An evaluation framework for digital authoring tools

Samuel Taylor, Ian Dagnall, David Johnson
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Background

- curriculum renewal working group
- speaking course
- 348 undergraduate non-English major students
- CEFR A1 to A2 English proficiency
Background

- flipped approach
- new e-learning materials to preview class content
- provide students with the scaffolding for in-class speaking activities designed to develop fluency and confidence
Research goals

- develop an evaluation framework for digital authoring tools
- use the framework to evaluate the suitability of two tools for creating new e-learning content
- analyze the framework evaluation in comparison to anecdotal experience
the tools

part of the Moodle LMS

create auto-graded quizzes with various question types, such as multiple choice and short-answer

choose from a wide range of quiz settings related to feedback, time limits and takes allowed

(Moodle, 2023)
create, share, and reuse interactive HTML5 content

57 content types: text, image, multimedia, question

plugin-integration into Moodle

(H5P Group, 2023)
Evaluating authoring tools

- software applications used to develop e-learning products
- use interfaces that allow for simple manipulation and configuration of e-learning assets
- reduce technical overhead by not requiring code or script in a programming editor

(Berger, 2014)
Evaluating authoring tools

- use accelerated by COVID-19 pandemic (Kang, 2021)
- using appropriate tools necessary to create detailed, clear, interactive, and user-friendly online courses (Taylor, 2022)
- tools inappropriate for the context can result in ineffective instruction or insufficient support of learning (Berger, 2014)
Evaluating authoring tools

Authoring tools need to satisfy aspects of...

- Learning
- Environment
- Structure
• prioritizing learning enables a learner-centred approach to analysis, evaluation and implementation of technology for language teaching and learning (Salmon & Nyhan, 2013)

• effective learning is result of sound pedagogical design (Laurillard, 2012)

• evaluation must include consideration of learning design (Reinders & Pegrum, 2017)
• environment supports learning by meeting the needs of the learner (Boettcher, 2007)

• role of educational technology includes affording educational tasks based on the needs of students and teachers (Antonenko et al., 2017)

• technology affordances - features of a technology that provides a type of interaction between the technology and the agent - helpful for indicating the usefulness of an authoring tool and the quality of the learning environment afforded by the tool (Antonenko et al., 2017; Reinders & Pegrum, 2017)
• structural criteria underpin the quality of the learning environment (Attwell, 2006; Volungevičienė et al, 2021)

• structural criteria identifiable through consideration of the organizational context

• context determines needs, problems, and opportunities used for defining goals and priorities and judging the significance of outcomes (Stufflebeam, 2000)
evaluation frameworks

- Reinders & Pegrum (2017)
- Salmon & Nyhan (2013)
- Antonenko et al. (2017)
- TELAS (2023)
- Stufflebeam (2000)
The DECAT evaluation framework

Digital
Educational
Content
Authoring
Tool

Learning
Environment
Structure
The DECAT evaluation framework

- L2 learning input
- L2 learning output
- Interactivity
- Sequencing
- Adaptation
- Feedback
The DECAT evaluation framework

<table>
<thead>
<tr>
<th>Environment</th>
<th>Temporality</th>
<th>Navigation</th>
<th>Accessibility</th>
<th>Modification</th>
<th>Technical support &amp; feedback</th>
<th>Analytics</th>
</tr>
</thead>
</table>


The **DECAT** evaluation framework

<table>
<thead>
<tr>
<th>Structure</th>
<th>Functionality</th>
<th>Reusability</th>
<th>Simplicity</th>
<th>Content creation</th>
<th>Cost</th>
</tr>
</thead>
</table>
## The DECAT Evaluation Framework

<table>
<thead>
<tr>
<th>1. Learning</th>
<th>Requirements</th>
<th>Description</th>
</tr>
</thead>
</table>
| **L2 learning input**  
What type of learning input is required? | Enter requirement  
Enter requirement  
Enter requirement  
Enter requirement | Enter description |
| **L2 learning output**  
What type of learner output is required? | Enter requirement  
Enter requirement  
Enter requirement  
Enter requirement | Enter description |
<table>
<thead>
<tr>
<th>1. Learning</th>
<th>Requirements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L2 learning input</strong></td>
<td>Text, audio, image, video input</td>
<td>Text, audio, image, video input</td>
</tr>
<tr>
<td>What type of learning input is required?</td>
<td>Text, audio, image, video input</td>
<td>Text, audio, image, video input</td>
</tr>
</tbody>
</table>

| **L2 learning output** | Text, speech output |
| What type of learner output is required? | Text, speech output |

| | Text, audio, image, video input |
| | Text, speech output |
| | Enter requirement |
| | Enter requirement |
The **DECAT** evaluation framework

| 1. Learning          | Requirements | Yes, and sufficient | No, not possible | *Reason for insufficiency*
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L2 learning input</strong></td>
<td>Text</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Audio</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Image</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **L2 learning output**| Text         | 1                   |                  |                             |

