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PREFACE

The use of computer for learning and teaching purposes in schools is unavoidable. As information and communication technology develops and becomes closer to people's daily life, the challenge to use computer for learning and teaching purposes becomes stronger. Though the role of teachers is certainly indispensable, the knowledge and skill to use computer for learning and teaching purposes is mandatory. Referring to Priowirjanto's statement in his paper (also included in this preceding), teachers who do not have the knowledge and skill to use computer for learning and teaching purposes will gradually be replaced with those who do have the knowledge and skill. Teachers, therefore, need to continually upgrade themselves to be able to use the technology in the profession if they want to persist on their career.

In line with the demand, the 8th AsiaCALL Conference 2009, which is hosted by Sanata Dharma University, finds its momentum. The conference is significant in that it can provide information on the development of the theories, method, and technology of the use of computer especially for language learning and teaching and for instructions in general. The conference theme *Innovations in CALL and their Implications for Language Learning* indicates the commitment of all who are involved in the conference for the development of computer-assisted language learning.

Forty nine papers on various topics in the field are presented by experts from different countries in Asia, America, and Australia. The various topics presented and discussed in the conference have certainly provided more insights in the use of computer for language learning to all the participants of the conference and challenged them to see what they can do in their profession in response to the innovations in CALL.

The conference proceedings, though do not include all papers, hopefully, can be a good record of what have been discussed in the conference and become a source of further inspirations.

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COMPUTER ANIMATION IN EFL LANGUAGE ENVIRONMENTS: HOW CAN IT BE POTENTIALLY USED TO SUPPORT LEARNING?

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ABSTRAC

Recent advances in technology have provided a wide variety of possibilities for incorporating animation in computer-based learning environments. A well-known benefit of using animation in a learning context is its ability to visually depict dynamic contents which are usually imperceptible because animated pictures can show information about two important visual attributes: motion and trajectory. The purpose of this paper is to explain how computer animation could be used in EFL learning environments to support learning achievement. It considers how effective the animation is and which learning processes are being supported. Present state of research on animations and projects that the author has been involved in are used to illustrate its potential. This paper also provides design implications and outlines its suitability for different learning activities. In current English learning practice, it is often the case that decisions about whether an animation should be used and how it should be used in a computer-based learning resource are based primarily on the nature of the to-be-learned subject matter.

Key words: computer animation, EFL learning environment, dynamic content, visuals, mental model

I. INTRODUCTION

The availability of computer-related technologies and the increase in software capabilities have facilitated an increase in incorporating animation in computer-based learning environments. With the ability to create coursework with graphics and animation, new opportunities exist for teachers and trainers to provide students with a wide variety of learning environments. Research has shown that computer-based instruction enhances learning and fosters positive attitudes toward instruction, as well as offers the opportunity for conceptual understanding through visualization (Owen & Dwyer, 2005). Visualization is a powerful tool which has been found to be an effective cognitive strategy to facilitate learning. According to Owens and Dwyer (2005) one strategy for enhancing the instructional impact of visualization is adding visuals in motion (animation). It is supported by Lowe and Schnotz (2008) who argue that animations are assumed to increase interest and motivation,

to direct attention, to illustrate procedures, and to explain how things work.

In teaching and learning English as a foreign language (EFL), the use of computer animations is increasingly common through multimedia. They are usually used along with verbal information for different functions, such as to motivate learners, enhance information processing, depict the dynamic information explicitly, make abstract things concrete, etc.. However, much of the computer animation now used in EFL learning environments may be far less effective than is generally supposed. The purpose of this paper is then to explain possible ways to incorporate computer animation into EFL learning environments. It considers how effective computer animation can be to support learning gains, which learning processes are being supported, when and why the animation may be effective. Present state of research on animations and projects that the author has been involved in are used to illustrate its potential. Recent research shows that animations are not inherently effective in supporting learning; they are not always a benefit. "Just as for language, there are gradations of quality. Like other visualizations and like metaphors, animations can mislead; they can create misunderstandings" (Tversky, Heiser, Mackenzie, Lozano, & Morrison, 2008: 267). This is because their design is not based on an understanding of what is required for people to learn from animation (Lowe & Schnotz, 2008). Approaches to the animation design have tended to rely on intuition rather than being based on principled guidelines derived from empirical investigation. This paper then also discusses the role of design features to enhance learning from animation, and provides design implications, as well as outlines their suitability for different English learning activities.

