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Why it is Difficult to Introduce e-Learning into Schools And Some New Solutions

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Abstract: Most informed educators agree that e-Learning should create a paradigm shift away from traditional teaching models, yet in practice this is extremely difficult to achieve. Typically, teachers use computer networks (internet or intranets) mainly for email, dissemination of information that frequently just mirrors traditional book material, assignments, and perhaps a discussion forum. In this paper, we examine reasons why there has been so little departure away from conventional teaching paradigms. We look beyond Virtual Learning Environments to Managed Learning Environments. We look at ways to make this transition a desirable option for both teachers and students. We suggest that when teachers and learners are properly supported within a Managed Learning Environment the workload of teachers is not increased and they enjoy teaching more; also, students learn better (i.e. more efficiently) and with higher motivation.

Keywords: e-Learning, WBT, managed learning, constructionist learning
Categories: K.3, K.4

1 Introduction

In this paper, we make the case that although there have been numerous success stories, e-Learning has not lived up to many educators' expectations. The successes are frequently from enthusiastic teachers who, predictably, create enthusiastic learners. However, the seldom-asked question is whether they are using a new teaching paradigm – or just an enhanced version of their previous face-face mode. And, most importantly, whether the outcomes are any different, i.e. better, than those obtained using traditional face-to-face teaching modes.

We begin the paper with the results from our literature survey entitled: "Is it difficult to introduce e-Learning into schools?" A superficial look at government agendas and educational conference papers can lead one to suppose that, given enough money, it is relatively easy. However, we shall show that in practice it is exceedingly difficult to introduce a new e-learning paradigm, by quoting from three major surveys: one European, one from the United States and one from the United Kingdom.

1.1 European Findings (EUN Consortium Study)

The European EUN Consortium Study [Vuorikari, 2003] is based on 502 responses from 27 countries. Three key points are:

- The development of Virtual Learning Environments (VLEs) is "booming".
- VLEs have not met the high expectations of educators.
- VLEs are usually used in traditional ways – to introduce new knowledge and to reinforce previous knowledge.

The report suggests that there are two possible reasons for the slow move away from traditional classroom teaching methods. One is that teachers are still learning how to use VLEs in innovative ways, and two, "VLEs in their current form hardly support the desired change" [Vuorikari, 2003]. It is this second contention that we consider closely in this paper. The study also points out that many (70%) of agencies are "concerned about interoperability issues" and the "transferability and reusability of content".

1.2 United States Findings (PEW Surveys)

In the United States *"three in five children under the age of 18—and more than 78% of children between the ages of 12 and 17—go online"* [PEW, 2003]. However the situation is complicated by the fact that well over 50% of the students have computers at home – a significant percentage of which are in their bedrooms. *"For the most part, students' educational use of the Internet occurs outside of the school day, outside of the school building, outside the direction of their teachers."* [PEW, 2003].Internet-Savvy students multi-task: *"conducting research for a paper, printing an online study guide for a book they are reading, downloading music, instant messaging simultaneously with dozens of friends, emailing other friends, and preparing a PowerPoint presentation for class the next day.[1]"*

This has had two significant effects. First, students are protesting that their school systems are so slow and restrictive[2] that they prefer to postpone school project work until they get home. Secondly, students are forming their own out-of-school VLEs. They use the Internet as a*: "virtual textbook and reference library , …virtual tutor and [most importantly] study shortcut, (includes viewing the Internet as a mechanism to plagiarize material)… virtual study group. Students think of the Internet as an important way to collaborate on project work with classmates, study for tests and quizzes, and trade class notes and observations. .. virtual guidance counselor… virtual locker, backpack, and notebook. Students think of the Internet as a place to store their important school-related materials and as a way to transport their books and papers from place to place. Online tools allow them to keep track of their class schedule, syllabi, assignments, notes, and papers."* [PEW, 2003]

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[1] http://www.pewinternet.org/reports/pdfs/PIP_Schools_Internet_Report.pdf

[2]http://www.pewinternet.org/reports/reports.asp?Report=67&Section=ReportLevel2&Field=Level2ID&ID=505

These students are convinced that their "real" learning takes place out of school because it concerns what is important to them personally. However there are considerable difficulties in assessing what their learning outcomes are!

