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Incorporating Internet resources into classroom practice: Pedagogical perspectives and strategies of secondary-school subject teachers

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Professional and scholarly context of the study

In England, recent national surveys based on OfStEd school inspections have drawn attention to increasing use of Internet resources in secondary teaching, notably in the following subjects:

in Geography: *“to enhance coursework”*;

in History: to gain *“unprecedented access to archive material”*; and

in Science: *“to supplement textbooks”*, including use of *“on-screen worksheets with hot-links to relevant sites”*.

The recent *Impact2* study of English schools reported that while the Internet was widely recognised as having educational potential, there was less clarity about how this might be realised in classroom teaching and learning. Likewise, a recent review of the research literature on educational use of the Internet –presented earlier this year at AERA– identifies a persisting lack of attention to pedagogical issues.

The aim of the study which we will outline here was to extend understanding of classroom use of Internet resources by examining the perspectives and practices of experienced secondary teachers. As Kerr has put it: *“If technology is to find a place in classroom practice, it must be examined in the context of classroom life as teachers live it”*.

Design of the study

The teachers we worked with came from secondary schools involved in a research partnership with our Faculty; they were undertaking BPRS projects with a particular focus on technology-integrated pedagogy. Teachers worked on their projects, sometimes with a departmental colleague, over the period between September 2000 and January 2002. This particular study focuses on all five of the projects which centred on the use of Internet resources, involving eight teachers altogether.

We were able to draw on a range of evidence about each project:

Project plans, which teachers sketched at an early stage.

Lesson observations and post-lesson teacher interviews, which were carried out by members of the university team supporting the projects.

The final reports which teachers prepared for the funding agency.

We analysed this evidence by seeking prominent themes, first within, and then across, projects. This led to the writing in parallel of case summaries –to convey a more holistic sense of key concerns and concepts within particular projects– and topic summaries –to identify salient issues and ideas running across projects.

The five projects focused on:

- Using on-line resources in supported study of science topics;
- Using a virtual archive in developing skills of historical interpretation;
- Making intensive use of ICT in independent study of geography topics;
- Using Internet resources in researching a Latin coursework topic;
- Mediating the study of geography by less academically successful pupils.

Illustrative sketches of within-project themes

In our full paper, we include all five case summaries –at a length of around 2000 words each. We believe that these more contextually-framed and project-specific portrayals of practice are important in grounding the necessarily more decontextualised topic summaries which follow them. Here we will give brief sketches of just two of the projects, chosen as the more educationally adventurous examples. The first project had a specific focus on developing students’ Internet research skills. In the second project, it was teachers who assembled a much more structured archive of Internet material.

Using Internet resources to research a Latin coursework topic

This project had a distinctive focus on developing the research skills of Year 10 pupils undertaking GCSE coursework. They were investigating a self-chosen aspect of Roman life, using the book stock in the school library and the Internet as the major means of accessing material. The project aimed *“to devise strategies to enable students to develop as efficient and discerning electronic information gatherers rather than remain as serendipitous and credulous surfer-browsers”*.

We observed two lessons at the start of coursework. In the earlier lesson, the teacher restricted students to using the book stock; in the later lesson, to using the Internet. She then discussed the relative qualities of the two information sources with students, allowing free access to both from then onwards.

Directing pupil activity towards finding facts and framing questions

In both lessons the teacher set students a very concrete objective, aimed at keeping them on task: finding five facts relevant to their project. Her own interventions aimed to take pupils beyond amassing facts, towards a more argumentative use of material, through formulating an appropriate organising question:

“If they just have a title, a topic -food, gladiators, religion- it tends to be what I call a ‘bung essay’ in that they just bung down random facts. They need a question in their head, and then they can marshal their facts and produce an argument: ‘How did the Romans use pain within their punishment system’. So instead of just a list of all the horrible things they did to each other, you have to actually think about how they are using this thing.”

Establishing a dialectic between library and Internet resources

The teacher contrasted the school library with the Internet, and pointed to a potential dialectic between them:

“Library stock has gone through a filtering process, and therefore it’s appropriate information for their needs at this stage. It’s very useful to have that as opposed to the freedom of the Internet, which is going to get them much more excited, and give much more up-to-date information, but it isn’t always reliable.”

