Evaluating the effective use of emerging technologies in education

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Evaluating the effective use of emerging technologies in education

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Acknowledgements: JISC, VITAE, Faculty of Mathematics, Computing and Technology, The Open University, UK

About the tutorial

• emerging technologies in education
• evaluation of technology-enabled learning initiatives
• perspectives of students, educators and institutions
• three research projects (2005 – present): wikis, blogs and 3D virtual worlds (Second Life)
• JISC-funded study on the use of social software (2008 – 2010): 26 case studies from further and higher education institutions in the UK
• data collection and analysis techniques
• ethical considerations of conducting research
Social software

• Examples are:
  – discussion forums (e.g. in a virtual learning environment such as Moodle), wikis, blogs, 3D virtual worlds (e.g. Second Life), social bookmarking (e.g. Delicious), microblogging (e.g. Twitter), social networking (e.g. Facebook), photo-sharing site (e.g. Flickr)

• students and educators can create, share and access content on the Web within institution’s firewalls or in the public domain

Student’s perspective

• collaborative, peer-to-peer and reflective learning
• gaining transferable skills; online communication skills
• a portfolio: collation of ideas and resources
• group-working concerns: ownership, assessment
• conflict: learning vs. technology
• concerns: interacting with tools in the public domain
Educator’s perspective

- are able to intervene early; student retention
- teaching interactively rather than broadcasting
- performing the role of a facilitator or mentor
- managing diverse needs of students
- workload issues: designing activities, training, technological aspects (backups, accessibility)

Institution’s perspective

- tools can help to overcome geographical distance
- student retention
- image building: alumni community
- contribute to employability by showcasing work
- tension between the virtual learning environment and the tools in the public domain: control, reliability, firewall
Evaluation

Evaluation implies investigating the

• usability of the initiative (user-centred design principles)
• pedagogical effectiveness (does it meet the learning outcomes and facilitate the development of intended skills?)
• student experience, and
• impact on direct stakeholders such as educators and technical support staff (in terms of workload and support required)

Collaborative learning in a wiki environment: Experiences from a software engineering course
Evaluation of the wiki initiative

- Did the wiki activities facilitate collaborative learning as intended?
- Is a wiki a good medium for collaborative work in a distance-learning course?
- What are the challenges in collaborative writing and requirements development?
discussions ... helped me to reflect on my own views and potentially modify them.

...it is only when people get together and discuss the problem that missed opportunities and inconsistencies are identified.

...allowed me to see how the others addressed this question and evolve my own contributions and understanding based on these...

Data sources

- discussions on the forums (students and tutors)
- emails from students
- emails from tutors
- interactions on the wiki
- reflective journal: through a set of questions
- phone-interviews
Reflection

- Reflection is a strategy that facilitates learning through re-examination and re-interpretation of experience.
- Experience on its own does not guarantee learning. Doing something, reflecting on what happens, taking new action in the light of that reflection, and repeating the process, is continual learning process.
- Reflection can also act as a catalyst for triggering creativity (Ghosh, 2003).
- The process of reflection is one of posing and answering questions. “Asking questions facilitates the process of reflection” (Johns, 1994).

<table>
<thead>
<tr>
<th>Core question</th>
<th>What information do I need access to in order to learn through this experience?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Cue questions</td>
<td>Description of experience</td>
</tr>
<tr>
<td>1.1 Phenomenon</td>
<td>Describe the here and now experience</td>
</tr>
<tr>
<td>1.2 Context</td>
<td>What essential factors contributed to this experience?</td>
</tr>
<tr>
<td>1.3 Clarifying</td>
<td>What are the significant background factors to this experience?</td>
</tr>
<tr>
<td>1.4 Clarifying</td>
<td>What are the key processes (for reflection) in this experience?</td>
</tr>
<tr>
<td>2.0 Reflection</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>What was I trying to achieve?</td>
</tr>
<tr>
<td>2.2</td>
<td>Why did I act as I did?</td>
</tr>
<tr>
<td>2.3</td>
<td>What were the consequences of my action for myself and everyone else involved?</td>
</tr>
<tr>
<td>2.4</td>
<td>How did I feel about the experience when it was happening?</td>
</tr>
<tr>
<td>2.5</td>
<td>How did the others immediately involved feel?</td>
</tr>
<tr>
<td>2.6</td>
<td>How do I know how the others immediately involved felt?</td>
</tr>
<tr>
<td>3.0 Influencing factors</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>What internal factors influenced my decision making?</td>
</tr>
<tr>
<td>3.2</td>
<td>What external factors influenced my decision making?</td>
</tr>
<tr>
<td>3.3</td>
<td>What sources of knowledge did/should have influenced my decision making?</td>
</tr>
<tr>
<td>4.0 Could I have dealt better with the situation?</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>What other choices did I have?</td>
</tr>
<tr>
<td>4.2</td>
<td>What would be the consequences of these other choices?</td>
</tr>
<tr>
<td>5.0 Learning</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>How do I now feel about this experience?</td>
</tr>
<tr>
<td>5.2</td>
<td>How have I made sense of this experience in the light of past experiences and future practice?</td>
</tr>
<tr>
<td>5.3</td>
<td>How has this experience changed my ways of knowing (empirical, aesthetic, ethical, personal)?</td>
</tr>
</tbody>
</table>
Process of data collection and analysis