1.3 United Kingdom Findings (The Becta Report)

The Becta Report [Becta, 2003] echoes both of the above two surveys. The major use in school is for the dissemination of material, with little impact on teaching methodology. The report also says that there is an uneven acceptance of the new technology across the country – often varying greatly within a school. Issues concerning safety appear to dominate in many areas, where it is not the teachers, but the administrators, who have most concern. Again the report underlines the frustration of teachers and learners alike when the underlying network system is so often not fast enough.

In the UK consultation document "Towards a Unified e-Learning Strategy"[3] the authors state their aim of achieving a continuum of learning from home to school and from preschool through adult. They plan to have "broadband connectivity by the end of 2006"[4]. They also consider special cases, such as children with special needs.

It is expectations such as these that offer an infinite range of possibilities – and "place[s] great demands on the teacher.[5]"

It is our belief that fast networks and even the 'one or two persons per computer philosophy' will not change the situation. Both aspects (particularly fast LANs) are essential, but do not lead to a shift in teaching unless novel approaches that motivate both teachers and students are taken. We will discuss this in detail in Sections 3 through 6.

2 The Almost Non-Existent Paradigm Shift

As mentioned above, there is widespread concurrence in the education community that there should be a move away from the traditional pattern of dissemination of material (backed up by assignments, tests and exams). However, as can be seen from the summaries above, although there has been a great deal of effort introducing e-Leaning technology into schools, there has not been a significant shift away from the traditional mode of teaching.

There have been several noteworthy initiatives, of which we shall mention just two here: Constructivism and Discovery Learning. The principles behind these are not new – Rousseau, Dewey, Piaget, Bruner, and Papert have all promoted them.

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[3] http://www.dfes.gov.uk/consultations2/16/docs/towards%20a%20unified%20e-learning%20strategy.pdf

[4] http://www.dfes.gov.uk/consultations2/16/docs/towards%20a%20unified%20e-learning%20strategy.pdf

[5] http://www.psy.vu.nl/iscrat2002/postholm.pdf

2.1 Constructivism

Bruner, who is largely credited with modern constructivism, postulates that learning is an active process in which learners construct new ideas based on their current understanding and perspectives[6]. However this is such a wide open definition that just a brief Web survey shows that there are hundreds of different variants of it. This is part of the problem for teachers – the method is too complex and too wide open. Secondly, the very definition of constructivism implies learner-centered instruction in the real world. Again, this is a concept that educators have striven to achieve for a long time. But busy teachers, with 20 or 30 students in their class, need more support than they are currently given.

"You can't teach people everything they need to know. The best you can do is position them where they can find what they need to know when they need to know it." - Seymour Papert.

2.2 CSCL: Discovery Learning

Discovery Learning is an inquiry-based learning method, based on constructivist principles, where students discover new understanding based on prior knowledge and experience. A notable example is the Discovery Learning initiative at the University of Helsinki[7]. As part of their Computer Supported Collaborative Learning (CSCL) program, they aim to go beyond constructivism and have developed a Progressive Inquiry model. It loosely relies on scientific research methods as can be seen in Figure 1. Students discuss the set problem with their peers, read, brainstorm, and discuss options with teachers and experts.

