The Development and Psychometric Testing of the Cognitive of Information Literacy (CIL) Inventory for Nursing Students

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Scope of the Problem

• With the focus of preparing students for lifelong learning, self-directed learning has been increasingly applied in the context of higher education.

• To be lifelong learners, students must have information literacy competence.
The evaluations of information literacy have produced mixed criteria and findings, some questionnaire are very specific or very heavy for the students.
Purpose of the Study

- The purposes of this study were to develop an instrument to measure the cognition of information literacy of nursing students and to test the validity and reliability of this instrument.
Methodology

- Four phases
  - Phase I: Develop a new instrument based on the literature
  - Phase II: Two round Delphi study
  - Phase III: Test construct validity of the CIL
  - Phase IV: Test the reliability of the CIL
Methodology
Phase I

- Develop a new instrument for measurement of SDL
  - Literature search
  - Develop 3 instruments:
    - Knowledge of information literacy
    - Cognitive of information literacy
    - Attitude toward information literacy
  - Develop preliminary items for the new instrument
Methodology
Phase II

- Test content validity
  - Conduct Delphi study:
    - Form an expert panel
    - Three experts in Nursing Informatics and 4 experts in information management.
  - Assess the appropriateness, representativeness and explicitness of the CIL’s items and content: two rounds of Delphi study
Methodology
Phase III

- Test construct validity of the CIL inventory
  - Using exploratory factor analysis
  - Subjects recruited from one national university with two nursing programs (4-year BSN program and 2-year RN-to-BSN program) in Taiwan (N=646)
<table>
<thead>
<tr>
<th></th>
<th>X(SD)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>20.37 (2.30)</td>
<td></td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN to BSN</td>
<td></td>
<td>127 (19.7%)</td>
</tr>
<tr>
<td>4-year BSN</td>
<td></td>
<td>519 (80.3%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>52 (8%)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>583 (90.2%)</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td>11 (1.7%)</td>
</tr>
<tr>
<td><strong>Having computer at home?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>630 (97.5%)</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>4 (.6%)</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td>12 (1.9%)</td>
</tr>
<tr>
<td><strong>Average using computer time per week?</strong></td>
<td>8.77(2.86)</td>
<td></td>
</tr>
<tr>
<td><strong>Average using internet time per week?</strong></td>
<td>8.15(9.85)</td>
<td></td>
</tr>
</tbody>
</table>
Methodology
Phase IV

- Test the internal consistency and reliability of the SDLI
  - Cronbach’s alpha
Results
Phase I

• Reviewed the content of information literacy and related questionnaire.
• Develop a new instrument based on The Information Literacy Competency Standards for Higher Education. Available at: http://www.ala.org/acrl/standards/informationliteracycompetency.
Results
Phase II

- Phase II began with a 15-item preliminary instrument and ended with a 14-item instrument after a two-round Delphi study.
Summarized results of the Delphi rounds

<table>
<thead>
<tr>
<th>Round</th>
<th>Total items</th>
<th>Items deleted</th>
<th>Items retained</th>
<th>Items modified</th>
<th>Items added</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>1</td>
<td>9</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
The CIL inventory

- The CIL inventory contained 2 domains with 14 items.
- Two domains:
  - Knowledge of information literacy (8 items)
  - Skills of information literacy (6 items)
Results

Phase III

- A 14-item CIL was assessed using EFA (exploratory factor analysis). The varimax rotation was used.

- Criteria:
  - KMO > .90
  - Bartlettes’ test: p < .05
  - It indicates appropriateness to use factor analysis.
CIL inventory

- KMO = .926
- Bartlett's test of sphericity
  - Chi-square = 5109.398
  - df = 91
  - P < .000
Screen plot for CIL inventory
## Factor structure matrix

<table>
<thead>
<tr>
<th>CIL</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors</td>
<td>Knowledge of IL</td>
</tr>
<tr>
<td>Item 1</td>
<td>.606</td>
</tr>
<tr>
<td>Item 3</td>
<td>.629</td>
</tr>
<tr>
<td>Item 4</td>
<td>.532</td>
</tr>
<tr>
<td>Item 10</td>
<td>.850</td>
</tr>
<tr>
<td>Item 11</td>
<td>.847</td>
</tr>
<tr>
<td>Item 12</td>
<td>.810</td>
</tr>
<tr>
<td>Item 13</td>
<td>.701</td>
</tr>
<tr>
<td>Item 14</td>
<td>.643</td>
</tr>
<tr>
<td>Item 2</td>
<td></td>
</tr>
<tr>
<td>Item 5</td>
<td></td>
</tr>
<tr>
<td>Item 6</td>
<td></td>
</tr>
<tr>
<td>Item 7</td>
<td></td>
</tr>
<tr>
<td>Item 8</td>
<td></td>
</tr>
<tr>
<td>Item 9</td>
<td></td>
</tr>
<tr>
<td>Explained variances</td>
<td>50.511</td>
</tr>
<tr>
<td>Total variances</td>
<td>59.261</td>
</tr>
</tbody>
</table>
Results
Phase IV

- The value of Cronbach’s $\alpha$ for the total item pool was .92, and for the F1 domain was .906, and F2 was .826.
Scoring of the CIL inventory

- This paper-and-pencil instrument takes around 10 min to complete. All items of CIL inventory are positively stated.
- A 5-point Likert scale ranging from 1 ("no confidence") to 5 ("strong confidence").
- The total possible score on the CIL inventory ranges from 14 to 70.
Discussion and Conclusion

- This study is unique because the sample was selected from two different types of nursing programs from one school in Taiwan.
- The instrument developed in this study help nursing educators to better understand students’ CIL abilities and implement appropriate teaching strategies, such as problem-based learning.
Both educator and students can use the CIL inventory throughout the process of nursing education to identify students’ competences of information literacy, learning obstacles and seek relevant counseling and support.
Future studies may use the CIL to explore the CIL of students across different types of programs, schools, regions and cultures.

The data collected from this study may also be used to develop a pedagogy and curriculum aimed at enhancing students’ CIL abilities.
Poster presentation

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Title: Attitude Toward Information Literacy Inventory (ATILI): Development and Psychometric Testing

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Thank you very much.