Incorporating Moodle-Wiki and Moodle-Digital Badges into HKU Undergraduate Courses: Impact on Students’ Collaborative Learning, Motivation, Behavioral Engagement and Academic Performance

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**Background**

- **Our previous studies:**
  - Using *wiki* could enhance students’ collaborative learning and approaches to learning (Fong et al., 2017).
  - Application of *digital badges* has a positive effect on motivating students to engage with difficult tasks and resulting in *better outputs* (Hew et al., 2016).
To compare the effects of Moodle-wiki and Moodle-digital badges on students’ collaborative learning, motivation, behavioral engagement and academic performance in BSc (Exercise and Health) courses.
Sixty-one and 31 BSc (Exercise and Heath) students were recruited by convenience sampling and assigned to a Moodle-wiki group and a Moodle-digital badges group, respectively.

The students in the Moodle-wiki group attended face-to-face lectures and used a wiki on Moodle platform weekly for online group discussion during a 13-week semester.
The students in the Moodle-digital badges group received the same interventions and were awarded gold, silver and bronze badges based on their performance online.

### Group Project on Moodle - Instructions

Students have been allocated into 2 small groups. 
Please check whether you have been allocated to group A or group B. 
Participate in the general discussion, plus either group A discussion or group B discussion or both.

Those who choose the easiest questions will be awarded a bronze medal (digital badge), while those who opt for the medium and hard questions will be given silver and gold medals (digital badge), respectively.

You must apply the knowledge you have learned in the course and post the answers in the Moodle wiki discussion forum. 
You can also examine other students’ answers to identify areas for improvement and provide feedback.

The course lecturer will give feedback to the online discussions and award gold, silver, and bronze badges, based on your performance.
Methods

- **Outcome measures:**
  - Collaborative learning (*Group Process Questionnaire, GPQ*)
  - Motivation and behavioral engagement (*Moodle activity log*)
  - Academic performance (*overall course results*).

- Data was collected at the **end of the semester**.
Methods

**Part A: Group Process Questionnaire**

This questionnaire measures the quality of group work and collaboration among members of a group. It is based on the conceptualization of Johnson, Johnson, and Holubec (1990) as well as Kagan (1990).

Looking back on the working process as a group, how much would you agree to the following experiences?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

**Positive Interdependence**
1. Group members use their strengths.
   The group works together to complete the target.

2. We work together to share resources.
   Group members share information with each other.

3. There is healthy competition among group members.
   Each group member is happy for others to succeed without thinking of others.

4. In our group, everyone is responsible.
   Each group member is ready to be held accountable.

**Individual Accountability**
1. Group members respect each other.
   Group members respect the contributions of others.

2. Group members are clear about their roles.
   The role of each group member is clear and no one can just be lazy.

3. We are often unable to resolve disagreements.
   Some group members rely on others and do not contribute to the group.

4. Some group members do not do their own work and rely on others to do their work.

**Equal Opportunity**
1. The distribution of work in our group is fair.

2. Every group member has an equal chance to participate.

3. There are no conflicts and no one's work is done for them.
   Some members do too much, others too little.

4. There are no problems with the work.
   There are members who take over the bulk of the work.

**Social Skills**
1. We help each other and get along well in the group.
   We help each other and get along well in the group.

2. We are open and honest.
   We are open about our feelings and opinions.

3. There is little respect within the group.
   There is little respect within the group.

4. We are often unable to resolve disagreements.
   We are often unable to resolve disagreements.
## Results

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Moodle-wiki group (n = 61)</th>
<th>Moodle-digital badges group (n = 31)</th>
<th>P value</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall course results, %</strong></td>
<td>82.08 ± 12.47</td>
<td>85.13 ± 14.76</td>
<td>0.305</td>
<td>0.223</td>
</tr>
<tr>
<td><strong>Group Process Questionnaire</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive interdependence score (range 4 -24)</td>
<td>14.75 ± 3.96</td>
<td>19.59 ± 3.15</td>
<td>&lt;0.001*</td>
<td>0.280</td>
</tr>
<tr>
<td>Individual accountability score (range 4-24)</td>
<td>14.84 ± 4.00</td>
<td>18.66 ± 3.75</td>
<td>&lt;0.001*</td>
<td>0.178</td>
</tr>
<tr>
<td>Equal opportunity score (range 4-24)</td>
<td>15.12 ± 3.83</td>
<td>18.14 ± 3.20</td>
<td>&lt;0.001*</td>
<td>0.136</td>
</tr>
<tr>
<td>Social skills score (range 4-24)</td>
<td>14.65 ± 4.75</td>
<td>19.59 ± 3.38</td>
<td>&lt;0.001*</td>
<td>0.229</td>
</tr>
<tr>
<td>Composite score (range 16-96)</td>
<td>59.37 ± 15.32</td>
<td>75.97 ± 11.53</td>
<td>&lt;0.001*</td>
<td>1.224</td>
</tr>
<tr>
<td>Wiki activity log, number of times</td>
<td>58.46 ± 71.92</td>
<td>175.52 ± 135.30</td>
<td>&lt;0.001*</td>
<td>1.080</td>
</tr>
</tbody>
</table>

Values are mean ± standard deviation.

*Denotes a significant between-group difference (p < 0.05).
Results

- The Moodle activity log, GPQ positive independence score, individual accountability score, equal opportunity score, social skills score and composite score were all higher in the Moodle-digital badges group compared to the Moodle-wiki group ($p < 0.001$).

- However, the overall course results were similar between the two groups ($p = 0.305$).
Conclusions

- Using Moodle-digital badges may be more effective in enhancing collaboration among undergraduate students when compared to using Moodle-wiki alone.

- The use of Moodle-digital badges also attracted students to visit Moodle more frequently (improved their motivation and behavioral engagement).

- However, the overall course results were similar between students in the Moodle-digital badges group and those in the Moodle-wiki group.
Key references


Acknowledgements

- This study is supported by a teaching development grant (17/659) from the University of Hong Kong.

- Contact: smfong@hku.hk

Thank You !