Advance organizers in videos for software training of Chinese students

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Abstract

The effectiveness of demonstration-based training (DBT) videos for software training has been investigated for a Western audience. These studies have generally found that the demonstration videos significantly enhanced self-efficacy and task performance, but also that there was a gap between task practice and learning with the latter lagging behind. The present study investigated the effectiveness of DBT-videos for software training of Chinese students. The control condition presented demonstrations only. In the experimental condition demonstrations were preceded with advance organizers that aimed to enhance learning. The 61 participants (mean age 11.8 years) came from a middle school in China. Data analyses revealed that self-efficacy significantly improved in both conditions. Task performance success also increased significantly over time. The familiar gap between task practice and learning was found between task practice and outcomes on an immediate post-test. However, on the delayed post-test this difference had disappeared. An effect of the advance organizer was found for accuracy of the self-efficacy appraisals, and for gain scores from pretest to delayed post-test. It is concluded that DBT-based demonstration videos are moderately effective for software training of Chinese students, and that it can be beneficial to precede these with advance organizers.

Introduction

Software companies such as Adobe, Apple and Microsoft and online education companies such as Lynda have been producing and distributing an increasing number of videos for software training. These videos usually consist of a recorded demonstration—a screen capture animation with narration. Beyond that, though, little is known about the design characteristics and effectiveness of the videos produced by these companies. When intended for use by a beginner, these videos must realize two goals. First, they must enable the user to achieve a task performance during training. The videos should guide the user's task practice; they must serve as a job-performance aid. Second, the videos should result in learning. That is, they should teach the user so that he or she acquires the capability to perform the trained and related tasks independently (Grabler, Agrawala, Li, Dontcheva, & Igarashi, 2009; van der Meij, Karreman, & Steehouder, 2009).

To enable achievement of these goals, a theoretical model for video construction that combines demonstration-based training (DBT) and multimedia learning theory has recently been proposed (Brar & van der Meij, 2017; van der Meij & van der Meij, 2016a). In a DBT-based video, an

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Practitioner Notes

What is already known about this topic

- Empirical research on DBT-based videos for software training has concentrated on a Western audience.
- This research generally shows that these videos effectively raise self-efficacy and task performance, but there is a gap between task practice and learning.

What this paper adds

- DBT-based videos for sofware training were effective for Chinese students. Self-efficacy and task performances significantly improved.
- The advance organizer increased the accuracy of self-efficacy appraisals and yielded a greater gain score from pretest to delayed post-test.
- The study found no difference between the students' task performance during practice and their delayed post-test performance.

Implications for practice and/or policy

- The DBT-approach to designing instructional videos for software training of Chinese students appears suitable.

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example of task performance is enriched with instructional features to enhance motivation and task achievement. The end result is a demonstration video that engages the viewer and that illustrates and explains the stepwise progression involved in task completion.

Empirical studies with a Western audience have investigated the effectiveness of DBT-based demonstration videos for enhancing self-efficacy and task performances. Self-efficacy is the central motivational construct in Bandura's (1986) social-cognitive learning theory that forms the basis for the DBT-model. Self-efficacy is important for someone's direct engagement with a demonstration video and as predictor of future engagement in software training. Almost without exception, empirical studies have shown that DBT-based demonstration videos significantly raise self-efficacy (eg, van der Meij, 2014; van der Meij & van der Meij, 2015; van der Meij & van der Meij, 2016b).

The studies also report different findings for task practice and learning. During task practice, a participant can consult the demonstration to check on a step in a procedure, or to refresh his or her memory. Task practice scores indicate how well the demonstration satisfies the primary objective of the video which is to enable task achievement. The second goal of a demonstration is learning. Ultimately, a participant should be able to achieve the trained and related tasks without video support. The effect should be a durable change. To measure learning, tests are administered under situations in which the user can no longer consult the video. Testing is also usually done immediately after training and after a short delay. In addition, a transfer test tends to be administered to discover whether learning has extended to comparable but untrained tasks. All empirical studies have shown that DBT-based demonstration videos significantly raise task practice. However, they have also shown a disparity with learning, with the latter lagging behind task practice (eg, van der Meij, 2014, 2017; van der Meij & van der Meij, 2016a).