II. WHAT IS COMPUTER ANIMATION AND WHAT COULD IT BE?

EFL teachers interested in creating or adopting animation into CBI programs are often troubled by not knowing what animation is. Therefore, before exploring possible effective ways to incorporate computer animation into CBI programs for EFL learning environments, it is necessary to find out what animation is. According to Lowe (2004), animation is a dynamic depiction that can be used to make change processes *explicit* to the learner. Thus, by its nature, an animated picture conveys the dynamic information of a situation *explicitly* or *directly* compared to a static picture which also conveys the dynamic information but *indirectly*. Rieber (1994) also notes that animated pictures can show information about two important visual attributes: *motion* and *trajectory*, where trajectory refers to the direction of the path of travel of an animated object. Animations can provide information about an object's motion (if it is moving) and how it is moving (its path, patterns, etc). They can also show information about which way the object is moving. In addition to the aforementioned definition, Bétrancourt and Chassot (2008) put forward that "animation can be generated by computer, recorded on video from real scene, or be formed from a mixture of real and computer-generated features" (p.144).

Further, as the function of animation is to convey dynamic information, the kind of information conveyed is critical. Lowe (2004) distinguishes three kinds of information that can be conveyed by animations:

- *Transformation*, that involves form changes in graphic depicted items (shape, color, and texture);
- *Translation*, that involves the movement of whole items relative to the reference frame or relative to each other;
- *Transition*, that involves the partial or complete appearance/ disappearance of items, due to temporal evolution (change in the viewpoint, or having elements added or removed).

Thus, computer animation, as described above, primarily involves the perception of motion on the screen. Such motion may be represented by that of a moving object or expanding or shrinking geometric shape. Motion, no doubt, constitutes the very essence of computer animation. In the broadest sense, anything non-static, involving either physical changes (in position, shape, size, ...) or status changes (such as color, lightness, font, ...) over time, may be regarded as a form of animation (Xiao & Jones, 1995).

It is generally believed that "animation is effective for conveying dynamic information, and consequently should improve learners' understanding of concepts involving change over time" (Bétrancourt & Chassot, 2008). As in animations the information conveyed is important, it is advisable that using animation appropriately should require at least one of those three kinds of information (transformation, translation, and transition) mentioned above. Inappropriate use of animation may not merely fail to provide benefits, it may even be harmful to learning (Bétrancourt, in press; Rieber, 1990; Rieber & Kini, 1991).

There are many possible ways to make use of animations in education. One of the main concerns for practitioners and educators is how animation can be put to best educational use. Some of these possible uses are offered by Bétrancourt (in press):

- *Supporting the visualization*: animation can be used to visualize dynamic phenomena that are not easily perceptible (space and time scale), impossible to realize in practice (too dangerous or too expensive), or not inherently visual (representation of abstract concepts such as forces).
- *Inducing a 'cognitive conflict'*: animation can be used to visualize phenomena that are not spontaneously conceived in the correct fashion.
- *Enabling learners to explore a phenomenon*: Animation can be used to provide a suitable interactive learning experience that encourages learners to generate hypotheses and test them by manipulating the depiction's parameters. In this case the animation becomes a simulation that is used in a discovery-learning approach (Schnotz, Bockheler, & Grzondziel, 1999; Hegarty, Quillici, Narayanan, Holmquist, & Moreno, 1999).

III. POSSIBLE WAYS IN WHICH COMPUTER ANIMATIONS CAN BE INCORPORATED INTO EFL LEARNING ENVIRONMENTS

In EFL learning environments, the use of computer animation is increasingly common. It is commonly used to explain, elaborate and illustrate animate expressions to abstract concepts. The most powerful and direct application of animation is its use in presenting instructional materials that are dynamic in nature, too abstract to be understood without a concrete example (Dwyer, 1994; Rieber & Kini, 1991). In EFL computer-based learning environments, there are some topics that commonly put in animations, such as:

Writing and speaking: e.g., description of a process

Speaking: e.g., body language- facial expressions and gestures

Reading: e.g., animated story, narration of events, to help learners better understand storytelling and sequencing ideas (in words or pictures).

Listening: e.g., comprehending abstract concepts, animated text for developing note taking skills as they listen. Associating and matching the instruction with correct animation (e.g. Imperative sentences) (Devi, 2005).

