THE EFFECTIVENESS OF OER USE IN STUDENT'S LOGICAL-MATHEMATICAL SKILLS: AN STUDY OF FIRST YEAR HIGHER EDUCATION STUDENTS IN CHILE

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IDRC Grant/ Subvention du CRDI: 107311-001-Research into Open Educational Resources for Development
María Montessori (1870-1952)
The effectiveness of OER use in student's logical-mathematical skills:

An study of first year higher education students in Chile

Update Sub-project 9

Banff, Canada. April 2015
Rationale

• OER Adoption looking to assess its Effectiveness
  – Student 1st year performance
    • Very low socio-demographic profile
  – Very low retention (46%)
  – Lack of basic knowledge and academic skills
    • No prerequisite to enroll

• Mixed approach
  – Quantitative report, March 2015
  – Qualitative
    • Focus groups with Students / Interview with teachers
    • Survey to students
Scenarios

Scenario 1: In person Class (Face to face)
- School of Education
  - Course: Arithmetics - Statistics
- Control Group
  - (30 students)
- Treatment Group 1
  - with Semi-open OER
    - (35 students)
  - Treatment Group 2
    - with More-open OER
      - (31 students)

Scenario 2: Blended/E-learning
- School of Education
  - Course: Algebra - Calculus
- Control Group
  - (41 students)
- Treatment Group
  - with OER
    - (21 students)
Treatment

• Comparison of groups:
  – randomly assign students to the groups
  – same teacher for all groups in each scenario
  – alternatives to assure comparison
    • Propensity Score Matching: estimation of the probability of receiving an specific treatment
  – mechanism of comparison
    • Inverse Probability Weight: matching algorithm compare results of most similar individuals
Treatment

• Result variables: dependent
  – Student’s results in the final exam of the evaluated course
  – Student’s grades in the evaluated course
  – Percentage of student’s attendance
  – Percentage of student’s retention

• Standard deviation
Results: Face-to-face scenario

Table 1: Estimation of the effect of using OER (Khan) versus the use of none additional resources

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Final Exam</th>
<th>Final Course Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.90**</td>
<td>0.66**</td>
<td>0.15</td>
</tr>
<tr>
<td>(0.28)</td>
<td>(0.29)</td>
<td>(0.30)</td>
</tr>
</tbody>
</table>

*** = p<0.01, ** = p<0.05, * = p<0.1; n = 61.

Table 2: Estimation of the effect of using OER (Khan) versus the use of none additional resources using PSM5

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Final Exam</th>
<th>Final Course Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.86**</td>
<td>0.54*</td>
<td>0.13</td>
</tr>
<tr>
<td>(0.36)</td>
<td>(0.30)</td>
<td>(0.33)</td>
</tr>
</tbody>
</table>

*** = p<0.01, ** = p<0.05, * = p<0.1; n = 32.
Results: Face-to-face scenario

Table 3: Estimation of the effect of using Khan versus the use of an Open Textbook

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Final Exam</th>
<th>Final Exam Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.38***</td>
<td>1.49***</td>
<td>0.21</td>
</tr>
<tr>
<td>(0.21)</td>
<td>(0.18)</td>
<td>(0.25)</td>
</tr>
</tbody>
</table>

*** = p<0.01, ** = p<0.05, * = p<0.1; n: 65.

Table 4: Estimation of the effect of using Khan versus the use of an Open Textbook using PSM

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Final Exam</th>
<th>Final Course Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.24***</td>
<td>1.55***</td>
<td>0.28</td>
</tr>
<tr>
<td>(0.25)</td>
<td>(0.20)</td>
<td>(0.24)</td>
</tr>
</tbody>
</table>

*** = p<0.01, ** = p<0.05, * = p<0.1; n: 55.
Results: e-Learning scenario

Table 6: Estimation of the effect of using OER

<table>
<thead>
<tr>
<th>Final Exam</th>
<th>Final SumScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.22</td>
<td>0.12</td>
</tr>
<tr>
<td>(0.30)</td>
<td>(0.31)</td>
</tr>
</tbody>
</table>

*** = p<0.01, ** = p<0.05, * = p<0.1; n=261.

Table 7: Estimation of the effect of using OER using PSM

<table>
<thead>
<tr>
<th>Final Exam</th>
<th>Fi-Mi SumScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.26</td>
<td>0.04</td>
</tr>
<tr>
<td>(0.29)</td>
<td>(0.28)</td>
</tr>
</tbody>
</table>

*** = p<0.01, ** = p<0.05, * = p<0.1; n: 32.
Conclusions

• students of the face to face classes that used a semi-open OER obtain significantly better exam grades than students:
  – that did not use any extra resource
  – that used an open textbook as an extra resource

• face-to-face students that used semi open OER have significantly less attendance levels than other examined students
Thanks for your attention!!!

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