Student Reaction to Video-streamed Content: Does it Enhance Knowledge and Understanding?

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ABSTRACT

The present study examined student responses to the use of a video-streamed expert interview to improve knowledge and understanding in two key areas related to stress and sport performance. Following a series of learning activities that accompanied streamed clips, students were asked to identify what they liked best and least about the approach adopted, and state areas for improvement. A series of questions gauging reaction to both technical and pedagogical aspects of the video-streamed content was also undertaken. Overall, student responses were favourable to the use of streamed video in this context, with video streaming seen as being a more positive than negative tool in support of learning, especially in the areas of aiding clarity and understanding and presenting material in a non written format. Concerns highlighted included the non availability of text versions of the video clips and narrow access to the streamed material. The study identified areas for improvement which will allow for further development of this resource

Keywords

video streaming, learning, evaluation

INTRODUCTION AND BACKGROUND

A key focus of many final year modules on undergraduate degrees is to get students to a 'current understanding' of the concepts and ideas being covered on the module by reading and understanding primary research materials. We wish students to have an appreciation of contemporary ideas, theories and research findings as opposed to a reliance on secondary source materials from textbooks that may be somewhat dated. The downside of this from a delivery perspective is that students can become increasingly frustrated at reading journal articles, given that this source of published material is often written in a very formulaic and stylistic manner. Certainly one might argue that the written format employed by many peer refereed scientific journals and the nature of language often used does not represent a user-friendly format from the student perspective.

As part of a Teaching Quality Enhancement Funded (TQEF) Project at Staffordshire University, SHE-STREAM (Sport, Health & Exercise – Streaming Teaching Resources for Education And Motivation) was developed partly in response to expressed concerns on behalf of students about the formulaic nature of material found in both primary and secondary reading materials. The aim of the SHE-STREAM project was to produce a stand-alone portal where examples of captured video content could be quickly encoded and stored on a server to be streamed to students on demand. In addition, the project also produced a first set of video-streamed resources to support a final year module entitled 'Stress and Sport Performance'.

In terms of developing ideas for SHE-STREAM, and being a complete novice in the area of video streaming technology and pedagogy) a number of U.K. based video-streaming projects were examined for ideas and support. By far and away the most useful resource was the Click and Go Video project (**http://www.clickandgovideo.ac.uk**). Whilst the full 'Video Streaming: a guide for educational development' was not initially available when the SHE-STREAM project commenced, there were a series of resources that proved of immense value in setting up the SHE-STREAM portal and in developing ideas of how this new technology might be used in appropriate ways to derive learning outcomes. The SHE-STREAM project was in particular influenced by the Three 'I's framework adopted and outlined by Click and Go video project (see Young & Asensio, 2002). This framework involving 3 categories of image, interactivity and integration allowed decisions to be made regarding the approach to be adopted for the initial set of resources. Thus the focus of the SHE-STREAM portal was to ensure interactivity in terms of independent access, choice of clip and control over the material. Secondly, it was deemed necessary to develop a degree of integration by linking viewed clips with a series of Independent Learning Activites (ILA's) which required students to extract information from the

viewed clip, with all of this occurring within a Virtual Learning Environment (VLE). Therefore, at appropriate times, students were directed within LLS (Lotus Learning Space) by an active link to a series of clips that were streamed to them. As each clip was being viewed, students were required to answer a series of questions in an accompanying word document on the material viewed and then save this resource (and submit the completed ILA's for assessment purposes).

The initial resource and the focus of this paper consisted of a 2-hour interview with Professor Lew Hardy of Bangor University, covering a wide range of research issues related to a number of the learning outcomes of the module. With respect to the Stress and Sport Performance module a series of questions examined two areas of importance – firstly issues surrounding the measurement of anxiety in sport and secondly a discussion of both catastrophe theory and research as applied to sports performance. Following the capture of this digital content, questions and answers from this interview were chunked into learning units, encoded and stored on a stand alone server to allow on demand access by students through the Lotus Learning Space VLE that supported the module delivery. For a more detailed account of the processes involved see Erskine & Jones (2003).

EVALUATION OF VIDEO-STREAMED MATERIAL

Formal evaluation of video streaming as a learning tool is in its infancy. The Click and Go video project used 3 case studies as part of their JISC/DNER funded project to assess the use of different approaches to video streaming within the fields of catering, surgery and fashion marketing using qualitative interviews to evaluate the value of video streamed content (see for example Zenios).

Given the paucity of evaluation on video streaming from the users (students) perspective, a questionnaire was constructed which attempted to elicit (at both quantitative and qualitative levels) students reaction to the video streamed component of the Stress & Sport Performance module.