Grammar: Some examples,

Verbs: e.g., action verbs, phrasal verbs

Nouns: e.g., singular and plural nouns

Tenses: Providing an animation to present a timeline which shows, for example, when an event happens, or when an event happens in relation with another event.

Prepositions: Some examples,

a. Providing a brief animated illustration to accompany a written expression from which a motion preposition is omitted. The animation functions to represent the dynamics of the missing preposition. Learners are required to identify the target preposition from a list of four plausible alternatives. For example, the animated illustration in Figure 1 is used to depict the movement (dynamics) of the target object (the paper boat) moving *toward* the reference object (the beach). Learners are expected to choose the preposition *toward* as the target choice. Compared to its static counterpart, the animated depiction is instructionally more beneficial because it can show more clearly the point where the target object starts to move and where its final destination is than the static counterpart.

	The paper boat is floating .....the beach. a. near b. toward c. away from d. toward or away from

Figure 1

a. Providing an animated illustration to show the location of a target object in relation to the reference object. This involves locational prepositions instead of directional (motion) ones, so the animation is not to represent the dynamics of a preposition but merely to raise motivation. One example related to it is (http://www.tcet.com/eaonline/FlashedESL/ CatsMX.swf). This software provides an animated illustration showing a mouse chased by a cat and then the mouse runs and stays at a certain spot. A question appears, "Where is the mouse?" Learners are required to identify where the mouse is by clicking the most appropriate preposition from a list of plausible alternatives, e.g. (a) in front of the sofa, (b) behind the sofa, (c) in the sofa, (d) under the corner (see Figure 2).

Figure 2

b. Providing animated illustrations to present the dynamics of directional prepositions explicitly. The animation represents the movement of a target object to its reference object, e.g., *into, onto, to, toward,* etc.. The use of animation is to specify the specific motion of each preposition to make it distinctive from each other. As mentioned earlier, compared to its static counterpart, the animated depiction is instructionally more successful than its static counterpart because it can show more clearly the point where the target object starts to move and where its final destination is. For example, Figure 3 depicts the dynamics of the motion preposition *into* while Figure 4 *onto*. When the dynamics of those prepositions are depicted in static illustrations, it is represented by an arrow which may be not as effective as explicit motion depicted in animated illustrations to show the distinctive motion between *into* (Figure 3) and *onto* (Figure 4).

Figure 3

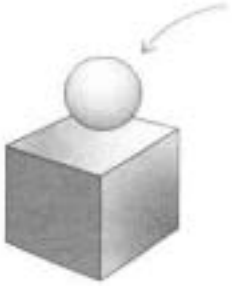


Figure 4

Pronunciation: Some examples,

a. Providing stress of sounds and syllables in English words. One example of software related to it is, *Pronunciation Animations* from Cambridge University Press (http://www.cambridge.org/elt/resources/skilss/interactive/ pron animations. It provides students with visual and audio lessons for learning to speak English. On this software students can see and hear which sounds and syllables to stress in English words. Figure 5 shows an example of stress on words in sentences where the stressed word is zoomed in. The site is divided into four categories; sounds, stress, intonation, and phonemic chart. Students have a choice of listening to a female voice or a male voice for most of the words and sounds on *Pronunciation Animations*. An animation to show intonation, for example, depicts the end part of a sentence going down or up (see Figure 6). This site could be a great resource for ESL/EFL students. The visual and audio segments could be used as model for a teacher-led lesson or be used as individual study resources.

Figure 5

Figure 6

b. Providing animated speech to better identify the visual cues that aid speech recognition: to show the position of articulation, the speech organs involved, the dynamic procedures for correctly producing each and every individual sound in English. One example of software related to it is *ProPower* (www.englishlearning.com), see Figure 7.

Figure 7

The animation provided in this software is of two genres: (a) *diagram* animation (left side) and (b) *real-life* animation (right side). The two different genres of animated depiction are used for different instructional purposes. While the real-life animation is used to help a learner *recognize* or *identify* the subject matter, the diagram animation is more useful for helping a learner understand the *structure* of the position of articulation and the speech organs involved. Despite the extra detail provided in the close-up the video (real-life) animation, learners are still guessing about what is hidden below the surface. This is where the more revealing treatment used in the diagram can be beneficial. The real-life animation *describes* but the diagram animation can *explain*.

