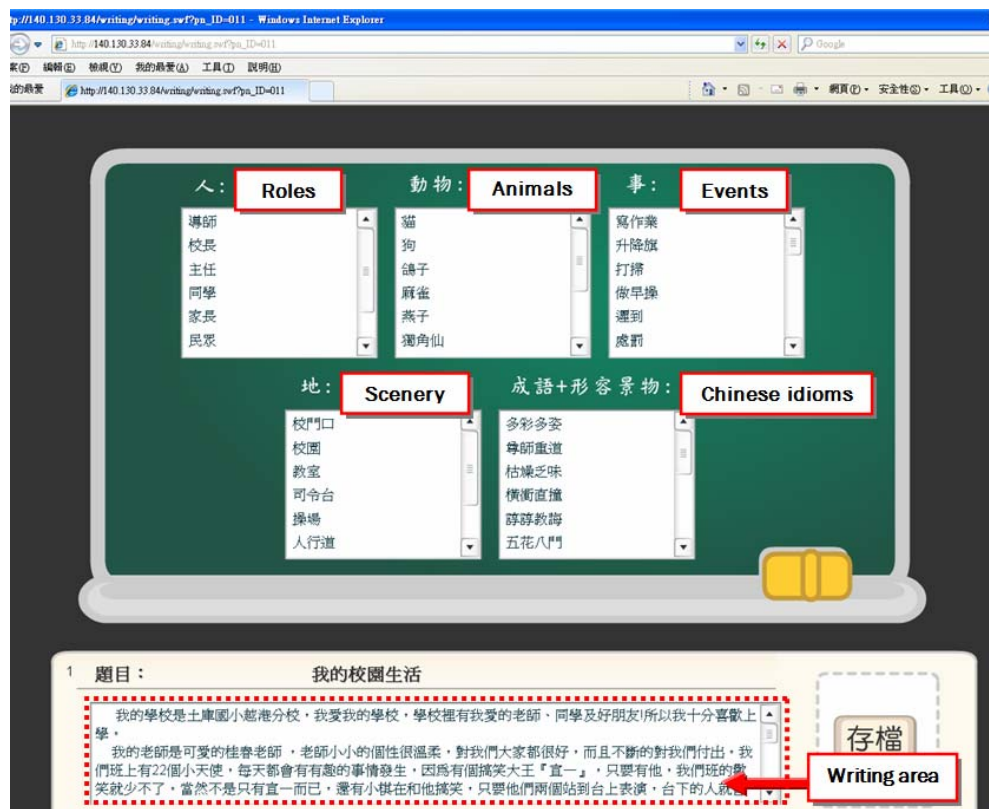


Figure 4: The LM-GWS writing environment.

● PP-GWS writing environment

Essentially, the PP-GWS writing environment is similar to a conventional classroom writing environment, where the instructor could guide learners to write in various ways such as writing or drawing on the blackboard, verbal prompts, using a textbook, pictures or video. Generally, verbal prompts are mainly adopted in this environment to guide learners' writing by the instructor.

As mentioned above, the common purpose of these three writing environments is to adopt relevant media presentations and prompt ways to enhance writing performance. The main differences between RM-GWS, LM-GWS and PP-GWS writing environments are summarized in Table 1. Besides, among these writing environments, the instructor still has to prepare suitable learning materials such as multimedia objects, keywords, and verbal prompts for supporting the learning activity before class.

Table 1: The main differences between RM-GWS, LM-GWS and PP-GWS writing environments

Writing environment	Characteristics
RM-GWS	<ol style="list-style-type: none"> Several multimedia components such as animation, images, and sound are provided to guide writing. The content provides better simulations of real-life contexts for connecting learners' experiences to more deeply enhance conceptual thinking for writing. Learners can freely integrate various media content and further plan the overall structure of their articles. The environment allows multi-users operation simultaneously and facilitates interactions among the users and the system.
LM-GWS	<ol style="list-style-type: none"> The environment mainly provides text-based learning materials related to the learning subject for learners' writing. Several words such as roles, animals, events, scenery, Chinese idioms, and other phrases describing the scenery are provided to help students construct their ideas. Learners can only browse suggestive words and sentences regarding real-life contexts and concepts to acquire inspiration and proceed with their writing.

	4.	The environment also supports multi-users operation mechanism.
PP-GWS	1.	The instructor guides learners to write in traditional ways such as writing or drawing on the blackboard, verbal prompts, using a textbook, pictures or video.
	2.	All learners share a common learning material provided by the instructor.
	3.	Verbal prompts are mainly adopted in this environment to guide learners' writing by the instructor.
	4.	The environment does not support multi-users operation mechanism.

