
Learning motivation survey of scripting animated pedagogical agent with multimedia instructional material in EFL course

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Introduction

- Animated Pedagogical Agent
 - Software avatars or animated life-like characters in an e-learning environment
 - Verbal and non-verbal behaviors
 - Speech
 - Body gestures
 - Emotions
 - Benefits
 - Human-human social interaction
 - Increasing attention, engagement, and learning motivation
 - Joyful learning
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Introduction (Cont.)

- Computer assisted language learning (CALL)
 - Applying innovative IT in language course
- Animated agents for CALL
 - Increasing social aspects in CALL systems
 - Reducing students' learning anxiety
 - Enhancing classroom learning motivation

Introduction (Cont.)

- Research objectives
 - Using animated agents as instructional tools in the typical EFL classrooms
 - Developing a related courseware
 - Survey effect of students' learning motivation
 - 4 scales: attention, relevance, confidence, satisfaction

Courseware development

- The courseware
 - XML-based markup language
 - Scripting an agent's presence and motions using high-level XML marks
 - Authoring tool
 - An editor for instructors to design multimedia teaching materials
 - Display system
 - A learning system for learners to display the teaching materials

XML markup language

- Mayer's segmenting theory
 - A lesson in a class can be divided into bite-sized manageable segments to reduce learners' cognition loads
- 3-tier structure
 - Lesson level
 - Overall lesson information: annotation data and starting segments
 - Segment level
 - The context consisting of external multimedia objects and the presenting schedule of animated agents
 - Tutor level
 - The presentation details of an animated agent, including its motions, speeches, and gestures

Tutor level

- Scripting the presence of an animated agent
- <Actor>: specify and select choose a character
- <Speech>: specify a tutor's speech formed in textual format and auditory format
- <Motion>: specify the high-level motion patterns such as “Blink”, “Sad”, “Greet”, “Read”, and “Lookdown”.



Tutor level (Con't)

```
<Tutor TutorID="T1">
```

```
  <Actor>Merlin</Actor>
```

```
  <Motion>greet</Motion>
```

```
  <Speech>How are you?</Speech>
```

```
</Tutor>
```

How are you?



Segment Level

- A segment organizes a list of tutors and the external multimedia resources
- <Theme>: link multimedia resources, such as images or video and audio files
- <Tutor>: link to a tutor script

Segment level (Con't)

```
<Segment SegmentID="S1">
```

```
  <Tutor>Tutor1</Tutor>
```

```
  <Tutor>Tutor2</Tutor>
```

```
</Segment>
```

Good morning!



Tutor1



How are you??