Vocabulary: Some examples,

a. To show words describing (a) movements and gestures: verbs like 'walk', 'run', 'write', 'talk', 'throw', 'swim', etc.. They can be qualified with phrases like 'walk away', 'walk ahead of', 'walk with', 'walk fast', 'walk towards', etc.. Gestures would be the parts of the body like 'point a finger', 'raise the right hand', 'kick with the left foot', etc.; (b) motion of an object, to describe 'how' an object moves like 'translate', 'rotate', 'swivel', 'fly in', 'fly out', 'fall out', 'fall', 'rise', etc., and to specify the motion precisely, it can be qualified using several adjectives like 'linear', 'curvi-linear', 'circular', 'sinusoidal', 'spiral', etc. to describe the trajectories; (c) the cause of motion of an object: verbs like 'throw', 'propel', 'push', 'pull', 'hit', 'swing', etc.; and (d) the effect of motion of an object: verbs like 'land', 'halt', 'break', etc. that describe what happens to an object as a result of its motion. Qualifiers like 'land smoothly', 'bounce back', etc. describe further details of the effect (Deshpande, n.d.).
b. Giving animated cues in electronic books to facilitate learning the meanings of unfamiliar words, such as *The New Kid on the Block* (1993) containing a collection of poems written by Jack Prelutsky published as a CD ROM in the Living Books series by Broderbund. When a word is selected (the learner clicks on the word) the computer pronounces the word aloud then a brief animation related to word is displayed. For example, when the learner clicks on the word *locomotive* in the poem, *My Incredible Headache*, two train engines are displayed banging into the sides of a character's head.
c. To teach alphabet, animation can be used to animate the character and an object that begins with a certain alphabet (e.g., apple for "a") as illustrated in Figure 8. The role of the animation is to attract learners' interest, visualize an object, and motivate learners to repeat learning from the software again and again so that the lesson will retain in the long term memory.

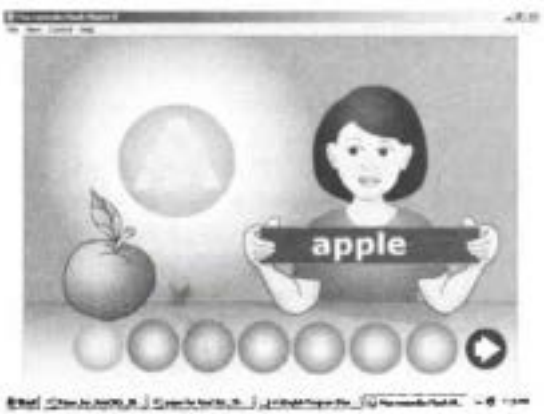


Figure 8

Those topics that put in animations have something in common, i.e., they involve dynamic information (content), motion or movement which is often presented via dynamic visuals such as animated pictures or animations. Though it is admitted that the use of animations in those topics when appropriately designed may be effective in helping learners comprehend the subject matter (topic) and retain it in memory, quite often animations are merely used as cosmetic and motivational graphics to attract or motivate learners (as *affective* functions) rather than enhance learning (as *cognitive* functions) (Rieber & Kini, 1991). They serve to add to the decoration of software to make it more attractive or aesthetically pleasing so as to raise the general motivational level of a lesson.

III. WHY ANIMATION COULD BE EFFECTIVE TO SUPPORT LEARNING

Dual coding theory (Paivio, 1986) can be used to explain why animation could effectively support learning. According to this theory there are two types of coding—in a verbal system and an image system. Verbally presented material is encoded only in the verbal system, while visually presented material is encoded in both the verbal and image systems. According to dual coding theory, learning is enhanced when information is coded both visually and verbally (i.e., dually coded). Animation, due to its unique dynamic qualities, is more likely to be dually coded "deeper" and "harder" into the long-term memory than are static pictures (Lin, 2001).

Mayer (1993) outlines a framework, derived from Paivo's dual coding theory, for interpreting the cognitive processing of information that is presented both visually and verbally. The framework postulates the formation of three types of mental connections: (1) the learner receives verbal material that is used to mentally form a verbal representation (thus forming a verbal representational connection); (2) the learner receives visual material and builds a visual representation (thus forming a visual representational connection; and (3) the learner builds referential connections between the visual representation and verbal representation. The referential connections create integration of the two that enhances the construction of a runnable mental model. If a learner has constructed a mental model, he or she should understand the information presented through text and picture and have better recall of the information. A mental model is "a situational representation that an individual constructs as the need arises. Once constructed, a mental model provides a basis for thinking about the represented situation" (Lowe, 1993: 226). In some domains involving dynamic information (motion), animations can be better than static pictures because the phenomenon being explained is too complex to be mentally simulated. As dynamic illustrations offer a complete model for generating a mental representation of motion, and so reduce the level of abstraction of temporal ideas, they should support a deeper understanding than is the case with static pictures (Park & Hopkins, 1993). When static pictures are used, learners are forced to infer

this model on their own. Therefore, it is expected that animations will be more helpful in fostering the learning process if motion is a relevant aspect of the subject matter (Lewalter, 2002).