The present study investigated whether DBT-based videos could enhance self-efficacy, task practice and learning for a Chinese audience. An important reason for selecting this audience lies in the fact that technical writers in China currently have little experience in creating software training videos (Li, personal communication), but a quickly rising consumer demand from all over the world may force them into creating this type of user support in the near future. If DBT-based videos provide

evidence of cross-cultural portability, the guidelines from this approach can form an important starting point for this development. An experiment is reported with a control and experimental condition. In the former, participants saw only demonstration videos. In the latter, advance organizers preceded the demonstrations. The advance organizers were expected to be especially effective for raising retention and thus reducing the (possible) gap between task practice and learning.

Advance organizers

Ausubel (1968) defined an advance organizer as introductory material presented in advance of the training material. The advance organizer provides a structure or schema of what is covered in the main body of that material (ie, demonstration video). Advance organizers are intended to facilitate meaningful learning. They can activate existing prior knowledge, and provide the student with a structure for ideational scaffolding that makes it easier to comprehend and remember new information.

Empirical research has generally found advance organizers conducive to learning (eg, Billings & Mathison, 2012; Gurlitt, Dummel, Schuster, & Nückles, 2012; Langan-Fox, Platania-Phung, & Waycott, 2006; Mayer, 1979; Popova, Kirschner, & Joiner, 2014). Most of this research has involved prose learning with static texts and pictures, however. Only a handful of studies appear to have investigated the design and effects of advance organizer videos (eg, Koscianski, Ribeire, & da Silva, 2012; Li, 2013, 2016; Roohani, Jafarpour, & Zarei, 2015). These organizers addressed declarative knowledge development. For example, Li (2013) examined the effectiveness of a video as an advance organizer for learning English as a second language, while Koscianski *et al.* (2012) concentrated on the design characteristics of short video animations for physics teaching ("moments of force").

To our knowledge, advance organizer videos for procedural knowledge development (ie, software training) have not yet been empirically investigated. That use of advance organizers is the focus of this paper. Based on the existing studies on advance organizers, motivational and cognitive contributions to observational learning from videos for software training were deemed probable.

An advance organizer can enhance the user's *motivation* to view an instructional video and participate in task practice by illustrating the relevance of task engagement (Westbroek, Klaassen, Bulte, & Pilot, 2010). Videos on software training can cater to the user's motivation by presenting an advance organizer that shows the initial and final states in performance of a task. Illustrating a task before and after its completion makes the task concrete and highlights its value for the user. Thus, the advance organizer can create meaning for the user; it can clarify the learning objective and provide a context in which the user is motivated to learn how to complete the task.

An advance organizer can enhance *cognition* by serving as a schema for information processing and retention (eg, Billings & Mathison, 2012; Mayer & Bromage, 1980). An advance organizer can prepare the student for the forthcoming demonstration by showing how the content is going to be presented, and introducing the task and its completion. The advance organizer can thus serve as a guide or standard for what the user should attend to when viewing the demonstration. In addition, as the organizer presents the user with a complete, concise view of the procedure, it can serve as an example of what the user should remember from the video. The example can then serve as a frame of reference for the user's efforts when learning is assessed. That is, when the user must perform the task independently (Bandura, 1986).

Experimental design and research questions

The study included an experimental condition with advance organizers preceding demonstrations and a control condition with only demonstrations. Students in the control condition could only view the demonstration videos on Word formatting tasks, whereas students in the experimental

condition could view an advance organizer for each task, before viewing the demonstration video on that task. Earlier empirical research with DBT-based demonstration videos for software training had involved Western users (eg, Brar & van der Meij, 2017; van der Meij, 2017). In contrast, the participants in the present study were Chinese students.

