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INTRODUCTION TO SECTION 5

Physics Action Research Project

Aim: This project involved the development of blogs and wikis using the college's virtual learning environment, specifically:

1) To engage students with physics outside of the classroom

2) To encourage students to create their own pages, research topics of interest and share their interests with other students

Contents: Report

Reviews Director of Learning Resources (FEC)
Professional Development Leader (SLC)

Excellence Gateway Feature

Methodology: This study is based upon the work that I conducted as part of an Action Research Project with the Science Learning Centre, Durham (2009/10). After conducting the initial report into student performance in A level physics modular examinations in 2008 (Section 4 of the portfolio), I wanted to encourage students to develop their written communication skills. By using the college Virtual Learning Environment (Blackboard), I wanted to encourage students to share their interests in the subject. I set up blog and wiki pages so that students could record their own learning progress, share ideas about physics with other students and to upload interesting videos, photographs or websites.

In order to prepare for conducting an action research project, I attended three training sessions at the Science Learning Centre in Durham, where the facilitators were incredibly enthusiastic and encouraging. Participating in the project also brought a small amount of funding directly into the department, which then had a further positive impact upon our students.

Conclusions: At the end of the project, the impact was evaluated by three criteria: the pass rate of the class of AS students who participated in the project, the number of students who progressed to study physics at A2 level, and the number of students who subsequently applied to study physics or engineering courses at university. All three criteria showed a positive improvement from the previous year. Whilst these are clearly quantitative methods, there were qualitative evaluations by comparing the written communication skills of students at the start of the second year with samples that I had saved from the same students at the very start of their course. Finally, there was the generation of enthusiasm for physics which pervaded the classroom, with many of the students appreciating the fact that I was undertaking the Action Research Project with the ultimate goal of helping them achieve better grades in the examinations.

Dissemination of this study: At the end of the project, I presented my findings to a group of Teaching and Learning Coaches at the Science Learning Centre, and have included the slides from the presentation within this section. I was interviewed by a representative from the JISC Excellence Gateway who was interested in the project. Apparently my project was of particular interest as it cost nothing whatsoever to set up, merely taking advantage of the vast range of features that the VLE offered yet were largely under-used. A copy of this feature is included within this section, as well as the evaluations from the two professionals, one who is a director at the FEC and the second evaluation was from the project co-ordinator at the Science Learning Centre.

Physics Action Research Project
Marianne Hill

Introduction

In September 2009, I embarked upon an Action Research Project with the regional Science Learning Centre. I became involved with the project after contacting the Professional Development Leader, as I was interested in some of the previous research that was mentioned on the SLC website. I was informed that they were starting a new series of projects and that any physics teacher or lecturer from a maintained school or college in England could apply to participate in the project. The programme would consist of three training days spread over a two year period, with the action research being conducted within our particular institution. At the end of the period, we would have the opportunity to reflect and refine our approaches, as well as sharing our findings with colleagues from other establishments.

This project presented an ideal opportunity for applying the findings of my previous research to a very practical and constructive investigation. The research that I had conducted into examination performance in the different physics modules revealed that, in general, the students fared less well on questions that required good written communication skills than numerical questions. I was also keen to explore ways of engaging students outside of the classroom with the subject and particularly to encourage the girls who study physics. As I will outline below, my project was to develop the physics site on the VLE (Blackboard) into a more interactive process by setting up blog and wiki pages, so that students could upload their own material, share useful websites, keep online diaries of their learning, and discuss some of the wider aspects of physics.

Background

Having conducted an extended analysis of student performance in the A level physics modular examinations, by evaluating data from the FEC (2004 to 2009) inclusive, it was clear that students performed better in some modules

than others. Whilst it was immediately evident that the grades from the three AS modules were, in general, higher than the marks for the A2 modules, it was also clear that students underperformed in the Health Physics optional module.

