USING VIDEO IN THE CONSTRUCTION TECHNOLOGY CLASS-ROOM: ENCOURAGING ACTIVE LEARNING

Mike Hoxley and Richard Rowsell

Department of Built Environment, Anglia Ruskin University,

Bishop Hall Lane, Chelmsford, Essex, CM1 1SQ, UK.

Tel. 01245 493131 ext. 3082, Fax: 01245 252646, E-mail: m.hoxley@anglia.ac.uk

ABSTRACT

During the last fifteen years the use of video in the classroom at all levels of education has increased while at the same time most research into educational technology has concentrated on personal computers and the internet. Consequently there is a lack of research into how video is used in teaching at a time when it is one of the most used technologies. What research has been carried out (mainly in the medical education domain) has generally found video to be effective in promoting student learning and that students are receptive to its use. However it is necessary to ensure that students engage in active (rather than passive) viewing. This paper reports the authors' experience of using the materials produced by the Video Project at the University of West of England (UWE) in teaching Level 1 domestic scale construction technology at Anglia Ruskin University. The research is concerned with how the videos may best be used in the lecture theatre. Data, collected by questionnaire from over 200 students largely support the authors' approach of using a short but carefully focused quiz as an 'orienting activity' to encourage 'active learning'. Feedback of the quiz results can then be used as the means by which further detail and reinforcement of key points is provided.

Keywords – construction; learning; teaching; technology; video.

INTRODUCTION

> ‘Video is uniquely suited to take students on impossible field trips – inside the human body, or off to Jupiter.’

This somewhat extravagant claim is made by one US public service broadcaster in its educational video promotional literature (Thirteen Edonline, undated). In the UK, video has long been used in the classroom in schools (Moss et al, 1991), further education (BBC/SFU. 1994) and in higher education (Barford and Weston, 1997). Houston (2000) reports that as the use of video in the classroom has grown, research into its use has waned. This is because research activity in instructional technology has shifted to media such as personal computers and the internet. Using the case study of the authors’ institution this paper investigates the *effective* use of video in facilitating student learning of domestic construction technology at level 1 of HE.

The research reported in this paper is not concerned with web-based video for use by students in a computer lab or at home, but with the use of video in the class-room. Web-based technologies can of course be used to supplement more traditional styles of teaching (for example see Shelbourn et al, 2004) but given that a majority of UK Universities own the videos produced by UWE, this research has explored the most effective way of using these learning materials in the lecture theatre.

WHY USE VIDEO?

It has been suggested that, in the teaching of the ‘TV generation’, fundamentally different strategies need to be adopted than hitherto. Gioia and Brass (1985-

1986) observe that students have grown up ‘in an intensive environment of television, movies and video games’ and have developed learning styles where comprehension occurs largely through visual images. They warn of a mismatch of traditional teaching methods, lecture and textbook readings, and the visual learning styles of contemporary students. Certainly the authors are surprised by the admissions that their students make concerning their lack of recreational reading – although there are noticeable gender differences, with female students generally reading much more than males.

On the other hand books have been characterised by Kozma (1991) as a learning medium for their ‘stability’. The stability of the written word offers several advantages to the learner. It enables the reader to control the rate at which information is received and those with highly developed reading skills can skim read at their own pace. The authors are not advocating that video should *replace* reading as the only learning medium, but that it can be used to enhance the learning process as just one weapon in the armoury. The other weapons are described later in this paper.

Using videos in higher education has been shown to both improve students’ examination marks and reduce tutorial support time (Rae, 1993). Marx and Frost (1998) provide a comprehensive review of the use of video in management education and suggest that video can convey meaning that is difficult to match with traditional lecture and reading assignments. They report that management educators have been impressed by the ability of video to engage students and managers. However Gioia and Brass (1985-1986) warn against catering to bad habits of reinforcing learning modes that support

passive, superficial consumption of video offerings rather than the more desirable offerings that define higher education. Rogow (1997) cautions against 'using the television as a babysitter'.

Video is particularly useful in two types of situation – where some *technique* needs to be demonstrated and where students require a *visual appreciation* to understand (Meisel, 1998). Obviously both of these situations apply in the study of construction technology. Meisel states the following rules for the use of teaching and training videos:

- Never show a video of someone else saying what you can say.
- Use videos for things you cannot adequately describe (e.g. emotions, broad application of theory to practice, etc.).
- The absolute need to prepare and plan. This is to get beyond the audience reaction characterised by, 'It was a great show but I don't know if I learned anything.'

