Using mobile technologies to help apprentice chefs to assemble learning experiences across locations.

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The general assumption: you can learn from (reflecting on) your experiences

The need from the field: to connect experiences across learning locations
Mobile devices...
The learning documentation: A boundary object?

Documentation of the experiences they have made at the workplace and they have to present at the final exams.

*It is not graded; however it is compulsory.*

1. Recipe book
2. Job report: Section where the main professional processes are described and commented
Participants and procedure

Two classes of apprentice chefs (n=45).
The same teacher in both classes invited apprentices:

1. To practice a specific cooking method (with any recipe) taking pictures about it through a smartphone
2. To document their practice exploiting the affordances given by pictures
   a. in the recipe book
   b. in the learning journal
DOCUMENTAZIONE DELL'APPRENDIMENTO E DELLE PRESTAZIONI

Mise en place
Kartoffeln kochen und abtrocknen
Eigelb, Ei und Salz bereitstellen
Das Backblech mit Butter ausstreichen
Ein Dressiersack vorbereiten

Preparazione
- Die noch warmen Kartoffeln kochen und abtrocknen
- Eigelb und Ei beigeben
- Die Kartoffelmasse salzen
- Die Kartoffelmasse mit frischer Erdnussöl
- Die Kartoffelrose mit geriebener Pfeffer
- 341. Champagne
- 342. Olivenöl

Finizione
Pommes Duchesse auf den Teiler legen

PERSONLICHE ÜBERLEGUNG:

Referenz Aktivität: Sottosala di vitello grassata e Vierte Spiege

Diese Sache sollten Ihnen helfen, Ihre Fähigkeiten und Ihre Lernfortschritte zu verbessern. So lassen Sie Ihre Fähigkeiten und Ihr Leistungsniveau steigen. Wiesen Sie erfolgreich, finden Sie Fotos, die dokumentieren, was Sie bereits lernten können.
Yes, but…

…where is research?

It’s Designed-Based Research!
Learning Scenario I
Learning Scenario II
Learning Scenario III

Please note the role of the MOLS
Learning Scenario III
Question(s) and measures

This Mobile&Online Learning System (MOLS) can be a good boundary object…

…?

1. Is the MOLS an easy-to-use tool?  \(\rightarrow\) questionnaire (Venkatesh, et al., 2003)
2. Is the MOLS a useful tool?  \(\rightarrow\) questionnaire (Venkatesh, et al., 2003; ad hoc built items)
3. Is the MOLS an effective tool? With respect to…
   a. …metacognitive skills  \(\rightarrow\) content analysis (Berger & Karabenick, 2011)
   b. …reflective skills  \(\rightarrow\) content analysis (Bain, et al., 2002)
   c. …«connectivity»?  \(\rightarrow\) questionnaire (ad hoc built items)
   d. …declarative knowledge acquisition  \(\rightarrow\) learning test (specific items)
# Results

## Ease of use: Production

<table>
<thead>
<tr>
<th></th>
<th>2010-11* (n=23)</th>
<th>2011-12 (n=22)</th>
<th>2012-13 (n=22)</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipes</td>
<td>15.2 (17.64)</td>
<td>37.14 (24.78)</td>
<td>48.14 (30.18)</td>
<td>t(21)= 3.946; p=.001</td>
</tr>
<tr>
<td>Learning Journal</td>
<td>n.a.</td>
<td>19.77 (15.86)</td>
<td>28.95 (24.34)</td>
<td>t(21)= 4.134; p=.000</td>
</tr>
<tr>
<td>Pictures</td>
<td>73.5 (69.40)</td>
<td>140.86 (131.45)</td>
<td>165.45 (135.76)</td>
<td>t(21)= 3.289; p=.003</td>
</tr>
<tr>
<td>Pictures per recipe</td>
<td>2.62</td>
<td>3.79</td>
<td>3.43</td>
<td></td>
</tr>
</tbody>
</table>

*Second semester only. Recipes were only used, the LJ having been introduced at the beginning of the II year.

**Table 1.** Mean numbers of recipes, learning journals and associated pictures included in the apprentices’ OLD in the three years (standard deviations in parenthesis).
Results
Ease of use and usefulness

1. Is the MOLS an easy-to-use tool?

- 75.7% of the apprentices found the device easy to use
- the remaining found it at least easily usable with someone’s support.
- None of them reported the device to be difficult to use.