METHODOLOGY

Before the experiment, to understand how familiar students are with computers and basic computer interaction, a student's prior experiences survey was used to assess the level of experience. According to the results, most learners have a computer at home with the Internet and more than 90% of learners have experience with web-based learning.

Besides, to explore the proposed research problem, this study analyzed which guided writing strategy is more suitable to enhance students' writing attitudes in the RM-GWS, LM-GWS and PP-GWS writing environments. In the following, the experiment was designed to answer the research question.

● Participants

A total of 66 sixth-grade students, with an average age of 12 from an elementary school in Taiwan, were invited to join the experiment. All participants had similar educational backgrounds. Random sampling was used to assign the students to three groups: Group 1 (15 males and 9 females), Group 2 (9 males and 12 females), and Group 3 (12 males and 9 females).

● Procedure and the design of learning activity

The experiment was conducted with repeated-measures design and completed in twelve weeks. The RM-GWS and LM-GWS writing environments were conducted in a computer room and the PP-GWS writing environment was conducted in a conventional classroom. Before the experiment, for the writing environment with the RM-GWS and LM-GWS, participants were taught how to use the assigned writing environment and given practical guidance for 20 minutes.

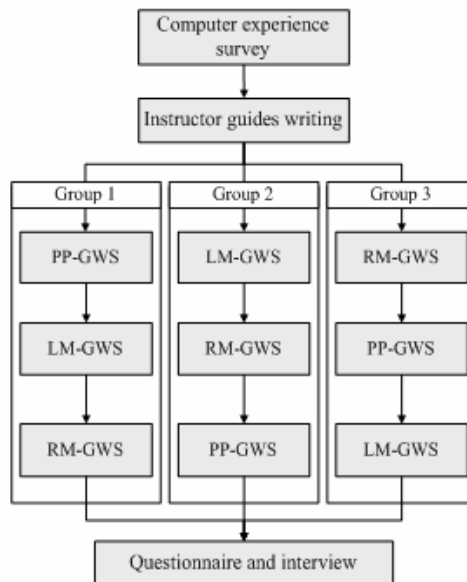


Figure 5: Experimental procedure.

Figure 5 shows the experimental procedure. The principle of this experiment design adopts a counterbalance of the order of treatments to avoid progressive errors. The order of treatments used the Latin Square mechanism. That is, the adopted guided writing strategy differed among the groups. Group 1 used the writing procedure in the sequence PP-GWS, LM-GWS and RM-GWS. Group 2 used the writing procedure in the sequence LM-GWS, RM-GWS and PP-GWS. Group 3 used the writing procedure in the sequence RM-GWS, PP-GWS and LM-GWS. Additionally, sufficient time was considered to minimize carryover effects among treatments. Each

group used a specific guided writing strategy for four weeks. Within these four weeks, the instructor guided learners to complete the learning task according to the assigned writing strategy. With this in mind, the objective of this experiment was to evaluate different guided writing strategies in terms of writing attitudes; therefore, all participants had the same treatments except for the order of using each guided writing strategy.

Regarding the writing task for each week, writing subject was proposed by the instructor. Three groups were conducted to write their corresponding writing task. During the writing activity, the instructor used the corresponding guided writing environment to help students to construct their ideas. For example, the instructor uses familiar pictures and multimedia objects from daily life to capture the students' attention and, then to develop their imagination. According to the guided writing activity, students can construct different ideas using multimedia objects, keywords and pictures and connect the relationships between these ideas. The reason is that the presentation of ideas in visual form has been proven to be particularly important as it helps the educational process in a critical way.

After finishing the experiment, all participants had to fill out a questionnaire. In addition, a brief interview was conducted to obtain further explanation of some parts of learners' thinking that were unclear in the questionnaire responses. The content of the questionnaire was related to the writing attitudes reported in the Appendix. Each item was evaluated on a five-point Likert scale (one was strongly disagree and five was strongly agree). Then, a repeated-measures one-way ANOVA analysis was utilized to explain the differences among the RM-GWS, LM-GWS, and PP-GWS writing environments in this experiment.