She subsequently reported pupils’ triangulating between Internet material and library stock:

“In the third lesson, pupils could choose any materials they wished. All, except one, began the lesson on the Internet – mostly using sites they had chosen previously. However, a significant number, while remaining logged on, supplemented or checked information using book stock.”

Developing and motivating use of library and Internet search techniques

The teacher identified a need to develop search techniques. In the ‘library’ lesson, she noted how students *“weren’t using the library imaginatively enough... They think all of it’s going to be in one place”*, under the same classmark. Similarly, in the ‘Internet’ lesson, she was concerned that, in using the search engine, *“they just put up any old thing, ‘Roman baths’ or whatever it was”*.

However, she recognised how the viability of browsing the book stock in a small school library reduced the incentive to employ more sophisticated search techniques; and similarly, how a simple Internet search typically provided sufficient material for browsing.

Following subsequent work on search techniques with her students, she reported that *“there was some improvement in the speed with which sites were selected, the relevance and reliability of those sites”*. She also found that *“these thinking skill strategies sharpened the students’ understanding of their chosen topic”*.

Nevertheless, she also noted that *“although pupils were compliant in the lessons, [they seemed to] regard the Internet as their own private area of expertise and power and resented teacher intrusion or manipulation of what they regarded as their own discrete world”*.

Using a virtual archive in developing skills of historical interpretation

This project used Internet resources to enhance an existing unit of work in History for Year 9 pupils. The unit aimed to bring out the part that interpretation of diverse source material played in historical enquiry. Over some twenty lessons, pupils engaged with a virtual archive of documents and artefacts relating to the First World War. The unit culminated in pupils writing an essay exploring issues of interpreting evidence, making reference to the range of archival material they had encountered.

The observed lessons took place towards the end of the unit, shortly before an excursion in which the classes were to visit a First World War battlefield. In one lesson, pupils analysed differing accounts of

the battle, using a range of digital sources. In the other lesson, pupils examined how artists had depicted the experience of war, through studying a selection of digital images.

Enlarging evidence and experience through authentic resources and non-textual media

The project had assembled differing representations and interpretations of the battle and the war, primarily from the Internet:

“We’ve got on there pictures, written accounts of the battle, we’ve got biographical information, we’ve got letters, we’ve got diaries, and we’ve got posters. We’ve got all sorts.”

Alongside the battlefield visit, non-textual media and authentic resources were intended to promote multisensory and empathetic understanding:

“I think all those things, they’re alerting the different senses [to] what it was all about. Perhaps we’re getting a more total picture.”

Care was taken to create a sense of authentic contact with a wider world, for example in introducing the lesson on images of war:

“The sense that this was an exhibition that they were visiting, a virtual exhibition, not just some pictures I’d chosen from a book, but something which was connected with the UN. It kind of brought the reality of outside into the classroom that this was something people could visit in the same way that they’re going out to visit battlefield sites in France.”

Providing structure and support for activity while preserving pupil agency

An important concern of the project was to provide sufficient structure and support for lesson tasks while preserving the sense of agency which deepened pupils’ engagement with them.

In response to dissatisfaction with some of the earlier lessons in the unit, the teachers increased structure, both in posing tasks and in accessing materials. At the same time, they commented on how pupils *“were able to dictate to some extent the pace”*, on how *“a lot of the time they were free to discuss, at whichever level”* and on their *“freedom about how to present”*. However, the teachers also noted their own contribution in *“going around and feeding ideas and asking questions”*.

Teachers singled out the contribution made by discussion of on-screen work:

“It was easier to intervene as there was already ongoing dialogue between pupils. Having work on the screen enabled both pupils and ourselves to view and discuss the work collaboratively. This contrasts with our previous classroom experience with these groups where it is often difficult to do this.”

Enhancing discussion and argumentation through ICT-supported handling of evidence

The teachers saw discussion and argumentation as playing a key part in successful learning. They pointed to a number of ICT-supported approaches which had enhanced these processes.

Pupils could *“almost use the computer like a notepad, looking at the screen, marking things on, and generally generate some discussion”*.

“The ability to manipulate the pictures was important; simply enlarging it, to home in on details”.

“Creating tables helped pupils to classify their ideas and allowed them to manipulate what they had found out more easily.”