Demonstrating techniques is important in the medical professions and several studies have been undertaken to assess the effectiveness of the use of video compared to other teaching methods in medical education. In a study of teaching clinical skills in assessing and managing drug-seeking patients three methods were compared (Taverner et al, 2000). Small group tutorials, video based tutorials and computer aided instruction (CAI) were used to teach the same skills to different groups of students within the same cohort of senior medical students over two years. The CAI development costs were higher but there was no significant difference in the results of assessment for the three groups. However the students preferred the video based tutorials to the other

two methods. Similarly Dequeker and Jaspaert (1998) found that video-supported small group learning of problem solving and clinical reasoning 'can promote enjoyable learning for students and teachers'. In a study of orthodontic auxiliary training, video teaching was found to slightly out-perform a slide-based lecture, in the training of the placing of orthodontic brackets (Chen et al, 1998). Parkin and Dogra's (2000) experience of using video in undergraduate teaching of child psychiatry was that 93% of 249 students found videos 'useful' or 'very useful' in learning about assessment and disorders in child psychiatry.

Given that the evidence presented above suggests that video based teaching is at worst *no less* effective than more traditional methods and that students seem to prefer it as a method, then this seems a good enough recommendation to adopt video-based learning, where of course, it is appropriate.

HOW TO USE VIDEO IN THE LECTURE THEATRE

As we have seen above, when reading, the learner is able to control the pace at which they learn but the pace of video 'is not sensitive to the cognitive constraints of the learner; it progresses whether or not comprehension is achieved' (Kozma, 1991). Kozma suggests that learning from video occurs through a 'window of cognitive engagement' which refers to the visual attention learners focus on the video's content. Many advocates of video use in the classroom have encouraged an 'active viewing approach' rather than a 'passive viewing approach' (Wetzel et al, 1994). Kreiner (1997) suggests that guided note taking of video material may improve learning compared with passive observation. The use of 'orienting activities' is advocated by Hooper and Hannafin (1991) and these can include stating lesson objectives before showing

the video. Rogow (1997) recommends 'use the board or overhead projector to write out a few questions relating to the video. Go over the questions before running the tape so students will know what to look for'. Houston (2000) carried out a questionnaire survey of over 500 community college faculty members in the US. She concluded that the use of *active learning* strategies in the classroom is one way to reduce students' tendencies to view videos passively and increase student participation in the learning process.

Marx and Frost (1998) see the greatest challenge of using video as 'harnessing the motivating impact of video without falling prey to its failings - shallow comprehension, trivialisation, and lowered mental effort'. They advocate meshing video and printed learning materials for optimal educational outcomes. Such an approach has been adopted by the developers of the Video Project at the University of the West of England (UWE).

UWE'S VIDEO PROJECT

This project was established in the early 1990s and has produced over 20 films on building construction and building conservation in a UK context (Marshall, 2001). UWE claim that over half of the built environment courses in the UK use these videos, and at UWE they are used to teach architects, planners, construction managers, surveyors, housing managers, estate agents and environmental health officers. The videos may be used as 'stand alone' or as a part of a wider lecture and tutorial package. Each video is approximately 25 minutes long, combines site/factory footage, professional narration and high quality graphics. There is a tutorial workbook to accompany most videos and students complete the workbooks as part of their directed study. The video and

workbooks are supported by a textbook – Marshall and Worthing (2000). This fully integrated learning package is highly acclaimed throughout the UK and the considerable contribution of the UWE project developers to the study of building technology is gratefully acknowledged by the writers of this paper.

ANGLIA RUSKIN UNIVERSITY'S EXPERIENCE

Following use of the complete learning package by one of the authors for two years at another institution, Anglia Ruskin University adopted it for the first time in 2000/2001. We therefore have five-years' experience of its use. In the Department of Built Environment, the Building Technology and Services module is taught in the first year of all courses (architecture, civil engineering, construction management and surveying). There are typically 120 part-time students and 80 full-time students studying the module and the different modes are taught separately. A formal lecture to each group (during which a video is usually shown) is followed by tutorials in groups of about 20 where students work in groups of three or four to complete, discuss and mark the workbooks, and also engage in other practical exercises. At the time that data for this paper were collected, the authors were module leader (Rowsell) and deputy module leader (Hoxley) and were assisted by three other teaching staff in the delivery of the module. We firmly believe that this first module in building technology is of crucial importance to students. All of the built environment professions to which students aspire, require a sound grasp of the technology that underpins them. As well as knowledge and understanding of construction functional requirements and processes there is a whole new vocabulary to learn.