When the average marks for each module were calculated, there was a significant drop in the marks for the Health Physics module, which was surprising as this was an optional module that had been selected by the students themselves. This module was of particular interest to girls, yet was also of interest to many of the boys who intended pursuing a career related to Health. During the course, the students enjoyed studying topics that were related to human aspect of physics, particularly those applications which could help people improve the quality of their lives. We incorporated visits to local hospitals and made the course very practical and applied it to real life situations. Unfortunately, when students prepared for the examination, it was clear that they disliked the high proportion of 'explanation' style questions.

A content analysis revealed that in the Health Physics examination papers (OCR), only about 30% of the marks were for calculations and the majority of the questions required the students to explain, describe, state, and engage in a more discursive style of response. There was a strong demand for students to memorise and recall extended factual information, which many of our students found difficult. A recall of students' papers revealed that many students had lost marks on the 'explanation' style questions. Analysis of the students' papers revealed that the following skills needed to be developed:

a) Using appropriate A level vocabulary and scientific terminology
b) Writing in coherent sentences using correct grammar
c) Writing in the depth required

An analysis of the students who performed well in physics examinations revealed that students with strong all round ability, particularly with good powers of written communication, fared better than those students who were good at science but not strong with communication skills. At college, many of the students who opt to study physics A level do not particularly enjoy extended writing, nor do they like activities which require them to express

thoughts in writing. Students inform teachers of this fact regularly in lessons or in a more structured manner through course committees. It may be surprising to note that a number of our students specifically chose to study science A levels as they had the misconception that there was very little writing in these subjects. An analysis of the GCSE science papers (2009) revealed that there were a significant number of multiple choice questions yet very little opportunity for students to express ideas in writing. Perhaps due to the assessment styles of the GCSE Science examinations, many of our new students think that phrases, rather than sentences are acceptable, expecting activities to consist of simply writing the correct word in the blank space. A survey was conducted with the students who were involved in the project (and is discussed later in this report) from which it emerged that writing was one of the least favoured classroom activities.

Whilst it is beyond the scope of this action research project, it could be argued that the ability to communicate effectively by writing ideas onto paper is perhaps not being encouraged as much, in some of our partner schools, as the thought processes that lead students to the correct answer. Many of our students come from schools where handwriting and presentation skills are a thing of the past, yet the importance of being able to convey thoughts in a legible manner are essential skills for a young adult.

A further issue is that I would like to increase the number of AS physics students who progress to the second year of their studies. Whilst many students enjoy the subject, they feel that it is difficult to achieve a high grade in physics compared to other subjects. The problem of progression is compounded by the fact that only one of the regional universities offers undergraduate degree course in physics and they have particularly high entry requirements. Very few of our students are prepared to travel in order to study for a degree course, so for the broad range of students who are unlikely to achieve three A grades, a degree in physics is out of the question. This information was found by conducting an analysis of all of the UCAS applications from the FEC (2004 to 2009), as I was conscious of the fact that students were reluctant to travel but wanted to quantify this statement with accurate factual statistics.

From the evaluation of the UCAS applications, I found that in 2009, only 88/666 (13.2%) of the UCAS applicants from the FEC moved out of the area in order to study for a degree course. Between 2004 and 2009, there have only been 7 students from the FEC who have chosen to study physics at university, which is mainly due to the fact that they are unable to study the subject locally rather than a reflection of their interest or enjoyment of the subject. These seven students who were prepared to move away from home in order to pursue a degree course in physics, all came from homes where at least one of their parents had a university degree. Of these seven students, there was only one girl who progressed to study physics at university. Therefore one of my objectives for conducting an action research project would be to try to increase the progression of students from AS to A2 study, as well as increase interest in the study of physics as an under-graduate subject.

Towards the end of the academic year 2008/09, one of my colleagues developed a ‘blog’ page for the A level mathematics students on the college VLE site. I was intrigued by the popularity of this site, particularly as it engaged students of all abilities with the subject yet it was primarily for use outside of the classroom environment. The teacher would write about the wider aspects of mathematics, ranging from a complex ‘problem of the week’ for the more able students, to discussions about where maths had been on television that week for all other students. The popularity of the site could be measured by the number of times that students had accessed the blog pages, which was over 500 times in three months by the 40 students at our Sixth Form Centre. When the examination results came out in August, our centre had the highest success rate for both AS and A2 Maths, compared to the other three sixth forms within the FEC organisation.