With reference to Section 14 – Evaluating the Educational Benefit of the Click and Go Video guide for educational development (Thornhill, Asensio & Young 2002), a series of questions were constructed to examine student's reaction to central features and components of SHE-STREAM. Section A of the questionnaire adopted a quantitative approach (likert scale format) to examine areas such as ease of access, pedagogical rationale, video and sound quality, clip length, interactivity and perceived learning benefit. A copy of the question stems can be found in Appendix A. Section B of the questionnaire used a qualitative approach by asking students to comment in a written format on (a) what they liked 'best' about the use of video streaming on the module, (b) what they 'least' liked about the streamed content and finally (c) what 'improvements' they would recommend for subsequent delivery.

The questionnaire was administered to 70 students (male = 50, female = 20) in the final teaching session of the module in December 2003. It was made clear to students completing the questionnaire that all answers would remain confidential and that their responses to the questionnaire would not be used in any way to influence assessment or grading on the module.

In order to analyse the data, responses to Section A were entered into SPSS (Statistical Package for Social Scientists, Ver. 11.0) to obtain descriptive statistical data. In terms of Section B, to undertake an initial analysis of the data, written student comments were transcribed verbatim. Following this, the two lecturing staff on the module independently examined the comments made within each of the three areas and provided a list of categories that they considered represented emerging themes for the 'best', 'least' and 'improvement' comments. The independent emerging themes were then compared and an agreed list of themes selected for each area. Subsequent to this, each member of staff independently classified each written comment as belonging a given theme. Finally both lecturers came together to examine the consistency of their classifications of student comments across the three areas. Where comments had been differentially classified, discussion took place and agreement reached. In reality there were very few disagreements across the 3 question areas, between the two teaching staff.

With respect to what students liked best the following six themes were agreed by the teaching staff from written responses obtained and were labeled as: Clarity & Understanding, Differing Learning Format, Ease of Access, Additional Viewpoint, Interest & Motivation, and Assessment Role (see Table 3a).

Ten themes emerged from the student responses to what they liked least about the SHE-STREAM experience: As outlined in Table 3b these were: Access Issues, Question/Answer Relevance, Text Availability, Clip Length, Answer Comprehension, Excessive Time, Assessment Weighting, Controllability, Sound Quality and Nothing,

In terms of areas for improvement, again 10 themes emerged: Increase Access Areas, Text for ALL Clips, SHE-STREAM Design, None, Decrease Clip Length, Assessment Weighting, Additional Viewpoint, Improved

Sound, Question/Answer Clarity, Headphone Provision (see Table 3c). It should be noted that there was a degree of correspondence between themes outlined in Table 3b and those in Table 3c.

INITIAL DATA ANALYSIS AND INTERPRETATION

A central aspect of the study was to investigate whether the SHE-STREAM clips and accompanying ILA's resulted in an improved understanding of key learning outcomes of the module. Two questions in Section A were directly related to this area. Over 70 % of students reported that the video streamed content had either 'somewhat' or 'very much' improved their understanding of concepts related to 'Anxiety Measurement in Sport'. With respect to a second area concerning 'Catastrophe Theory and Research', this figure rose to 84.3%. This finding is supported by the qualitative data findings in Table 3a, with 46% of students commenting that the clips aided clarity and understanding.

For example one student responded:

"it helped me understand some concepts which were perhaps were unclear from reading the literature"

Students were asked if viewing of SHE-STREAM clips was required or essential to successfully complete their understanding of topic areas. Over half the students (53%) responded 'frequently' or 'yes', with only 10% stating that the viewing of clips was not essential for understanding.

In terms of a first use of SHE-STREAM within this module, these results are encouraging. Finally, it is pleasing to note nearly one in two of the students (44%) commented positively on the different nature that the streamed content represented as an alternative to text based material. One respondent commented

"it was very different from reading the work and made it a lot more clearer and enjoyable"

Table 3a Positive Emerging Themes and Illustrative Quotes

Theme	**Total Number of Comments**	**% of Students Making Statement Theme**	**Illustrative Quote(s)**
Clarity and Understanding	32	46%	"Hardy simplified some of the concepts which was useful for a clearer understanding of some areas within the module" "it helped me understand some concepts which were which perhaps were unclear from reading the literature" "I found that listening to Hardy reinforced what I learned in the lectures, and I found it easy to listen to him and he put across what he was saying very well and made the theories easy to understand"
Different Learning Format	31	44%	"it gave a new and interesting resource to use instead of having to read text all the time" "it was very different from reading the work and made it a lot more clearer and enjoyable" "it was easier to listen to the clips and take in the relevant information than wade through journal articles"
Ease of Access	15	21%	"we were able to take the information in when we wanted and we could take it in at a pace that suited our needs" "it is a very good resource that can be accessed again and again throughout the semester to clarify the points to learn from" "gave additional information in a quick and easy way"
Additional Viewpoint	10	14%	"it gave another view to the subject other than the module staff" "it enabled us to gather another lecturers viewpoint which enhanced the chances of learning" "gave us a greater understanding of areas of the course from different perspectives"
Interest& Motivation	8	11%	"made learning more interesting as a personal opinion was given" "it kept me interested in the subject area" "made the work more interesting overall"