- Both the mobile device and the whole system are considered easy-to-use and useful by apprentices

(details in Motta, Cattaneo, & Gurtner, 2014)
Results
Effectiveness

3. Is the MOLS an effective tool?
   a. With respect to metacognitive skills

   - The MOLS stimulated metacognitive learning strategies related to planning, monitoring, debugging, and evaluation

   - The more frequent the use of the MOLS (and of the LJ in particular), the higher the performance at the final examination

(details in Mauroux, et al., accepted; Cattaneo & Aprea, 2014)
## Results

### Effectiveness on reflection (within)

<table>
<thead>
<tr>
<th>LJ-based scenarios</th>
<th>M_{pre} (SD_{pre})</th>
<th>M_{post} (SD_{post})</th>
<th>Wilcoxon test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning scenario #2*</td>
<td>4.81 (1.68)</td>
<td>5.16 (1.68)</td>
<td>(Z_{\text{cooking method 1}} = 2.03) (p = .042) (r = 0.51)</td>
</tr>
<tr>
<td></td>
<td>4.47 (1.13)</td>
<td>5.12 (1.50)</td>
<td>(Z_{\text{cooking method 2}} = 2.23) (p = .026) (r = 0.58)</td>
</tr>
<tr>
<td>Learning scenario #3</td>
<td>4.25 (1.28)</td>
<td>6.23 (2.09)</td>
<td>(Z_{\text{cooking method 3}} = 2.54) (p = .011) (r = 0.90)</td>
</tr>
<tr>
<td></td>
<td>4.50 (0.93)</td>
<td>5.07 (1.91)</td>
<td>(Z_{\text{cooking method 4}} = 2.12) (p = .034) (r = 0.78)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collaborative scenarios</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning scenario #1</td>
<td>5.67 (1.67)</td>
<td>7.29 (2.62)</td>
<td>(Z_{\text{cooking method 1}} = 3.09) (p = .002) (r = 0.89)</td>
</tr>
<tr>
<td>Learning scenario #2</td>
<td>5.33 (1.37)</td>
<td>7.50 (2.90)</td>
<td>(Z_{\text{cooking method 2}} = 3.08) (p = .002) (r = 0.89)</td>
</tr>
<tr>
<td>Learning scenario #3</td>
<td>4.94 (3.78)</td>
<td>7.00 (3.84)</td>
<td>(Z_{\text{cooking method 3}} = 3.44) (p = .001) (r = 0.83)</td>
</tr>
<tr>
<td>Learning scenario #4</td>
<td>3.93 (1.53)</td>
<td>6.00 (2.81)</td>
<td>(Z_{\text{cooking method 4}} = 3.20) (p = .001) (r = 0.83)</td>
</tr>
</tbody>
</table>

* LJ-based scenario #1 doesn’t foresee the revision of the learning journal

Table 3. Pre-post difference in the number of elements cited in the Learning Journal entries (experimental group).
Results

Effectiveness on reflection (between)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>M_exp (SD_exp)</th>
<th>M_ctrl (SD_ctrl)</th>
<th>T-test</th>
<th>p-value</th>
<th>r-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking method 1</td>
<td>5.16 (1.68)</td>
<td>3.31 (2.57)</td>
<td>t(24.960)=2.461</td>
<td>p=.021</td>
<td>r= 0.44</td>
</tr>
<tr>
<td>Cooking method 2</td>
<td>5.12 (1.50)</td>
<td>3.63 (2.16)</td>
<td>t(26.549)=2.297</td>
<td>p=.030</td>
<td>r= 0.41</td>
</tr>
<tr>
<td>Cooking method 3</td>
<td>6.23 (2.09)</td>
<td>4.33 (1.81)</td>
<td>t(29)=2.698</td>
<td>p=.012</td>
<td>r= 0.45</td>
</tr>
<tr>
<td>Cooking method 4</td>
<td>5.07 (1.91)</td>
<td>5.35 (1.97)</td>
<td>t(30)=-.417</td>
<td>p&gt;.05</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario</th>
<th>M_exp (SD_exp)</th>
<th>M_ctrl (SD_ctrl)</th>
<th>T-test</th>
<th>p-value</th>
<th>r-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking method 5</td>
<td>7.29 (2.62)</td>
<td>3.56 (2.74)</td>
<td>t(24)=3.410</td>
<td>p=.002</td>
<td>r= 0.57</td>
</tr>
<tr>
<td>Cooking method 6</td>
<td>7.50 (2.90)</td>
<td>2.33 (2.18)</td>
<td>t(25)=4.710</td>
<td>p&lt;.0001</td>
<td>r= 0.69</td>
</tr>
<tr>
<td>Cooking method 7</td>
<td>7.00 (3.84)</td>
<td>5.20 (1.30)</td>
<td>t(22)=1.017</td>
<td>p&gt;.05</td>
<td>-</td>
</tr>
<tr>
<td>Cooking method 8</td>
<td>6.00 (2.81)</td>
<td>5.17 (1.47)</td>
<td>t(22)=.689</td>
<td>p&gt;.05</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 4. Difference in the number of elements cited in the Learning Journal entries (experimental *versus* control groups).
Results
Effectiveness on reflection