I believe that it was the wider engagement and involvement of the students that led to these successful results. Using the VLE initiative as an inspiration, I embarked upon an Action Research Project with the Science Learning Centre in September 2009 in order to develop the VLE (Blackboard) and explore ways to engage and interest physics students outside of the classroom, particularly girls who chose to study physics. The intention was to use the VLE as a direct means of encouraging students with the wider aspects of physics, yet in order to develop the pages, this would involve students

having to write about physics in different contexts. Whilst not stating this fact explicitly to the students, I believed that by encouraging students to write regularly, whether formally or informally, would help them to develop a greater fluidity in their writing, and the VLE was used to provide a forum where they could express ideas and concepts to their peers.

The Action Research Project

The original objectives of the Action Research project were:

a) To engage students with physics outside of the classroom

b) To encourage students to create their own pages, research topics of interest and share their interest with other students.

c) To (indirectly) develop students' written communication skills and encourage them to write frequently and openly.

d) To provide particular support and encouragement for the girls who study AS physics.

The FEC consists of four sixth form centres. Having taught A level physics at one Sixth Form (U) for three years, I found that for the forthcoming academic year (2009/10), I would also be required to teach at another Sixth Form (S). Therefore my initial reasons for wishing to engage and encourage students in the study of physics had now widened to incorporate the fact that I had a class at a site where I was only present for four hours per week. The use of the VLE presented an opportunity to maintain communications with the group as well as individuals when faced with geographical differences.

When the new intake of students enrolled, I was alarmed to find that only 4/48 students from the FEC were female. I was allocated two parallel AS physics classes – one at Sixth Form U and the other at Sixth Form S. There was also a third class at Sixth Form B, which was taught by another teacher who would not be participating in the project. It was originally intended that this third group could be a control group, but I did not want to deliberately exclude students from participating simply because of the class teacher, so all of the resources that were developed were open for all of the students in the cohort.

The success of the project will be measured against:

a) AS examination success – comparing performance with previous years
b) The number of students who progress from AS to A2
c) The number of students who show an interest in pursuing physics as an undergraduate degree subject
d) With each of the above criteria, particular attention would be paid to the girls within each category to ensure that they are well-represented.

The pass rate for AS physics at Sixth Form U (June 2009 examinations) was 82% and at Sixth Form S, the pass rate was only 54% (taught by another teacher), which was one of the reasons that I was asked to take over the class. The progression rates from AS to A2 in September 2009 were 12/17 (71%) at Sixth Form U and 9/28 (32%) at Sixth Form S. Therefore the data from 2010 can be compared to that of 2009 to determine whether the pass rates or progression rates have improved. The third aspect of whether students are interested in pursuing physics further will be determined by a questionnaire to be issued during the course of the action research project.

The First Term

The first task was to create a WIKI site where students could create their own page and write about what interests them about physics. This is the first paragraph from one particular student:

> i chose to study physics because astronomy, and learning about our universe or how atoms behave intrests me. I find stuff to do with mechanics quite interesting. i like knowing how and why thing work, I wish to do somthing interesting involving maths physics and biology. (sic)

This student had a grade A* in Physics GCSE, A in Maths GCSE and B in English Language GCSE and was representative of the many students within our AS cohort who had stronger numerical skills than literacy skills. Here is an opening sentence from another student within the class:

> ‘i like physics, because its expanding our knowledge, its learning and discovering the unknown, whats out there, what makes up everything around us, as in atoms and particles, but also the space and the universe, why we are even here,.. why do we exsist ?,.. and that i beleive is interesting  and is what i like about physics’ (sic)

This student had a grade B in Physics, B in Maths and C for English Language. Compared to other students in the classes, these entries were particularly weak and it was a struggle for these students to develop good written communication skills. Both of the students quoted above passed AS physics, but only with a grade E.