An additional set of videos is available in the reference section of the learning resource centre, so that a student missing a lecture is able to view it later and any student is able to view a video for a second time should they wish to do so. The advantages of using videos in teaching construction technology are well understood – they reduce the need for (and therefore the risk of) site visits, students can view processes not easily communicated in a formal lecture and the subject takes on a real live dimension. However we still take students on one site visit during the module and believe that this experience is invaluable, particularly for full-time students who may never have visited a construction site before. The module has 48 hours of classroom contact time and a recommended 152 hours of self-study. It is assessed by an assignment and an end of module examination. More recently the completion of a minimum number of the tutorial workbooks has been made compulsory.

From the outset of using the videos we saw the need to maintain students' attention during the playing of the video and to encourage 'active' rather than 'passive' learning. The 'orienting activity' we have adopted is that recommended by Rogow (1997) - to get students to complete a short quiz during the playing of the video. Our first attempt at this was a disaster! The quiz was far too long and students spent more time looking down at the quiz than watching the screen. We then tried showing the quiz on an overhead projector at the same time as the video was playing. However students said that they would prefer the quiz on a handout which they could spend a few minutes studying before the video played. We have experimented with the number of questions but believe ten or a dozen to be about right.

TO LECTURE OR NOT TO LECTURE?

The amount of formal lecturing required in addition to the showing of the video depends on the level of detail required for a particular topic. We have tried lecturing before and after the lecture (see results of data collection below) but a solution we have found to be quite effective with some topics is to make the feedback of the quiz answers, the focus of learning. If this method is to be adopted then the quiz requires very careful design to ensure that the questions asked are the key points of the topic. Feedback on the answers to the quiz is then used as the vehicle for providing the necessary further detail and to reinforce these key points.

THE STUDENTS' PERCEPTION

Towards the end of the second and third sessions of using the videos we sought feedback from students in order to help inform any necessary changes. A two-page questionnaire was given to all students attending a lecture in the penultimate weeks of the module. Two hundred and nine completed questionnaires were returned and a blank questionnaire may be seen at Appendix A.

The breakdown of the student sample by course studied is shown in Figure 1. There were 131 part-time and 78 full-time students in the sample.

< Insert Figure 1 >

Two hundred and six students (98.6%) supported the concept of showing videos. Even if the two missing responses are taken as being negative, this result is a clear vote of approval for the use of video to teach level 1 construction technology. One civil engineering student commented: "I really

enjoy the videos. Books and lecturing are useful but to actually see work in progress is very beneficial. Definitely keep with the videos, they're useful". An HND Property and Surveying student said "I found this subject particularly interesting, the use of videos is a fantastic idea as I do not get the opportunity to visit a working site very often".

The reasons given for liking videos are illustrated in Figure 2 (respondents were able to indicate more than one reason). 'Demonstrating site processes' and 'preferring to watch a video than read a book' were the highest responses at 108 and 103 respectively. The latter response is rather alarming but perhaps not surprising given that most students are part of Gioia and Brass' (1985-1986) 'TV generation' – and indeed mostly male!

< Insert Figure 2 >

One hundred and eighty nine students approved of the use of a quiz with only sixteen saying that they did not. The reasons given are illustrated in Figure 3 and again students were advised that they could give more than one reason. 'Reinforcing the main points' scores more highly than 'easier to remember' and 'aiding concentration'. Perhaps this result is yet another indication that what really focuses a student's attention is assessment. It also stresses the importance of the tutor ensuring that the quiz questions do indeed focus on the key issues. Fifteen of the 16 students who did not think the quiz was a good idea stated that they found it a distraction and some said that they would prefer to make their own notes. We suspect that these students are all 'high-performers' but since the data collection was carried out anonymously, further research would be required to confirm this view.

< Insert Figure 3 >

Only five students preferred the quiz to be on an overhead slide with 201 preferring a hand-out (there were three missing responses). The number of quiz questions preferred is indicated in Figure 4 and the authors' view (given above) seems to have been endorsed by these cohorts. Only thirteen students admitted to borrowing a video from the library and nine of these said that it was because they had missed a lecture.

