ThinkSpace: the collaborative process of designing new technologies for the classroom

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ABSTRACT
In order to explore some of the potentially problematic implications of introducing new technologies into school classrooms, this paper focuses on one particular instance of innovation. The study introduces ThinkSpace - a specific educational tool - comprised of concept mapping and a wiki. It is aimed at facilitating the learning of higher order skills and construction of coherent understanding of complex concepts. The paper investigates the processes of conceptualisation and experimentation that must be carried out in order to achieve a product that meets both the developer’s aspirations for the tool, and also those of the teacher who is to use it.

Categories and Subject Descriptors
K.3.1 [Computer Uses in Education]: Collaborative learning.

General Terms
Experimentation, Human Factors

Keywords

1. INTRODUCTION
This paper describes the rationale and the process of development behind a specific educational tool, in order to explore some of the potentially problematic implications of introducing new technologies into the well-established ecology of a school classroom. In particular, the paper considers the different perspectives of the developer, focused on trying to optimise the usability and effectiveness of a new instantiation of technology, with its potential to alter or disrupt existing pedagogical and learning practices, and of the teacher who, even if open to the notion of enhancing practice through innovation, is quite properly concerned with sustaining proven means of achieving crucial goals.

The particular kind of educational technology under consideration is unambiguously designed to engage directly with processes of learning. Educational technology is a catch-all concept, encompassing communications tools, course and resource management, student tracking, assessment, pedagogical planning, teacher productivity – and a variety of applications that might loosely come under the category of ‘cognitive’ tools, that are intended to enhance or enable processes of thinking and learning. Cognitive tools are the area of interest in this paper, in that they enable us to focus directly on the question of whether a technological tool designed to impact mental processes can prove efficacious in classroom settings, despite competing imperatives, practices and beliefs about teaching and learning embodied within the institution, the curriculum and particular classes.

Given such constraints, it is likely that tools produced in collaboration with teachers have an easier prospect of success (which is to say, sustainable acceptance within a particular classroom), in that they will presumably have been developed to achieve existing goals in line with existing practices. For the most part, any such developments are likely to be quite low-key, both technologically and pedagogically speaking, and will most often involve the deployment or redeployment of an existing tool designed primarily for another purpose, because it proves to be an effective way of encouraging some cognitive process seen as desirable by the teacher. For instance, teachers may deploy PowerPoint as a means of getting learners to organise and articulate information or arguments through the act of preparing a presentation and, especially, working with hierarchical headings; or they might deploy blogs as a means of providing a kind of discourse frame for using a foreign language.

Doubtless there are some teachers with quite advanced skills in creating new technology applications for use in the classroom, but this is not generally the case: most teachers do not possess either the design and coding skills or the considerable amounts of time necessary for creating anything approaching a substantively new educational tool. Whilst the tool discussed in this paper is not in itself a wholly new technology, but something more in the way of a mash-up of existing resources, it is the product of a design and development process that few teachers would have the time or inclination to engage in. As such, it embodies both the strengths and weaknesses of any new classroom tool: it offers the prospect of enabling what was previously not possible or easily achieved, but it is not the direct product of the understandings and practice of the person who is to use it: of the teacher.

The question that this paper addresses is therefore: what processes of conceptualisation and experimentation must be carried out in order to achieve a product that meets both the developer’s
aspirations for the tool, and also those of the teacher who is to use it?

2. THE ThinkSpace TOOL

The tool whose development is discussed in this paper is currently referred to as the ThinkSpace tool. It has been conceptualised as applicable within a wide variety of disciplinary and educational settings, but the particular process of development to be described is taking place within a history classroom.

ThinkSpace is a simple idea combining computer-based concept mapping [32, 33] and wikis, into a tool that can be used for structuring and clarifying thoughts about complex material. The tool is used by groups of students for creating an interlinked online knowledge repository – a mini encyclopaedia - in a wiki with a corresponding concept map. This repository is dynamic and is a means of analysing and interlinking content knowledge. Each concept-bubble on the map represents a wiki article about that concept. The two are linked to each other so that clicking on any concept on the map takes the learner directly to the article on the relevant concept.