Towards the end of the first term, I gave students the opportunity to develop their own blog pages as well. Some of the students were well motivated whilst others were less keen to express their ideas in writing. It emerged that there were several students who had specifically selected to study A levels in sciences as they believed that these qualifications did not require much writing. As mentioned previously, the GCSE science courses do not ask for a significant amount of writing and students have often told teachers that the way they were taught at school involved series of short activities, rather than longer extended tasks. The only female student at Sixth Form U claimed that she chose her AS level subjects of maths, physics and physical education as she believed that these subjects would not require much writing and that whilst she did enjoy these subjects, wished to avoid writing as much as possible.

The students had been informed that the pages were to be used as part of a project, yet their levels of written communication were in many cases rather poor. Of the more articulate opening pages, one of the students had an interesting opener:

> ‘So far Physics has been going well, I find it a little bit challenging at times but still pretty fun. This is the only subject where I’ve considered the jump from GCSE to be massive, but I’ sure that will be corrected over time. I quite enjoyed starting the year with Marianne preaching the joys of particle physics, as this was a completely new topic for me. I suppose I have to credit this to Marianne, who is both "charming" and "strange" (did you see what I did there, with the quarks???)’ (sic)

The creation of the wiki in the first term (September to December 2009) was successful on some levels:

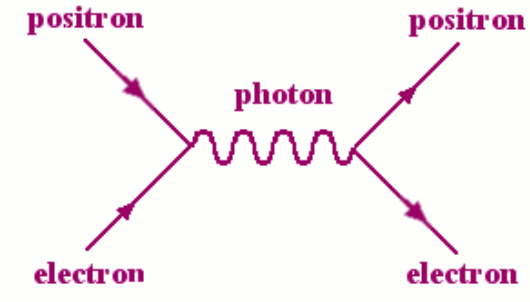
1) One of the students at Sixth Form U suffered from Asperger's Syndrome and he became the first student to set up his pages, adding to them on a regular basis. For this student, it was a means to communicate with other students when regular verbal communication within the classroom posed a particular problem.

2) It provided a means of getting to know the students very quickly, as the student's pages revealed a lot about their personality, interests and engagement with the subject.

3) It proved to be an alternative method of communicating with each other, particularly when teachers have to work at different centres. It provided a forum for exchanging ideas and keeping in touch electronically.

4) It encouraged students to look at the wider aspects of physics outside of the classroom and research topics on the internet. Students came up with some extremely imaginative sources, ideas, interactive applets and one student photographed cracks in pavements that reminded him of Feynman Diagrams!

> 'I was walking down the street the other day when I carelessly tripped over a piece of physics (a crack in the road). I was preparing to sue the council until I noticed something very odd about the crack. It reminded me of Richard Feynman's diagrams. I was unsure whether or not to take a picture of the crack, but after a little contemplation, and a near road accident, I took the picture and legged it. Here is a picture of an actual Feynman Diagram:



Here is the picture of the crack in the road

The resemblance is uncanny. I had the urge to find a chisel and add in the names of the particles and the arrows, but then I'm pretty sure it would be the council suing me. I hope that I now find many more examples of physics around town!'

One of the girls produced a book review of *Angels and Demons* (Dan Brown) as she wanted to share with the class how physics was incorporated into a popular novel, and how the novel had encouraged her to consider the study of physics at college. The second girl wrote about physics in sport, as she was particularly interested in gymnastics and explained how balance, centre of mass and angular momentum are important features of performance. The third girl was rather reticent about the project, and did not engage at all.

The Second Term

In the second term, I conducted a survey with the group at Sixth Form S (18 students, of which 2 were girls) to determine their interests in physics. The survey was divided into several sections. The first part was to assess the reasons why the students had chosen to study physics at AS level. Students were asked to tick all of the factors that applied (see Table 1 below).