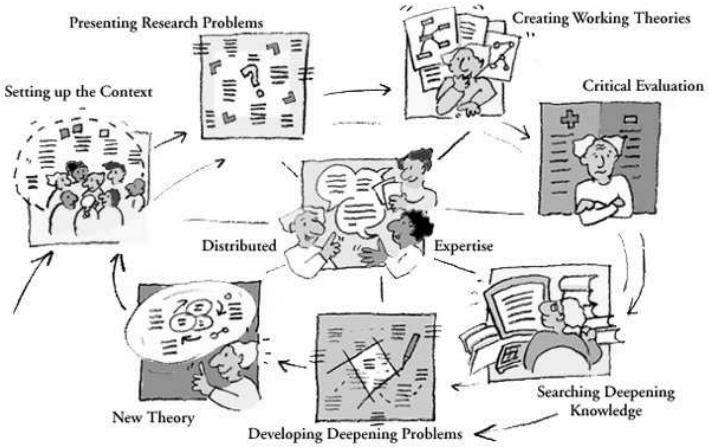

Figure 1: Progressive Inquiry Pedagogical Model
http://www.helsinki.fi/science/networkedlearning/eng/tausta.html

[6] http://www.artsined.com/teachingarts/Pedag/Constructivist.html
[7] http://www.helsinki.fi/science/networkedlearning/eng/tausta.html

As the complexity of the model in Figure 1 indicates, paradigms such as constructivism and discovery learning are impractical in many schoolrooms. This may be why most discovery learning takes place away from school. It is also difficult to apply in some subjects areas. For example, although constructive methods are used successfully in parts of Geometry it is not easy to apply them in other areas of Mathematics.

"The scale of the task is clearly daunting to many institutions… There is increasing concern in evidence about the uneven quality of learning and other materials, much of which is home-grown or sourced on the Internet and being 'dumped' on the systems with no observation of or opportunity for quality control procedures.[8]*"*

In the light of the problems discussed above there is little doubt that teachers need more support than they are currently receiving if they are to move from traditional to learner-centered paradigms.

It is not so much that we need the courseware but descriptions how to use the material in class.

3 Managed Learning Environments and New Ways to Motivate Teachers and Students

A MLE has a VLE as one component – because a VLE can refer to any environment where students learn using online resources.[9] *"As shown in the diagram, the VLE will act as a 'portal' to: online Curriculum Mapping, Assessment, and Communication, Delivery, Tutor support and Tracking facilities."* [10]

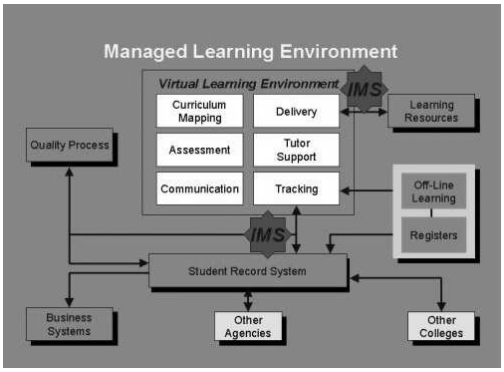

Figure 2: Managed Learning Environment
http://www.jisc.ac.uk/index.cfm?name=mle_briefings_1

[8] http://www.jisc.ac.uk/uploaded_documents/mle-study-final-report.pdf
[9] http://www.jisc.ac.uk/index.cfm?name=mle_overview
[10] http://www.jisc.ac.uk/index.cfm?name=mle_briefings_1

Both the European and UK studies show that there is a strong move towards Managed Learning Environments[11].

3.1 The Hyperwave Managed Learning Environment

The Hyperwave system[12] and its e-Learning Suite have implementations worldwide and are currently being introduced into all schools in Northern Ireland: schools are clustered into groups containing six servers, with one additional general-purpose server. In an ideal world, there should only be one or two students to each PC – and broadband connection to the Web.

Some of the advantages for schools are:

1. The system is a Knowledge Management System and hence documents can be well organised – as in any public library. It will also seamlessly support administration functionality such as displaying: the type of school, maps of the school with facilities marked on them, the lists of teachers and administrators, the curriculum, etc. It may can support feedback/chat functionality where parents can discuss issues such as proposed changes.
2. The system supports professional archive facilities with flexible authorization functionality. Appropriate access can be assigned for groups and individual teachers, children, and parents. The school administrators and teachers will decide who can have "write access" and who can have "read access". For example, groups, for each type of access, could be: the author(s), class teacher(s) other students in the author's class, parents of students in the class, other parents and grandparents. In Section 4.1 we give further examples that demonstrate the importance of a good archive system.
3. The system manages links in a sophisticated link database. This is most important in a school setting where it is essential that the data is as accurate as possible. It manages broken links by removing underlines and highlights, and then emailing authors. Since parents may also add files this implies that we may need to have their email addresses attached to their documents. The system also checks whether files have been modified. This is important in a school environment, particularly where information is changing rapidly. It is no good having a document give an outdated name for a current president or prime minister!
4. Teachers and students can annotate documents on the server (or on other servers in the cluster). In fact, since documents from any Web site are "channelled" through the server every document visible to the user can be annotated.
5. Documents are "active". This can be a very powerful timesaving feature. Students can query any part of a page. At first, human experts answer the questions but in time, the system itself can answer them: this does require that when new texts or course modules are added to the system authors or experts need to be on "stand by" for a certain time-period to answer email questions. (This will require a change of contracts between publishers and authors, a point little discussed so far!). Note that the system itself will be

[11] http://www.jisc.ac.uk/uploaded_documents/mle-study-final-report.pdf
[12] http://www.hyperwave.com

able to answer students when similar questions are repeated. This is so since all questions and answers are stored in a database and the system uses a bag of techniques to discover if a new question asked is indeed the same as a previously asked one, even if the two questions are formulated in a different manner. [Heinrich and Maurer, 2000]. Note that active documents also provide valuable feedback to authors: if many questions are asked concerning a particular part of a document it is likely that either the material is of much interest and warrants expansion or else is poorly explained and needs better explanations.

6. Frequently a document that is located on the Web has useful material embedded somewhere in the middle of it. For example, a document on the American Civil war may be dauntingly long for nine year old children. All they may need is a couple of relevant paragraphs. Omissions (or "Transclusions" to use Nelson's terminology [Nelson, 2003] allow to include just that part of the document that is of interest.
7. Books will no longer be static but rather will change due to annotations, question/answer dialogues, the transclusion mentioned and improvements due to feedback through the active document mechanism. Note also that the same library may look completely different to different people depending on their authorization class!
8. There can be discussions, collaborative efforts and competition beyond school boundaries, something that can provide much enthusiasm and motivation.

4 Motivation for Teachers

Motivation for teachers is of paramount importance since any e-Learning system will fail if we cannot win over the teachers – or at least one teacher (preferably the group leader) per Learning Center. Busy teachers have, as mentioned above, many good reasons for not wanting to fully embrace e-Learning. According to Becta[13], research shows that barriers to adoption are: lack of time, lack of confidence, lack of effective training, initiative overload, and so on[14].

Thus, on the one hand, we have agencies rapidly installing e-Learning technology and, on the other hand, many schoolteachers are reluctant to use it fully. Regardless of which particular reasons teachers may have, they all want to see clear advantages for adopting any new system. This implies, as marketing managers have discovered long ago, that the new system needs real selling points – and experience has shown us that these may be difficult to define. Often the unnoticed, emotional, things can make the difference between a successful and failure. Consider, for example, the well known fact that in buying a house people frequently seriously consider factors such how "well-designed" the kitchen is, only to make the final choice on some emotional factor such as the "feeling" of the place!

[13] http://www.becta.org.uk/research/
[14] http://www.becta.org.uk/research/research.cfm?section=4&id=2662

This analogy is equally relevant in the e-Learning arena. A number of small factors that appeal to the teachers may in the last instance decide the choice and success of a MLE. For example, offering incentives and shortcuts, such as those shown in the next sections, may help offset extra loadings.

4.1 Sharing of Material

One of the most significant advantages of having a group of schools in an MLE "cluster" is that material that has proved to be of worth to any particular age group can readily be shared amongst teachers. Thus, exercises, exam questions, problems, topics for essays, suggestions for projects, lists of terms useful for various activities (see e.g. the crossword puzzle example in Section 6.1) are available to all teachers. This provides significant help for instructors and hence is one of the easiest ways to show how such system helps teachers, already on its own a powerful motivating force.