Research shows that Chinese and Western designers create user instructions that differ in style (eg, Barnum & Li, 2006; Wang & Wang, 2009; Zhu & St. Amant, 2007). However, this does not mean that appraisals and effects of these instructions differ. A recent study found that a paper manual with software instructions structured in either a Western or Chinese style did not make a difference in the performance or reported appreciation of Western and Chinese students (Li, de Jong, & Karreman, 2015). Accordingly, it was decided that video construction could adopt the DBT-based design approach that had been found effective for a Western audience. Two main research questions were investigated:

Research question 1: How well do the demonstration videos support the development of self-efficacy and task performance of Chinese students? To our knowledge, this is the first study that investigates the effectiveness of DBT-based demonstration videos for software training for this audience. In other words, the study serves as an inventory of how well these videos support Chinese students. The present study measures self-efficacy which can be defined as a person's expectancy for success in specific tasks (Bandura, 1997). As reported earlier, empirical studies have repeatedly found positive effects of DBT-based demonstration videos for software training on self-efficacy and task performance. This was also expected in the present study.

Research question 2: Does the complementary presence of advance organizers raise self-efficacy and task performance? A positive effect of the advance organizer on self-efficacy development was expected (see Westbroek *et al.*, 2010). Also, the study investigates whether the control condition displayed the usual difference between task practice and learning, and whether the advance organizer reduced this gap.

Method

Participants
Participants were 61 students (mean age 11.8 years, range 10.9–13.6) from a middle school in Shanghai, China. Students were randomly assigned to either the control or experimental condition, after stratification for gender. The control condition included 15 female and 14 male students. The experimental condition consisted of 14 females and 18 males. All materials were in the native language of the students (ie, Mandarin).

Instructional materials
A brief pilot test with the translated Western demonstration videos suggested that Chinese users found the videos to be clear and helpful for task completion. The videos instructed students on important and prevalent formatting problems in creating school reports with Microsoft Word. The set of videos was organized into three distinct sections (ie, adjusting the margins for the whole text, adjusting the margins for a text segment and creating an automatic table of contents). The presentation of these sections and the included videos followed the simple-to-complex principle. For instance, the video on adjusting the left margin appeared before the video on adjusting the right margin, because it involved a similar but slightly easier positioning of the cursor.

The videos were presented via a website. The left side of the home page for this website presented the table of contents, giving the section and video titles. Clicking a video title activated the video and a toolbar on the right side of the home page. The toolbar facilitated user control, offering the usual options of play, pause, resume and stop. In addition, the user could use it to adjust the sound level and screen size of the video. Furthermore, a progress bar enabled the user to keep

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1   Hello everyone !
2   The left side or margin of this text is too small.
3   We are going to make it wider.
4   First, we've got to put the cursor on the object we're going to use.
5   Move the cursor to the ruler.
6   Get it just in the middle of the hourglass.
7   The cursor changes into a double arrow.
8   Hold it still for two seconds.
9   Word shows the words Left Margin.
10  Second, we've got to slide the double arrow more to the right.
11  Click the left mouse button and keep it pressed down.
12  A dashed line appears, indicating the left margin.
13  Drag the double arrow about two centimeters to the right.
14  The dashed line moves and so does the grey area on the left side of the ruler.
15  Third, we've got to let go of the double arrow.
16  Simply let go of the mouse button.
17  The left margin of the whole text is wide enough now.
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Figure 1: The narrative for a demonstration video (Numbers and formatting are for purposes of reference only)

track of how far along the video had progressed and supported approximate video replays of segments of the clip that students might want to view more than once. That is, it helped the user estimate how far back to go.

Demonstrations

The core videos were recorded demonstrations. That is, they consisted of recorded screen animations with narration (from a native female speaker). Each demonstration first displayed a title slide with the word "Demonstration" for 2 seconds, after which the video started automatically. Figure 1 presents the narrative for the demonstration video for "Adjusting the left margin." It will be used to illustrate key design features.

Demonstration videos had a strong focus on supporting (inter)actions. Descriptions of the actions that the user needed to perform included cues about details involved in task execution. These descriptions followed the general rule that instructions should contain an action verb and an object, at a minimum. Occasionally, there was complementary information as well, which led to instructions such as "Move the cursor to the ruler" (sentence 5) and "Hold it still for two seconds" (sentence 8). Deictic words (eg, it, that, there) were used only when the object or location that was referred to had been explicitly mentioned in the previous sentence.