TABLE 1: Reasons for choosing to study AS Physics (all 18 students)

Reasons	Total number of responses (from 18 students)
a) Enjoyed it at school	8
b) Feel that you are good at it	10
c) Useful for future career	9
d) Leads to a wider choice of careers	7
e) Parents suggested it	3
f) Careers Advisers suggested it	5
g) Teacher from school suggested it	0

TABLE 2: Reasons for the 2 girls choosing to study AS Physics

Reasons	Total number of responses (from 2 students)
a) Enjoyed it at school	2
b) Feel that you are good at it	1
c) Useful for future career	1

The survey was administered to all students, whilst particular interest was with the responses given by the girls. The responses by the two girls are given in the second table, with one girl ticking box a and b, and the other girl ticking boxes a and c. The responses of enjoyment of the subject, perceptions of ability (feel you are good at it) and relevance to future career were the most important factors for our students and verify the research contained in Murphy and Whitelegg's IOP report. (Murphy and Whitelegg, 2006, p.i)

The second section asked students which activities they preferred within physics lessons. Students could answer on a five point scale, from Dislike (1) to really like (5). The responses were assigned a mark from 1 to 5 then added to obtain a total score for each activity. As there were 18 students who participated in the survey, the maximum mark for the total score was 18 x 5 = 90 marks, if all students had greeted each activity with 'really liked'. If all 18 students really disliked the activity, then the minimum mark would potentially be 18 x 1 = 18. Therefore the range of marks for the point score is from 18 to 90. The results are shown in Table 3 below.

TABLE 3: Student preferences for classroom learning activities

Activity	Point score (From a maximum of 90 points)
Practical work	66
Calculations	62
Using ICT	60
Researching topics	59
Graph work	57
Writing lab reports	45
Extended writing	45

It is worth noting that none of the students 'really liked' the use of ICT in lessons, writing reports or extended writing. On further questioning the students in small groups, it emerged that teachers in our partner schools no longer ask students to write up practical work in the form of a report. The Investigative Skills Assessments (ISAs) do not require formal laboratory reports, so it appears that schools are preparing pupils for the ISAs but not the traditional style of writing up practical reports.

Of the two girls in the class, one really liked practical work and researching topics of interest, with the remainder of the activities being 'ok' (point score 3, the median). The other girl thought that calculations, graph work and using ICT were 'ok' and disliked the remaining activities.

The third part of the survey asked students which topics they enjoyed (or would enjoy) from the A level course. The students were given a choice of marks from 1 to 5, with 1 being 'not very interested' to 5 being 'very interested. Therefore the maximum number of marks would be 18 x 5 = 90, if all students were very interested in a particular topic. The minimum score for each subject would be 18 x1 = 18, if it emerged that none of the students in the class were not very interested in a particular topic. The most popular topic by far was 'space' which is part of the AQA Unit 5 module.

TABLE 4: Students interest in topics from the A level course

Topic	Point Score (From a maximum of 90 points)
Space /astronomy	79
Waves	68
Materials and their uses	66
Radioactivity	65
Light	64
Atomic	63
Motion	63
Heat	57
Sound	55
Electricity	45

It was difficult to compare the responses from the girls, as by the end of the term, it was clear that the paths of the girls were diverging. The sole girl at Sixth Form U was working very hard, but of the two girls at Sixth Form S, one became pregnant and the other student decided that her future was in performing arts. These latter two outcomes were certainly not expected at the start of the project, and had not been related to physics, my teaching or the action research project in any way. These unexpected outcomes indicate some of the problems associated with educational research, where external variables that can have an adverse effect upon the action research project.

Part 4 of the survey asked about wider physics topics and what students would like to learn about, if the specification allowed. The list below (Table 5) ranks the number of students who would be interested from the 18 respondents in the survey. The two girls in the group responded positively to astrophysics, medical physics and biophysics. Whilst ordinary classroom teachers may not be able to influence the specification of the examination boards, it is important that teachers have a sound awareness of the aspects of physics that appeal to young people and then shape lessons around students' interests.