< Insert Figure 4 >

The area of most disparity with the authors' pre-conceptions was about whether a formal lecture was required in addition to the video and quiz feedback. One hundred and fifty-two students said that a traditional lecture was required (49 thought that it was not). There is also strong support for having the lecture after the video (171 students) rather than before (34 students). Having reflected on these results the authors' believe that where the lecture introduces new concepts, provides an over-view of a topic, or discusses functional requirements, then it is probably best to lecture before the video. Where however the main purpose of the lecture is to deliver technical detail then this is certainly best delivered after the viewing of the video. This approach, informed by student feed-back, is the one that we have since adopted.

CONCLUSIONS

The use of video to teach technology to built environment undergraduate students is now a common feature of UK courses. This may be partially in response to a desire to adapt teaching methods to cater for students brought up in an age of TV, but it is also, no doubt, because an excellent learning package has been made available by the Video Project of UWE. Many institutions have realised that there is no point in re-inventing the wheel and that the UWE

videos, tutorial workbooks and the accompanying textbook, provide a fully integrated system for delivery of domestic scale construction technology at a reasonable price. The authors' experience of using video in this context is that there is a need to aid students' concentration while showing the video and to encourage 'active' rather than 'passive' viewing. The use of a short quiz provides this aid and also usefully allows tutors to move seamlessly into lecture mode during feedback of the quiz solutions. However data collected from students as part of this study suggest that there is still a need for the traditional lecture and that this is usually best delivered *after* the video has been shown. A small minority of students (7%) said that they found the use of the quiz a distraction. These may be 'high performing' students but further research would be required to confirm this view.

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APPENDIX A

Student Questionnaire on the use of Videos in Building Technology and Services

1. Which course are you on? ……

2. Do you think that the videos are a good idea? (please tick)

   Yes ☐ No ☐

3. If you said No, please say why below; if you said yes then please tick one or more boxes below to say why you like videos.

   ☐ They demonstrate site processes without the need to visit site.

   ☐ They make the subject "come alive".

   ☐ I prefer to watch the video than read the book.

   ☐ Other (please state below)

   ……
   ……
   ……

4. Do you think that a quiz for you to complete as you watch the video is a good idea?

   Yes ☐ No ☐

5. Why? (again you may tick more than one box)

   ☐ It helps me to concentrate.

   ☐ It reinforces the main points.

   ☐ I find it easier to remember what I have watched.

   ☐ Other (please state below)

   ……
   ……
   ……

6. Do you prefer the quiz on a handout rather than just on the overhead projector?

   Yes ☐ No ☐

7. What do you think is about the right number of questions for the quiz? (please tick one box)

☐ Less than 10.

☐ 10-15.

☐ 16-20.

☐ More than 20.

8. Have you borrowed any of the videos from the library?

Yes ☐ No ☐

9. Why? (you may tick more than one box)

☐ Because I missed a lecture.

☐ To reinforce what I saw in the lecture.

☐ Other (please state below)

……
……
……

In the remaining questions please think about the use of the videos in comparison to a "traditional lecture".

10. Is the video best before or after the lecture on the subject?

☐ Before.

☐ After.

☐ No lecture required.

11. If the feedback to the quiz is comprehensive do you think that you still need a "traditional lecture" on the subject?

Yes ☐ No ☐

Many thanks for your help. We would appreciate any other comments you have on the videos - please write them on the other side of this page. *Richard and Mike*