The dynamic knowledge repository thus consists of two levels - the overview or ‘breadth’ in the concept map and the detail or ‘depth’ in the wiki - that are interlinked and readily accessible (see Figure 1). The learning lies in constructing the complex interlinked web of knowledge, negotiating which concepts are important in the material and discovering underlying links between details of seemingly unrelated material. The technology provides a visual (concept map) and collaborative (wiki) platform, and facilitates easy movement between the two levels of abstraction. The difficult part - structuring and keeping track of the knowledge - is up to the learners.

Currently ThinkSpace is based on a TWiki platform coupled with Gliffy.com for concept mapping. The concept map is drawn in Gliffy and then embedded into a page on the wiki serving as navigation and overview. Gliffy allows for links to wiki pages to be attached to individual concept bubbles or link labels. Once embedded, the map view in the wiki is automatically updated every time the students change the map on Gliffy and thus the navigation structure is kept up to date. Currently numerous steps are involved in keeping the map and the wiki structure consistent and the presence of the researcher is paramount to this process. Because the focus of the project is on the pedagogical changes inherent in the introduction of collaborative tools and not on technological functionality, the admittedly simplistic technological process is suitable for the project. If the tool proves its potential for promoting deep thinking and coherent understanding in students, it will need technological development to make it more usable and viable in a classroom environment without researcher support.

Concept mapping is a relatively well-established teaching and learning aid developed by Joseph Novak in the course of his work at Cornell University for teaching science concepts. Concept mapping was invented as a means of representing the learner’s cognitive structures [32] and for making clear both to students and educators the small number of key ideas and concepts that are important to a specific learning task [33]. It was based on Ausbel’s assimilation theory [1], which is highly influenced by Piaget’s writings on assimilation and accommodation, and where the fundamental idea is that meaningful learning (as opposed to rote learning) happens by assimilating new information into the learner’s existing cognitive structures. This means that the student’s learning is highly dependent on what she already knows. Concept mapping provides a means of eliciting a learner’s prior understanding of a knowledge domain and of representing this understanding on a single page by breaking the domain down into its main concepts and their interrelationships.

A concept map consists of bubbles or boxes representing concepts1, and lines or arrows labelled with ‘linking phrases’ representing the relationships between the concepts. Pairs of concepts connected by a relational link form propositions, which, according to this tradition, are the semantic units we use to construct our knowledge [10]. Concept maps are generally constructed in a hierarchical fashion, beginning with the most general or inclusive concept at the top, and branching out into still more specialised and refined concepts toward the bottom. The hierarchy is not strictly enforced, because concept maps allow for and encourage ‘cross-links’ between different branches of concepts, representing ‘creative leaps’ and high level understanding on the part of the learner. In fact the number of cross-links is sometimes used for evaluating the quality of concept maps [23, 35].

The second technological element of the ThinkSpace tool is the wiki. The wiki is a rather new tool in education, having about 10 years behind it. Research on using wikis for learning was preceded by research on reading and writing hypertext, which stretches back to the introduction of Apple’s HyperCard in the late 1980s.

The findings on the benefits of reading hypertext for learning are ambiguous [11, 17]. The effects depend to a very high extent on the type of task the hypertext is used for [7, 15] and the kind of learner engaging with the task [2, 22, 30]. Research on writing hypertext for learning has yielded somewhat more optimistic findings. Bereiter’s and Scardamalia’s extensive work on using CSILE (later Knowledge Forum) for knowledge building is a good example of this [37-39].