A recent framework for explaining the effects of pictures within explanatory texts on comprehension combines elements of both dual-coding theory and mental model theory (Schnotz, Böckheler, & Grondziel, 1999). The processing model developed by Schnotz and his associates offers an integrated account of the interplay between texts and pictures in knowledge acquisition. According to this theoretical framework, pictures which are well-matched to the purposes of texts are more likely to enhance knowledge acquisition. To make such a picture, the design variables entailed in the pictures constituent elements is central. Therefore, design features need to be considered in order to develop high quality pictures that help the learner construct an accurate mental model of the situation represented by an accompanying text.

IV. THE ROLE OF DESIGN FEATURES OF ANIMATION IN SUPPORTING EFL LEARNING

As presented earlier, animations are commonly used to present dynamic content/information involving motion or movement. In comparison with static illustrations, animations have the potential to be especially beneficial for instruction presenting dynamic contents. However, the use of animations in EFL learning environments has not been explored for its potential in instruction, in general (Devi, 2005). The effect of animations and video on learner competencies in EFL learning has not received much wider research attention, and also not much research can be cited. The use and effectiveness of animation as a visual aid for language teaching and learning has to be explored by teachers, researchers, and instructional designers, and others in classrooms, seminars and conferences.

Some research has shown animation to be advantageous in some learning situations, others have not (Tversky & Morrison, 2002). In terms of supportive evidence, Higgins and Cocks (1999), for example, showed that the use of animated cues in electronic books on children's vocabulary development significantly increased scores on a post-test compared to a pre-test. A similar positive result was provided by Devi's study (2005) that the students could make a list of phrasal verbs and comprehend the dialogue while wacthing animated cartoon, and could understand the meaning of phrasal verbs in that context. In this study an animated cartoon has been found to be remarkably useful for learning phrasal verbs contextually. Okolo and Hayes' (1999) study also showed a positive effect of animation that students preferred reading a CD-ROM version of a book with animation, spending almost four times as much time 'reading" the book in this condition. In this case, the use of animation as a motivational purpose is proved to be effective. A similar study conducted by Higgins and Cox (1998) on the effect of animation cues on third grade children's ability to learn the meanings of unfamiliar words

showed a similar positive result. In this case, the animation functions as a cognitive purpose. The results indicate that when children are required to attend to the animated cues, the clues facilitate learning for most of the children. Pramono (2008a) provided similar positive results, with animated presentations shown to be more effective than static visual for students studying motion prepositions.

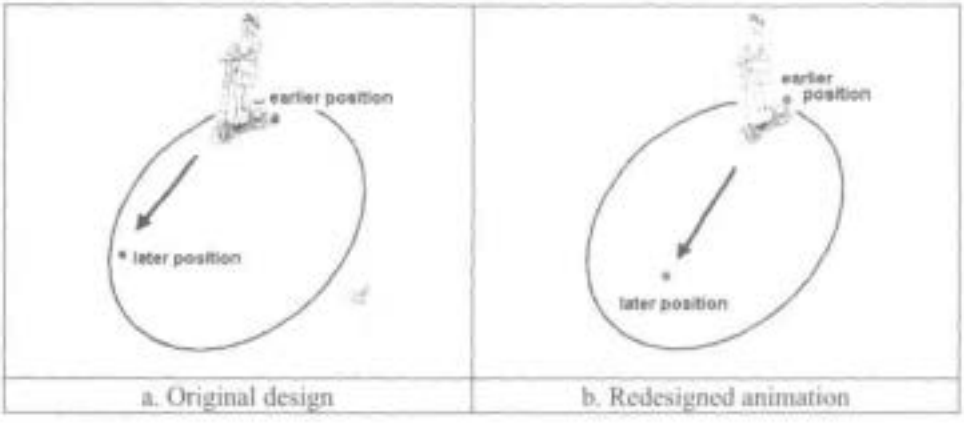
There have also been a number of studies that show the effects of animations to be of little or no instructional value within an instructional lesson (Milheim, 1993). A study conducted by Schnotz and Grzondziel (1996), for example, comparing learning from static pictures and animated pictures of time zones of the earth found that learners who had access to the animated pictures did not perform better in questions requiring the use of mental simulations. Schnotz and Grzondziel concluded that the use of animated pictures can result in a more superficial processing of the subject matter compared with the use of static pictures. Dorothy Chun and Jan Plass (1996) found a similar effect for second language vocabulary acquisition, where students who used the text and picture annotations scored higher on the follow-up vocabulary test than students who used text and video annotations. Further, Lowe's (1999) research indicates that "in some circumstances, animations may not be instructionally superior to static depictions because the processing demands involved can have negative effects on learning" (p.225). It is possible that, in some conditions, static presentations will be more effective than animations, especially when learners have the knowledge necessary to mentally simulate processes from the static pictures. Moreover, there is a risk that providing people with external simulations can prevent them from developing their ability to mentally simulate complex events.