- collecting the forum discussions and e-mails from students and tutors
- extracting the reflective accounts from the assignments
- reading the different sociological accounts to gain an understanding of the positive accounts and the obstacles
- identifying the emerging themes for both the positive accounts and obstacles, guided by the research questions.
- from these emerging themes, the top-level common themes were identified. The lower-level themes were found from multiple readings of the data.
- validating the cataloguing scheme through dual-coding by researchers

Inductive or thematic analysis

- The inductive approach is a systematic procedure for analysing qualitative data in which the analysis is likely to be guided by specific evaluation objectives
- *inductive analysis* refers to approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model *through interpretations* made from the raw data by an evaluator or researcher
- the findings arise directly from the analysis of the raw data, *not from a priori expectations or models*. The evaluation objectives provide a focus or domain of relevance for conducting the analysis, not a set of expectations about specific findings
Ethical considerations

- Recruiting participants
- The consent process
  - project summary sheet
  - consent form
  - include contact details of supervisor, project leader, project website (URL)
- Data collection and storage
- Retaining anonymity
- Approval of the research by the University’s ethics committee
- Consent for using pictures

Let’s pause for a moment

- Formulating research questions
- Selecting research methods corresponding to the research questions, availability of participants, and to have a number of data sources
- Process of reflection as a ‘researcher’: discussing experiences with other team members or sending an email
- Looking for both the positive accounts and obstacles in the data
- Conducting analysis in a team
- Considering the ethics of conducting research
- Deriving some practical guidance for students, educators and policy makers wherever possible
Blogging behaviours of students: course-directed and self-motivated blogging

Evaluation of the blogging activities

• what challenges do students face when they are trying to blog?
• how do their perceptions of these challenges impact upon the ways in which they use their blog?
Data sources

Semi-structured interviews

• content of their blog, and their rationale for its inclusion
• their opinions about whether and how blogging made any impact on the way they learned;
• their experience of writing in a public space;
• their perceptions of ‘community’ amongst the course bloggers;
• their opinions about the utility of blog comments; and
• the degree to which blogging was integrated into their learning on the course.

Before conducting interviews

Pre-interview questionnaire by email

• Please tell me about your experience with blogging: how do you feel the blog helps you in your role?

I am interested in any activities you carry out on your blog, what made you start blogging, the positive and negative experiences. Then we can expand on these at the semi-structured interview.
Before conducting interviews

Running a pilot
• one should always conduct a pilot with 2-3 representative participants
• not just running through the materials with somebody but carrying out the entire exercise as you would do in the actual session
• trying out all the logistics – where you will conduct it?
• what you need to know about the participant before the interviews?
• are the questions meaningful?

... the ideas led me to other roads... when I think... where did [this course] happen... the location was the collective blogging space.

...I have a problem with study blogs... I don't think that the institution should feel like it belongs to them.

...gets me to think through things... and I get new insights, or ways of expressing things... it highlights holes in my thinking... where I have questions...

...'intimidating'...as 'difficult to develop the right sort of voice'...
Data sources

Analysis of the blog content
• whether the student explicitly addressed their audience
• whether the student revealed their emotional state at the time
• whether the student revealed details of their learning activities beyond those explicitly suggested by the course materials
• whether the student revealed details of their personal non-learning activities
• the average number of posts and comments per behavioural group over the whole course

Blog content analysis

The "stitched" picture that I've linked to at the bottom of this post started life as a *.jpg file that was nearly 7 MB in size, so people won't be bothered to wait for it to open. I needed to learn how to make it smaller.

Today I learned more about the "Auto Panorama" function on my Olympus C-720 Ultra Zoom camera.

Follow the link below to access a 203 KB version of the stitched "panorama" shot

• Identifies problem
• Identifies learning need

• Identifies resource to solve problem
• Identifies learning activity
• Link to tool
• Example of work
I don't agree with Ben Goldacre's article that humanities graduates are now taught to mistrust science and push the idea of it as just one of many competing discourses.

Science is not more important than anything else. It's good they're taught about different ways of looking at things.

But the other thing that frankly scared me was that the article - for the first time I think - really expressed the damage that the media can do with the rubbish it writes in search of a story. I'm not sure I could stand up and point to one news organisation that takes their responsibility in this area seriously, that has really brought home Ben Goldacre's point for me.

