Subject leadership and design and technology

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Abstract

The Centre for Design and Technology Education at Sheffield Hallam University (SHU) supported by The Design and Technology Association (DATA) has developed a Postgraduate Certificate in Managing School Design and Technology as part of a three-year part-time MA in Design and Technology Education. This has been run successfully for three years in five locations in England.

This paper seeks to explore the development of specific leadership skills required by secondary school subject leaders of design and technology as defined by DATA's Exemplification of National Standards for Subject Leaders. It describes a specific research project designed to investigate teaching and learning methodology. A virtual learning environment (VLE) was made available to teachers through Sheffield Hallam University's Intranet site. The project compared the teaching and learning issues arising from teachers completing a core activity as part of the Managing School Design and Technology course. The work of two groups of teachers was observed, one being taught using traditional 'face-to-face' teaching methods and the other working remotely in a VLE.

The research findings are discussed with a view to informing development of continuing professional development (CPD).

Keywords

design and technology, leadership, management, teaching/learning, secondary education, virtual learning environment, continuing professional development

Background

It has been suggested that there is a relationship between subject leadership and standards of teaching and learning in schools. Consequently, continuing professional development (CPD) programmes have been provided by local education authorities, higher education institutions and professional associations. For many years these have contributed to the development of leadership and management skills for both existing and aspiring middle managers and subject leaders.

The National Standards for Subject Leadership were published by the Teacher Training Agency (TTA) in 1988. They set out the:

'knowledge, understanding, skills and attributes, which relate to the key areas of subject leadership. The standards define expertise in subject leadership and are designed to guide the professional development of teachers aiming to increase their effectiveness as subject leaders or of those aspiring to take responsibility for leading a subject.' (TTA, 1998)

In 1999, the TTA commissioned the development of subject leader qualifications in three curriculum areas including Design and Technology. The Centre for Design and Technology at SHU with DATA, developed a Postgraduate Certificate (PGC) in Managing School Design and Technology as part of a three-year part-time MA in Design and Technology Education. Over three years, 113 design and technology teachers have been taught in five UK regional centres.

DATA recognises that design and technology subject leaders have specific needs: the subject being one of the most complex and expensive areas of the curriculum. It argues that:

'Heads of department in design and technology and prospective heads of department, […] have a wide range of management issues to tackle (including personnel, funding, buildings, equipment and health and safety, as well as a complex curriculum.)' (DATA, 2001)

DATA published its *Exemplification of National Standards for Subject Leaders* (1999) which provides design and technology subject specific definition and exemplar illustration.

The course design has been informed by both documents but also meets the TTA requirement to

develop design and technology subject knowledge. Design and technology has been subjected to constant change and development, perhaps more so than any other curriculum area. 'Modernisation' of the curriculum, accommodating: developments in design methodology; the use of ICT; materials technology and manufacturing processes are of paramount importance. There is a need, therefore, for teachers with up to date experience and leadership skills. As part of its annual *Survey of Provision for Design and Technology in Schools* (DATA, 2001), DATA surveys the perceptions of teachers' needs for professional development. Out of the 19 categories identified, as a percentage of the total response, 45% were concerned with CAD/CAM, systems and control and use of ICT in design and technology. Only 3% of the responses referred to Management and Organisation. (2001 figures) The survey also identified that:

> '37% of heads of department reported they had no specific training for their role […] Several commented that there was no training in preparation for the post of head of department.' (DATA, 2001)

Aims of the research
The research referred to in this paper aims to investigate the perceptions of teachers studying on the PGC course. This is explored through investigating the effectiveness of teaching and learning methods associated with Virtual Learning Environments (VLE) in the context of management and leadership training for design and technology teachers.

The current course outline
The course consists of three modules:

Managing the design and technology curriculum concentrates on issues relating to: curriculum content; delivery models; assessment; accessing new technologies and approaches to teaching and learning; health and safety and the use of comparative data.

Management issues for the head of department deals with the generic management and leadership issues but concentrates on developing these skills in the design and technology context. Content includes the management of: finances; resources; people; meetings; delegation; time; change; OFSTED inspections and recruitment and selection procedures.

Design for manufacture is concerned with the development of skills relating to methods of design and manufacture, making use of industrial links and how through positive intervention and leadership, the modernisation of the design and technology curriculum can be achieved.