What type of learning input is required?

What type of learner output is required?
<table>
<thead>
<tr>
<th></th>
<th>H5P</th>
<th>Moodle Quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2 learning input</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>L2 learning output</td>
<td>4.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Interactivity</td>
<td>3.6</td>
<td>3.2</td>
</tr>
<tr>
<td>Sequencing</td>
<td>1.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Adaptation</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Feedback</td>
<td>5.0</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19.5</td>
<td>15.3</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporality</td>
<td>2.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Navigation</td>
<td>3.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Accessibility</td>
<td>1.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Modification</td>
<td>3.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Tech. support &amp; feedback</td>
<td>1.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Analytics</td>
<td>3.9</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17.4</td>
<td>23.5</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functionality</td>
<td>3.8</td>
<td>3.8</td>
</tr>
<tr>
<td>Reusability</td>
<td>3.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Simplicity</td>
<td>4.5</td>
<td>3.9</td>
</tr>
<tr>
<td>Content creation</td>
<td>2.1</td>
<td>4.1</td>
</tr>
<tr>
<td>Cost</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18.7</td>
<td>21.7</td>
</tr>
</tbody>
</table>

**Analysis**

Framework used to evaluate two digital authoring tools.

Framework produced a rating out of 5 for each category and a total score for each section.
Learning

H5P performed better in the learning categories.
Moodle performed better in the environment categories.
Moodle performed better in the structure categories.
Moodle performed better overall, while H5P was stronger in the learning category.
Discussion

- to what extent does the framework analysis reflect anecdotal experience?
- does the framework offer insights beyond anecdotal experience?
- modifications and future directions
H5P

- simple to create activities
- visually appealing
- wide variety of content types
- lack of temporal control
- limited analytics and data
- limited editing and copying
- doesn't save student progress in activities

Many people live in the suburbs and commute to work every day.

多くの人が郊外に住んでいて、毎日通勤しています。
Moodie Quiz:

- learning curve for creating content
- problems with resizing content
- simple to re-use content
- ability to edit and regrade content
- saves student progress in activities
- detailed data and analytics

次の活動に対して正しい動詞を選びましょう。

1. rugby.
2. cycling.
3. yoga.
4. violin.
Anecdotal analysis

**H5P**
- simple to create activities 
- visually appealing 
- wide variety of content types 
- lack of temporal control 
- limited analytics and data 
- limited editing and copying 
- doesn't save student progress in activities

**Moodle Quiz**
- learning curve for creating content 
- problems with resizing content 
- simple to re-use content 
- ability to edit and regrade content 
- saves student progress in activities 
- detailed data and analytics
The **DECAT** framework

- provides a more nuanced analysis
- considers all criteria
- reflects teachers' experience with tools
- enables visualisation of relative strengths and weaknesses
- provides more balanced analysis
- facilitates an informed choice of authoring tool
The **DECAT** framework

- provides a more nuanced analysis
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- reflects teachers' experience with tools
- enables visualisation of relative strengths and weaknesses
- provides more balanced analysis
- facilitates an informed choice of authoring tool
The **DECAT** framework strengths

- provides a balanced, nuanced analysis
- rates tools on all criteria
- enables visualisation of relative strengths and weaknesses
- enables a quick analysis
The **DECAT** framework things to consider

- results dependent on detailed criteria
- criteria selection can be time-consuming
- criteria must be defined for each context
- adding weightings to requirements might make the framework more accurate
Conclusion

- DECAT provided detailed analysis
- enabled an informed decision over tool choice
- process of defining criteria is useful
- criteria are context specific
The authors would appreciate any comments and feedback from users of the DECAT framework. The authors can be contacted at the following email addresses.

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References