4.2 Preloaded Materials

A well-managed system will have carefully selected and packaged material preloaded onto the school server. This will include interesting material such as multimedia encyclopaedias, atlases, and picture dictionaries – in various languages. It is interesting to note that one reason children give for using the Web is that it provides readily accessible multimedia.

As noted in the previous sections, the system should preferably be a Knowledge Management System, well organized as a library. This helps avoid the pitfalls noted in current MLEs, where Web material with little quality control is being "dumped" onto school servers.[15]

Leveraging on the MLE's in-built archive features, teachers may well be proud to be able to contribute with their knowledge to some encyclopaedia, book or course module. Such addition is shown with the name of the teacher killing two birds with one stone: it creates the sense of visible achievement for the teacher and may induce some healthy 'competition', yet at the same time it makes it clear that the material has not passed the possibly much more rigorous control of some editing board. By letting persons annotate any contributions (including those created by teachers) and others annotating annotations, etc., a veritable discussion can explode at any point about some topic. In the same way discussion corners usually need a moderator, it is wise to also provide such moderators for new contributions and annotations attached to them. This requires a set of tools often not yet available, yet easily implemented on top of sophisticated knowledge- document systems such as Hyperwave[16].

A controversial privacy issue is the question of how much access parents, students, teachers, head teachers, or other officials, should have to parts of the archive. Only an large life system will provide the answer, hence any system built must provide the possibility to change access rights for any person or any group whenever desirable.

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[15] http://www.jisc.ac.uk/uploaded_documents/mle-study-final-report.pdf
[16] http://www.hyperwave.com

4.3 Readily Controlled Levels of Access and Anonymity

As mentioned above, use of the files should be controlled by user-group access-rights. This means that, where applicable, even parents can be given the right to add documents to the system. This is another way that teachers can leverage help. Parents can assist by uploading resource material. If, for example, students are doing projects on their town or school environment, parents can help them take pictures and video and upload them.

In chat groups and forums, the system also provides levels of anonymity. This can be of considerable advantage when there are discrimination problems in the class (see Section 5). Forums can be anonymous – except for the system and, say, the teacher.

The system may also provide summaries of the chat threads, merging important points, e.g. traffic problems, and putting the summary on the seventh server. Ideally, this should be done automatically across multiple servers – say for all the servers in the country – but this is a massively difficult research project.

5 Learners as Teachers (the best of both worlds)

As all good teachers know, teaching is one of the very best ways to learn. In MLEs this fact can be leveraged to great advantage. The children get to discover knowledge, and wise teachers get, at least some, of their work done for them.

Here the teacher will usually give an introductory, motivating, talk to fire the learners' imaginations and get them started. The learners may then search the Web, read appropriate material, use email to clarify points and produce a multimedia report.

For example, as part of their Geography syllabus the children may be required to learn about New Zealand. The teacher motivates the children by describing some of the highlights (perhaps acting as if she has really enjoyed seeing them herself). The learners then produce a report entitled: "What I will see if I go by car from town A to town B". Each child, or group of children may be required to select different cities. They will describe the trip themselves using online maps that they can annotate (see Section 3.1). They search the online Encyclopaedia, books (that contain useful added information) and the WWW for information and pictures. From this, they produce an appealing multimedia presentation that is posted on their server.

The next stage is the crucial one. Each child can learn from their classmates' projects – providing they look and consider them carefully enough. To ensure this, the teacher asks each child to "grade" the others' presentations. There are several ways to help overcome discrepancies in marking. To avoid favouritism (or its reverse) the projects can be displayed anonymously. The teacher determines a number of points to be distributed by each student anonymously. In a group of 20 students 190 points might be typical. To assure that some students do not 'cheat' and assign 10 points to each contribution without reading them, various mechanisms have been tried out. The most simple one is to monitor assessment times using computer logs. Another possibility is for teachers to assign a number of points to each student project depending on its quality. The system can then check if there are dramatic discrepancies between what points students assign and the points assigned by the teacher. One of the best techniques, however, is to assure that students insert on each screen at least one question whose answer can be easily deduced from the material on

the screen. Such question can range from something like "In which country does the Amazon originate?" on a screen that mentions that the Amazon emerges through the confluence of small rives in Peru. In this case, the desired answer is of course 'Peru'. But a question could also be "What is the colour of the flower shown in the picture?" The idea is not so much that the questions strengthen the knowledge (this may be a by-product) but that (i) students have to do something tactile on each page and (ii) cannot just turn pages without ever thinking.