Each of the modules is referenced to the individual competences or 'National Standards' but also covers additional areas regarded as important by the course tutors who have substantial experience of managing design and technology in schools. Significantly, DATA's *Exemplification of the National Standards for Subject Leaders* also identifies key areas of professional knowledge and understanding not mentioned in the generic TTA National Standards document. They are:

- breadth of subject knowledge
- designing strategies
- management of change.

These three strands are addressed concurrently in each of the individual modules.

One module is taught per term. Typically, this requires four taught days and three evenings each term. Attendance at day sessions is very high but sporadic at evening sessions, particularly in situations where teachers' schools are not local to the course centre. Compensating for absence is difficult.

Teachers are assessed by written assignments and one formal presentation. Each assignment requires the teacher to explore issues developed on the course within the context of their own and other schools. As a result, not only do they personally benefit, but so do their institutions from, for instance, the development of an initiative within their own design and technology department.

Strengths and weaknesses of the delivery model
The current mode of delivery makes use of formal lectures, seminars, active tasks, reading and face-to-face contact with a range of experts. This provides:

- a variety of activities including input from design and technology 'experts' and national figures
- extensive opportunity for teachers to engage in peer discussion
- opportunities for teaching and learning to take place away from the distractions of the school environment
- a social context for learning
- regular face-to-face contact with tutors in addition to use of electronic communication.

Disadvantages of this delivery model include:

- some course members remaining passive, concentrating predominately on the assessed tasks
- difficulties in attendance
- 12 days absence from school across the year is disruptive
- teacher replacement and travel is expensive
- inflexible teaching times may not be easily accommodated within a teacher's workload.

Rationale for developing the course delivery model
The course has been refined over the three-year period but structurally it has remained unchanged. Analysis of data concerned with recruitment and retention statistics, assessment at PGC level, comments from OFSTED, LEA advisers, evaluations from teachers and the continued demand for places, indicates the course has been highly successful. However, access is curtailed by several factors.

Geographic location: a significant amount of time is needed to attend taught sessions. Teachers need to live within a commutable distance of a 'centre'. The number of remote centres to which the university can travel, in order to provide teaching, is limited.

Release from teaching: various schedules have been tried requiring up to 12 days release from teaching and nine evening sessions.

Workload: postgraduate study requires serious commitment and for many design and technology teachers, it may be the first time they have had to undertake study requiring significant amounts of writing.

Cost: TTA funding for the current round of courses, 2001 to 2004, has been considerably reduced making it difficult to support courses away from Sheffield.

Significantly, heads of department do not have available (or choose not to take advantage of) significant periods of time for personal development. The DATA Annual Survey reports that:

> '…the average number of training days for heads of department in the last three years was 2.1 days in 2000, 2.6 in 1999, 3.3 in 1998 and 3.1 in 1997'.
> (DATA, 2001)

Taking these factors into account, action that increases teacher access seems prudent. Teacher responses have indicated that reducing both the amount of face-to-face contact and release from teaching would make a considerable difference to their school's support for their application. However, they also point out that the opportunity to meet regularly with other teachers occupying similar positions, enabling exchange of experiences and ideas is a major benefit.

Design of the task
At the end of the second module of study, teachers were asked to complete an exercise putting into practice some of the skills they had developed on the course. A range of written and statistical data, pertaining to a hypothetical 'Virtual Reality School' supported the exercise. Data concerning levels and details of staffing, resources, examination performance and assessment statistics, budgetary figures as well as a description of the whole school put the task in context. Working individually in their own time, teachers completed a 'strengths, weaknesses, opportunities and threats (SWOT) analysis' of the scenario. Groups assuming the role of head of department then developed a strategic plan for improving design and technology in the school.

Two cohorts of teachers were observed. In cohort one, 12 teachers divided into three groups worked on the task during a single day in a traditional face-to-face teaching environment. This involved prior reading of the data followed by three hours spent developing and orally presenting a strategic plan using PowerPoint presentation software.

The second cohort of 15 in three groups was given access to the same data made available through 'Blackboard', a VLE software package. Teachers were taught how to log on remotely and access the data during a one and a half hour face-to-face session. A group co-ordinator was appointed with responsibility for posting the group's final PowerPoint plan on the Intranet site. The task was completed over six days, requiring each member of the group to access Blackboard remotely, and engage in online group discussion. During this period, the researchers were able to observe the online activity. The tutor (also acting as a participant observer) responded to requests for help or interjected with suggestions as in the face-to-face environment.