Disagrees with author

Counter argument

Describes/evaluates article

Recounts own experience to justify own opinion

Agrees with author

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Grouping codes into themes

1) **Good argumentation:** poses a problem, argues it through, tries different solutions, appropriate trial choices, logical thinking, finds solution, challenges established theory, gives reason for opinion, poses counterarguments.

2) **Learning methods:** appropriate exploration, goes off track, broad/narrow view of problem, identifies learning need, asks for help, reflects on whether need is met, reflects on value of learning process, acknowledges need for new strategy.

3) **Identification, validation and use of resources:** good/poor use of background knowledge, identifies appropriate resources, uses course materials, draw on own experience, accepts others' idea, agrees/not with student X, builds upon argument of student X.

4) **Poor argumentation:** confused, does not find solution, lacks logic, makes errors in methods, misses stages of solution process, statement.

5) **Emotion:** gets frustrated, pleased with outcomes, family problems

6) **Social:** discusses hobby, talks about pet, recounts social event

7) **Discusses reading:** describes content of book, expresses own opinion, compares with other reading.

8) **Resources for others:** link to paper, link to blog, instructions.

9) **Echo blogging:** agrees/not with student X, builds upon argument of student X, counter-argument to student X.
## Grouping themes into categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Articulation of ideas:</strong></td>
<td>good and poor argumentation, discusses reading, resources for others, echo blogging</td>
</tr>
<tr>
<td>2. <strong>Metacognition:</strong></td>
<td>learning methods, use of resources</td>
</tr>
<tr>
<td>3. <strong>Self:</strong></td>
<td>emotion, social</td>
</tr>
</tbody>
</table>

**Triggers questions on the use of blogs**
- Demonstrate understanding?
- Articulation of ideas?
- Echo blogging
- How can educators use these features?

**Use for reflective learning?**
- How can educators use these features?
- How can educators use these features?

**Blogging behaviours**
- Blogging avoidance
- Resource network building
- Support network building
- Self-sufficient blogging
- Anxious, self-conscious blogging just to complete the suggested course activities
Audience: …the issue of it being available to anybody doesn’t excite me very much but the issue of it being available to me when I’m online anywhere is good.

Community: I wouldn’t have written this [material] if it had been in a Word document… it was the fact that it was out there for people to read that drove the whole thing.

Comments: …they throw up … points you may have missed and give alternative views.

Presentation: before I write down something and put it in the blog I do think a lot, “oh have I spelt it correctly, does it make sense”, and I read it over and over again.

Blogging framework

Developing my blogging behaviour and skills within the technological and pedagogical context of my course

Who are my audience? How large is my audience? How often do they access my blog? How responsive are they? How actively do they participate in conversations initiated on my blog? How long do they spend on my blog? What do they do on my blog? How do they measure the value of my blog? How relevant is my audience to my audience? Am I writing for my audience or myself? Do I want to use my blog to attract new readers to my community? Do I want to use my blog to provide new content to my community? Do I want to foster greater engagement with the community? What kind of intellectual engagement with the community would I pursue? What level of intellectual engagement with the community would I pursue?

My audience My blogging community

Do I want comments? Why? Do I want to attract more comments? Do I want to become more active and entice more comments? What do I do with my comments?

My comments

What kind of engagement do I want with my community? Do I want to foster more or less engagement? What kind of intellectual engagement with the community would I pursue? What level of intellectual engagement with the community would I pursue?

The presentation of my blog

What does presentation matter to me? Do I want to publish my blog? Do I want to produce or share any content before posting it to my blog? How will I adapt a format or informal style of presentation? What does presentation matter to me? Do I want to publish my blog? Do I want to produce or share any content before posting it to my blog? How will I adapt a format or informal style of presentation?
Let’s pause for a moment

- Use of a pre-interview questionnaire or some correspondence by email
- Developing rapport with the participant
- Running a pilot of the evaluation materials and the evaluation process
- Quoting participants: anonymity issues
- Using the content of blogs and other social media content in publications and reports: searchable and traceability to the participant
- Usage of social media in personal and professional contexts: finding similarities and differences and the influences

Evaluation of social software

- Even the researcher may not have the full grasp of the technology, its characteristics, and how it can be used
- If you are launching the initiative, then you have to consider training requirements; etiquettes and norms
- Unexpected aspects might appear in the data
- You may not have access to many participants
- To consider a multi-stakeholder perspective and the impact of the initiative on various stakeholders
- Combination of technologies may be required or may be in use
- Ethical considerations may be ‘unique’
A 3D virtual world: Second Life

...I get a feeling of meeting you face-to-face...even though I engage with avatars, I am aware that behind them there is a real person...

...I particularly enjoyed meeting in the library as it was fitting to the topics under discussion...