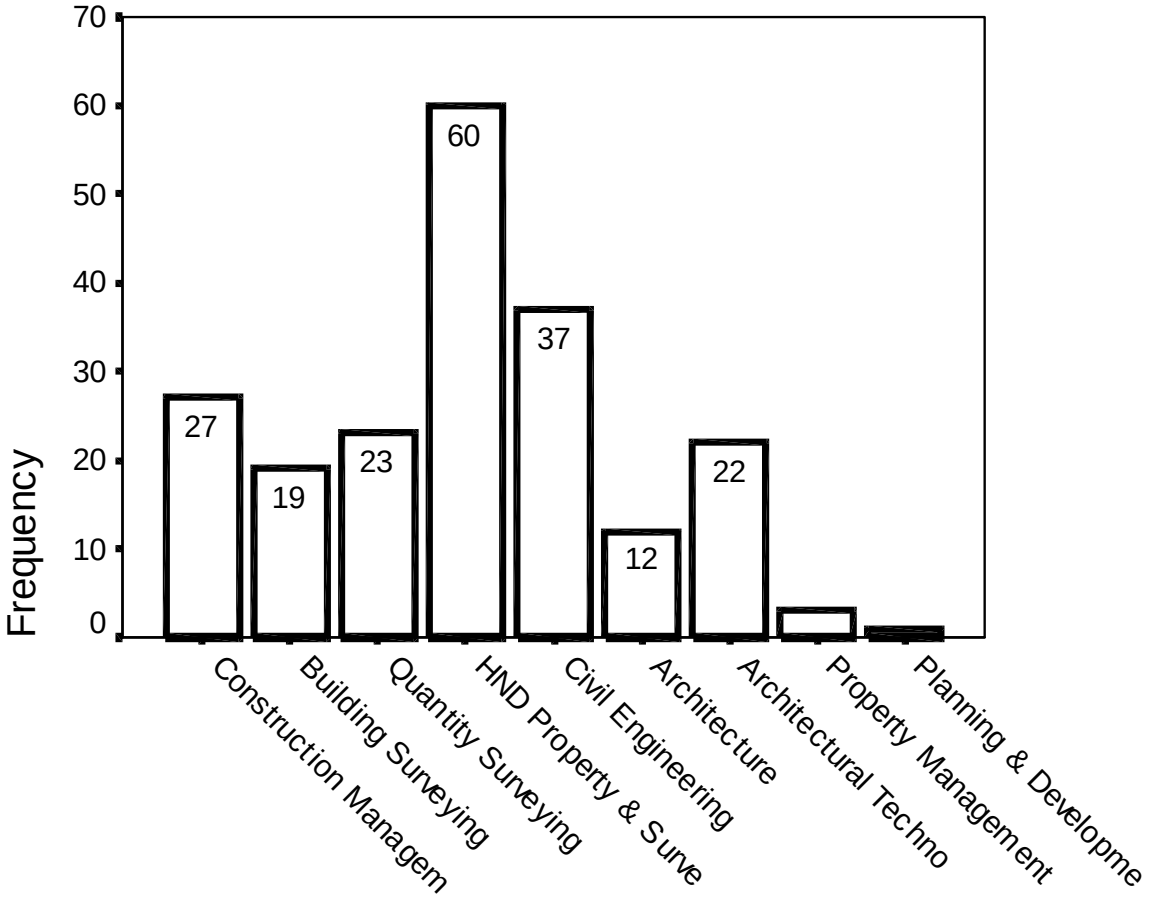

Figure 1: Course Studied by Questionnaire respondents

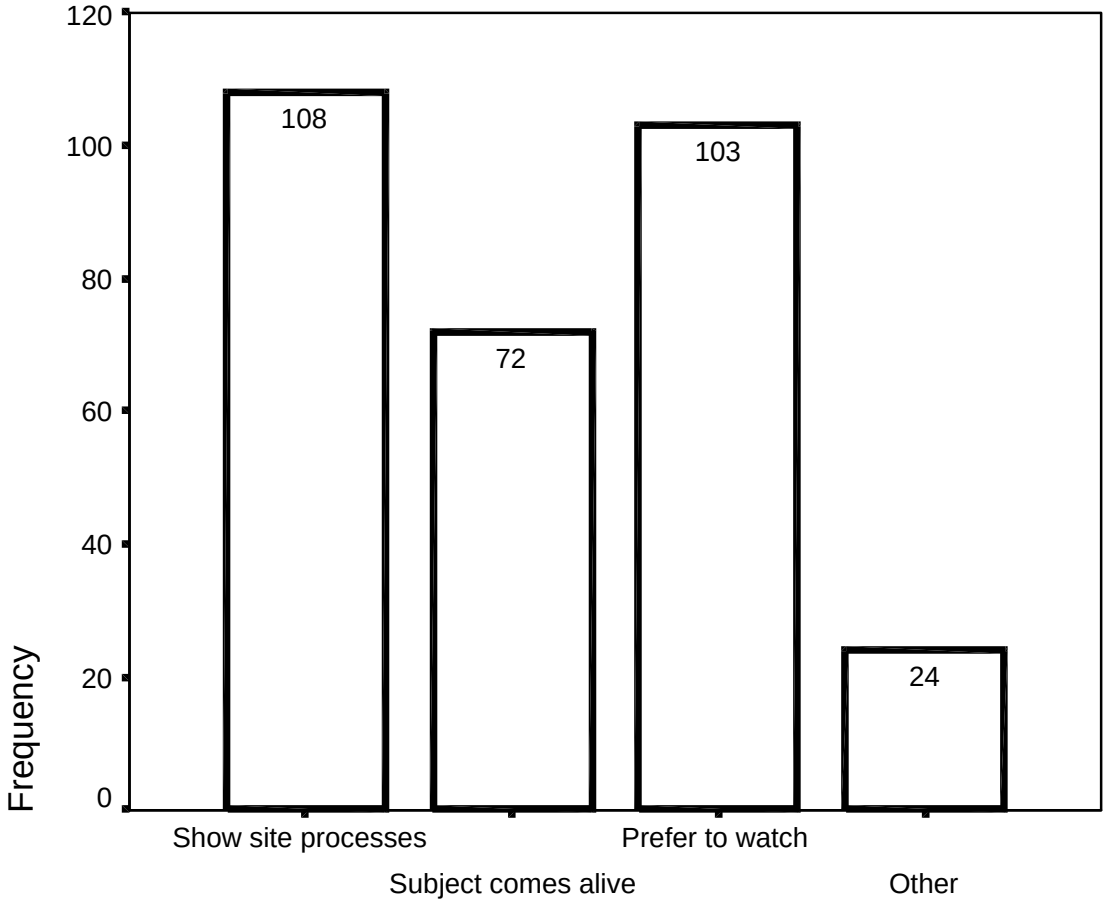