With modern eye-tracking (monitors equipped with four small cameras that do not require the calibration necessary with most currently available eye-tracking systems) it is possible to actually make sure that students do look at each word on the screen. This is first exploited in [García-Barrios et al. 2004].

6 Motivation for Learners

The good teacher is one who can transmit enthusiasm – be it just from the sparkle in their eyes. As the Becta report emphases, blended learning, a mixture of face-to-face and MLE, is a necessity. However, to effect the paradigm shift that we are looking for we need to consider how the learning environment can be enhanced to yield the desired for outcomes. As shown in all three surveys, students who have experienced working at their own pace at home are frustrated when they are "held back" at school.

As most experienced teachers know, there is a time and place for individual learning to take place. Note also that much has been written in the literature about the need for "personalization" [Conlan, 2002]. For this reason, it is important to let students have some time to work at their own pace. One way to do this is to make a series of graded activities available on the school server. Learners can proceed at their own pace.

It is often argued, particularly in papers about navigation in hypermedia systems that it is crucial to always 'know were one is in hyperspace', that it is essential to 'know how much work there is still to be done'. We are sure that this is sometimes true, but we are also sure that it is consistently overlooked that sometimes the opposite is more desirable. Let us take an analogy from real-life: it is often fortunate that we do not know how long an activity such as climbing a mountain (where every ridge looks like it might be the summit) or looking for a new job, or moving to a new place, will take! Hence we believe that this is sometimes also true for learning efforts! Thus, it will sometimes not be necessary, or even desirable, to split material to learn into well-defined time-defined units of well-known length.

However, particularly for young children, the system may need to provide "brownie points" to motivate the learners to keep going. In our experience, it is amazing how well this can work. When the child has achieved a preset number of points, the teacher can assign a "reward". This may be as simple as taking a break for ten minutes, or being privileged to have more responsibility in the class learning environment described in Section 5, or sending an email "Your child xyz has done very well today" to the parents.

6.1 Motivating Activities

Using the built-in archival features, material created by children (essays, multi-media presentations, projects, pictures painted or photographed, music … you name it!) can and should be kept on the server for a long time. Twenty years later children, parents, and teachers will be able to search and browse the archives and perhaps be very proud of what they or others they know achieved a long time back. Such an archive may also be valuable for studies on the development of learning and curricula, on the increasing or decreasing knowledge of students (that might be very area dependent). Issues such as who is allowed to access what does raise serious privacy issues. The settings 'who is authorized to see what' must therefore be modifiable at any point in time, and whether archived material is displayed with exact or partial or no source information will depend on the situation at hand. To be specific, maybe only authors of some body of work and all those authorized by the author should be able to access the material; in other cases, parents may want to compare their child's work with the work of other children of same age, in the same school, or across schools—but possibly both the names of the children and schools remaining unknown. It is a major challenge to foresee while implementing a large system all the authorization issues arising. It is interesting how little attention has been paid to such issues up to now! Note also that the 'stability of information' is an interesting issue with no single correct answer, hence all alternatives have to be provided. If students discover mistakes in their work, should they be allowed to change them or not? If a new edition of a book appears, should it replace the old one? In all such cases we believe that systems should preserve all versions of a document, something we can afford to do with the decreasing cost of large scale storage.

We now give a small selection of the many motivating activities that can be included in e-Learning Environments. Those activities are particularly valuable if they present a 'win-win' situation in the sense that they are both convenient for teachers, and fun to use for students.

