Examining (f)actors influencing ICT-integration in compulsory education

ICT and Initial Teacher Training
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References


Summary

1. In educational research, ICT integration in schools has been conceptualised and measured in many different ways.

2. The influence of school level factors on ICT-integration is not yet well understood, but there are indications that local policy planning is one of the key success factors.

3. Schools should use more data about their own performance to shape policy and practice
1. In educational research, ICT integration in schools has been conceptualised and measured in many different ways.
ICT-integration: example of a macro-curriculum.

09/2007: Framework for ICT attainment targets in Flemish primary ed and 1st grade of secondary ed: different aspects of ICT use are stressed

1. Pupils have a positive attitude towards ICT, and are willing to use ICT to support their own learning process.
2. Pupils use ICT in a safe, responsible and effective way.
3. Pupils can work independently in a ICT enriched learning environment.
4. Pupils can learn independently in a ICT enriched learning environment.
5. Pupils can use ICT to elaborate their ideas in a creative way.
6. Pupils can use ICT to search for, process and store digital information.
7. Pupils can use ICT to present information to others.
8. Pupils can use ICT to communicate in a safe, responsible and effective way.
9. Pupils can chose adequately between a number of different ICT applications, depending on the specific goal to be achieved.
10. Pupils are willing to redefine their actions after reflection on their own and others’ use of ICT.
Curriculum features

The development of attainment targets is based on a clear vision on the role of ICT in education

- Macro-curriculum is a measure to provide equal opportunities for all learners;
- Central aim is to empower the learning process and to use ICT as a catalyst for educational change;
- Formulated as broad targets to ensure large responsibility for schools in the process of curricular decision making;
- Cross-curricular: aiming at ICT-integration within different subjects;
- Technical skills are NOT included in the attainment targets;
- Emphasis on the attitudinal and meta-cognitive dimension.
Micro-level: different types of ICT use

Examples in primary education:
- Learning to use a computer in a traditional classroom setting
- Computer as a tool for elaborating knowledge and skills in a peer tutoring model
- Computer as a tool for information gathering and presentation

As ICT can be used in diverse technical and pedagogical ways, different factors will have influence on the integration process in the classroom.
<table>
<thead>
<tr>
<th>School characteristics</th>
<th>Basic skills</th>
<th>Learning tool</th>
<th>Information tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of computers</td>
<td>+++</td>
<td></td>
<td></td>
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<tr>
<td>Computers with Internet</td>
<td></td>
<td></td>
<td>+++</td>
</tr>
<tr>
<td>Computers in the classroom</td>
<td>++</td>
<td>+++</td>
<td></td>
</tr>
<tr>
<td>Innovativeness (aggregated)</td>
<td>++</td>
<td>++</td>
<td></td>
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<tr>
<td>ICT-policy</td>
<td>++</td>
<td>+++</td>
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<tr>
<td>ICT-training</td>
<td>++</td>
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</table>

<table>
<thead>
<tr>
<th>Teacher characteristics</th>
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<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>+++</td>
</tr>
<tr>
<td>Computer experience</td>
<td>++</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditionalist beliefs</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Constructivist beliefs</td>
<td>+</td>
<td></td>
<td>+++</td>
</tr>
<tr>
<td>Innovativeness (individual)</td>
<td>+</td>
<td></td>
<td>++</td>
</tr>
</tbody>
</table>

Tondeur, J. et al. (2008).

+ $p < .05$  ++ $p < .01$  +++ $p < .001$
Conclusion

1. In educational research, ICT integration in schools has been conceptualised and measured in many different ways.

   - ICT-integration is not a monolithic process. ICT can be integrated in many ways in classrooms. It should be studied as such.