...sense of realism which is hard to match in other online environments...
Supporting distributed team working in 3D virtual worlds

Evaluation of the Second Life initiative

- Does a 3D virtual world such as Second Life facilitate socialisation and team working among students working on a team project at a distance?
- How does Second Life compare to other collaboration tools such as instant messaging or Skype?
- What are the difficulties that students experience in becoming acquainted with and working in Second Life?
Team working in Second Life

...unlike a conference call, here [in Second Life] we feel that we are sitting in the same space; we are together...

...it is better than video conferencing because people can be self conscious of their appearance...

...benefited towards the project ... by allowing the team to communicate effectively like they would be in the same room...

Project team meetings in Second Life

...I think that this helped us bond as a team much better, as it helped us see more of a person's personality...

...allows us to make decisions much quicker compared to making decisions over a forum or wiki and waiting for replies...

...gives you the feeling that you are actually facing the team... you may be called to answer for your actions, or lack of them...
Data collection and analysis

- Conducting in-world group interviews
- Carrying out email interviews
- Conducting semi-structured in-world interviews with individual students
- Inductive analysis of the data by two researchers

Let’s pause for a moment

- Care in making assumptions about student’s (or participant’s) prior experiences with the technology
- Providing training to the students
- Not to burden the participants with evaluation activities
- Following a staged process of evaluation: conducting it when it is ‘fresh’ in the participants’ minds
- Using group interviews in the early stages where the impressions/experiences of participants in a group meeting helps to raise issues and discussions
- For emerging technologies where you may not know about the possible participants, a survey may be helpful for recruiting participants
### Blending 2D and 3D environments

<table>
<thead>
<tr>
<th>Socialisation</th>
<th>Externalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>tacit to tacit</strong></td>
<td><strong>tacit to explicit</strong></td>
</tr>
<tr>
<td>Socialisation in Second Life: introductions, tours</td>
<td>Course activity in Second Life</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internalisation</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>explicit to tacit</strong></td>
<td><strong>explicit to explicit</strong></td>
</tr>
<tr>
<td>Reflection-on-learning in forums or in Second Life</td>
<td>Connecting ideas, discussions in wikis, blogs, forums</td>
</tr>
</tbody>
</table>

### JISC-funded social software study

- to investigate the use of social software in higher and further education
- wikis, blogs, Flickr, Delicious, Facebook, Ning, Twitter…
- Case study methodology
  - interviews, focus groups, analysis of reports, observing students activities
- 26 case studies
- report and case studies: please see [http://www.jisc.ac.uk/whatwedo/projects/socialsoftware08.aspx](http://www.jisc.ac.uk/whatwedo/projects/socialsoftware08.aspx)
Case Study Methodology

- Developing of criteria for selecting case studies
- Email invitations, short-listing
- Interactions with the Ethics Committee and preparation of research materials
- Developing an investigator’s pack
- Purchase of audio recorders, secure USB drives
- Pilot study (interview template) at the OU; sample audio recording
- Recruitment of consultants
- Setting up secure server-space and permissions

Preparations for the investigations
Collection and validation of data

Validation by stakeholders

- At the completion of interviewing, data can be summarized and respondents allowed to immediately correct errors of fact or challenge interpretations.
- During subsequent interviews, respondents can be asked to verify interpretations and data gathered in earlier interviews.
- Informal conversations can take place with members of an institution with interests in the setting being studied.
- Copies of a preliminary version, or specific sections, of the evaluation report can be provided to stakeholder groups, and written or oral commentary on the report can be solicited.
Let’s pause for a moment

- Develop an ‘evaluation pack’ for a team of researchers
- Having processes for data collection and storage
- Using templates for data collection and reporting
- Establishing a rapport with the representative of the host institution or the ‘gate keeper’
- Validate your understanding with the participants or their representative, especially when you are interacting with an external institution or participants
- When conducting research on several technologies or participant-groups with a common underlying theme, developing a case study template for reporting the results
- Deriving conclusions/implications across the case studies

Pedagogical, technological and social factors that influence student experience

- situating the technology within the learning
- clarifying the role of the technology to the students
- ensuring usability of the technology
- providing user guidance and social norms, etiquette
- designing for socialisation in on-line collaborations
Design considerations for social media initiatives

• a pivotal success factor: facilitation skills of the educator
• resource-intensive
  – planning and running the initiative
  – cycle of feedback and change has to be built
• not always possible to transfer the initiative to another context or discipline and assume that it will ‘work’

For further information

• Papers and reports on social software, wikis, blogs and 3D virtual worlds on Open Research Online (repository)
  http://oro.open.ac.uk/view/person/sm577.html
• My contact details
  email: s.minocha@open.ac.uk
  profile: http://uk.linkedin.com/in/shaileyminocha