Subgoal statements began with ordinal numbers (eg, "First," "Second," "Third") indicating which step in the sequence was being presented. The numbers also served as retrieval cues. In addition, subgoal statements always included the phrase "we've got to" before stating the goal. This consistency (along with the ordinal number at the beginning) served to make subgoal statements easily recognizable as such. The term "we" was employed to create a sense of shared purpose. Sentences 4, 10 and 15 in Figure 1 are subgoal statements.

The narration was in conversational style; it was personal rather than formal. That is, the narrator regularly addressed the student personally (eg, "you" and "we"). In contrast, action statements were presented in command form (eg, "Move," "Click" and "Drag"), which is in line with the recommended, standard formulation for this type of information in written instructions (Farkas, 1999).

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1   Hello everyone !
2   The left side of this text doesn't look nice.
3   The margin is too small.
4   To make the margin bigger, you need to move the double arrow.
5   The double arrow is hidden in the middle of the left hourglass.
6   You drag the arrow to the right along the ruler and then let go.
7   See how the left margin looks much nicer now?
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Figure 2: The narrative for an advance organizer (Numbers are for purposes of reference only)

The pace of the demonstrations was largely dictated by the narrative. That is, the female voice-over went at a normal speaking rate. Obviously, the pace should be neither too slow (for risk of boredom) nor too fast (for risk of cognitive overload). Objective guidelines for what is considered the proper pace are hard to come by. Comments from other native speakers and a limited pilot test suggested that the pacing was moderately slow but appropriate for the target audience.

Demonstration videos contained built-in pauses. Pauses always followed after natural event boundaries. In demonstration videos, these boundaries occurred after subgoal completion (eg, after sentences 9, 14 and 17 in Figure 1). When task execution for an intermediate goal was completed, a 2-second pause (in which no new image or sound was presented) followed. Immediately after that, the narrative automatically resumed.

Demonstrations were self-contained. For this reason, they started with a greeting, goal information and introduced lay terms and jargon for key concepts (sentences 1, 2 and 3). Not only was this recommended good practice, demonstrations also needed to be comprehensible on their own because these were the only videos seen by the students in the control condition.

At the end of each demonstration video, there was a 5-second pause before it stopped. The average length of the demonstration videos was 1.25 minutes (range 1.06–1.50).

Advance organizers

Students in the experimental condition automatically saw the advance organizer first when they clicked on the video for a particular task. Advance organizers involved the same Word document as demonstrations.

Advance organizers opened with a slide entitled "Preview" that stayed on the screen for 2 seconds. After that, the advance organizer video started playing automatically. After a greeting, advance organizers provided information about four key aspects of procedures: (1) initial and final goal states, (2) actions, (3) objects and their locations and (4) jargon. The content of the advance organizers is best illustrated with a complete narrative. Figure 2 presents the narrative in the advance organizer for "Adjusting the left margin."

Sentence 1 presents a greeting which is common in Chinese tutorials (Li, Karreman, & de Jong, 2018). Sentences 2, 3 and 4 referred to the initial goal state. Users' attention was drawn to the goal state for motivational purposes and also to facilitate recognition of the prerequisite condition for adjusting the left margin of a Word document. Sentence 2 used a lay term to refer to the key concept (ie, side). Sentence 3 introduced the jargon used by Word to address the formatting problem. The inclusion of jargon in the advance organizer was expected to activate or help build prerequisite knowledge. Sentences 4 and 5 introduced the main interface object that needed to be manipulated during task execution. First, the object was described (ie, double arrow). After that, its location was indicated. Action information was limited and concise (eg, drag, let go). Sentence 7 concluded the advance organizer by directing students' attention to the end state for the task.

At the end of each advance organizer, there was a 5-second pause before the demonstration video for that task automatically started. The average length of the advance organizers was 0.42 minutes (range 0.33–0.55).

A paper *instruction booklet* provided guidance during training. The booklet informed the students about the task sequence and required actions. For each formatting task, the students were first told to view the (advance organizer and) demonstration video. Then they were instructed to engage in task practice on their own computer, using a practice file for that task.