Methodology
Qualitative research into student perception of the face-to-face and Blackboard environment was conducted. Observation, teacher evaluation forms and semi-structured telephone interviews enabled triangulation of the data. The case study endeavours to portray the experiences and thoughts of the participants in the study. (Cohen, Manion and Morrison, 2001)

Research method
Data collection: The external non-teaching researcher was not known to either group but initially met with both cohorts. This researcher was a complete observer (Wellington, 1996), as this was a short-term study with no prior involvement with participants. The researcher planned unobtrusive observation within the face-to-face group as observing communication, within the VLE, would be invisible. Blackboard software was used to log data relating to teacher use e.g. date, time and number of messages posted on discussion boards.

All students were required to complete an evaluation form. (Appendix A) Follow-up telephone interviews

were conducted to supplement the evaluation forms and provide additional opportunity for reflection.

Findings and discussion

Course content: Skills learnt on the course are being applied in school. Comments in teacher questionnaires relating to aspects of curriculum design, content and management, indicate a very positive take up of the ideas and methodology advocated. 18% strongly agreed and 82% agreed with the statement: ' Skills learnt in the Virtual Reality School activity can be used in the workplace. Responding to the question: 'The content of this task has increased my confidence and ability to manage a department,' 18% strongly agreed and 53% agreed.

> '[The course is having] far reaching effects on assessment … [I] would have ticked over but I would not have had a clear vision.'
>
> (Teacher feedback questionnaire)

Several responses indicated that as a consequence of studying on the PGC, they felt more confident in applying for head of department positions.

> 'If I wasn't on the course then I would really struggle
>
> [in HOD interviews.]'

> ... 'I've been to two head of department interviews and having done the course I know the answers to their questions. Without the course I wouldn't have had a clue.'
>
> (Teacher interview)

Peer support: The opportunity to meet other teachers, to discuss issues away from the constraints of their own school, stands out as an invaluable part of the course. Incidental informal meetings during breaks are highly valued and have led to useful networking. 76% strongly agreed and 24% agreed that:

> 'Meeting as a group is an important element of the course'. 65% strongly agreed and 35% agreed that: 'Sharing information with other students in the group was valuable.'
>
> (Teacher questionnaire)

The face-to-face group of teachers expressed concern that delivering some aspects of the course, including the Virtual Reality School exercise, would be less successful using VLE. One member was particularly vehement:

> 'I wouldn't go for it because of the social side. Meeting up is very valuable.'
>
> (Face-to-face group, interview)

This observation is echoed in the work of Asennsio et al who identified that:

> '… participants had the perception that, in contrast to face-to-face communication, the online environment was likely to be a cold and lonely environment. However, the descriptions of experiences from the online participants seemed to indicate the opposite.'
>
> (Asennsio, M. *et al*, 2000)

Social interaction and peer support was evident in the VLE group with messages relating to one teacher gaining promotion and messages of support to one member who had been in hospital. Humour was also evident.

Some of the fears expressed by the face-to-face group are challenged by the experiences of the VLE group:

> 'It also meant that I had a chance to work closely with members of the group with whom I have little contact.'
>
> (Teacher questionnaire)

> 'It developed my ability to analyse. The VR School Case Study – gave time for in-depth analysis. It felt like a real situation.'
>
> (Teacher questionnaire)

The presentations produced by the VLE groups were found to be generally of higher quality with respect to content, sophistication and presentation. The experience was described as positive and it was seen as having 'great potential'.

> 'Used in conjunction with other teaching methods this is an excellent style of delivery. On a part-time course when contact between students is brief, this enhances the experience. Should be developed further.'
>
> (Teacher questionnaire)

Focus on task: The three face-to-face groups approached the presentation in different ways: silence, animated brainstorming and procrastination. (Similar characteristics were also observed in the VLE groups.) Groups did not engage exclusively in task discussion; social messages and humour were also evident in both cohorts. The timing and extent of activity within the VLE discussions also varied. The two graphs below plot the number of messages posted by each individual member. They show group 2 being more active immediately after the task was set while group 1 waited until nearer the deadline.