1 A concept is defined as a “regularity in events or objects designated by some label” [33]
Wikis build on these foundations of collaborative knowledge building. Since Cunningham’s first implementation of the WikiWikiWeb in the mid 1990s [29], multiple versions of the wiki have been developed. Common for all of them is that they allow for open asynchronous editing of content, where incremental growth is favoured over upfront design and where all users are encouraged to become designers of the hypertext [16, 42]. As could be expected, making learners into designers is not straightforward. As with reading hypertext, writing and designing hypertext in wikis or other applications, imposes a great cognitive load on the learner. As in the ThinkSpace tool presented here, some studies advocate the use of visual overviews, such as concept maps to help users manage the design task. Désilets et al. [16] found in their study of wiki usability that the hypertextual nature of the task presented problems to their students. They observed that the problems were alleviated by using the maps the students had created during their planning of the hypertext, and by having the maps in plain sight throughout the learning task. Pohl and Purghathofer go even further in arguing that creating visual overviews not only helps the authors to navigate the hypertext, but is also beneficial for their learning because “Semantic networking or concept mapping helps students to analyse their own knowledge structures to integrate new information with what they already know.” [34] (p.88)

3. USING ThinkSpace FOR LEARNING HISTORY

The ThinkSpace project adopts a design-based research approach [3, 8, 13] to frame the introduction of the technological innovation into a classroom context. By iteratively developing the tool in close collaboration with an experienced practitioner, it seeks to understand the affordances of the tool in the particular environment and the barriers to its introduction that emerge in the course of the study. The following account presents preliminary findings from the ongoing study and can by no means be treated as conclusive evidence about all possible uses of the tool. Still, these findings are indicative of the types of processes of conceptualisation and experimentation that must be carried out in order to achieve a product that meets both the developer’s aspirations for the tool, and also those of the teacher who is to use it.

Many disciplinary contexts were explored as potentially suitable for the development of this tool. Eventually history was pinpointed as a particularly appropriate subject for its exploration: specifically in support of meaningful learning for A-level2 history students. It must be emphasised that the application of the tool is not limited to history: it could be applied to a range of school subjects that require coherent understanding of complex concepts. Most subjects within the social sciences and humanities fit into this category and therefore history should be seen as merely a suitable testing ground for ThinkSpace.

Some of the most difficult academic skills that we try to impart on the students in school (partially through the study of history) are also some of the most difficult ones to define. They are the ‘higher order’ skills of analysis, critical thinking and decision-making. Furthermore these ‘information-consumption’ skills seem no longer to be enough to be literate in a ‘read-write culture’ of a Web 2.0 world [21]. In the workplace, as well as on the web, we must learn to be active researchers, producers of knowledge and contributors to team efforts: able to draw on the ideas of others and negotiate consensus in the representation of our ideas. Can we equip schools with tools to foster this array of capabilities in their students?

Viewed within the socio-constructivist framework, learning itself is a matter of active participation and production within a social community of practice [27] or of collaborative knowledge-building [4, 5, 38, 41]. Education in this view, must seek to give students opportunity to practise critical research and analysis in the field of their study, to practise developing their ideas in collaboration with their peers and to build collective knowledge artefacts representing the fruits of their analysis. Teaching must scaffold the students’ getting to grips with, sorting, producing, rearranging and structuring material so that it makes sense as a coherent whole – in other words, to enable them to think more like ‘insiders’ in the community or experts in the field.

Research has shown that there are considerable differences between the ways experts and novices approach a problem in their field. One of the main characteristics of experts’ knowledge and problem solving is that they perceive and try to solve problems on the basis of ‘big ideas’ or underlying conceptual principles of the domain. Novices, on the other hand, lack the understanding of the underlying structure of the field and approach material and problems based on their surface characteristics [6]. Physics students, for example, approach a problem in terms of the equations that would be used to solve it, instead of categorising problems according to the underlying physical laws [12]. History novices fail to develop elaborate understandings of historical sources because they do not have a fundamental understanding of the epistemology of the field and lack strategies of real historical thinking. Furthermore, it is evident that expertise is not down to a deep knowledge of content or familiarity with a particular time period: historians specialising in other areas are able to apply their skills flexibly to gain a similar level of understanding as core experts, previously familiar with the problem [44]. In another study Wineburg investigated how an expert historian who lacked content knowledge of a particular problem tackled its solution. He found that “It was how he responded in the face of what he didn’t know that allowed him[… ] to learn something new” [45]. Monitoring own learning or metacognition is thus another characteristic of expert knowledge and skill. It is a very important skill to impart to students in schools in light of the demands upon them to be creative and adaptive members of the labour market, where they will face new problems regularly.