Research instruments
A paper questionnaire measured *self-efficacy* (SE) before and after training. Both instruments had the same set-up and included the same set of seven questions about the formatting tasks from the videos. The questionnaire described and illustrated each task with a screenshot of a before and after state. Then participants were asked: "How well do you think you can complete this task?" Answers were given on a 7-point Likert scale. That is, the scale values ranged from "very well" (1) to "very poorly" (7). These scores were reversed for data presentation (ie, a higher number refers to higher self-efficacy) because this format is easier to read. Reliability analyses yielded good Cronbach's alpha scores of 0.93 and 0.92 for SE-before and SE-after respectively.

Task performance was assessed with hands-on tests for all of the seven main formatting tasks in the videos. There were four assessments for the trained tasks: pretest, practice, immediate post-test and (one week) delayed post-test. Each test had the same number of tasks. The Word files in all four tests differed slightly in surface features from those presented in the videos, but the underlying formatting problem was identical. In addition, a transfer test was administered. This text consisted of four items involving related tasks (eg, adjusting the top margin of a text, and moving a text section in a document and updating the table of contents). A score of 0 was awarded for each item the student could not complete correctly. Correct task completion yielded a score of 1. Scores were converted to a percentage of possible points. Reliability analyses yielded moderate to good Cronbach's alpha scores of 0.59, 0.78, 0.84, 0.61 and 0.56 for pretest, practice, immediate post-test, delayed post-test and transfer test respectively.

Procedure
The experiment was conducted in two sessions that took place in the school's computer room. The first session began with a brief introduction of the study, after which the SE-before questionnaire and pretest were administered (20 minutes). Training followed shortly after. During the training, each student wore headphones and worked on a computer that was equipped with all of the instructional materials. Students were instructed to follow the directions given in the instruction booklet. In the control condition, this booklet repeatedly informed them about the task (demonstration) video they should view, and the practice task that they should engage in next. In the experimental condition, the booklet likewise told the students to view the task (advance organizer and demonstration) video before enaging in task practice. Students could consult the videos at all times during training. After 40 minutes, training stopped and students completed the SE-after (paper) questionnaire and immediate post-test (20 minutes). The students were not allowed to consult the videos after training. One week later the delayed post-test and transfer test were administered (40 minutes).

Data analysis
The dataset included some missing data. However, to facilitate comparisons across measurement moments, the tables in the results section present only complete datasets for the two self-efficacy measurements and the four task performances. In statistical testing all available data were used,

Table 1: *Mean scores (standard deviation) for self-efficacy before and after training by condition*

	Self-efficacy	
	Before	*After*
Condition	*M* (SD)	*M* (SD)
Control (*n* = 24)	5.84 (0.94)	6.70 (0.47)
Experimental (*n* = 27)	5.37 (1.40)	6.41 (0.76)
Total	5.59 (1.22)	6.55 (0.65)

Note: Scale midpoint is 4; scale maximum is 7. A higher score indicates higher self-efficacy.

leading to slight variations in the degrees of freedom for tests. Assumption testing revealed violations of the normality distribution. Therefore, nonparametric tests were employed.

The effect of condition on self-efficacy was investigated with a Mann–Whitney test. A Wilcoxon test was used to assess self-efficacy development over time. The relationships between self-efficacy and task performances were explored with Spearman rank correlations.

The effects of condition on task performances were investigated with a Mann–Whitney test. The tests involved gain scores (eg, practice score minus pretest score), because a (surprising) statistical significant difference on the pretest was found, $U(61) = 267.00$, $p = .004$. To correct for repeated testing, a Bonferroni correction was applied for these computations, setting alpha at 0.016. Wilcoxon tests were used to investigate task performance development over time. The Bonferroni correction set alpha at 0.013 for these findings. For effect size, we report the *r*-statistic (Field, 2005). This statistic tends to be qualified as small, medium and large for respectively the values $r = 0.10$, $r = 0.30$ and $r = 0.50$.

Results

Self-efficacy

Students began training with a mean score for self-efficacy that was considerably above the scale midpoint (see Table 1). After training, their mean score came close to the scale maximum.

A Mann–Whitney test indicated that there was no difference between conditions for self-efficacy before training, $U(59) = 378.50$, $p = .396$ or after training, $U(52) = 272.50$, $p = .209$. The Wilcoxon test revealed the presence of a statistically significant positive change over time, $z = 4.69$, $p < .001$, $r = 0.46$. The effect size statistic signals a medium effect.

