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

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Speaker: Kai-Yi Chin
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
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
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 TutorID="T1">
  <Actor>Merlin</Actor>
  <Motion>greet</Motion>
  <Speech>How are you?</Speech>
</Tutor>
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 SegmentID="S1">
  <Tutor>Tutor1</Tutor>
  <Tutor>Tutor2</Tutor>
</Segment>
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)

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

Lesson Management

Theme Setting

Button Setting

Tutor Setting

Sequence Management
Display system

Exposition to the Curriculum Content

Additional curricular explanation

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.
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

<table>
<thead>
<tr>
<th>Classroom activity</th>
<th>Procedure</th>
<th>Instruction method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storytelling and Q&amp;A</td>
<td>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.</td>
<td>Direct method</td>
</tr>
<tr>
<td>Role playing and pair working</td>
<td>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.</td>
<td>Communicative method</td>
</tr>
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**Teaching material and classroom activities (Con’t)**

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<td>Total physical response</td>
<td>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”</td>
<td>Total physical response method</td>
</tr>
<tr>
<td>Leading mode</td>
<td>The agent presents a correct sentence, and then asks students to repeat it three times.</td>
<td>Audio-lingual method</td>
</tr>
</tbody>
</table>
Teaching material and classroom activities (Con’t)

(a). Storytelling  (b). Total physical response
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

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<tr>
<th>Factor</th>
<th>Mean</th>
<th>SD</th>
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<tr>
<td>Attention</td>
<td>4.45</td>
<td>0.53</td>
</tr>
<tr>
<td>Relevance</td>
<td>4.42</td>
<td>0.56</td>
</tr>
<tr>
<td>Confidence</td>
<td>4.48</td>
<td>0.59</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>4.51</td>
<td>0.52</td>
</tr>
</tbody>
</table>
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
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
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