● Measurements

The independent variable was the use of the guided writing strategy, including RM-GWS, LM-GWS and PP-GWS, in the proposed writing environment. The dependent variables were related to the writing attitudes toward motivation, enjoyment and anxiety. To understand the effects of the guided writing strategies on students' writing attitudes, the present study developed a questionnaire to estimate these effects. Besides, the questionnaire items were designed based on the previous literature and adapted instruments of motivation (Duncan & McKeachie, 2005), enjoyment (Laros & Steenkamp, 2005) and anxiety (Clark, 2004). Specifically, this study used three 14-item scales as measures of motivation (4 items), enjoyment (5 items) and anxiety (5 items). For the factor reliabilities, the resulting Cronbach's alpha reliability coefficient was between 0.84 and 0.89 for each factor and total reliability was 0.808. Analysis of the herein-considered sample showed a reasonable level of reliability ($\alpha > 0.70$). Factor analysis also confirmed the construct validity of the scales could be carried out adequately. Using the principal component method with varimax rotation, the construct validity was examined. Table 2 reports the factor loadings and explains the variance for each of the factors. The factor loadings for all items exceeded 0.72, indicating the individual items also had discriminant validity.

Table 2: Scale reliabilities and factor loadings for measures of constructs

Scale	Motivation	Enjoyment	Anxiety
Cronbach's alpha = 0.840			
M Q1	0.850		
M Q4	0.822		
M Q3	0.814		
M Q2	0.802		
Cronbach's alpha = 0.898			
E Q2		0.918	
E Q3		0.890	
E Q5		0.847	
E Q1		0.838	
E Q4		0.722	
Cronbach's alpha = 0.852			
A Q2			0.859

A Q1	0.827
A Q4	0.780
A Q5	0.768
A Q3	0.732

Note: M, Motivation; E, Enjoyment; A, Anxiety.

Data analysis and results

To evaluate which guided writing strategy is most suitable to support writing activity among RM-GWS, LM-GWS and PP-GWS, this research had all participants test all three writing environments. After the experiment, all participants had to fill out a questionnaire. To test the hypothesis H1-H3 regarding the effects of the guided writing strategy on writing attitudes toward motivation, enjoyment and anxiety, this study conducted three repeated-measures one-way analyses of variance. After the experiment, Table 3 presents the relevant descriptive statistics for RM-GWS, LM-GWS and PP-GWS regarding motivation, enjoyment and anxiety. The results indicated RM-GWS had the highest mean among the groups in terms of motivation ($M = 4.03$) and enjoyment ($M = 4.26$); besides, RM-GWS had the lowest mean among the groups in terms of anxiety ($M = 2.85$).

Table 3: The descriptive statistics on analysis of writing attitudes among RM-GWS, PP-GWS and PP-GWS

Research variable	RM-GWS		LM-GWS		PP-GWS	
	Mean	SD	Mean	SD	Mean	SD
Motivation	4.03	0.731	3.91	0.507	3.26	0.873
Enjoyment	4.26	0.766	3.64	0.632	3.39	0.896
Anxiety	2.85	0.771	2.99	0.797	3.26	0.928

Additionally, an analysis of ANOVA was summarized in Table 4. The results revealed there were significant differences among the guided writing strategies, regarding motivation (F -value = 23.739, $P = 0.000$), enjoyment (F -value = 21.400, $P = 0.000$) and anxiety (F -value = 11.285, $P = 0.000$). This implies the use of different guided writing strategies significantly affects the writing attitudes. Further, regarding students' writing attitudes, to evaluate which guided writing strategy is an appropriate way to support writing activities among RM-GWS, LM-GWS and PP-GWS, a post hoc multiple comparisons with LSD method analysis was conducted and the results were summarized in Table 5.

Table 4: The ANOVA analysis of writing attitudes among RM-GWS, PP-GWS and PP-GWS

Research variable	Source	SS	df	MS	F-value
Motivation	Between subject	38.913	65	0.599	
	Within subject (Error)	84.667	132		
	Effect	22.65	2	11.325	23.739*
	Error	62.017	130	0.477	
	Total	123.58	197		
Enjoyment	Between subject	35.286	65	0.543	
	Within subject (Error)	106.746	132		
	Effect	26.439	2	13.220	21.400*
	Error	80.307	130	0.618	
	Total	142.032	197		

	Between subject	64.990	65	1.000	
	Within subject (Error)	76.613	132		
Anxiety	Effect	5.709	2	2.855	11.285*
	Error	70.904	130	0.545	
	Total	141.603	197		

According to the result of the post hoc comparisons, for motivation, both RM-GWS and LM-GWS had a higher value than PP-GWS. However, there was no significant difference between RM-GWS and LM-GWS. On the other hand, regarding anxiety, RM-GWS had a lower value than PP-GWS. In terms of enjoyment, the result showed RM-GWS had the highest rating.