Figure 2: Reasons Given for Supporting the Use of Videos

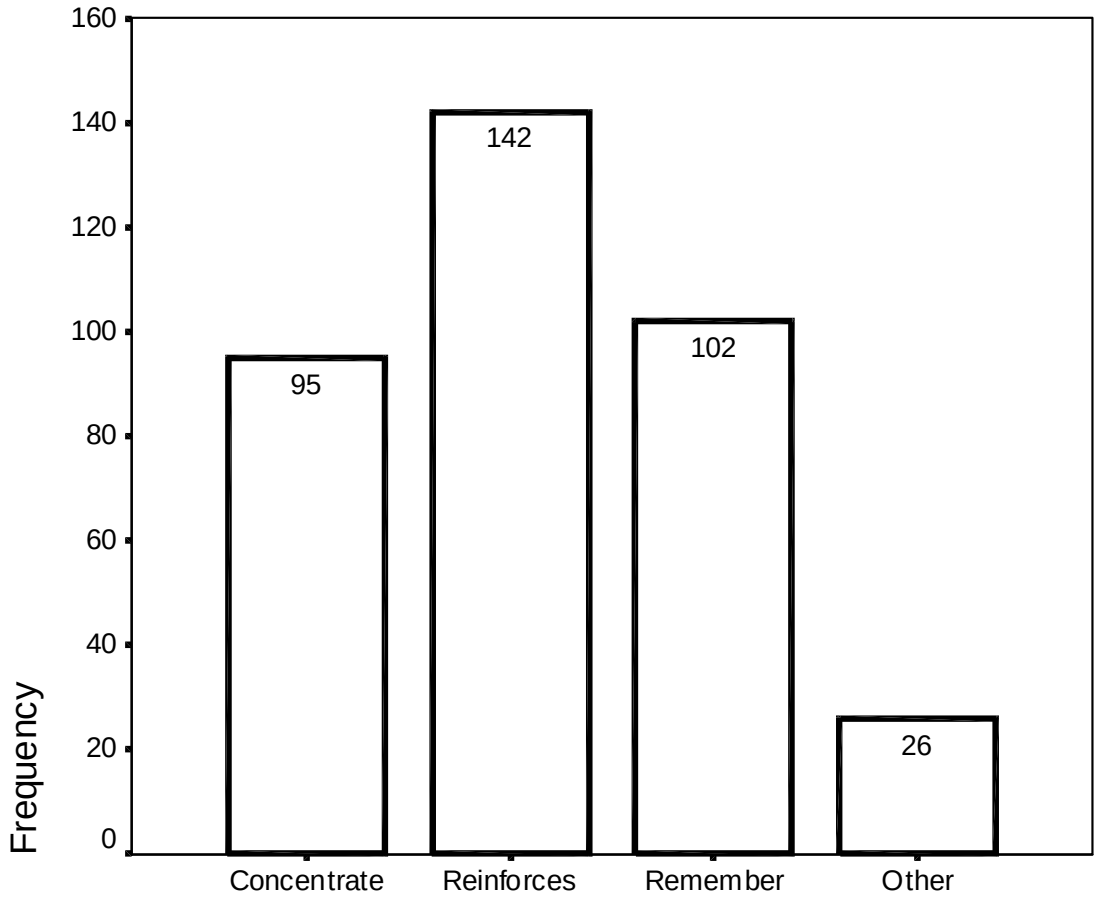