There is no doubt that children enjoy game-like activities and jokes so we have included several ideas here, all of presented very much as concrete examples, as 'pars pro toto', as standing for innumerable similar applications.

Picture competitions: Children have competitions for the best digital pictures within a project, class, or across schools.

Treasure hunts: Children all over the world like appropriate reward systems such as treasure hunts, paper chases, or (as they are called in Austria) 'Schnitzel hunts'. On-line lessons can insert "hidden" brownie points that only appear once an activity has been successfully completed.

Crossword puzzles: A teacher who has been teaching one way or another e.g. certain parts of biology selects from a database (which teachers involved in the subject have made up over the years), say, 80 technical terms. The students have a 'cross-word puzzle tool' at hand: each student has to build a cross word puzzle using at least 20 of the 80 terms. If the student uses e.g. the term 'DNA' then clearly the student has to somehow find hints for others to solve the puzzle. So the student has to dig up the fact that 'DNA' stands for 'Desoxyribonucleicacid' or that 'DNA' is 'the abbreviation of that organic compound that bears the genetic information of all living organisms' since those would be hints allowing other students to come up with entry 'DNA' required to fill out the cross word puzzle. Note that in this fashion every

student learns a lot while creating the puzzle, but then learns also a lot more by solving the many puzzles constructed by the other kids.

This may well be more fun then just trying to re-hash material learnt before. But the amount of work for teachers is also quite reasonable. They just pick a list of words from a database, then let the students work for 2 or 3 hours, during which they will help a student here or there, certainly more fun than frontal mode lecturing or 'oral exams', where the rest is supposed to listen (but in reality does something else).

Karaoke singing: This can be a real hit. Even children who think that they cannot sing can have the attitude: "may as well join the crowd". After all "bad" people do not sing! As the German saying goes: "Wo man singt, da lass dich nieder- Böse singen keine Lieder".

Map tracing: Trace around a country map, or any other object, using the mouse, to select it for inserting into a project file. This may take longer than using a drawing package but it will significantly re-enforce learning.

Tamagotchi-like activities: The system can provide an avatar that reflects the child's progress – or lack of it.

7 Managed Discovery Learning

As we have shown, Discovery Learning that takes place in a Managed Learning Environment has considerable advantages for teachers and learners alike. It is more manageable. However, as students progress they may, as shown in the PEW studies, find the environment too restrictive. Teachers may then wish to enhance activities by giving over more control to the learners by assigning "group leaders" who can organize their own in-class VLEs – much as Internet-savvy students do with their friends at home. Students, for example, can take turns at being moderators of chat groups and forums or even facilitators.

Progressive inquiry can take place. For example, the students may be required to read articles on Iraq that appear in a newspaper on successive days. They can discuss them with peers and parents and post comparisons on the forum. The teacher (and other students) will read and comment – leading the learners to new levels of inquiry.

An important point is that, since the learners are operating in a managed environment with teacher input and pre-programmed activities, educational outcomes are still closely controlled. However, the increased levels of responsibilities will greatly increase the learners' sense of self-esteem and provide much needed motivation.

8 Censorship

According to the surveys, the problem of children accessing pornography etc is of overriding concern to parents, teachers, and administrators. To overcome the problem, various types of access restrictions are employed. One widely use technique is word filtering. This, however, is not the best solution because a word like "sex" may be inappropriate in one context but appropriate in a biology class. The word "cash" may indicate SPAM – but just as easily be a required word in a commerce lesson where the children are studying cash flow. Another attempt has been to solve this problem by "black listing" sites. However, because of the rapid proliferation of sites, this

method of control has serious pitfalls. The most reliable method is to take the opposite approach and define "white lists". Access to the media is via portals on the school server, controlled by lists of sites that schoolteachers (from a large set of schools) vet and add to. One problem is that a server on the white list may have links to servers not on the list. This can be handled by good portal servers that sort-of act like clients: they retrieve the file (without cashing or locally storing it, since this may violate coy-rights). If a link is activated it is checked by the server and not followed if it is not a server on the white list.