History is an excellent subject for practising getting to grips with the read/write world, firstly because it requires students to carry out thoughtful, detailed analysis. Becoming historically literate can give students a framework to structure their understanding of the past and present and to help them make decisions about the future [28]. It can teach them to adequately explain what they see in the world [18, 24] and to evaluate, interpret and reconcile often conflicting evidence [20, 44].

The nature of historical material is complex, multilayered and interlinked in ways that are not always obvious. History is what Spiro, Feltovich and others [19, 25, 40] call an ‘ill-structured’ domain. It is ‘messy’ and although there are some rules that apply, the combinations of rules in each case follow different patterns and require deep understanding of each single rule in order to be

2 A-level (short for Advanced level) is the two year post-compulsory part of secondary education in the UK completed by students in the age range 16 to 19 years.
able to understand their interactions. A-level history is within the range of ‘advanced knowledge acquisition’, which is, according to the same authors, the stage between novice and expert learning, where deep and detailed understanding of the concepts of the domain is key. Oversimplification, which is a much used strategy in novice learning is no longer sufficient to produce the right kind of understanding and leads to misconceptions and inability to understand the full complexity of concepts. Thus, in A-level history, students move towards expert thinking, although only part of the way.

On these grounds A-level history was chosen as testing ground for ThinkSpace. The technological tools used in this investigation are aimed at supporting the following key goals:

- Scaffolding students’ getting to grips with the conceptual structure of the field and seeing detailed factual information in light of that structure
- Allowing the students to practice communicating their knowledge
- Allowing the students to practice building communal understandings and negotiating consensus in the representation of those understandings
- Helping the students to monitor their learning progress and to identify gaps in their knowledge

The concept mapping element of ThinkSpace addresses the first half of the first goal by helping the students and the teacher to think of and represent the conceptual structure of the curriculum. It can encourage the teacher to think and plan in terms of concepts, prompting analytical rather than narrative approaches to the syllabus, and provide students with visual cues to the structure of the domain. Concept mapping also addresses the last goal by giving both the students and the teacher an overview of the students’ developing understanding and alerting them to misunderstandings or missing links and concepts.

By combining design of maps with the design of hypertext in wikis, the ThinkSpace tool addresses the second half of the first goal outlined above: helping learners see detailed information in light of the overall structure of the field. Importantly the wiki element of the tool also addresses the two remaining goals. Bruns and Humphreys [9] point out that demanding observance of Wikipedia-style NPOV (neutral point of view) in learning tasks is useful for encouraging students to reach consensus in the production of a communal text and also serves to implement a type of meta-analysis of the material that exercises the students’ critical thinking skills. The technological combination of concept mapping and wiki writing therefore seems to cover all the goals set out for an educational tool. However, the technology is only one part of a useful and successful learning tool.

4. OBSTACLES ENCOUNTERED DURING THE IMPLEMENTATION OF THE TOOL

To this moment one teacher and his two A-level history classes have been involved in the project. The teacher has to a large extent been a co-designer in the study, sharing his expertise and participating in the formulation of the purpose of the tool. At the point of writing we have worked together for half a year, developing the tool technologically, pedagogically and practically. Students in both classes were divided into groups of three and each group equipped with a ‘web’ on the wiki and access to creating and editing concept maps. At regular intervals throughout the year students were given tasks to complete with the tool, usually asking them to expand their map and wiki to represent their current understanding of the historical period they are studying. The goal is that by the end of the year each group will have created a revision guide for themselves that they understand and are familiar with.