Exploratory analyses showed that, in the control condition, self-efficacy before training correlated significantly with the immediate post-test score, $\rho(28) = 0.45$, $p = .015$. In the experimental condition, self-efficacy before training did not correlate significantly with any test score.

In the control condition, there were no significant relationships between self-efficacy after training and test scores. In contrast, in the experimental condition, self-efficacy after corrrelated significantly with the pretest score $\rho(31) = 0.48$, $p = .010$, and with the immediate post-test score, $\rho(28) = 0.49$, $p = .008$.

Task performance

Table 2 shows that students began training with an overall mean success rate of 37%. After that, all test scores were substantially higher.

A Mann–Whitney test indicated that there was no effect of condition on the gain scores *from pretest to practice* $U(61) = 596.50$, $p = .055$. Likewise, there was no effect of condition on the gain

Table 2: *Mean percentages (standard deviation) for task performance tests before, during and after training by condition*

Condition	Pretest M (SD)	Practice M (SD)	Immediate post-test M (SD)	Delayed post-test M (SD)	Transfer M (SD)
Control* (*n* = 26)	45.7 (21.5)	66.2 (24.5)	57.3 (31.1)	68.5 (18.9)	53.0 (26.3)
Experimental† (*n* = 32)	30.9 (19.8)	64.4 (27.2)	50.0 (30.5)	70.0 (21.4)	50.0 (30.3)
Total	37.5 (21.8)	65.2 (25.9)	53.2 (30.7)	69.3 (20.2)	51.3 (28.4)

Note: *For the Control condition, $n = 25$ for the transfer test.

†For the Experimental condition, $n = 31$ for the transfer test.

scores *from pretest to immediate post-test* $U(61) = 528.50$, $p = .351$. There was, however, a statistically significant and small effect of condition on the gain scores *from pretest to delayed post-test*, $U(58) = 573.50$, $p = .014$, $r = 0.23$. Table 2 shows that the experimental group had a larger gain, increasing its rate of successful task performance from the first to the final measurement point by nearly twice as much as the control group (39.1 vs. 22.8%). There was no effect of condition for gain scores on the *transfer test*, $U(56) = 368.00$, $p = .737$.

A Wilcoxon test revealed a statistically significant and large positive change *from pretest to practice*, $z = 6.24$, $p < .001$, $r = 0.58$. Also, there was a statistically significant, and medium change *from practice to immediate post-test*, $z = -3.50$, $p < .001$, $r = 0.32$. However, in this case the change was negative. The finding therefore replicates earlier studies that reported a gap between task practice and learning. The Wilcoxon test also revealed the presence of a statistically significant and medium positive change *from immediate to delayed post-test*, $z = 3.37$, $p = .001$, $r = 0.32$ and the absence of a difference *from practice to delayed post-test*, $z = 1.67$, $p = .095$. The latter findings indicate that students improved from immediate to delayed post-test, performing on the latter at the same level as (or slightly higher than) the practice test.

Discussion and conclusion

The findings for self-efficacy show that the students began training with a high level of confidence in their capacity to accomplish the formatting tasks. The training raised these appraisals further, to a mean level that approached the scale maximum. The final self-efficacy scores are substantially higher than those found in empirical studies with Western students trained with comparable videos who engaged in similar self-efficacy (eg, van der Meij & van der Meij, 2016a, 2016b). The audience contrast is tentative, however. A valid comparison would require both audiences to be included in the same study.

The finding also contrasts with outcomes from cross-cultural studies that generally show that Asian students hold lower self-efficacy beliefs in comparison to Western students (eg, Klassen, 2004; Scholz, Gutierrez-Dona, Sud, & Schwarzer, 2002; Wang, Schwab, Fenn, & Chang, 2013). There is no ready explanation for the high self-efficacy findings obtained in the present study.

The high scores for self-efficacy after training bode well for student engagement in other software training situations. That is, this appraisal may influence the students' future attempts at software learning, as high self-efficacy has been found to relate to people trying harder and being more persistent with comparable task challenges (eg, Bandura, 2012; Bandura & Locke, 2003).