Pupils had been able *“to support their findings in a more sophisticated way, by the ease of incorporating evidence into their work”.*

Summary outlines of cross-project themes

Now, again briefly, to the cross-project themes. For further economy, we have grouped them in three clusters. Necessarily more decontextualised than the case summaries, these topic summaries pick out issues and ideas which were salient in more than one project, and typically across all five.

Adaptation to destabilised routine

We start with some important aspects of situational adaptation which framed the work of all the projects. These tended to destabilise established routine and introduce new unreliability. Such factors indicate why less enthusiastic teachers might well be deterred from pursuing practice of this type.

Managing lesson relocation, room configuration and technical malfunction

In all the projects, making use of ICT facilities involved relocating lessons from the normal timetabled classroom to a suitably equipped room booked in advance. This not only called for additional planning by the teacher, but disrupted working norms and procedures, something of particular concern to teachers whose classes contained pupils who could be difficult to manage.

The general preference amongst teachers appeared to be for each pupil to work individually at a terminal, but this proved impossible in most projects. Nevertheless, whether pupils were working at a terminal individually or in pairs, teachers recognised advantages of peer support, particularly on technical matters.

Typically, the inflexible layout of ICT rooms and the absence of any public form of computer display made it difficult to gain and hold the attention of the class as a whole, and cramped conditions sometimes inhibited effective pairwork.

A general concern was malfunctioning of computer facilities, which was so prevalent that teachers felt obliged to anticipate it by always having alternative resources to fall back on.

(Re)orientation of learning and teaching

The next cluster of themes reflects a basic pedagogical organisation common across the projects that we studied. To some degree, this may represent adaptation to pedagogical constraints and affordances introduced by the design of the ICT suites that the teachers were using. To a stronger degree, however, it appears to have been driven by an explicit pedagogical (re)orientation on the part of the projects and teachers concerned.

Organising lessons around teacher-supported, ICT-based, pupil activity

The majority of time in all the observed lessons was spent in teacher-supported, ICT-based seatwork activity by pupils. In one of the projects that we looked at earlier, this was largely dictated by the agenda of carrying out individual coursework, but in all the others it was a deliberate choice in favour of a more “*independent*” or “*student-centred*” approach to a class topic. In some projects, worksheets –sometimes online– were often used to specify the assigned task and structure pupils’ work on it.

Adopting this form of lesson organisation was seen as promoting more active pupil participation in lessons, and greater engagement in thinking. It was described as permitting teachers to stand back and take more of an advisory role, and as offering a welcome contrast to teacher-led and textbook-based lessons.

Supporting and shaping pupil activity through informal teaching

Across all the projects, teachers reported various forms of informal teaching.

They referred to helping pupils with technical skills and troubleshooting technical difficulties. They reported showing an interest in what pupils were doing and giving them rewards such as praise. They made sure that pupils were on task, and jollied, jogged or chivvied them along.

Teachers talked of supporting pupils who were struggling, pointing pupils in the right direction, trying to move them on, trying to push the subject forward. They described themselves as probing and stimulating pupils, as focusing them onto specific points, as feeding ideas to pupils. Finally, they reported checking pupils’ understanding, helping pupils to understand, discussing pupils’ ideas.

Building and capitalising on pupils’ sense of capability and agency

In all of the projects, teachers noted how working with ICT gave pupils opportunities to express and take pleasure in their capability. Equally, teachers were aware that some pupils needed encouragement, support, and often a degree of flexibility if they were to make confident and personally satisfying use of ICT.

Many teachers emphasised opportunities for pupils to exercise a degree of control over their work and responsibility for it. This tended to be expressed in terms of letting pupils do things for themselves, in terms of giving them choice –of which resources to work with, and which ICT tools to use– and of giving them responsibility for pacing their own work.

Refining orientation to teaching and learning: a sociocultural perspective

This cluster of themes reflects what projects reported as a shift towards more self-regulated learning by students. We suggest that socio-cultural learning theory provides a promising framework for analysing the ways in which teachers (and pupils) were coming to structure classroom activities and interactions.