Many studies point to the fact that introducing wikis into education is far from straightforward, and that the wiki’s ‘deceptively simple user interface’ brings along profound changes in learning epistemology [31]. Because the wiki affords a collaborative and collective approach to learning, it faces sometimes insurmountable problems in learning environments that traditionally follow a different approach. As Rick and Guzdial put it: “Culture trumps medium” [36]. Research shows that the success of a wiki depends on a multitude of factors including the culture and traditions of the discipline where the wiki is being introduced [14, 31], and the task that it is being used for. The tool needs to be adapted to the institutional context while challenging the context and moving it forward [43].

In the course of the first trials with ThinkSpace it became apparent that the tool did not fit neatly into the classroom practices. The obstacles to the introduction of ThinkSpace fall into three main categories:

- the technological barriers, to do exclusively with the technical setup of the tool and remediable by technological improvement
- the cultural barriers connected with the collaborative nature of the proposed tool, independent of technology
- and the ‘technocultural’ barriers, where technological and cultural factors influence and shape each other.

The purely technological difficulties can be termed to be of a transient nature, in that the technology, although not yet ideal, has been developed and improved since the outset of the project and the tool has become easier to ‘transplant’ into other schools. Still, the technological barriers are worth mentioning in this context because they were part of the overall development of ThinkSpace. For example both the concept mapping software and the wiki were exchanged for different tools during the project. At the outset the technological approach had been to minimise the technical and financial barriers to the introduction of the tool and therefore an open source mapping software and a free version of a hosted wiki were chosen. The wiki proved to be too restrictive for the needs of the project having recently changed its pricing policy and thus cutting off features that were previously available. The concept mapping software proved to be very difficult to get to work on the school system, although the researcher worked closely with the school’s IT staff. Its method of saving the maps required for specialised folders to be set up on the network, which clashed with students’ access rights on the network creating problems with saving their work. The risks of technology ‘hiccups’ influenced the lesson planning, necessitating some degree of contingency planning, and to some extent limiting the role that the tool could play in the lessons. This was not down to the impossibility of making the software work, or to the incompetence of the IT department – far from. Time constraints prevalent in schools presented the biggest problem, leaving little time to thoroughly test the system in between lessons and in free periods where access to the computers could be achieved. This led to new, sometimes critical problems, only being discovered during
the lesson. Therefore, to minimise the risk of breakdowns in lessons, the concept mapping software was swapped for an online version. The risk of disrupting the lessons was not the only detrimental effect of the initial technical problems. This ‘midstream’ change of the technology, also influenced the students’ attitude towards the project, unfortunately losing a great deal of their trust.

4.1 The teacher-researcher relationship

To understand the cultural side of the barriers to the introduction of ThinkSpace it is necessary to take a look at the roles of and relationship between the participants in the project.

The teacher and the researcher have been working closely together throughout the development of the tool. At the outset, their roles were quite clearly delimited: the researcher had initiated the project, had developed the preliminary ideas and was in charge of the technological implementation of the tool. The teacher on the other hand, provided the pedagogical and subject expertise, was an insider – and in his role as head of the history department at the school, a ‘shaper’ – of the school environment.

The initial lessons with ThinkSpace were grounded in the researcher’s ideas about how the tool could be practically implemented (i.e. how to present the tool and familiarise the students with it, and how to formulate the first tasks). These ideas met with the teacher’s expertise and were tempered and adapted to the teacher’s style and to the curriculum. As the project progressed, in subsequent iterations, the roles of the teacher and researcher shifted, the teacher gaining a deeper insight into the technology and its possibilities and the researcher familiarising herself with the curriculum and the classroom practices. This blending of the roles meant that the formulation of the tasks would increasingly follow the teacher’s (changing) understanding of the tool but also that the researcher could develop her ideas according to the curriculum and discipline demands. This led to a mutual shaping of the implementation of ThinkSpace, directed by both teacher and researcher, and constrained by a tension between the ideas and expertise of the two actors.