   - We should take a differential impact of teacher and school factors into account, depending on the way ICT is integrated in the classroom.
2. The influence of school level factors on ICT-integration is not yet well understood, but there are indications that local policy planning is one of the key success factors.
Meso-level

Actors
- Principal/leadership
- School board
- Parents
- Business leaders

Factors
- School type and location
- School organization
- Local culture
- Intended curriculum
- Staff development
- ICT-infrastructure
- Technical support
- Innovation history
<table>
<thead>
<tr>
<th></th>
<th>$\beta$</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
<td>Teachers’ participation in decision making</td>
<td>-.06</td>
<td>ns</td>
</tr>
<tr>
<td>Supportive leadership</td>
<td>-.05</td>
<td>ns</td>
</tr>
<tr>
<td>Collegiality among teachers</td>
<td>-.04</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Satisfaction about Infrastructure</strong></td>
<td><strong>.21</strong></td>
<td>+++</td>
</tr>
<tr>
<td>ICT vision and policy planning</td>
<td><strong>.18</strong></td>
<td>+++</td>
</tr>
<tr>
<td>Perceived ICT support</td>
<td>-.07</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Developmental beliefs</strong></td>
<td><strong>.17</strong></td>
<td>+++</td>
</tr>
<tr>
<td>Transmissive beliefs</td>
<td>.04</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Self-perceived ICT competencies</strong></td>
<td><strong>.13</strong></td>
<td>+</td>
</tr>
<tr>
<td><strong>Professional development in ICT</strong></td>
<td><strong>.14</strong></td>
<td>+</td>
</tr>
</tbody>
</table>

**Dependent Variable:** Primary teachers’ class use of computers ($R^2=.19$) ($n=456$)

$p < .05$  $++ p < .01$  $+++ p < .001$
ICT vision and policy (9-item scale)

- My school has a clear vision on the role of ICT in education
- My school’s vision on ICT is well known by all colleagues
- ...
- My school has a well developed ICT policy plan
- ...
- The ICT plan in my school starts from a shared vision on ‘good education’
- The ICT plan in my school gives assistance on how to use ICT in the classroom
- The ICT policy plan is regularly monitored and adjusted when needed
- ...
Conclusion

2. The influence of school level factors on ICT-integration is not yet well understood, but there are indications that local policy planning is one of the key success factors.

- ICT integration can be explained as a dynamic interplay between factors on different levels: the individual level (e.g. beliefs, competencies...), the school level (infrastructure, policy planning) and the macro-level (attainment targets, ...)
- ICT-integration is higher in schools strongly involved in the process of ICT policy planning, including vision development, cooperation between colleagues and shared responsibilities
- Schools should be encouraged to build their own ICT policy plan
3. Schools should use more data about their own performance to shape policy and practice
Two research group initiatives to support schools in creating information rich environments
1. Systematic feedback when quantitative research data is processed
2. Development of a tool to support the local process of policy planning
Background

When following a ICT-related staff development programme, schools get access to pICTos (planning of ICT in schools). Development is financed by the Department of Education (Regional Expertise Network) and starts from:

– Flemish situation: compulsory ICT curriculum
– Theoretical models on educational change and ICT integration

Design principles (Vanderlinde e.a., 2008):
– Writing an ICT plan is a cyclic process
– Formulating a shared vision on education as the foundation of an ICT plan
– Developing an ICT plan should be the concern of the whole school team
– ICT planning is a strategic and forward-looking process
1. Educational beliefs (school vision)

2. Actual ICT use

3. Priorities

4. New ICT activities

5. Action plan

http://pictos.ictbeleidstool.be

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Step 1: Gaining insight into teachers’ vision on education

- Jumping-off point → reflection on the (shared?) beliefs about the nature of ‘good’ education
- Online survey → distinction between transmissive (teacher-centred) and developmental (pupil-centred) beliefs
- Individual teachers’ beliefs on ‘good’ education plotted in a school graph → basis for debate (vision on education and role of ICT in education)
- This school: beliefs are fragmented, high number of teachers with high transmissive and low developmental beliefs
Step 2: Making an inventory of the actual use of ICT

- Teachers register their ICT activities currently practiced in their classroom (link with the new ICT curriculum)
- School profile → overview of the number of activities per attainment target
- This figure:
  - School particularly focus on ‘positive attitude towards the use of ICT’ and “independent ICT use after instruction”
  - ‘ICT as a communication tool’ is underexposed
Step 3: Setting priorities for the future

After discussion about the actual use of ICT → setting ICT priorities (attainment targets Flemish ICT curriculum) for the future (per grade)

School priorities are given based on a group discussion

School in this figure:

– All ICT attainment targets are given priority (see blue boxes)
– Lower grades → use of ICT within a teacher-centred vision on education (especially within mathematics and languages)
– Higher grades → use of ICT within a pupil-centred vision on education (e.g. ICT as a presenting and communication tool)
### Step 4: Considering new ICT activities