TABLE 5: Students interest in the wider aspects of physics

Topic	Number of students who would like to study this topic
Astrophysics	15
Rockets and spaceflight	15
Physics of flight	12
Inventions	12
Physics of cars	11
Alternative energy studies	10
Medical physics	10
Earth Physics	10
Physics of music	8
History of physics	7
Biophysics	5
Other forms of transport	5
Electronics	5
People in physics	5
Buildings/structures	3
Materials	2

The blog and wiki project continued throughout the term, however many of the students used the pages for writing revision notes and important facts for the examinations. The writing became less creative or imaginative and more linked with the topics studied in class.

Evaluation of the outcomes of the project

The blog and wiki pages continued throughout the academic year and the students sat their AS examinations in the summer of 2010. The examination results for the Sixth Form S group, which was the group that used the VLE for communication as well as uploading their pages, were far better than the previous year. Within post-compulsory education, we measure our success with three main quantities:

1) Retention – the percentage of students who take the examination compared with the number of students who start the course.

2) Achievement – the pass rate, i.e. the percentage of students who achieve grade E or above from the total number of students who take the examination.

3) Success rates – for this, you have to multiply the retention and achievement rates and express as a percentage. For example, if you have a retention rate of 80% and an achievement rate of 80%, your success rate will be 8 x 8 = 64%

TABLE 6: Evaluation of the examination results for the Sixth Form S group

Year	Retention	Achievement	Success
2008	91	41	38
2009	97	57	54
2010	90	83	75

The classes for 2008 and 2009 were both taught by male teachers, the first was very experienced and the second was a fairly young, enthusiastic teacher at an early stage of his career. Despite the fact that I was not based at Sixth Form S, I significantly improved the achievement and success rate. The retention, as mentioned above, was due to other factors outside of my control. The pass rate for Sixth Form U remained at a consistent level to previous years, the only difference being that there were more students interested in pursuing physics at university.

Another measure of success was the progression from AS to A2 physics. In 2009, the progression at Sixth Form S was 8/28 = 28.6%. In 2010, the progression rate had risen to 38.9%, which is still not good, but shows an improvement of 10%. Unfortunately, in 2010, there was a particular problem with the results of AS Mathematics and if students did not have the entry requirements to the second year of study (3 grade D at AS) then they had to choose another course of study. There were five of the 18 students who would have liked to progress to A2 physics but were not allowed due to not achieving a grade D in AS mathematics.

The student who suffered from a form of autism achieved a grade B in the summer examinations, which was a tremendous result considering that he had only achieved grades CC in science and additional science at GCSE. By the end of the summer term, he had invested a considerable effort into the blog and wiki sites and he used the sites for revision notes that were used by other students. His social and personal skills had improved extensively, as well as his confidence with other students. The one remaining girl from the original three girls achieved a grade B in her AS physics examination and is now studying A2 physics.

The final means of evaluating the project is to consider the number of students who are considering the study of physics at university. There are now approximately six students (from a group of fourteen A2 students) who have applied to UCAS for degrees involving physics or engineering. Whilst this does not sound very high, it is an improvement upon previous years. As the evaluation into UCAS applications showed, between 2004 and 2009, there were only 7 applications to study physics, so having six students interested in the study of physics at university is a very promising improvement.

Apart from quantitative methods of evaluating the outcomes, I also used two other methods for evaluating the success of the project. The first was to conduct a survey with the students to assess how they found the project. The students who participated in the project were very positive. Some of the comments were:

> ‘I found it quite enjoyable to find other resources to share with my peers in an accessible form’.

> ‘By doing this, it helped consolidate the work I had done in class, making me feel more confident in answering questions.’

The second of these qualitative evaluations was based upon a comparison of work that students had completed at the start of the first year with a similar written task at the start of the second year. I had retained samples of the students work in my file, so this was a very straightforward task. The students

who participated in the project had shown a definite improvement in the presentation and clarity of their work, as well as improvements in grammar and the use of scientific terminology.

