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Objectives of Study

The study

» Regarded IT in learning and teaching as a curriculum innovation
» Explored how the innovation was implemented by teachers in a vocational education institute
» Identified factors affecting the implementation
» Revealed issues encountered by teachers during the implementation
» Proposed recommendations for improving the curriculum implementation and using the Implementation Rubric
Terminology: Innovation

- Any process, product, idea or practice that requires new behaviours of the user (Loucks & Lieberman, 1983)
- As products, it could be computers, curriculum texts, assessment techniques, and
- As processes, it could be constructive teaching techniques, student teamwork, etc (Hall & Hord, 2006)
Information Technology (IT) in teaching & learning in context

- Use of computer networks, application software or the Intranet/Internet
  - to prepare course materials, present lecture materials, communicate with students or colleagues, and
  - to develop and manage learning environments to enhance student learning
Terminology: Implementation

- Actual *use* of an innovation and what an innovation consists of in practice (Fullan & Pomfret, 1997)
- Focusing on learning and teaching, implementation consisted of:
  1. using new materials (or *technologies*)
  2. engaging in new teaching *behaviours* and *practices*
  3. incorporating new *beliefs* (Fullan, 2001b)
1. Implementation of educational innovation and change (e.g. Fullan, 1991a & 2007; Loucks & Lieberman, 1983; Hall et al., 1975; Leithwood, 1981)

2. Levels of use for IT in teaching learning (e.g. Harmon & Jones, 1999; Mason, 1998; Reeves & Reeves, 1997)

3. Factors affecting implementation (Fullan, 1991b)

4. Factors affecting the use of IT for education (e.g. Gosper et al., 1996; Harasim et al.; 1998; Harmon & Jones, 1999; Roberson, 2007)

5. Implementation Rubric (established for this study)
Implementation Rubric established

- A set of **dimensions** that reflected/represented different aspects of the implementation process
  
  1. **Policy in context**: Teachers’ knowledge of the institution’s policy that expects of them
  2. **Teachers’ perceptions of teaching and learning**: Teachers’ perception of teaching and learning and their roles in the innovation
  3. **Teachers’ practice**

- Each dimension consisted of **sub-dimensions**
## Implementation Rubric established

Implementation of each dimension was measured by **Levels of Use**

<table>
<thead>
<tr>
<th>Level of Use</th>
<th>State in which the teacher ‘USES’ the innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Use</td>
<td>The user has no or little knowledge of the innovation, no involvement with the innovation, and is doing nothing towards becoming involved</td>
</tr>
<tr>
<td>Informational Use</td>
<td>… has limited knowledge of the innovation, and little or limited involvement with the innovation</td>
</tr>
<tr>
<td>Supplemental Use</td>
<td>… has some knowledge of the innovation, and has applied the innovation as supplement to his/her daily teaching</td>
</tr>
<tr>
<td>Intensive Use</td>
<td>… has ‘rich’ knowledge of the innovation, and has integrated the innovation into his/her daily teaching</td>
</tr>
<tr>
<td>Constructive Use</td>
<td>… constructs his/her own knowledge about using IT for teaching and learning, and is able to provide advice to other teachers in using IT for teaching and learning</td>
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</tbody>
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## Implementation Rubric established

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>IT competencies</td>
<td>Teachers have no knowledge about IT competencies identified by the institution</td>
<td></td>
<td></td>
<td>Teachers are able to criticise the existing competencies and are able to propose new competencies</td>
<td></td>
</tr>
<tr>
<td>Curriculum delivery</td>
<td>Teachers have no idea about the policy of curriculum to be delivered by IT</td>
<td>Teachers can explain there is a policy in place</td>
<td>Teachers can explain some details of the Plan for reference</td>
<td>Teachers actually use the Plan as part of their own professional development plan and record</td>
<td>Teachers are able to criticise the existing delivery policy and suggest a new policy</td>
</tr>
<tr>
<td>IT skill acquisition</td>
<td>Teachers have no knowledge about the IT Enhancement Programme (ITEP)</td>
<td>Teachers have seen information about the ITEP</td>
<td>Teachers have attended some ITEP workshops</td>
<td>Teachers modified the Plan to suit their own need for professional development purposes</td>
<td>Teachers have attended a variety of ITEP workshops and provided training to other teachers</td>
</tr>
<tr>
<td>Benchmarking</td>
<td>Teachers have no idea about the IT Capability Enhancement Plan</td>
<td>Teachers can explain there is a Plan in place, but do not use it</td>
<td>Teachers can explain some details of the Plan for reference</td>
<td>Teachers actually use the Plan as part of their own professional development plan and record</td>
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### 1. Policy in Context: Teachers’ knowledge of the institution's policy that expects of them