#### Nieuwe activiteiten

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>leerstoef van taal en rekenen invoegen</td>
<td>ET1</td>
<td>ET2</td>
<td>ET3</td>
<td>ET4</td>
<td>ET5</td>
<td>ET6</td>
<td>ET7</td>
<td>ET8</td>
</tr>
<tr>
<td>in de computerklas de computer opstarten en sluiten en toezehoors en muismatjes ordelijk zichkel alvorens het klasklokaal te verlaten</td>
<td>ET1</td>
<td>ET2</td>
<td>ET3</td>
<td>ET4</td>
<td>ET5</td>
<td>ET6</td>
<td>ET7</td>
<td>ET8</td>
</tr>
<tr>
<td>In het WO-thema 'van gebarentaal tot internet' laten we de kinderen kennismaken met de evolutie van communicatiemiddelen. We spreken over communiceren met computer. Kinderen vertellen hun ervaringen van thuis</td>
<td>ET1</td>
<td>ET2</td>
<td>ET3</td>
<td>ET4</td>
<td>ET5</td>
<td>ET6</td>
<td>ET7</td>
<td>ET8</td>
</tr>
<tr>
<td>We maken af en toe gebruik van het smart-board in de klas van het zogenaamde leeg om een DVD- of power-point-voorstelling te bekijken.</td>
<td>ET1</td>
<td>ET2</td>
<td>ET3</td>
<td>ET4</td>
<td>ET5</td>
<td>ET6</td>
<td>ET7</td>
<td>ET8</td>
</tr>
<tr>
<td>Klasseur behoort maa Skype (coolekoppels) met de klas 1 of de klas 2 over klas 1 en de klas 2. Kinderen kijken elkaar aan om samen een opdracht uit te werken.</td>
<td>ET1</td>
<td>ET2</td>
<td>ET3</td>
<td>ET4</td>
<td>ET5</td>
<td>ET6</td>
<td>ET7</td>
<td>ET8</td>
</tr>
<tr>
<td>Taakstellingen bij Veleig Leren Leren</td>
<td>ET1</td>
<td>ET2</td>
<td>ET3</td>
<td>ET4</td>
<td>ET5</td>
<td>ET6</td>
<td>ET7</td>
<td>ET8</td>
</tr>
</tbody>
</table>

### Registration of new ICT activities

- Per grade
- Per attainment target

### Verifying if all necessary conditions are fulfilled (e.g. availability of hardware/software, in-service ICT trainings, collaboration, ICT support...)}
Step 5: Drawing up an action plan

<table>
<thead>
<tr>
<th>Teacher</th>
<th>ICT-kennis verbeteren</th>
<th>Informatie opzoeken</th>
<th>Nascholing volgen</th>
<th>Andere</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>School team</td>
<td>Leerlijn ontwikkelen</td>
<td>Nascholing volgen</td>
<td>Andere</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Equipment</td>
<td>Update hard/software</td>
<td>Hanksopen hard/software</td>
<td>Schikking uitrusting</td>
<td>Andere</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>21</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Support</td>
<td>ICT-coördinator</td>
<td>Collega</td>
<td>Externe</td>
<td>Andere</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>8</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Ander leerjaar</td>
<td>Partnerschool</td>
<td>Ouders</td>
<td>Andere</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0</td>
<td>1</td>
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</tr>
</tbody>
</table>

Data from previous phase (conditions) ⇒ formulating policy actions and accompanying deadlines

Blueprint for school-based ICT policy plan & optimisation of ICT use

Policy actions:

- New mandate for the ICT coordinator (more pedagogical instead of technical support)
- Formation of an ICT steering group (parents, teachers, etc.)
- Update of hardware and software
Conclusion

3. **Schools should use more data about their own performance to shape policy and practice**

- The development of a school-based ICT policy plan is a crucial step towards the practical implementation of ICT in education (Baylor & Ritchie, 2002; Bryderup & Kowalski, 2002, Tondeur e.a., 2008)

- In the process of policy development, schools learn to collect and interpret data about their own situation, share data among colleagues, reflect on their own performance, build a shared vision on good education in general and the role of ICT in particular. This form of shared leadership is a key factor is successful ICT-integration.
Summary

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