To conclude, I believe that the Action Research project was successful, for the wider engagement of students and in sharing enjoyment of the subject. The problem in evaluating educational research, however, is that unlike scientific research, there are often other factors that can not be eliminated from the study. The fact that the students knew of my research raised their interest, as they felt that they were special. The students liked the fact that I was striving to be a better teacher and that I was participating in the project in an effort to raise their examination results. The students liked the fact that members of the both groups, as well as the teacher, were electronically accessible at all times. The VLE provided a very efficient way of keeping in contact with the group as well as individuals.

I had fully intended to keep up the project for the forthcoming year, however the college has now changed the VLE from Blackboard to Moodle, which is still in the early process of development. I am now interested in exploring wider means of engaging students through technology, such as using iphones and apps for physics, as well as developing podcasts and other ways of reaching out to students outside of a traditional classroom environment.

References

Murphy, P and Whitelegg, E. (2006) *Girls in the Physics Classroom: A Review of the Research on the Participation of Girls in Physics,* London: Institute of Physics.

Marianne Hill

November 2010

Report Evaluation Form

REPORT:
Physics Action Research Project

REVIEWER:

Director of Learning Resources

Organisation: FEC

Comments on the report:

I found the research reported on to be very interesting and it highlights very well the potential benefits of using technology to engage students and, thereby, positively impact on their success. Whilst it is hard to argue that the use of the wiki and the blogs had a direct causal relationship to the improved success rate of the students concerned, the strength of the relationship should not be under-estimated.

Are there things that could be added or removed to improve it?

As one of the aims was to improve the students written communication, it would have been useful to have had two additional measures:

- What were the students' perceptions about writing extended passages at the end of the project compared to what they were at the start;
- Some formal analysis of their writing skill at the start and finish of the project would have been useful in order to see whether or not this aim had been met.

In what way could the contents of this report influence the wider profession?

This could be written up as a case study by the JISC Regional Support Centre (Northern) and submitted to the Excellence Gateway.
It could be used as a starting point for using technology to engage students in other curriculum areas in addition to physics.

Signature:

Supplied

Action Research Evaluation Form
Marianne Hill

Physics Action Research Project

Training Days: November 5th 2009
March 29th 2010
December 8th 2010

Presentation for Teaching and Learning Coaches: June 17th 2010

Final Report: December 8th 2010

REVIEWER:

Professional Development Leader

Organisation: Science Learning Centre North East

Comments on the research project:

Marianne has successfully completed a 12 month action research project, which has involved planning an intervention (in this case impact of using a VLE) with the aim of increasing student participation in Physics. Marianne has collected a range of data and reported on findings – both in a written report, and also presented her findings at Science Learning Centre North East.

Are there any suggestions for improvements?

No suggestions for improvement.
Although any continuation of the project would no doubt provide further findings of interest to the teaching profession.

Could this research have wider influence for the profession?

Marianne's report has been written as a Case Study, and this will be collated and circulated within the national network of Science Learning Centres.

Signature

Supplied

Engaging AS Physics students with blogs and wikis

http://www.excellencegateway.org.uk/page.aspx?o=314664

An Excellence Gateway case study

Published: 17 March 2011

This case study was produced by JISC Regional Support Centre Northern on behalf of the Excellence Gateway.

Sector relevance: Further education and Sixth Form colleges

Keywords: Improving teaching and learning, improving responsiveness to learners; e-learning materials: creating and adapting; e-learning materials: using; personalisation of learning; coaching learners; motivating learners; support for learners with learning difficulties and/or disabilities; 14-19; learners' feedback; science;

Summary

Marianne Hill, Curriculum Leader for Science and Mathematics (FEC) introduced a blog and wiki pages to her AS Physics students to engage them in the wider subject of physics and develop their written skills. The project has successfully encouraged students to communicate with each other and research and share their interests. This has had a positive effect on both pass and progression rates, and led to an increase in the number of students interested in pursuing physics at university.

The challenge

Many AS-level Physics students show stronger numerical skills than literacy skills, some even specifically selected to study science A-levels in the belief that these qualifications do not require much writing! Another issue is the underrepresentation of girls in physics and girls choosing not

to continue with their study of physics.