While the overall findings from research on animations in instructional material are mixed to some degree, animations still appear to have significant potential for use in EFL learning environments. The potential support of an animation can be geared when the animation is well designed. Pramono's study (2008), for example, investigated the effectiveness of animated illustrations used to present prepositions learning, revealed that well-designed animated illustrations could improve learners' capacity to choose the motion prepositions that were most appropriate for use in ambiguous incomplete text expressions. The support given by these illustrations was attributed to their function in helping learners build effective mental models that appropriately represented the situational dynamics. Thus allowed learners to disambiguate an incomplete sentence sufficiently to identify the preposition required for its proper use. Pramono concluded that a representational animated illustration can support the construction of a mental model and an ambiguous animated illustration may hamper the construction of an appropriate mental model. The results of the study showed that simply putting static illustrations into animations does not seem to enhance its effectiveness over static illustrations in helping learners construct an appropriate dynamic mental model and so directing learners towards the

intended choice of motion preposition for sentence completion.

The results indicated that the animations were not intrinsically superior to static counterparts. These findings suggest that the animation alone does not determine its effectiveness in supporting learning. Rather, it appeared that the animation's design features was central to instructional effectiveness. These features include all the entities (the target object itself and the reference object), their visuospatial arrangement, and the visual context as a whole. These should be arranged in a way that can support the effectiveness of animation because animation alone, without the support of other features, can be ineffective. In the case of motion preposition learning, for example, the finding of Pramono's study suggests that effective animation design features are those that are able to make the intrinsic perceptual characteristics of spatial relations less dominant over those of the temporal relations depicted. For example, examine the animated pictures in Figure 9 where proximity between the target object and the boundary involved in the illustration is a matter. In the original design of the item *The boy on the scooter moves* _____ *in the circle*, the trajectory of the animated target object ('the boy on the scooter') was *close to* the boundary of the reference object ('the circle') as shown in part a, Figure 9.

The alternative answers were 'forwards', 'backwards', 'forwards or backwards', and 'along'. The intended answer was 'forwards' and the main chosen distractor was 'along'. It was hypothesised that for students who chose 'along' instead of 'forwards', the visuo-spatial arrangement of the original design directed their attention to the visuo-spatial aspect rather than the intended dynamic aspect of the reference situation. As a consequence, this arrangement allowed them to build a mental model of the referent situation representing a spatial rather than temporal relation between the target object and the reference object. The model then could produce the choice of the unintended preposition 'along' rather than the intended motion preposition 'forwards' for the sentence completion.



a. Original design | b. Redesigned animation

Figure 9

Accordingly, the animation *per se* did not provide sufficient disambiguation. In order for the design to provide more support for the construction of the intended dynamic mental model that could produce the appropriate choice of the motion preposition 'forwards', the visuo-spatial arrangement had to be changed in a way that could enable the dynamic aspect to appear more salient than the visuo-spatial aspect of the animation. The approach taken in re-designing the animation was that the trajectory of the animated target object that was originally *close to* the reference object's boundary (see part a, Figure 9) was changed to be *far* from it as shown in part b, Figure 9. The results of the study showed that for the original designed animation (part a), 63% of the students chose the intended preposition 'forwards', while for the re-designed animation (part b) 100%. Thus, design features can be of central importance in the effectiveness of animated illustrations and implies that in order to support learning animations must give emphasis to the dynamic information presented.