- **IT competencies**
  - Teachers have no knowledge about IT competencies identified by the institution
  - Teachers can explain there is a policy in place
  - Teachers can explain some details of the Plan for reference
  - Teachers actually use the Plan as part of their own professional development plan and record

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</tr>
</thead>
<tbody>
<tr>
<td><strong>2. Teachers’ perceptions of teaching &amp; learning:</strong> Teachers’ perception of teaching &amp; learning and their roles in the innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Teachers’ perception of using IT for teach’g & learn’g**
- Teachers have no idea about the roles of IT in teaching and learning
- Teachers believe that IT is a tool to transmit information
- Teachers believe that IT is a tool to resource-based teaching and learning
- Teachers believe that IT is a tool for collaborative learning and knowledge construction

**Teachers’ belief about their roles in IT for teach’g & learn’g**
- Teachers have no idea about their roles in using IT for teaching and learning
- Teachers believe that their role is to provide information via IT
- Teachers believe that their role is to provide content via IT
- Teachers believe that their role is to facilitate student learning via IT

... have no idea about the roles of IT in T&L

... believe that their role is to provide content via IT

... believe that IT is a tool for collaborative learning & knowledge construction

... believe that their role is to provide content, activity & assessment via IT

... believe that their role is to facilitate student learning via IT
# Implementation Rubric

<table>
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<th>Intensive Use</th>
<th>Constructive Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture presentation</td>
<td>Teachers do not use any IT to present their lectures</td>
<td>Teachers use pre-designed IT resources to present a lecture</td>
<td>Teachers create simple IT resources to present a lecture</td>
<td>Teachers create multimedia resources to present a lecture</td>
<td>Teachers assist or advise other teachers to create IT resources for lecture presentation</td>
</tr>
<tr>
<td>Communication</td>
<td>Teachers do not use any IT to communicate with their colleagues or/and students</td>
<td>Teachers have knowledge of electronic communication, but they do not use it</td>
<td>Teachers use simple facilities for basic asynchronised communication with their colleagues or/and students</td>
<td>Teachers use a variety of facilities for asynchronised and synchronised communication with their colleagues or/and students</td>
<td>Teachers assist or advise other teachers to use asynchronised and synchronised tools</td>
</tr>
<tr>
<td>Teaching &amp; learning online</td>
<td>Teachers do not do any online teaching</td>
<td>Teachers put content/information online with minimal online support, e.g. e-mails and online component occupied less than 20% of teaching/study time</td>
<td>Teachers develop and use custom-designed online materials and activities to supplement existing content and classroom activities and that online component contributed up to 50% of teaching/study time</td>
<td>Teachers provide learning resources and facilitate collaborative activities online and that online component contributed more than 50% of teaching/study time</td>
<td>Teachers assist or advise other teachers to provide learning resources and facilitate collaborative activities online and that online component contributed to most teaching/study time</td>
</tr>
<tr>
<td>Assessment online</td>
<td>Teachers do not use any IT to conduct assessment</td>
<td>Teachers use only assessment tools available to them to conduct assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**3. Teachers’ Practice: Expectations of teachers’ practice in using IT for teaching & learning**

... Teachers do not do any online teaching

... Teachers do not do any online teaching
Implementation Rubric

1. Literature review & Policy documents
2. Formulation
3. Implementation Rubric
4. Validation
5. Focus group interview & Expert review

Finalising
Methodology

Policy documents
- IT Strategic Plan
- Goals for using IT
- IT Competency
- IT Enhanc’t Prog.
- IT Cap. Enhanc’t Plan

Minutes of meetings
- IT Steer’g Comm.
- T&L Steer’g Comm.
- ...