3. Is the MOLS an effective tool?
   b. With respect to reflective skills

- Learning journal entries significantly increase their content quality, especially when the use of the MOLS is integrated in classroom activities (both pre-post and with respect to a control group)

(details in Motta, Cattaneo, & Gurtner, 2014; similar findings in Motta, Boldrini, & Cattaneo, 2013; Boldrini & Cattaneo, 2012; Cattaneo & Boldrini, accepted)
Results

Effectiveness as a boundary object

3. Is the MOLS an effective tool?
   c. With respect to «connectivity»?

- The use of MOLS is considered effective to link what experienced at the workplace with what happening at school

- The usefulness of a MOLS is particularly identified for connecting experiences across learning locations

(details in Motta, Cattaneo, & Gurtner, 2014; Cattaneo, Motta, & Gurtner, submitted)
## Results

Effectiveness on declarative knowledge acq.

<table>
<thead>
<tr>
<th>Session #</th>
<th># of questions (specific/total)</th>
<th>t-test</th>
<th>Experim.Group M (SD)</th>
<th>Control Group M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General test on fish</td>
<td>12/14</td>
<td>t(34)= -2.420, p = .021, r = 0.38</td>
<td>3.19 (.32)</td>
<td>2.89 (.43)</td>
</tr>
<tr>
<td>Test on beef</td>
<td>3/17</td>
<td>t(37)= -2.308, p = .027, r = 0.35</td>
<td>5.62 (1.44)</td>
<td>4.58 (1.35)</td>
</tr>
<tr>
<td>Test on veal, pork and lamb</td>
<td>2/25</td>
<td>t(37)= -1.834, p = .075, r = 0.29</td>
<td>2.33 (.66)</td>
<td>1.97 (.55)</td>
</tr>
<tr>
<td>General test on meat</td>
<td>6/14</td>
<td>t(35)= -2.587, p = .014, r = 0.40</td>
<td>5.33 (1.06)</td>
<td>4.48 (.90)</td>
</tr>
</tbody>
</table>

Table 2. Effects on learning of using the OLD versus the standard paper-pencil journal. Mean scores (and Standard deviations) for each learning test (specific questions only).
Discussion

The feasibility of the approach is tested in both places for the different stakeholders

The effectiveness of the MOLS is proved
1. to support apprentices’ professional development and learning
2. to better articulate VET learning locations (both at personal, interpersonal and systemic level)

Limitations with respect to the small sample are being faced now: 700 baker apprentices are using the platform nation-wide (and we are monitoring it)
Outlook and sustainability

Progressive circles included, at the different levels
«Expanding the zone of influence», across communities of practice
(e.g. inspectors, corporate association)

The school centre progressively took it in charge:
VET working for VET (e.g. mobile apps)

Other professions already use it at the national level
(e.g. bakers and pastry cooks)

Identifying the core functions and features of a MOLS
to develop a new (across-professions) prototype, and
to design and test new MOLS-based instructional scenarios
(the strenght of the leading house on our reciprocal shoulders:
8 years of design-based research with several professions)
Thanks for your attention!

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Selected References


