‘Credit where credit’s due’: encouraging and rewarding self directed learning through technology homework

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‘Credit where credit’s due’: encouraging and rewarding self directed learning through technology homework

Andrew Hine and Jonathan Pine
City of Norwich School

Abstract
This paper discusses a school-based project exploring the use of a credit-based rewards system and differentiated homework activity to encourage students to become ‘self-directed’ learners in Technology work. The paper outlines a curriculum development in which students were rewarded with a credit each time they ‘self-directed’ to complete a homework task that was beyond their minimum expected performance. A snapshot review of the students’ activities is reported with students’ comments from interviews and examples of the methods of differentiation that were employed.

Keywords: differentiation, disaffection, homework, learning, rewarding, self-directed

Context of study

City of Norwich School (CNS) is a member of the Norwich Area Schools Consortium with the University of East Anglia. The Teacher Training Agency supports the consortium with funding to develop teachers’ engagement in and with research. This paper reports the development of one of the school-based projects undertaken by the Technology teaching team at CNS. This project was based on the premise that the greater the extent to which students can be given control (and responsibility) for their own learning the more likely they are to make progress compared with their previous attainment.

Previous authors have identified the underlying philosophical basis of self-directed learning (Silverman, 1996) and the need for clear frameworks of implementation (Altrichter, 1986).

Methodology

‘Extension work’ (home work) was identified as a learning activity in which students could be responsible for directing their own learning. Four types of possible extension activity were identified. Students could:

- practise the application of principles in new situations;
- undertake research or preparation activities for future lessons;
- complete exercises to test their understanding of work undertaken in class;
- use extension work for the ‘distance learning’ of new concepts.

Within the terms of this project only the first two types of activity provided the opportunity for ‘extension work’ to be constructed in such a way that students could be responsible for directing their own learning.

The teaching schemes for Key Stage 3 Technology were constructed such that each week’s ‘extension work’ was differentiated into three or four bands of activity. Two approaches to differentiation were considered, ‘differentiation by distance’ and ‘differentiation by complexity’. A useful analogy to explore these two approaches is to consider the progress that a student makes through his/her learning as a railway journey. The intention of this project was to engage and encourage all students to progress to the end of that journey. Not all students start the journey at the same place; some students have a level of previous attainment that enables them to start from ‘stations’ that are further along the line. For any given extension work students whose previous attainment is low will have a longer journey to make to reach the ideal finishing point than will students whose previous attainment is high. Where an extension task is differentiated by distance the

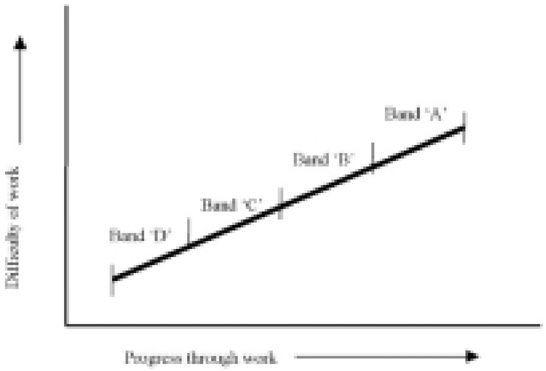

Figure 1 Differentiation by distance

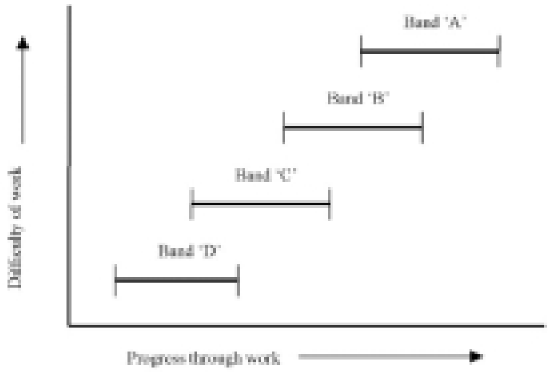

Figure 2 Differentiation by complexity

completion of one band provides the starting point for the next band; in Figure 1 this journey is represented by an unbroken line that passes through a number of bands. In terms of the rail journey analogy students can pass through the stations (the completion of one band and the start of the next) without having to change tracks. Where extension work is constructed in bands that are differentiated by complexity (Figure 2) the learning journey is broken, and students have to change to another track at each station - the completion of one band and the start of another. Students are less likely to attempt a long journey, through a number of bands, if the progression from one band to the next involves restarting from another station. Wherever possible 'extension work' was differentiated by distance (Figure 3) rather than complexity (Figure 4).