Documentation analysis

Face-to-face interview

Implementation
Rubric

Questionnaire survey

Self-administered Questionnaire
- 7 Qs on teachers’ inform.
- 11 Qs on LoU of innovation
- 17 Qs on factors affecting implementation
- 1 open-ended Q
Questionnaire survey

Survey
- Postal questionnaire to 1,096 teachers
- E-mail reminders with questionnaire

Returns
- 355 (32.39%) returns collected
- 329 (30.02%) valid for analysis
Semi-structured non-scheduled standardised interview

- 12 teachers of different ranks selected for face-to-face interview
- Same questions and probes were used
- Order might change according to individuals’ response
- Content focused on
  - Level of use of innovation
  - Factors affecting implementation
  - Issues encountered by teachers during the implementation
Finding (1): Level of Use (LoU) in general

- Teachers' knowledge of policy
- Teachers' perceptions of teaching & learning
- Teachers' practice

Reliability Coefficient (Cronbach Alpha) > 0.74~0.77
Finding (2): Relationship between LoU & teachers’ background (ANOVA)

<table>
<thead>
<tr>
<th>Teachers’ Characteristics</th>
<th>Dimensions of LoU</th>
<th>Knowledge of policy</th>
<th>Perception about T&amp;L</th>
<th>Practice in using IT for T&amp;L</th>
</tr>
</thead>
<tbody>
<tr>
<td>^Rank</td>
<td></td>
<td>-0.087* (F=2.164)</td>
<td>-0.117* (F=1.614)</td>
<td>-0.060* (F=2.756)</td>
</tr>
<tr>
<td>Teaching experience in IVE</td>
<td></td>
<td>0.239** (F=11.269)</td>
<td>-0.111* (F=2.286)</td>
<td>-0.039* (F=1.866)</td>
</tr>
<tr>
<td>Level taught</td>
<td></td>
<td>0.011* (F=2.530)</td>
<td>Not significant</td>
<td>0.173** (F=4.996)</td>
</tr>
<tr>
<td>IT training received</td>
<td></td>
<td>0.177** (F=10.596)</td>
<td>0.143** (F=6.794)</td>
<td>0.168** (F=9.532)</td>
</tr>
<tr>
<td>IT in T&amp;L training received</td>
<td></td>
<td>0.175** (F=10.371)</td>
<td>0.183** (F=11.338)</td>
<td>0.153** (F=7.869)</td>
</tr>
</tbody>
</table>

Notes: ^Ranks were arranged in reverse order

*p < 0.05 and **p < 0.01
### Finding (2): Relationship between LoU & teachers’ background (ANOVA)

<table>
<thead>
<tr>
<th>Teachers’ Characteristics</th>
<th>Dimensions of LoU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knowledge of policy</td>
</tr>
<tr>
<td>Rank</td>
<td>Higher rank : Higher rank : Higher rank :</td>
</tr>
<tr>
<td>Teaching experience in institution</td>
<td>Longer exp. : Longer exp. : Longer exp. :</td>
</tr>
<tr>
<td>Level taught</td>
<td>Higher level taught: Not significant Higher level taught:</td>
</tr>
<tr>
<td>IT training received</td>
<td>More IT training received : More IT training received : More IT training received :</td>
</tr>
<tr>
<td>IT in T&amp;L training received</td>
<td>More IT for T&amp;L training received : More IT for T&amp;L training received : More IT for T&amp;L training received :</td>
</tr>
</tbody>
</table>
## Finding (3): Issues encountered by teachers