Interaction between pairs of pupils, and with the teacher, capitalised on the visibility of work on the computer screen. As the teacher circulated, pupils exploited informal opportunities to solicit help and feedback, and actively manage their own motivation and participation, while teachers assessed progress and understanding and adjusted their support contingently. Proactive interventions, responsive assistance and opportunistic interactions created more reciprocity of pupil and teacher agency in structuring activity.

The technology is clearly far more than an inert contextual feature; it is a mediational means which plays an integral role in shaping activity, bestowing shared ‘mediated agency’ upon the participants. While overt teacher guidance and task structuring appeared to fade as pupil competence increased, implicit forms of these kinds of support remained important. Teachers felt that they should encourage and support pupils in acting and thinking independently. Rather than devolving the responsibility for learning either to the computer or to pupils, this meant strategically balancing freedom of choice, pupil responsibility and self-regulated learning with structured activity, focused enquiry and proactive teacher guidance.

Exploitation of resources and tools

The final cluster of themes is more specifically concerned with the exploitation of Internet resources and ICT tools. In many respects, of course, these themes take for granted the pedagogical orientation which we have just outlined.

Enhancing lesson resources through use of Internet material

Teachers reported that Internet resources provided material lacking in textbooks, and much wider coverage than the books available in school libraries.

Authentic sources and materials created a sense of contact between the school classroom and a wider world. In some projects, too, non-textual media were used to promote more multisensory understanding. Such authentic and multimedia resources were seen as helping to stimulate pupil interest and engagement in lessons.

Nevertheless, all projects reported contending with the issue that much Internet material was ill-matched to pupils’ capabilities or to educational purposes.

Structuring and supporting pupil access to Internet resources

Many projects found that they had been over-optimistic in expecting student searching of the Internet to provide ready access to suitable information. Where they had not set developing search skills as a goal, it became attractive to fall back on greater teacher pre-selection of material, sometimes retaining an element of searching and synthesis.

One project made particular use of online worksheets with hyperlinks not just to guide pupils to preselected sites but to facilitate access to them; in other projects intranet portals fulfilled a similar function. In two projects, a deliberate investment was made in helping pupils to develop more effective strategies for seeking and critically analysing information. More immediately, advice could be given

on types of search terms that might be used, and ‘good’ sites found could be publicised to the whole class.

Some projects noted pupil resistance to overly structured and supported approaches to accessing Internet resources, which they perceived as intruding on pupil territory and diminishing personal agency.

Instrumenting use of ICT tools to support subject learning

Beyond structuring and supporting access to relevant Internet resources, several projects gave explicit attention to how using ICT tools to locate such resources, to search within them, and to manipulate their content, could support subject learning.

The first project we sketched earlier reported that developing ‘thinking skills’ for refining searches, devising keywords, and judging websites, sharpened pupils’ understanding of the topic they were researching. The second project identified several ICT-mediated techniques in which analysis and argument were supported by manipulation and reorganisation of digital material.

By contrast, in another project, a sharp demarcation was made between the technical and subject components of classroom activity, and these were even conceived as antagonistic in some respects. This project lacked a clear rationale relating its extensive use of ICT tools to subject learning.

Refining exploitation of resources and tools: a sociocultural perspective

The way in which teachers thought about use of Internet resources and ICT tools was anchored in familiar analogues: worksheet and textbook, library and archive. Teachers employed these, initially as models, then as comparators, to inscribe use of the new technology into their practical thinking.

Those projects where the guiding analogues were library and archive placed more emphasis on interpretation and validation of material. It was in these projects that issues of how Internet searching and other uses of ICT tools might mediate thinking, learning and teaching emerged more strongly than in others. In particular, one project suggested that the process of searching, including the discussion surrounding it, can deepen understanding of subject matter. In effect, this is one aspect of the idea that mediation by ICT tools can contribute to the development of thinking within the subject itself.

However, schooling tends to factor out issues of interpretation and validation, viewing these as a less welcome form of contact with the wider world. In projects where the guiding analogues were the worksheet and the textbook, the emphasis was on the Internet as a source of subject-related material, and on ICT tools as efficient –but otherwise neutral– means of delivering and handling these resources.

We conclude, then, that there are particular curricular niches which lend themselves to more critical use of Internet resources. On the basis of this study, we would point to the potential of coursework projects in this respect, and of more consciously interpretative subjects in which the evaluation and synthesis of material occupy a central place.