Each student was set a minimum performance level, the number of bands that student was expected to complete for extension work each week. More able students were expected to complete more bands during the agreed homework time than less able students. Minimum performance levels were based on a teacher assessment of students' attainment in class during the first few weeks of the academic year combined with a professional judgement of the effort they were making. The intention had been to use data derived from the MidYis predictive package but this was not available at the start of the academic year. Extension work was differentiated into four bands – A, B, C and D; students were placed in three minimum performance bands – B, C and D. No student was placed in the A band (highest performance level); this provided an opportunity for all students to work at least

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YEAR 9 EXTENSION WORK — GRAPHICS WEEK 5

For this extension work you will need to find a cardboard container or package. Carefully undo the package — take care to undo it in the same places where it has been glued togetherThen:

D Draw the development of the package. Use dotted lines to show the fold lines and solid lines to show the cut lines. Include labels to show which edges of the development fit together — for example A to A.

B/C Using 3D sketches show how the packet opens and closes suggest why the pack has been designed to open the way it does.

A Study the shape of the card development. Use notes and sketches to suggest some reasons why that shape of development has been used. Sketch another arrangement of parts to produce the same shape package.

Figure 3 Extension task – differentiation by distance

CNS TECHNOLOGY

EXTENSION WORK — EXAMPLE

Read the information sheet about fixings then:

D Sketch and name six different types of nails.

B/C Sketch and name six different types of screws, on one drawing name the different parts of the screw. What features other than heads can be used to define screw types.

A Draw an instruction sheet to show the stages in fixing two pieces of wood together using a screw.

Figure 4 Extension task – differentiation by complexity

one band above their minimum performance level. Students were encouraged to spend additional time completing work beyond their own minimum performance band.

The school operates a credit-based reward system. A credit was given every time that a student completed work which was beyond their own minimum performance band. The number of credits a student could be awarded was unlimited. A credit was given for correct 'good' work at each band. Thus a student who had a performance target set at the lowest band could, by correctly completing that task and those of the next three activity bands, gain seven credits, one for each completed band and one for each band above minimum. It was hoped that this would be a strong motivational force even considering the extra time that would be needed to undertake additional work.

The development of this project addressed two major concerns which were held by the department teaching team about their Key Stage 3 scheme of work. The first concern was that use of data about a student's prior attainment was problematic; the rotation of groups through five focused areas, each taught by a different member of staff, made the transfer of assessment data a complex procedure. The second concern was the value of the homework activities at that time. The department has 10% curriculum time for Design and Technology. If homework activity is thought of as 'curriculum time but without a teacher' the department could be thought to have an extra 2.5% of teaching time. Some classroom activities were identified that could usefully be undertaken out of school without direct teacher support. This would, in turn, make time available for teachers to support other learning in class. The title 'extension work' was adopted to reflect the notion of work which extended classroom activity and that might be undertaken in study centre at school or at home. At the time this project was discussed three further factors made its development possible. Most importantly the Key Stage 3 schemes of work had to be revised in any event to take account of the introduction of a new focused area into the rotation, and a revision of content following changes at Key Stage 4. The two remaining factors were that the school had subscribed to the MidYis predictive package; and that the department team had a good track record of encouraging students to be 'self evaluative', setting their own learning targets.

Extension work that students had completed was marked on a scale of 0 to 10. Where an extension task was differentiated it was not possible for a student to obtain full marks unless the A performance band had been attempted and completed correctly. Other lower performance bands would have a marking limit and in order to obtain a higher mark students would have to attempt the higher performance band; for example, a correct C performance band task would be limited to 6 out of 10. This method of marking (and thus recording attainment) was felt to be the only viable approach which would enable a comparison of student attainment to be undertaken. Where extension work was differentiated the teaching team hoped the gaining of credits would become a more pertinent incentive for students to attempt a higher performance band than the opportunity to obtain higher marks.

The Year 8 teaching scheme is a rotation or 'circus' of six focused technology areas. In April 1999, following the mid-year rotation, data were gathered during the six week teaching block. The number of occasions on which each student attempted extension work beyond their minimum performance level and the bands that they had completed was recorded. This data provided an opportunity sample in so much as some students may have attempted a greater or lesser number of bands in another technology area had the 'snapshot' been taken at a different stage during the academic year. The sample of 210 students contained a gender imbalance with more boys than girls (122 boys and 88 girls).

When the extension activities were constructed the intention was to construct four levels of differentiation. In some instances the construction of four tasks was problematic and where three tasks were constructed they were labeled D, B/C and A. When the analysis of data was undertaken the existence of the joint B/C category complicated the process. In the final analysis students were considered to be in one of two performance populations D and B/C minimum performance band, no student having been placed in the A performance band. The combining of the B and C bands also created an imbalance of population with more B/C students than D students (183 B/C, 27 D). As a result of the imbalances above, the findings reported here are presented as a percentage of students in each population rather than the number of students concerned.

Major findings

Approximately half of the students in the study worked beyond their minimum performance bands. Students reported that they enjoyed having greater control over their learning. The majority of students interviewed considered the awarding of 'credits' to students who attempted to reach beyond their minimum performance band a worthwhile incentive. The method of differentiation (of extension activities) had an impact on its accessibility for students wishing to transfer between performance bands.