As a result, hypothesis H2 was supported; however, hypotheses H1 and H3 were partially supported. That is, RM-GWS is a better way to support learners' writing activities than LM-GWS and PP-GWS with respect to enhancing enjoyment. Moreover, while the result of this experiment does not completely support hypotheses H1 and H3, RM-GWS is still a suitable way to support learners' writing activities in terms of enhancing motivation and reducing anxiety.

Table 5: Post hoc multiple comparisons (LSD method)

Dependent variable	(I) Strategy	(J) Strategy	Mean Difference (I - J)	Std. Error	Sig.	95% Confidence Interval		Post Hoc analysis
						Lower bound	Upper bound	
Motivation	RM-GWS	LM-GWS	0.117	0.075	0.121	-0.32	0.266	RM-GWS
		PP-GWS	0.769*	0.137	0.000	0.495	1.043	>PP-GWS
	LM-GWS	RM-GWS	-0.117	0.075	0.121	-0.266	0.032	
		PP-GWS	0.652*	0.138	0.000	0.376	0.927	LM-GWS
	PP-GWS	RM-GWS	-0.769*	0.137	0.000	-1.043	-0.495	>PP-GWS
		LM-GWS	-0.652*	0.138	0.000	-0.927	-0.376	
Enjoyment	RM-GWS	LM-GWS	0.618*	0.094	0.000	0.430	0.806	RM-GWS
		PP-GWS	0.870*	0.157	0.000	0.556	1.184	>LM-GWS
	LM-GWS	RM-GWS	-0.618*	0.094	0.000	-1.806	-0.430	
		PP-GWS	0.252	0.150	0.099	-0.049	0.552	RM-GWS
	PP-GWS	RM-GWS	-0.870*	0.157	0.000	-1.184	-0.556	>PP-GWS
		LM-GWS	-0.252	0.150	0.099	-0.552	0.049	
Anxiety	RM-GWS	LM-GWS	-0.139	0.076	0.072	-1.292	0.013	RM-GWS
		PP-GWS	-0.409*	0.153	0.009	-0.715	-0.104	<PP-GWS
	LM-GWS	RM-GWS	0.139	0.076	0.072	-0.013	0.292	
		PP-GWS	-0.270	0.143	0.063	-0.555	0.015	
	PP-GWS	RM-GWS	0.409*	0.153	0.009	0.104	0.715	

LM-GWS	0.270	0.143	0.063	-0.015	0.555
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* The mean difference is significant at the 0.05 level.

DISCUSSION

According to the experiment results, overall this study found RM-GWS had a more positive influence on enhancing writing attitudes than the other proposed strategies. Table 5 shows RM-GWS had higher significant differences than the PP-GWS in terms of writing attitudes toward motivation, enjoyment and anxiety. However, there were no significant differences between the RM-GWS and LM-GWS in terms of motivation and anxiety. In other words, a web-based learning environment with multimedia learning materials could provide various interactions and presentations of media types (such as picture, animation and audio) as a guided writing strategy to enhance students' motivation and enjoyment and further reduce their writing anxiety. More detailed descriptions are discussed as follows.

For enhancing motivation, RM-GWS and LM-GWS were both significantly superior to PP-GWS, but no significant differences were found between them. This implies a web-based learning environment providing multimedia- or text-based digital materials could better enhance students' learning motivation compared with the traditional learning environment. This experimental result is the same as Kose (2009) who suggested computer-aided education can facilitate learning and enhance students' motivation. Therefore, this study shows both RM-GWS and LM-GWS might be suitable writing strategies to enhance learners' motivation.

In terms of enhancing learners' enjoyment, RM-GWS was better than the other strategies. The findings in this research are also similar to those in the Chen, Ghinea, and Macredie (2006) study, revealing multimedia content significantly influenced users' levels of understanding and enjoyment. More specifically, using a web-based learning environment with high richness media as a writing strategy could enhance learners' adoption and enjoyment.

With respect to reducing writing anxiety, there was no significant difference between LM-GWS and PP-GWS. Only RM-GWS was significantly lower than PP-GWS. This finding indicates learners' writing anxiety was below expectation. It is possible to conclude writing anxiety may be affected by learners' level of writing skill. In the experimental class, the instructor indicated learners' writing skills were generally good. This may imply learners' writing anxiety is affected by their writing skills. Overall, RM-GWS is the best strategy to reduce learners' writing anxiety.