This tension between the researcher’s and the teacher’s goals and understanding is situated within a complex nested system of institutional practices and traditions. The teacher’s and thus his students’ practice is situated within the context of the school, which in turn is influenced by the principles, philosophies and not least rules of the English educational system. The most significant barrier in the project has been a fundamental incongruence between the institutional goals and the underlying principles of the tool, which became evident in day-to-day task design.

The researcher’s ideas were largely inspired by how the technology could potentially afford collaboration between the students – in other words, by the goals outlined above. This often entailed charging individual students with the task of specialising in a specific area of the curriculum, so that each student could bring deep knowledge of an aspect of the historical topic to the group discussion. These ideas met with the teacher’s need to safeguard each individual student against the risk of losing out on parts of the curriculum and ensuring that ‘everybody covered everything’. Both of these concerns are valid in their own right and throughout the project we tried to reconcile the two. This resulted in a ‘mutation’ of tasks, trying to ‘straddle’ both opposing aims. For instance, the initial tasks were originally envisaged as a combination of home and in-class work. The students were to go in depth with a particular area of the material they were studying and write ‘encyclopaedia’ pages about their area. Then in class, they would present their findings to the other members of the groups, and together draw the concept map of this part of the curriculum discussing the connections between their areas. The group was to tap into the expert knowledge of each student allowing for a detailed discussion. This is an idealised representation of the task, which naturally would have to be adapted to ‘messy’ classroom reality, but the main components of which were to remain in place. Because of the impossibility of allowing students to ‘specialise’, the collaborative task could no longer be genuinely collaborative. The group members were sharing the same (shallower) knowledge, there was no need to rely on others’ expertise to obtain a detailed picture of the whole topic and collaboration became simple task-delegation. It is not possible at this stage to say whether such tasks were ‘useless’, and undoubtedly there were successful elements – the creation of maps being one - but it is certain that the tool did not function as a scaffold for collaboration in the way it was envisaged.

The researcher’s and the teacher’s differing perspectives were also clearly visible when the teacher began appropriating the tool for other purposes than the ones intended by the researcher. He quickly noticed the wiki’s administrative potential and began talking in terms of the wiki as an organisational tool. The tasks that were formulated by the teacher alone were influenced by his view of the wiki as being a quick way to gather the students’ homework and as a place for the students to archive their work for later retrieval. In one task students were asked to take notes from specific pages in the book and then copy-paste them into the wiki, as to create one page each, indicating their ownership of it by putting their name in the title. This is a very different interpretation of the usefulness of ThinkSpace in classroom work than the one initially set out by the researcher. In this and other cases, the teacher’s use of the tool was directed towards potential benefits to the individual student in keeping track of and archiving their work, and not towards collaborative knowledge building.

These observations of the teacher’s and also the students’ use of the tool echo other studies of innovations that in their attempts to introduce fundamentally collaborative technological tools into classrooms have found that students are largely assessment driven [14] and that assessment is seen as being a strictly individual-focused activity [21]. A-level exams being more or less the only criterion determining students’ access to university puts great pressure on the students to perform. As for the teacher, frequent inspections and publication of year-by-year examination results put pressure on him to deliver the grades thus increasing the risks of innovation. It is then perhaps little surprising that it is difficult to conjure up a collaborative culture of knowledge construction, when the examination of each individual student’s knowledge is looming in a few short months.