Marianne wanted to find a way to:

- develop learners' written communication skills and encourage them to write frequently and openly;
- engage learners with learning outside the classroom;
- encourage students to create their own pages, research topics of interest and share their interest with other students; and
- provide particular support and encouragement for the girls who study AS-level Physics.

The activity

'A lot of the educational research suggests that girls like the more social aspects of learning. It is something that I have known as a teacher but has been crystallised in a report on girls and physics. So whilst I can't change the specification of an examination based subject, I thought that I could try different approaches to make the learning outside of the lesson more social'

Marianne Hill, Curriculum Leader for Science and Mathematics

Marianne **set up wiki pages and a blog** for her students in Blackboard - the College's VLE (virtual learning environment). The blog and wiki features were already part of the Blackboard system, but Marianne didn't know any lecturers who were using it. She got some help from the Learning Resources Manager on how to set up the blog and wikis and it was easy after that.

'The blog/wiki idea was to dip into the students interests in social networking, encouraging them to write for each other and read each other's work'

Marianne Hill, Curriculum Leader for Science and Mathematics

Towards the end of the first term students were given the opportunity to **produce their own blog**, which allowed more scope for individual development than the wiki did. The blog and wiki pages continued throughout the academic year.

The outcomes

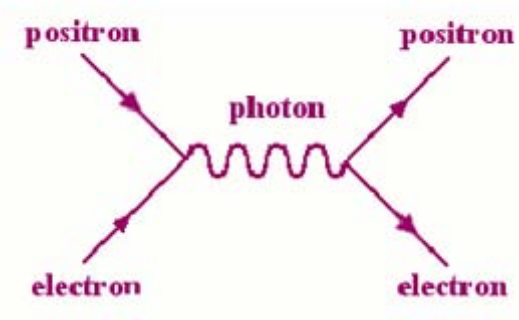
The wiki and blog were very popular with the students; they uploaded their own material, shared links to useful websites and YouTube clips, kept online diaries of their learning, and discussed some of the wider

aspects of physics.

The project had some **additional outcomes** besides engaging the learners with physics and developing their writing skills:

- Marianne **got to know the students very quickly** as the wiki pages revealed a lot about their personalities, interests and engagement with the subject.
- It proved to be an **alternative method of communicating** with each other, particularly when lecturers have to work at different centres. It provided a forum for exchanging ideas and keeping in touch electronically.
- One of the students suffers from **Asperger's syndrome** and he became the first student to set up the pages, adding to them on a regular basis. For this student, it was a means to communicate with other students when regular verbal communication within the classroom posed a particular problem.
- It encouraged students to look at the wider aspects of physics outside of the classroom and research topics on the internet. Students came up with some extremely imaginative sources, ideas and interactive applets. One student, for example, photographed cracks in the pavement that reminded him of Feynman Diagrams:

'I was walking down the street the other day when I carelessly tripped over a piece of physics (a crack in the pavement). I was preparing to sue the council until I noticed something very odd about the crack. It reminded me of Richard Feynman's diagrams. I was unsure whether or not to take a picture of the crack, but after a little contemplation, a near road accident, I took the picture and legged it. Here is a picture of an actual Feynman Diagram:'



There were only three girls in Marianne's classes. One of the girls wrote a book review of ‘Angels and Demons' as she wanted to share with the class how physics was incorporated in this popular novel , and how the novel

had encouraged her to consider studying physics in College. Another girl wrote about physics in sport, as she was particularly interested in gymnastics and explained how balance, centre of mass and angular momentum are important features of performance.

The impact

Marianne believes that the blog and wiki features on the VLE were successful for the wider engagement of students with the subject.

- The learners' **pass rates improved significantly** in 2010. Marianne firmly believes this is due to using the VLE that enabled the students to engage with the subject.
- **More students are interested** in pursuing Physics at university.
- The **progression rate** from AS-level to A2-level Physics has also significantly increased.

Marianne is now interested in exploring wider means of engaging students through technology, such as using i-phones and apps for physics, as well as developing podcasts. Her aim is to find other ways of reaching out to the students outside of the traditional classroom environment.