Tutor intervention: With both cohorts, tutor intervention attempted to ensure groups remained on

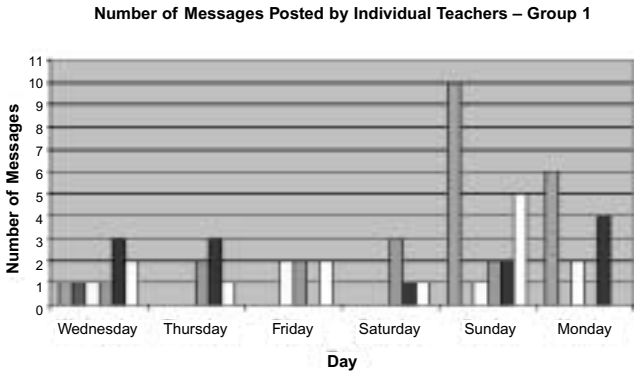


Figure 1: Number of messages posted by individual teachers – group 1.

task and that everyone contributed. Supporting the

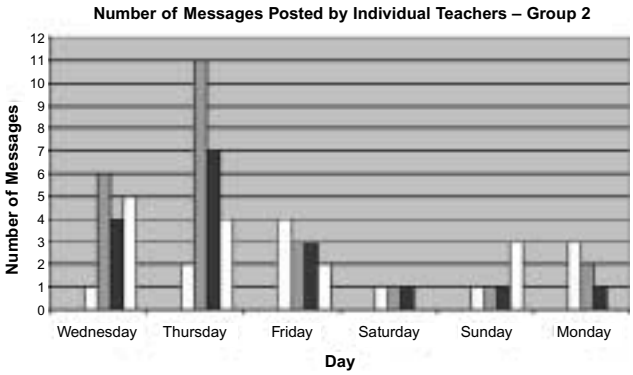


Figure 2: Number of messages posted by individual teachers – group 2.

VLE group required reading all the discussion board messages to ensure that questions raised were answered, unlike with face-to-face, where only part of conversations would be picked up. Where there was little peer communication, the lecturer interceded to offer support. The tutor found providing the same level of support for the VLE group more time consuming and demanding than supporting the students working face-to-face.

Some teachers encountered problems accessing Blackboard outside SHU: one never managed to login at all. These problems resulted from system 'firewalls' restricting access and difficulties with individual login codes. The 'chat' facility enabling synchronous discussion was very slow to load or in some cases would not load at all. This was a particular problem when run on school networks. The ability to engage in synchronous discussion was seen as a factor in bonding groups. This was successfully used to support the teacher who was absent at the introductory session.

Other issues: Whilst the face-to-face group found it acceptable for a group member to arrive late and another to leave early, this was not seen as acceptable behaviour in the VLE. Non-attendance in the VLE is conspicuous, unlike a face-to-face session. The apparent 'disappearance' of two of the co-ordinators and a message from a group member saying they were 'off on holiday' caused frustration and annoyance. Issues of trust and reliability became matters of importance in the VLE.

The role of the co-ordinator was seen as essential within the VLE groups, taking on the greater role of 'leader'. One teacher who made a minimal contribution recorded:

> *'…Where's NG – We need some leadership and co-ordination to pull things together…'*
> (Comment posted on a group discussion board.)

The group of students who worked using VTE spent on average more time than those taught face-to-face, working on the course component. This was not because they were required to or indeed because they needed to, rather evaluations indicated they wanted to.

Novelty value: The researchers were conscious of the 'Hawthorne' factor; the observer's participation in the groups discussion and the knowledge that they were being observed for research purposes, may have fuelled the desire to successfully complete the task.

Conclusions

Evidence collected from this small-scale research project goes some way to confirm that the course is having a very positive impact on teachers functioning as subject leaders. It has also demonstrated that it is possible to deliver part of the course using VLE without a reduction in quality. Indeed, it suggests some aspects are enhanced.

Overall, the VLE group enjoyed a positive experience. However, two members were unable to participate as a result of technological difficulties. If teaching is to make more use of VLE, it will be essential to ensure participants have access to reliable and fast Internet access.

There is an assumption that 'everyone' has access to the Internet. This is not always the case in schools. Within the face-to-face group, at least three out of the 12 did not have home Internet access and access from school was difficult as in some cases the only available computers were in classrooms.

Other studies have identified this issue:

> 'The disadvantages to utilising collaborative learning in virtual teams include: limitations to the software interface, technical difficulties, slow access times, lack of training, unclear expectations, the magnitude of the task, tight timelines and goal

oriented approach created considerable pressure for group decision-making (Kitchen and McDougall, 1999). Other members of the Kitchen and McDougall study felt that a lot of time was wasted waiting for all group members to respond to an issue.'

(Smith, R.O., No date)

'Netiquette': VLE is liberating in terms of when learning can take place. One student preferred to work late at night. It enables participation but is equally dependent on discussion within the group to set timescales and targets; otherwise, those engaged in the task at the beginning become frustrated. Some form of netiquette needs to be agreed early on in the development of the smaller groups. Communication is key to the group cohesion, as experienced when group members apparently disappear from the discussion area without comment.