Assessment Role	6	8.5%	"The fact that the work was assessed meant that I was motivated to complete the task" "useful for the assignment" "the extra percentage for the module was helpful"

As highlighted by the Click and Go video project, streamed video offers the opportunity of interaction with the learner in terms of access (asynchronous), choice (selection) and control (start, stop, pause and review). From student responses it appears that a significant number of students felt that interaction was an important and helpful aspect of the SHE-STREAM approach. For example, far more students (> 80%) felt either 'somewhat' or 'in total control' of the technology, as opposed to 17% feeling 'somewhat' or totally' controlled by the technology. One in five students (21%) highlighted ease of access as a key positive aspect of SHE-STREAM (see Table 3a). As one student stated,

> *"we were able to take the information in when we wanted and we could take it in at a pace that suited our needs"*

With respect to control of the streamed clips, 73% of students reported using the pause button either 'frequently' or 'all of the time'; 75% used the cursor to drag a clip backwards to repeat a phrase or sentence, but perhaps somewhat disappointingly only one in five students (26%) used the cursor 'frequently' or 'all the time' to repeat a clip in its entirety.

None of the students reported the Question and Answer clips as being too short, one fifth of the students thought the clips too long, whilst over three quarters (78.6%) thought the length of clips about right. Clip length emerged as a negative theme (see Fig 3b), with 9 comments (13%) offered supporting the view of clips that were too lengthy. However given the advanced nature of many of the issues addressed, it would have been difficult to break down often complex answers into shorter units.

A number of students commented that being able to hear an explanation of issues from a source other than the lecturer on the module was of benefit with one student suggesting that,

> *"it enabled us to gather another lecturers viewpoint which enhanced the chances of learning"*

Table 3b Negative Emerging Themes and Illustrative Quotes

Theme	**Total Number of Comments**	**% of Students Making Statement Theme**	**Illustrative Quote(s)**
Access Issues	32	46%	"clips could only be accessed in B150" "it was only accessible in this one room" "it was not accessible on all computers in the University"
Question/Answer Relevance	11	15%	"on occasions there was excessive information which was not relevant to the specific question" "Some of the answers did not relate to the questions asked" "In some of the clips Lew didn't really seem to answer the question being asked"
Text Availability	10	14%	"the text support for clips did not work" "the text did not work in most cases" "text was not available in most of the topic areas"
Clip Length	9	13%	"in some clips the video length was too long" "some of the answers were too long and detailed"
Answer Comprehension	8	11%	"occasionally the terminology used was confusing" "the clips were sometimes hard to understand" "some clips did not make much sense"
Excessive Time	8	11%	"sometimes quite time consuming when accessing different clips" "some clips were time consuming" "it took a long time to complete if you did not do each one at

			the time required"
Assessment Weighting	8	11%	"should have been worth more than 5%" "it was a fair amount of work for 5%" "should be worth more than 5%"
Controllability	4	6%	"for a few of the clips the control bar was not displayed" "on occasions I was unable to control the clip"
Sound Quality	4	6%	"at times it was difficult to hear what Prof. Hardy was saying" "sometimes the sound was quite quiet" "some of the interviews were difficult to make out"
Nothing	3	4%	

Turning to emerging negative issues, by far the biggest issue that students commented on (46% - see Table 3b above) was the fact that the streamed clips were only available (initially) to a single room (a departmental I.T. room). This was a decision undertaken due to technical reasons early on in the project. Not surprisingly this issue was identified as a priority for improvement (see Figure 3c) with 23% of student comments identifying this as an issue that require addressing for the next delivery of the module

For example, one student stated "allow clips to be accessed from all rooms/facilities in the university"

A major concern identified by students was the fact that,

"text was not available in most of the topic areas"

The Special Education Needs and Disability Act (SENDA) highlights the importance of providing alternative ways of obtaining video and audio materials. Unfortunately the time demands present within the project did not allow for all clips to have accompanying text – again this issue was high on the agenda for improvement (Table 3c) with 14% of students identifying this as an area to work on.

Nine of the 70 students commented negatively on clip length (see Table 3b), and this again emerged as an area for improvement with a similar number of students (n=8) suggesting that for example we,

"possibly break down the longer answers into more manageable clips, to further aid understanding"

Although there is some suggestion that video segments in multimedia should be limited to twenty to thirty seconds (Alessi & Trollip, 2001), the length of clips really depends on the content and how it is being used. With respect to the content area and the ILA that was required to be undertaken, it is felt that clip lengths of much longer duration are justified in this instance.