Girls were more likely to attempt work that was beyond their minimum target band, 60% of all girls (53 of 88) compared with 40% of all boys (49 of 122). Considering students who worked beyond their minimum performance band, students in the D performance band were as likely to work beyond their minimum performance band as students in the combined B/C band (48% D, 49% B/C). These two populations were also considered in terms of gender. The proportion of boys and girls in each population who attempted to work beyond their minimum performance band reflected the global findings. Students who worked beyond a D minimum performance band were more likely to be girls than boys (71% of girls compared with 40% of boys). Students who worked beyond B/C minimum target level were also more likely to be girls than boys (60% girls compared with 40% of boys).

Interviews were held to explore students' understanding of the structure of the extension tasks; their views about being given greater control for their learning; their rationale for working beyond the minimum performance level or not; and their views about the use of credits to encourage further participation in extension activity. The students selected for interview were identified from three performance populations: those who had not attempted work above their minimum level, D level students who worked above their performance level, and B/C level students who had worked beyond their performance level. A gender balance was maintained within each interview population. Individual students were selected (and interviewed) from lists of names by a researcher from the University of East Anglia who had no prior knowledge of the students.

There was a general consensus amongst these students that they should be given greater control and responsibility for their learning. This was a view held by a large majority of students, whether or not they had attempted to work beyond their minimum performance band. Students' views about the setting of minimum performance bands were also sought. Opinions differed on this matter. Significantly, those students who had attempted to reach beyond their minimum band thought they were a good idea. When asked to express an opinion about teachers using credits to reward students who worked beyond their minimum performance band, those who had done so saw this as an incentive:

> Yeah that' s a really good kind of incentive sort of thing.
> (male student, attempted B/C)

> Yeah because they've obviously worked harder at the subject and sometimes they even give them to people who haven't got the task book. So if the teachers think you've worked hard ...
> (female student, attempted D)

> Probably, yeah. Because that would be more achievable and good to tell my Dad about.
> (male student, attempted D)

> Yeah that's a good idea because then you've got something work towards so you work harder. And um try more of the work scheme. You do more and you learn more as well.
> (male student, attempted B/C)

> I think that is good because if you say to someone, do this and we'll give you a credit they'll try much harder.
> (female student, attempted B/C)

One student who had reservations about minimum performance bands did approve of the use of credits to reward those who worked beyond their levels:

> What do you think about the idea of credits being used to reward this?
> Student: It's a good idea.
> Why do you think that?
> Student: Because if like there's credits then it'll make people work harder to get them.
> So it gives you an incentive to work?
> Student: Yeah.
> But you don't think the minimum performance targets do?
> Student: No.
> (male student, not attempted)

Most of these students preferred to work in a situation where tasks were directed by the teacher but controlled by the students

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YEAR 8 EXTENSION WORK — ELECTRONICS WEEK 2

D Draw a table as shown below to record the way in which fifteen household objects tell you when they have finished an activity. The first entry for Mr. Hine s microwave has been included for you.

B/C List the items that you have identified into groups according to how they tell you they have finished.

A For each group provide an advantage and disadvantage of this method. You should give a reasoned explanation for your answer in the form of a short statement.

Item	How it tells you
1. Microwave	Beeps
2.	
3.	
4.	

Figure 5 Extension task – differentiation by distance

CNS TECHNOLOGY

YEAR 8 EXTENSION WORK — ELECTRONICS WEEK 4

Read the information sheet about plastics then:

D Name a plastic which could be used for each of the situations — you should include a reason why this is the best choice.

B/C Name a plastic which could be used for each of the situations — you should include a reason why this is the best choice. What other material (not a plastic) could be used.

A Name a plastic which could be used for each of the situations — you should include a reason why this is the best choice. Identify five situations around your house where plastics are used, try to name the plastic and explain why that particular type was chosen.

Situation 1

Plastic to make a hospital tray that has to be washed at a very high temperature.

Situation 2

Plastic to make the throw away plastic tray which is used to serve in-flight meals on a aircraft.

Situation 3

The plastic for a see through lid for a box made by a Year 11 student in the workshops.

Situation 4

Plastic which could be included inside a cool box to keep Mr. Hine s beer bottles upright.

Figure 6 Extension task – differentiation by complexity

themselves. Many students viewed self-directed learning as beneficial in that it enabled them to work at their own pace and (in a classroom situation) to have increased access to teacher time and individual attention.

During the review of the quantitative data it became apparent that one form of differentiation (of extension tasks) was more likely to encourage students to work beyond their minimum targets than others. One approach to extension work proved more successful than others in encouraging students to tackle bands above their personal minimum. This was extension work which was constructed so that the completion of one level formed the starting point of the next; such that a B level student had to work through levels D and C. For example, the extension work in Figure 5, differentiated by distance, was more successful than work which was constructed by distinct levels of complexity, differentiating a common concept (Figure 6). Differentiation by distance combined with the opportunity to gain credits proved to be a tempting combination for students. For students in one particular technology area, when the ‘snapshot’ was recorded, four times as many students attempted the next level by distance than by discrete task.

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