Another importance of design features of animations in supporting learning was shown by Mayer and Anderson's (1991; 1992) work on the use of verbal narration or text in conjunction with animation that understanding concepts using animation was significantly improved if verbal explanation ran concurrently with the animation. "Students learn best when words and pictures of an explanation are presented contiguously in time and space" (Mayer & Anderson 1992: 450). This 'concurrency' of the text and animation is a 'design factor'; however, it is design of the *combination*, not the internal characteristics of the animation itself.

Similarly, Price (2002) suggested that the effectiveness of animations for helping learners understand dynamic systems is influenced by the extent to which the portrayal makes those dynamics visually explicit. However, learners are required not only to 'see' the dynamics, but also to interpret the meaning behind the changes that are occurring in the presentation, and to 'integrate' all of these pieces of information into a coherent understanding of the system as a whole. This is to say that the use of animated illustrations to facilitate understanding of a dynamic process is not merely a matter of providing visually explicit information. There is more for the learner to achieve in understanding from this kind of representation than 'seeing' the depicted dynamics.

Based on the findings of those studies, it is likely that, as with static illustrations, design features can be crucial to the effectiveness of animated illustrations. Providing animation in the depiction, may not, of itself, be sufficient to produce the dynamic information required for learners to build an accurate mental model of dynamic content. The findings suggest that effective animations in learning material need careful design and that an instructional designer may need to consider all features in the depiction, in addition to the animation itself.

V. IMPLICATIONS FOR DESIGN

Based on the above discussion, the following points need to be taken into account for implementation of animation within a computer-based EFL learning environments in order to produce animation which can potentially be effective:

a. Animation or no animation? Clearly, the very first decision the software designer needs to make is whether or not to include any animation to present a particular content of subject matter. The designer may start a needs analysis by trying to see whether or not animation is appropriate with the nature of the subject matter and predict the learning effect of animation. The designer should also consider whether animation would help enhance the learner's understanding and retention of the subject matter, motivate the learner or retain learner's interests. If indeed animation is needed, the designer then needs to decide how much (both the size and the duration of the animated object) animation is appropriate (Xiao & Jones, 1995).
b. The type of animation to be included for a given content depends largely on the function of the animation, (e.g., cosmetic function, attention-gaining function, motivation function, presentation function, clarification function, etc.)
c. Design animation presentations in such a way that important information can easily be perceived.
d. Use animation when the instructional materials are dynamic in nature, too abstract to be understood without a concrete example (Dwyer, 1994; Rieber & Kini, 1991).
e. Use animation when the instruction includes the use of motion or trajectory.
f. Use animation when the instruction requires visualization.
g. Use animation to gain a learner's attention or increase motivation.
h. Avoid extraneous use of animation since it can be distracting to learners, drawing their attention away from the main points of the content or from more important ideas.
i. Design factors are crucial, so design the animation carefully to be sufficient to produce the dynamic information required for learners to build an accurate mental model of dynamic content.
j. For animations to be educationally effective, the instructional designer should not rely solely on providing an explicit depiction of the dynamics. Rather, all features comprising the depiction itself need to be considered in detail. This includes all the entities (the target object itself and the reference object), their visuo-spatial arrangement, and the visual context as a whole. These should be made in an effort to support the effectiveness of animation because animation alone without the support of other features may be ineffective. In particular, these features need to be arranged so that they make the relevant dynamic aspects of the content more salient than the visuo-spatial aspects. In general, the depiction should be designed in a way that it properly captures all essentials required to fully understand the dynamics.

k. Present words and animated pictures of a situation contiguously in time and space.

VI. CONCLUSION

The use of computer animations in EFL learning environments is becoming more common along with the advent of computer technology. They are generally used to fulfill or assist one of several functions, whether to merely visualize information, attract and direct learners' attention, motivate learners, or represent dynamic domains, enhance comprehension and retention. Animations can be potentially used in EFL learning environments. However, the implementation of animations still needs to be explored for more wider scope of language learning by teachers, researchers, and instructional designers. Besides, more research also needs to be conducted to find out, especially in what conditions or when animations can be effective to enhance learning. The use of animation of itself is not inherently effective; it must be designed appropriately so that the important dynamic information can easily be perceived. The design features of animations should be able to facilitate the construction of an intended dynamic mental model of a referent situation, and this is not merely a matter of providing visually explicit information. They must give emphasis to the dynamic information presented.

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