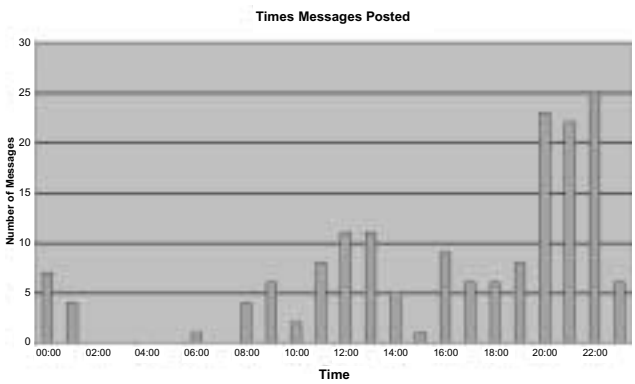
'Our communication lines weren't really set up, we didn't get into 'feeding back' on each others contribution.'

(Teacher questionnaire)

The research has provided evidence to support the development of the current PGC in Managing School Design and Technology. This will increase access to teachers but reduce the amount of time needed to be released from school. A balance between face-to-face teaching and the use of VLE must be struck to enable the benefits of the former to be retained.

The VLE exercise indicates that when motivated, teachers are provided with learning resources that they value and can access from home, some are prepared to engage in professional development outside of normal working hours. The graphs illustrate both the range of times teachers engaged in discussion and the number of messages posted. In addition to this, teachers also engaged in synchronous chat to support the collaborative approach.

Figure 3: Times messages posted.



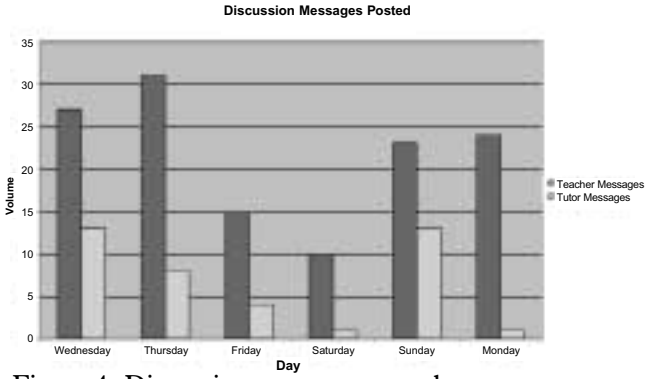


Figure 4: Discussion messages posted.

The authors are not advocating teachers working outside of normal working hours to complete courses of CPD, rather they seek to point out that current teacher workload can lead to this pattern being the case.

Tutor support: The amount of tutor time needed to support course activity undertaken in VLE is significant and needs to be planning. The ease whereby course members can communicate can tend toward demands being placed upon the tutor resulting in an unsustainable workload. This leads to the question: could this level of support be maintained if a larger proportion of this course was resourced in this way?

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Unit: MDT02

Management Issues for the Head of Department

This survey will be used by your tutors to help plan the future delivery of the unit. Below are some statements relating specifically to the case study task, followed by open questions relating to this Unit.

Please indicate, with a tick, the extent to which you believe each statement describes your experience feel free to add additional comments underneath the statement.

The Virtual Reality School Case Study	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1 The time allocated for the reading of the case study was sufficient.					
2 I felt confident about contributing to the group.					
3 I found sharing information with other students in the group useful/valuable.					
4 I appreciated the contact with other students.					
5 I found it helpful to practise my constructive feedback s kills when critiquing other people's work.					
6 Sharing the presentations broadened my understanding of the management issues.					
7 Meeting as a group is an important element of the course.					
8 Skills learnt in the Virtual Reality School activity can be used in the workplace.					
9 It is likely, as a result of the Virtual Reality School task, that I will propose some changes to my Department/Organisation. Please give brief details if applicable.					
10 The content of this task has increased my confidence and ability to manage a Department.					

Below are some open questions relating to this unit – Please write in the spaces provided.

11. How many hours (approx. in total) did you spend studying this unit?

12. How many hours (approx.) did you spend studying the case study?

13. Did you have any contact with the other students outside the unit? If so how? If you had no contact, would it be helpful to have contact with other students during or before the next unit?

14. Upon reflection, would you approach this unit differently? If so, how?

15. What were the strengths of this unit?

16. What were the least successful aspects of this unit?

17. How might this unit be improved?

Any other comments relating to this unit or the case study?

Thank you for completing this evaluation.