<table>
<thead>
<tr>
<th>Issues</th>
<th>No. of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lacking support given to teachers</td>
<td>80</td>
</tr>
<tr>
<td>▶ Lack of hardware, software and teaching resources (26)</td>
<td></td>
</tr>
<tr>
<td>▶ Lack of technical support (25)</td>
<td></td>
</tr>
<tr>
<td>▶ Poor infrastructure (22)</td>
<td></td>
</tr>
<tr>
<td>▶ Insufficient training (7)</td>
<td></td>
</tr>
<tr>
<td>2. Insufficient time / heavy workload</td>
<td>64</td>
</tr>
<tr>
<td>3. Students’ academic ability and motivation</td>
<td>21</td>
</tr>
<tr>
<td>4. Teachers’ knowledge in using IT</td>
<td>18</td>
</tr>
<tr>
<td>5. Teachers’ incentives for using IT</td>
<td>7</td>
</tr>
<tr>
<td>6. Students’ access to IT at home</td>
<td>6</td>
</tr>
<tr>
<td>7. Copyright concerns</td>
<td>5</td>
</tr>
<tr>
<td>8. Management’s discouragement</td>
<td>4</td>
</tr>
<tr>
<td>9. Lacking a well-defined policy</td>
<td>2</td>
</tr>
<tr>
<td>10. Subject not appropriate to be delivered by IT</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes: 168/329 responded in the open-ended question
Finding (4): Factors affecting Implementation

Factors affecting implementation

- From 27 pre-set questions
  - Confirmatory Factor Analysis (CFA) used to extract factors from 27 questions
  - 5 factors* extracted for meaningful interpretation
- From open-ended question
  - Further factors were identified
- 8 factors concluded and verified in interviews

*A good fit of data to the model:
Comparative Fit Index (CFI) = 0.92 (>0.9)
Standardised Root Mean Squared Residuals (SRMR) = 0.058 (<0.08)
Root Mean Squared Errors of Approximation (RMSEA) = 0.05 (<0.08)
Reliability Coefficient (Cronbach Alpha) > 0.65~0.80
Finding (4): Factors affecting Implementation

8 factors concluded

1. Support for teachers when using IT
2. Teachers’ knowledge of using IT
3. Incentives for using IT
4. Intellectual property concerns
5. Extra workload when using IT
6. Teachers’ attitudes
7. Student background
8. Availability of a well-defined policy

*Factors extracted by CFA
Recommendations

Improving the curriculum implementation

1. Review/refresh current policy with frontline teachers’ involvement
   - Clear vision of using IT for learning and teaching
   - IT’s role in curriculum delivery
   - New IT competency and pedagogical skills sets
   - New benchmarking system
   - Professional development programmes
   - Rewarding system
   - Appropriate infrastructure, resources and technical support
Recommendations

Improving the curriculum implementation

2. Set up appropriate channels to disseminate new policy
   ▶ at different levels
   ▶ using different media

3. Empower teachers with professional development activities
   ▶ both IT and pedagogical knowledge and skills
   ▶ available in different delivery formats
Recommendations

Improving the curriculum implementation

4. Cultivate teacher collaboration
   - Set up discipline-based IT learning and teaching development teams
     - to develop contextual learning and teaching resources
     - led by subject experts and teachers
     - with instructional design and technical support related OUs

5. Enhance teachers’ incentives in using IT
   - Reward scheme: financial and recognition
Recommendations

Improving the curriculum implementation

6. Enhance support to teachers from management
   ▶ Management to guarantee
     ▶ Reliable infrastructure
     ▶ Up-to-date software and hardware
     ▶ On-site technical support
   ▶ Reporting mechanisms at different levels are in place
     ▶ to ensure support is available, appropriate and sufficient
     ▶ to facilitate interactions among different parties for better implementation
Recommendations

Improving the curriculum implementation

7. Encourage sharing of good practices
   - Set up centralised committee
     - to stock take e-resources developed by Course Boards and teachers
     - to collect and disseminate e-resources on a common platform
   - Showcase of e-learning/teaching resources
     - through forum, conference, workshop, demonstration...
Recommendations

Using the Implementation Rubric to evaluate:

1. similar curriculum innovation at classroom level using different methodology, e.g. classroom observation, participation observation
2. similar curriculum innovations used by other stakeholders, e.g. administrators, HoDs, students…
3. similar curriculum innovation in educational settings other than VET
4. different curriculum innovation in different educational settings
Major reference


Thank You!

Alfred KOO Ph.D

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