The white list has many other advantages: Meta-data may be added to the servers by teachers so that queries are made more efficient. Certain servers on the white list may only be accessible for some user groups or projects. Mental age, class, suitability, etc can determine these groups. Each group teacher can be in charge of his or her own list. Moreover, the lists may follow each group of children as they mature – with new sites added as appropriate. This assumes that sites are easy to add, and delete – another point for administrators to consider when choosing a system. Finally, note that plagiarism is steadily on the increase in schools: why bother to write an essay about whatever, when probably a very much better essay is available on the WWW. Restricting the universe of WWW servers allows to use similarity recognition software between documents composed by students and documents on the universe of white listed servers!

9 Conclusion

In the majority of VLEs, particularly those which are not well designed, there appears to be a tendency toward chaos. Most teachers expected at some stage that the new technology would lead to a New Paradigm shift – but it has not. An analogy that has been used in the literature is: "New wine in old bottles".

Paradigms such as "constructivism" and "discovery learning" have often proved to be too time-consuming for teachers. In this paper, we are suggesting a form of system-supported constructivism that is not too complex. We have shown how the learners themselves can take a "teacher's role" that supports both teachers and learners in a variety of ways. Interestingly, with learners taking more of a helping role, we now have a learning paradigm that also begins to resemble the Progressive Inquiry Discovery Model shown in Figure 1. It is a feasible "Managed Discovery Learning" paradigm. The two authors are involved in consulting major project developments that are planning to implement many of the mentioned ideas.

References

[Becta, 2003] http://www.becta.co.uk/page_documents/research/report01.pdf, http://www.becta.org.uk/page_documents/research/ngflseries_impact2.pdf

[Conlan, 2002] "Towards a Standards-based Approach to e-Learning Personalization using Reusable Learning Objects". World Conference on E-Learning in Corp., Govt., Health., & Higher Ed. 2002 (1), 210-217.
http://www.aace.org/dl/index.cfm/fuseaction/ViewPaper/id/9365/toc/yes

[García-Barrios et al. 2004] García-Barrios, V.M.; Gütl, Ch.; Preis, A.M.; Andrews, K.; Pivec, M.; Mödritscher, F.; Trummer, Ch.: "AdeLE: A Framework for Adaptive E-Learning through Eye Tracking." To appear in Proceedings of I-Know '04, Graz (2004), pp 609-616.

[Heinrich and Maurer, 2000] Heinrich, E., Maurer, H.: „Active Documents". J.UCS 6, 12 (2000), 1197-1202.

[Levin and Arafeh, 2002] Levin, D., & Arafeh, S. "The Digital Disconnect: The Widening Gap Between Internet-Savvy Students and their schools." www.pewinternet.org , 2002.

[Maurer, 2003] Maurer, H.: "Necessary Aspects of Quality in e-Learning Systems". In: Quality Education @ a Distance (Eds. Davies, G., Stacey, E.) Kluwer Academic Publishers (2003), 29-37.

[Nelson, 2003] Nelson, T.,
http://www.xanadu.com.au/ted/, http://www.xanadu.net

Theodor Holm Nelson, The unfinished revolution and Xanadu. ACM Computing Surveys 31(4es): 37 (1999) [DBLP:journals/csur/Nelson99a]

[PEW, 2003] PEW Internet Project: Summary of Findings
http://www.pewinternet.org/reports/reports.asp?Report=67&Section=ReportLevel1&Field=Level1ID&ID=292

[Vuorikari, 2003] EUN Consortium study: Insight Executive Summary: Virtual Learning Environments for European Schools."
http://insight.eun.org/eun.org2/eun/en/Insight_Policy/content.cfm?ov=25201&lang=en

[Wilson, 2003] Wilson, B. "Metaphors for Instruction: Why we Talk about Learning Environments." http://carbon.cudenver.edu/~bwilson/metaphore.html
Full reference: Educational Technology 35 (5), 25-30.