Apart from the questionnaire analysis, an interview was also conducted to understand learners' perceptions of the learning activity and their attitudes toward the usage of guided writing environments. Most students indicated they felt writing is a difficult task and usually did not know how to generate, organize and formulate their abstract ideas. Fortunately, by using the proposed writing environments, they expressed the environments not only did arouse their interest, happiness and motivation, but also increase the fun of learning; they also thought the environments were useful and easy to use and did improve interaction between learner and content of materials, especially by using the RM-GWS and LM-GWS writing environments. Compared with the conventional approach (PP-GWS writing environment), learners indicated that they have more opportunities to interact with the provided system and further stimulate the self-initiated motivation to learn. This feature is very important for learners to improve writing.

Still, there are cautions that instructors should take while conducting a guided writing environment. For example, during the learning activity, because the multimedia presentation could lead to greater student motivation in learning, students were sometimes distracted by such high richness media. Accordingly, when students write with computers, they need to be advised to regard computers as a partner to help them construct a sketch instead of regarding it as a playable toy. Besides, among these writing environments, the instructor has to design and develop suitable learning materials such as multimedia objects, keywords, and verbal prompts for supporting the learning activity before class. This may lead instructor to spend more time preparing the lesson, especially in the RM-GWS writing environment.

Generally, the results of interview are consistent with those discussed in the questionnaire analysis of this study. This leads us to conclude that the RM-GWS writing environment can guide students to have better writing attitudes than other strategies. The results support previous studies (Chen & Liu, 2008; Sun & Cheng, 2007) which found multimedia is usually used as assisting materials for providing more information and knowledge to arouse learners' attention and interests in learning.

CONCLUSIONS

The purpose of this study is to develop different guided writing strategies and further evaluate these strategies to enhance students' writing attitudes. Guided writing strategy plays a very important role in writing process and is beneficial for improving writing performance, especially in elementary writing activities. The advent of web-based learning and multimedia technologies not only provides potential for applying innovative teaching and learning strategies, but also increases the fun of learning. We believe that more positive writing attitudes can be achieved by using proper support of the guided writing strategy and technology. Accordingly, to investigate the effects of different guided writing strategies on students' writing attitudes, in this study three guided writing strategies based on media richness theory were developed for teaching implementation, two belonging to a web-based writing environment (i.e., RM-GWS and LM-GWS writing environment) and the other belonging to a traditional writing environment (i.e., PP-GWS writing environment). There were 66 sixth-grade students participating in the experiment and they were randomly assigned into three groups. A repeated-measures one-way ANOVA analysis was utilized to test the research hypotheses. The results showed that the RM-GWS environment can help learners to have better writing attitudes in terms of motivation, enjoyment and anxiety.

This has important implications for pedagogies. It implies that providing a web-based learning environment with high richness media can guide students to write and achieve more positive writing attitudes in terms of motivation, enjoyment and anxiety. Instructors who intend to enhance students' writing attitudes can use the findings as a guide to help them in writing activity.

Although the findings are encouraging and useful, the present study has certain limitations that necessitate future research. First, learners' learning style and self-efficacy were not measured; however, these limitations may lead to different degrees of their participation and perception towards the learning activity. This issue is unclear and it might be another direction for future work. Second, this study mainly focused on examining students' writing attitudes; however, students' products were not analyzed. Future research needs to focus more on evaluating the content of students' learning outcomes, which may help teachers better understand how the effectiveness of the used strategies.

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Appendix: Questionnaire items and sources

The research variables were related to the writing attitudes.

Research variable	Item	Source
Motivation	1. I think this class is interesting, even if it is more difficult.	Duncan and McKeachie (2005)
	2. I feel that the writing activity is practical and is worth the effort to learn.	
	3. I believe I can learn all the concepts in class.	
	4. I am actively engaged in the learning activities.	
Enjoyment	1. I feel unhappy to learn. (R)	Laros and Steenkamp (2005)
	2. I enjoy the learning activity.	
	3. I feel enthusiastic about the learning activity.	
	4. I like the competitive task assignments.	
	5. I feel relaxed and comfortable during the learning activity.	
Anxiety	1. I worry about the writing grade.	Clark (2004)
	2. I feel a lack of belief to complete the writing task.	
	3. I feel writing is hard work.	
	4. I have a negative attitude toward writing.	
	5. I feel comfortable. (R)	

Note: (R) reverse coded.