4.2 Technocultural problems – when technology meets people in institutions

As the study progresses, the goals of the teacher and the researcher are being aligned and the tool is being attuned to the reality of the classroom. An important barrier to this alignment has been the constraints placed by the everyday school life on the teacher’s time. The structure and pace of a school day have left the skilful and engaged practitioner with virtually no time to ‘play’ with the tool and get to know the technology. Not knowing his way around the technology, not having a ‘fingertip’ understanding of the affordances of the mapping tool, the wiki,
and especially of the combination of the two, makes it very difficult for him to translate the technology into practical tasks. In a sense, if the affordances of a tool are "the possibilities for action provided by the environment" which "exist relative to the action capabilities of a particular actor" (McGreene and Ho 2000) [26] p.80, and if the actor does not have the means or time to get to know the layout of the tool, the perceived affordances will not amount to much. This does not mean that the teacher has not reflected on the pedagogical possibilities of ThinkSpace. According to the teacher himself, a major change that the tool has brought about is to re-orient his thinking towards a more conceptual approach to teaching history rather than a narrative one; it has made him 'think in concepts instead of facts'. This indicates his readiness to integrate aspects of the tool that seem useful and make sense to him into his teaching.

An interesting question arises, that so far receives no answer: what is the reason for the teacher’s quick appropriation of some aspects of the tool (its scaffolding of conceptual thinking) but not of others (for instance, its potential scaffolding of collaborative knowledge building)? Does the answer lie in the discrepancy between the fundamental assumptions of the tool and the assessment-driven culture of the school? Is it the lack of time necessary to 'realise' the affordances that do not straightforwardly fit in to the school practices? Or is the answer hidden in the technology itself: is it inappropriate for fostering collaboration, does the wiki in reality not afford anything that the technology itself: is it inappropriate for fostering collaboration, does the teacher's quick appropriation of some aspects of the tool is to re-orient his thinking towards a more conceptual approach to teaching history rather than a narrative one; it has made him ‘think in concepts instead of facts’. This indicates his readiness to integrate aspects of the tool that seem useful and make sense to him into his teaching.

The same question can be asked about the students’ reception of ThinkSpace. According to the prevailing rhetoric about the 'digital natives' and the 'Google generation', the students should feel at home with the technology to a much higher extent than the teacher. But the students do not seem to take naturally to ThinkSpace either. Is this because, as mentioned earlier, the technological difficulties in introducing the tool have reduced their trust in the project? Is it because they perceive no need for collaboration in light of the type of assessment that they are subjected to and the general value system in educational institutions, valuing individual knowledge above collaborative skills? Or does the technology fail to engage them because they do not intuitively perceive its affordances and usefulness to them, because it is not user friendly and does not fit in with their views of what good technology can do for them? Several students are at this point – more than half a year after the introduction of the tool – still having tremendous problems with using the wiki. Many forget their passwords, some cannot create new pages, or once created, are unable to find them, some do not seem to realise that they need to log in. These are students who are evidently capable of using computers for other purposes. This suggests that the question of the usability and usefulness of the technology from the students’ point of view cannot be written off and must be incorporated in the design process of the tool.

Further trials and development of ThinkSpace will attempt to reveal the balance of the above factors in creating obstacles to introducing this particular tool into A-level classrooms. Further research will attempt to make the tool fulfil some of the roles theorised for it. The above evidence, although of a fairly impressionistic character is, nonetheless, indicative of challenges that similar projects may face.

5. CONCLUSION

It is evident from the above account of trying to implement the tool in one classroom that the distinctive perspectives of developer/researcher and teacher towards a particular innovation will lead to differing ideas about what the tool is for, and about how to implement it. Indeed, it is entirely possible that some degree of tension between these different perspectives will occur, even within a partnership strongly committed to collaboration, as is the case here.

It is the argument of this paper, though, that such tension is both necessary and desirable. Technology is very often sold to teachers in terms of convenience, productivity and motivation, and less often for its potential to raise questions about reconfiguring classroom practices. The developers of new technology tools for the classroom will achieve little if they cannot modulate their designs in light of the pressing agendas of modern classroom, and they must work closely with teachers in order to understand what these are and what they mean for the design of the tool. Likewise, teachers (and students for that matter) will need to consider expanding their repertoire or even in some cases abandoning some established practices that work well enough in order to explore new possibilities that might work even better, if given a chance. This should be seen as part of the contract between the developer/researcher and the teacher, and perhaps should be discussed very openly from the outset of a joint innovation project.

6. REFERENCES


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