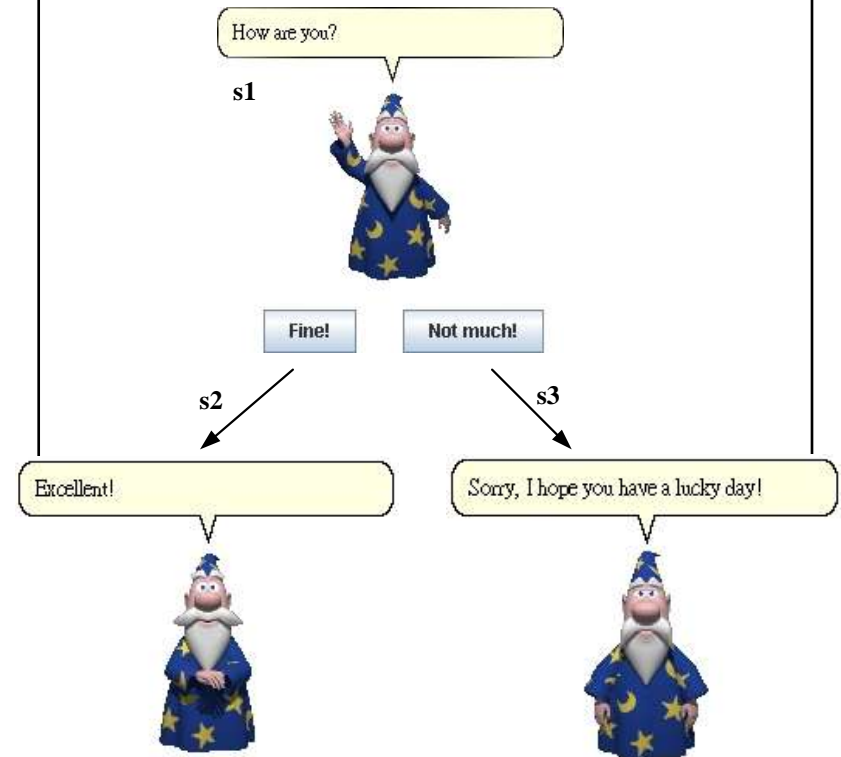
Tutor2

Lesson level

- A lesson organizes a finite set of segments
- <SegmentInit>: specify the starting segment in a lesson
- <Interactivity>: specify a set of buttons to link to the following segments

Lesson level (Con't)

```
<Lesson LessonID="L1">  
  <SegmentInit>s1</SegmentInit>  
  <Interactivity SegmentID="s1">  
    <Button>  
      <Text>Fine!</Text>  
      <Segment>s2</Segment>  
    </Button>  
    <Button>  
      <Text>Not much!</Text>  
      <Segment>s3</Segment>  
    </Button>  
  </Interactivity>  
</Lesson>
```



Authoring tool

Lesson Management

Theme Setting

The screenshot displays the authoring tool interface with several key components highlighted by red boxes and labels:

- Lesson Management:** A hierarchical tree structure of segments (e.g., Segment1, Segment2, Segment3, Segment4, Segment5, Segment6, Segment7, Segment8, Segment9, Segment10) is shown on the left. A red box highlights this tree, with a label "Lesson Management" pointing to it.
- Theme Setting:** A panel on the right titled "分段設定" (Segment Setting) contains fields for "分段名稱" (Segment Name), "佈景圖片" (Background Image), "背景音樂" (Background Music), "下一段" (Next Segment), and "播放文字" (Play Text). A red box highlights this panel, with a label "Theme Setting" pointing to it.
- Button Setting:** A panel on the right titled "虛擬按鈕設定" (Virtual Button Setting) contains fields for "人物選擇" (Character Selection), "動作選擇" (Action Selection), "人物停留時間" (Character Stay Time), "轉的資源" (Turn Resource), "台詞" (Dialogue), and "台詞聲音檔" (Dialogue Sound File). A red box highlights this panel, with a label "Button Setting" pointing to it.
- Tutor Setting:** A panel on the right titled "虛擬老師設定" (Virtual Teacher Setting) contains fields for "人物選擇" (Character Selection), "動作選擇" (Action Selection), "人物停留時間" (Character Stay Time), "轉的資源" (Turn Resource), "台詞" (Dialogue), and "台詞聲音檔" (Dialogue Sound File). A red box highlights this panel, with a label "Tutor Setting" pointing to it.
- Sequence Management:** A panel on the right titled "想到了嗎?" (Thoughtful?) contains a list of five items, each with a character icon and a text description. A red box highlights this panel, with a label "Sequence Management" pointing to it.

Display system

Exposition to the Curriculum Content

Additional curricular explanation

The screenshot shows a software window titled "DPlayer" with a menu bar containing "檔案(F)" and "檢視(V)". The main display area is divided into two sections. The top section shows a cartoon illustration of two children in a forest. A girl on the left says, "I want to go home. I'm hungry." and a boy on the right replies, "Me, too." A yellow text box below them reads: "The children are hungry. They find a candy house in the forest. They are very happy. What are they doing? Let's see." The bottom section shows a character resembling Oscar the Grouch. The right side of the window has a control panel with a font dropdown set to "標楷體" and size "20", and two scrollable text areas. The top area is labeled "內容" and is empty. The bottom area is labeled "對話" and contains the following text: "Oscar: It's story time. Oscar: The children are hungry. They find a candy house in the forest. They are very happy. What are they doing? Let's see."

Pedagogical agent's speech

Experiment design

- Primary: Learning motivation survey of applying animated agent-based instructional materials in EFL course
- Others: Three open-ended questions to survey student comments and suggestions and the instructor's opinions.