Figure 3: Reasons Given for Supporting the Use of a Quiz

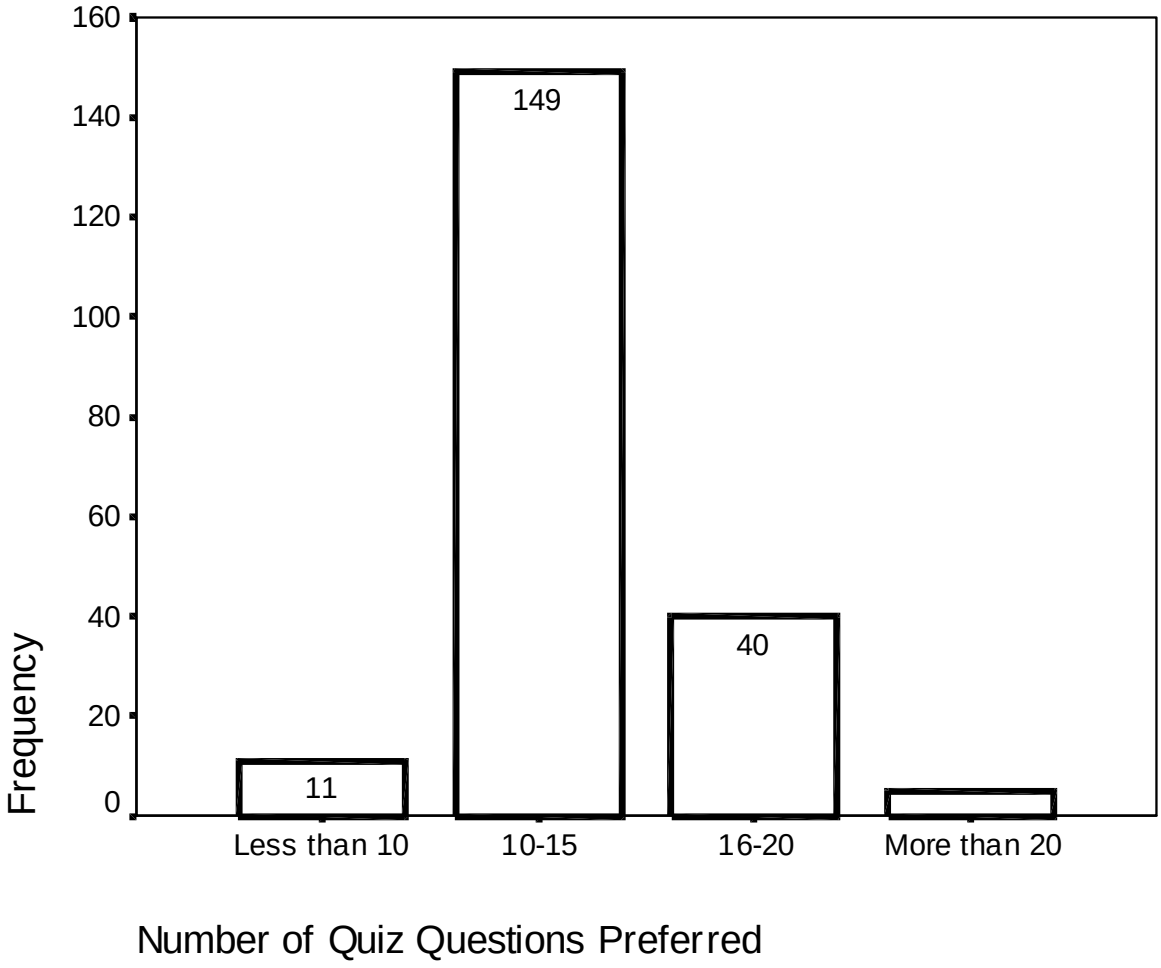

Figure 4: Preferred Ranges of Quiz Questions