Not surprisingly a few students felt the work required to complete the ILA's was not sufficiently rewarded in assessment terms (full completion of 5 ILA's was worth 5 % of the module grade). However this was very much a minority with only 7% of students suggesting increased weighting of the ILA's as an area for improvement. Just over half the students (56%) reported that 'most' or 'all' of the ILA's were undertaken at the time requested, though it was disappointing to find that when requested to view a set of web resources accompanying a series of video clips explaining elements of catastrophe theory, 83 % of students reported not undertaking this activity. It is felt that this is primarily a design issue that needs addressing to allow for a more overt and seamless structure to link video to web resources within the VLE materials produced.

Finally, a number of students suggested improvements to the interface between ILA's and streamed clips within LLS, with a request to,

"label questions with week numbers by them so students are aware what question is required for each ILA".

Table 3c Improvement Emerging Themes and Illustrative Quotes

Theme	**Total Number of Comments**	**% of Students Making Statement Theme**	**Illustrative Quote(s)**
Increase Access Areas	16	23%	"allow clips to be accessed from all rooms/facilities in the university" "enable home viewing" "more computers to access it on"
Text for ALL clips	10	14%	"Make each clip available in text format as well" "make the text format more accessible and inform students about this text format" "have text available for all clips"
SHE-STREAM Design	8	11%	"one document book for all the answers" "label questions with week numbers by them so students are aware what question is required for each ILA" "an easier/simpler way to find each clip under the ILA and subject heading"
None	8	11%	
Decrease Clip Length	8	11%	"cut down the clip length – questions would have been easier to answer" "possibly break down the longer answers into more manageable clips, to further aid understanding" "some of the clips were too long"
Assessment Weighting	5	7%	"perhaps it could be worth more towards the overall mark" "increase the % of the weighting of SHE-STREAM activities" "put more emphasis on the streaming"
Additional Viewpoints	5	7%	"other perspectives from other researchers would be interesting" "perhaps a variety of expert opinions" "could perhaps vary the content, maybe have it from different sources"
Improved Sound	4	6%	"improve the quality of the sound" "make the sound quality of the clips better so it is easier to understand the person being interviewed…"
Question/Answer Clarity	3	4%	"make questions clearer" "making the interviews clearer"
Headphone Provision	2	3%	"have earphone available" "provide headphones in B150 as it was difficult to hear what was being said if a number of people were listening to other clips"

CONCLUSION

While very much aware of the non-validated nature of the questionnaire used in this study, initial analysis of the student evaluation of SHE-STREAM is more than encouraging. Given that this was the first delivery of an untested system, it was pleasing to note that the overall volume of positive comments exceeded those offered identifying negative elements of the SHE-STREAM approach. The majority of students reported that the video streamed material was beneficial to their learning and understanding of key concepts and that the streaming format offered a welcome alternative to text based materials. The goals of achieving a resource emphasizing

interactivity and integration appear to have been partially met. On the negative side, students wished that the streamed material was more widely accessible and had accompanying text for all the streamed clips. A minority of students had some concerns about the design of SHE-STREAM but these were not fundamentally problematic. The questionnaire has highlighted those areas to address to further improve the pedagogic value of video streamed content in support of the learning outcomes of the module.

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APPENDICES

Appendix A: SHE-STREAM Student Evaluation Survey Question Stems

Section A

1. How difficult did you find access to the SHE-STREAM clips?
2. How easy was it to understand what you needed to do in order to access a particular clip?
3. Did you feel like you were controlling the technology or was it controlling you?
4. When viewing the streamed clips to what extent did you use the following strategies
   (a) use of pause button
   (b) drag clip backwards to repeat phrase/sentence
   (c) drag cursor back to repeat clip from the beginning
5. Was the teaching rational for using streaming media on this module made explicit?
6. Please indicate where you viewed the streamed video clips
7. With respect to this viewing source, how would you rate the quality of the sound that was streamed?
8. With respect to this viewing source, how would you rate the quality of the video that was streamed?
9. In terms of the clips viewed and the work requested of you, do you consider the clips were (a) too long (b) too short (c) about right
10. Were you aware that the video streamed content could be acquired in a text-based format?
11. Was viewing and listening to the streamed content essential/required in order to successfully complete your understanding of the related topic area?
12. To what extent has the video streamed content improved or added to your understanding of (a) the measurement of anxiety in sport (b) catastrophe theory and research
13. To what extent did you undertake and complete the SHE-STREAM Independent Learning Activities when requested?
14. One ILA suggested you visit some Web resources on Catastrophe Theory, which were available in an attached word document above the video clips – did you undertake this activity?

Section B: Please provide some written comments to the following questions

15. What did you like 'best' about how video streaming was used in this module?
16. What did you like 'least' about how video streaming was used in this module?
17. What suggestions would you make to 'improve' the impact of video streamed content for this module next year?