Participants and Procedure

- The evaluation was conducted at an elementary school in Taichung
 - A class of 5th-grade totalled 32 students enrolled for 3 hours per week and a total of 17 weeks
 - The survey of student motivation was conducted in the 17th week
 - The final response rate was 100%
 - Z-scores ($z = \pm 3.0$) revealed that none of responses to our survey should be eliminated

Teaching material and classroom activities

Classroom activity	Procedure	Instruction method
Storytelling and Q&A	The story is told by an animated agent in English, followed by the animated agent conducting a question and answer activity. The teacher could play the role of a judge who was able to concentrate on the students' answers and gave them advice.	Direct method
Role playing and pair working	Agent is an assistant by calling a pair of students, then issuing them narrative missions. Then the teacher is a coach to encourage them and train them to talk with each other in English for solving the missions.	Communicative method

Teaching material and classroom activities (Con't)

Classroom activity	Procedure	Instruction method
Total physical response	Agent asks students in English to respond with physical movements to commands such as “stand up” or “sit down” and “hands up” or “hands down”	Total physical response method
Leading mode	The agent presents a correct sentence, and then asks students to repeat it three times.	Audio-lingual method

Instruments

- Motivation survey: a modified version of Keller's IMMS (Instructional Material Motivation Survey)
 - 34 questions with scale ranges from 1 to 5
 - The total score for the instrument ranges from 34 to 170
 - 4 factors in IMMS: Attention, Relevance, Confidence, Satisfaction

Results

- Descriptive statistics for all factors in ARCS
 - The total scores of the 32 ranged from 117 to 170 with a mean value of 151.8 (SD = 12.2)
 - The majority of the participants were motivated
 - The highest mean score (M=4.51, SD=0.52) was **Satisfaction** and the lowest mean score (M=4.42, SD=0.56) was **Relevance**

Factor	Mean	SD
Attention	4.45	0.53
Relevance	4.42	0.56
Confidence	4.48	0.59
Satisfaction	4.51	0.52

Instruments (Con't)

- 3 open-ended questions for experimental group
 - What do you like about the course in contrast to your prior English courses?
 - What do you like about the animated agent based instructional materials in the English course?
 - What suggestions do you have for future improvements?

Students' comments

- Question 1:
 - 20 agreed EFL course more joyful
 - 16 felt more at ease talking to agents than to the teacher
- Question 2:
 - 29 liked the agent spoke native English
 - 11 liked the presentation of the agent in cartoon-like style
- Question 3:
 - 18 hoped the agent can be applied in other courses
 - 3 hoped the more characters

Teacher's comments

■ Positive

- In storytelling mode, Animated agent can pronounce native English sentences
- Animated agent can share my jobs to entertain the students by naturally presenting interesting gestures and movements to gain students' attention

■ Negative

- The authoring tool might not support me to design new animated characters

Discussion

- 4 factors in the ARCS model had a mean value above 4.0
 - indicating that the students were motivated by the teaching materials integrated animated agents
- Satisfaction (M=4.51) had the highest mean value
 - This result showed that the participants had positive feelings and might like to accept the advice from animated agents.

Discussion (Con't)

- The confidence factor had an mean value of 4.5
 - The participants had confidence to learn the designed EFL instruction.
- Existing research studies have demonstrated that animated agents can provide positive effect on students' learning experiences

Discussion (Con't)

- The attention factor (M=4.45) had a high mean value above 4.0
 - The majority of participants gained their attention in learning the designed course
- The life-like and cartoon-like presentations of an animated agent are eye-catching and can help students to focus on the learning tasks

Discussion (Con't)

- The relevance factor (M=4.42) also had a high mean above 4.0
 - The participants agreed that the designed teaching content was important and relevant to their needs for learning EFL

Conclusion

- A courseware was developed
- Our investigation showed animated agents could be a well instructional tool.
 - Well-designed class activities are necessary
- Future works
 - Enhancement of courseware
 - Robot-assisted language learning

Thanks for attentions...

Q & A