That the advance organizer did not affect self-efficacy development is perhaps due to a ceiling effect. The correlational data suggest that the advance organizer contributed to better alignment between final self-efficacy and performance score immediately after training.

The findings for the gain scores from pretest to practice indicate that the students improved considerably. From a pretest score of 38%, successful task performance rose to 65% of the training tasks during practice. Although the gain was significant, the task practice score is somewhat disappointing if one considers the fact that students could consult the videos at any time during training. The practice scores are also lower than those obtained in comparable empirical studies with Western students (van der Meij, 2014, 2017; van der Meij & van der Meij, 2016a).

A speculative account why only moderate gain scores were obtained in this study relates to a cultural difference in attitude towards different solution methods. The videos in this study only teach structural solution methods. These methods keep the text's formatting intact when moderate textual changes are made. In contrast, novices and beginners generally employ temporary fixes for the trained formatting tasks that do not uphold when text is altered. It has been argued that Chinese students have a relatively more tolerant view towards the existence of multiple versus single solution methods (Li, de Jong, & Karreman, 2018). This suggests that Chinese students need videos that hold more compelling evidence in favor of the demonstrated method. One possible way of achieving this purpose, is to complement the current set of videos with: (1) demonstrations in which temporary formatting solutions are shown to fail to keep text formatting intact when textual changes are made, and/or (2) extend the demonstrations with structural solution methods with displays that convey how these methods keep text formatting intact. Such a cultural adaptation does not require an entirey different take on content and presentation of software training videos. The proposal comfortably fits within the DBT-approach as it relates to the motivational processes in observational learning. But here too, the disclaimer is made that both audiences should be included in the same study to make a valid comparison.

The gain scores from practice to immediate post-test show the gap between practice and learning that other studies have also reported (van der Meij, 2014, 2017; van der Meij & van der Meij, 2016a). That it is harder to learn the new tasks than to achieve these tasks during practice does not come as a surprise. During task practice, the students could always look back to the videos to refresh their memory. During the immediate post-test, the students were not allowed to consult the videos. Students can successfully achieve the trained tasks only when they have remembered or can reconstruct the task procedure. The absence of an effect of condition indicated that, in contrast to expectations, the advance organizer did not prevent the students from suffering a performance loss from practice to the immediate post-test.

From the immediate to the delayed post-test the scores rebounded. In fact, the students even achieved significantly higher levels of task performance on the delayed post-test than on the immediate post-test. Other studies with comparable DBT-based demonstration videos have likewise shown such a rebound, but never to a point that the delayed task performance were significantly higher than the immediate post-test scores. One explanation for the high scores on the delayed post-test is uncontrolled practice. Although video access was blocked directly after training, the possibility cannot be excluded that students engaged in voluntary practice in the 1-week period between the immediate and delayed post-test. Interestingly, the scores on the delayed post-test were such that they were at least on the same level as during practice. In other words, the gap with practice had disappeared on this delayed test of learning outcomes.

A complicating factor in the analyses was the unexpected finding of a significant difference between conditions on the pretest. With the pretest scores factored in, only one significant contribution of the advance organizer was found, namely on the gain from pretest to delayed post-test. This advance organizer effect on task performance is hard to interpret due to the different starting levels of the participants in the two conditions in the study.

To conclude, the present study suggests that Chinese students responded moderately well to DBT-based videos for software training. Their self-efficacy increased significantly, as did their task performance. The inclusion of an advance organizer had a positive effect on the accuracy of their self-efficacy appraisals, and on the gain from pretest to delayed post-test.

China has made tremendous progress in improving the ICT-infrastructure in schools (eg, Di, 2014; Guodong & Zhongjiao, 2010; Jingtao, Yuanyuan, & Xiaoling, 2010), and in providing teacher training programs for ICT usage (eg, Jun & Zhuzhu, 2010; Wang *et al.*, 2017). To our knowledge, no research has yet been done on how to design effective videos for software training for Chinese students. The present study is a first attempt to tackle this complementary aspect of creating ICT-development support. Hopefully, it also stimulates technical writers in China to adopt (and adapt) the DBT-approach in their video construction efforts.

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