Second Language Acquisition in a Blended Learning of programming languages (SLA-aBLE): Students respond to new materials

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Implementations by Term

Fall 2015
- Graded Discussion Board: Weekly topics. Possible comments: questions, answers, examples, resources.
- Open-ended questions in quizzes.
- Videos followed SLA-aBLE methods: Concepts broken into smaller sections. Parts: Syntax, Keywords, Examples, etc.
- Embedded quiz questions in videos.

Spring 2015
- Discussion Board: Used as resource. Includes Q&A from previous term as reference for students.
- Open-ended questions: Rubric fixed to better meet the needs. Questions updated.
- Videos followed SLA-aBLE methods: Videos divided. Length is shortened as much as possible.
- Embedded quiz questions in videos: Prompt added to enable asking questions at the end of video.

Fall 2016
- Discussion Board: Includes Q&A from previous terms, as well as examples, discussion questions.
- Open-ended questions: Incomplete script provided.
- Videos followed SLA-aBLE methods: Captions and music added to videos.
- Embedded quiz questions in videos: No changes.

Demographics: Fall 2015 - Spring 2016

<table>
<thead>
<tr>
<th>Language</th>
<th>Not at all fluent (%)</th>
<th>Not very fluent (%)</th>
<th>Moderately fluent (%)</th>
<th>Somewhat fluent (%)</th>
<th>Very fluent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>0</td>
<td>2.41</td>
<td>12</td>
<td>9.64</td>
<td>77.11</td>
</tr>
<tr>
<td>Chinese</td>
<td>25</td>
<td>3.85</td>
<td>0</td>
<td>0</td>
<td>76.93</td>
</tr>
<tr>
<td>German</td>
<td>31.75</td>
<td>6.35</td>
<td>4.76</td>
<td>1.59</td>
<td>3.17</td>
</tr>
<tr>
<td>Spanish</td>
<td>11.7</td>
<td>25.53</td>
<td>24.47</td>
<td>4.26</td>
<td>11.70</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>27.45</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>French</td>
<td>22.73</td>
<td>15.15</td>
<td>10.61</td>
<td>4.55</td>
<td>6.06</td>
</tr>
<tr>
<td>Arabic</td>
<td>25.93</td>
<td>0</td>
<td>1.85</td>
<td>0</td>
<td>5.56</td>
</tr>
<tr>
<td>Korean</td>
<td>32</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Portuguese</td>
<td>26.93</td>
<td>7.69</td>
<td>1.93</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>19.12</td>
<td>11.76</td>
<td>2.94</td>
<td>2.94</td>
<td>14.71</td>
</tr>
</tbody>
</table>

- 49.75% have experience learning a second language.
- Student of Korean ascendance:
  - Saw relation between programming language and a second language.
  - Final grade: 79.75%
  - SLA-aBLE tests top: 93%, 88.21%.

- One third of the students have been exposed to programming before.
- Prefer new video format; consider changing all topics to SLA-aBLE format.
- 27.87% of students learned MATLAB to some extent before taking the course.

Programming Language Demographics

<table>
<thead>
<tr>
<th>Programming language</th>
<th>Low skill (%)</th>
<th>Moderate low skill (%)</th>
<th>Moderate skill (%)</th>
<th>Moderately high skill (%)</th>
<th>High skill (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATLAB</td>
<td>48.84</td>
<td>20.93</td>
<td>23.26</td>
<td>4.65</td>
<td>2.33</td>
</tr>
<tr>
<td>Fortran</td>
<td>96</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Java</td>
<td>53.66</td>
<td>17.07</td>
<td>17.07</td>
<td>9.76</td>
<td>2.44</td>
</tr>
<tr>
<td>C/C++</td>
<td>73.53</td>
<td>11.76</td>
<td>14.71</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Visual Basic</td>
<td>80</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Python</td>
<td>58.14</td>
<td>16.28</td>
<td>20.93</td>
<td>4.65</td>
<td>2.33</td>
</tr>
<tr>
<td>Other</td>
<td>70</td>
<td>10</td>
<td>13.33</td>
<td>3.33</td>
<td>3.33</td>
</tr>
</tbody>
</table>

- Students have related to the topic to discussions online and think-pair-share in-class activities.
- Surveys and one-on-one interviews were conducted to obtain feedback from students, which was used to improve the materials.

Grades: Fall 2016 and Fall/Spring 2016

- Frequency count of grades in SLA-aBLE and non-SLA-aBLE courses in three semesters

<table>
<thead>
<tr>
<th>Grade</th>
<th>Fall 2015</th>
<th>Fall 2016</th>
<th>Fall/Spring 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>50</td>
<td>49</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>60</td>
<td>56</td>
<td>1</td>
</tr>
</tbody>
</table>

- Comparison of students’ final grades in the SLA-aBLE and non-SLA-aBLE sections for three semesters – Fall 2016, Spring 2016, Fall 2016

K-12, Outreach

- Flash-drive with SLA-aBLE contents distributed to professors at Digifest in Embry-Riddle.
- Included: Readme file with instructions, quizzes, Think-Pair-Share, Discussion Board prompts, SLA videos, and publications.

- Students responded to new materials.
- Learning of programming languages (SLA-aBLE): Second Language Acquisition in a Blended Learning environment

Fall 2016
- Discussions board.
- Students had related to the topic to discussion board.
- New videos preferred. Helps grasp concepts better.
- New quizzes should be shorter. Divide into multiple quizzes.
- Implemented in Spring 2016.
- Short quizzes are good and preferred.
- Add incomplete files to online programming quizzes. Will help reduce heavy workload.
- Implemented in Spring 2017. Completion rate of programming question increased. Issue with incompatible files almost eliminated.

Spring 2016
- Add examples and issues other students have had related to the topic to discussion board.
- Implemented Spring and Fall 2016.
- Response still low. Students want to keep discussion board as resource.
- Captions would be good.
- Spring 2016 Captions would be good. Specially for second language students.
- Fall 2016 Captions are helpful to clarify (from second language speaker).

One-on-One Interviews

- Comments taken directly from One-on-One interviews:
  - Fall 2015 comments will help in graded quizzes
  - Fall 2015 New videos preferred. Helps grasp concepts better.
  - Spring 2016 Preventing skipping in videos is good because it actually makes you watch them.
  - Interactive videos (SLA) are preferred to old videos. Old (Non-SLA) videos lack explanation. SLA videos are detailed and thorough.
  - Fall 2015 Quizzes should be shorter. Divide into multiple quizzes.
  - Implemented in Spring 2016.
  - Spring 2016 Short quizzes are good and preferred.
  - Spring 2016 Add incomplete files to online programming quizzes. Will help reduce heavy workload.
  - Implemented in Spring 2017. Completion rate of programming question increased. Issue with incompatible files almost eliminated.

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