PURPOSEFUL EXPLORATORY LEARNING WITH VIDEO USING ANALYSIS CATEGORIES

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ABSTRACT

There is still much to be learnt about best practices in leveraging digital resources for learning in higher education. Research on student interactions with online video indicates such practices are as minimal as setting passive-receptive viewing through to teacher-structured purposeful engagement. This position paper focuses on teacher-set analysis categories to guide student exploration of digital video content and to help novices to scaffold their thinking. Various uses of analysis categories within one Australian university in conjunction with a video annotation tool are reviewed. Then practice examples from other universities are reviewed to demonstrate the use of analysis categories in higher education settings without an annotation tool. The literature indicates that the use of categories to inform the design of digital video analysis needs to ensure that the learning challenge is retained. Analysis guided by teacher-set categories tends to be beneficial for performance evaluation in particular. Further research on university teacher practices with digital video is required.

KEYWORDS

Digital Video; Pedagogical Design; Analysis Categories; Higher Education

1. INTRODUCTION

From a higher education context, Laurillard (2012) purports that there is much yet to be discovered and shared about effective teaching with media and technologies. While recognising the learning benefits of digital resources, Laurillard asserts, "they do not drive the development of learners' skills… [which] can come only from the scaffolding [that] the teacher sets up to support learners in the process" (2012, p. 133). While good practice examples can be found, meaningful leverage of educational technology remains patchy (Selwyn, 2007). This includes digital video integration in higher education, where teachers often create conditions for student interaction no higher than passive-receptive viewing (Kay, 2012; Yousef et al, 2014). Video is a better learning resource when students engage actively with its content (Sharples et al, 2014).

Research into tertiary student engagement with video utilising video annotation, across multiple disciplines within one institute (RMIT University), has reinforced the need for attentive teacher design and planning of learning activities that employ digital video. Several key findings from this work highlighted factors to support the cognitive and exploratory learning potential derived from digital video. Some factors relate to general good teaching practices with any media in higher education, such as socio-constructivist based practices (teacher feedback; student-to-student collaboration to achieve meaningful outcomes) and purposeful alignment to assessment (e.g. Colasante, 2011; Colasante & Lang, 2012). Motivation to learn often relied upon clearly communicated and purposeful intended learning outcomes, and structured guidance, demonstrated by some students achieving beyond the required learning interactions with video compared to others not completing basic interaction requirements (e.g. Colasante & Leedham, 2013; Douglas et al, 2014).

This paper collates published cases of tertiary students purposefully analysing video using teacher-set categories. The first set cites examples from one university utilising a video annotation tool, for Laboratory Medicine, Physical Education, Chiropractic, and Juris Doctor students. The next set has practice examples from other universities where students explore video content without an annotation tool, including Business, Speech Pathology, and Psychology students. This collective review invites the reader to contemplate the university teacher's role in pedagogical design to leverage digital video as a tool for learning.

ISBN: 978-989-8533-55-5 © 2016

2. WHY IS TEACHER INTERVENTION REQUIRED FOR STUDENTS TO LEARN FROM DIGITAL VIDEO?

Effective teaching is neither quick nor easy. Laurillard (2012) argues that students acquire and use knowledge differently when engaged in formal and informal learning. Students' motivation to learn in academia differs from their intrinsic motivation to learn in everyday life. Academic learning is complex and teaching requires skills beyond matching learning processes; "teachers must be willing to treat the process as essentially problematic, iterative, and always improvable" (*ibid.*, p.82).

Video is ubiquitous in contemporary learning institutions and in life. Predictions of remarkable growth in online video as prime internet traffic (CISCO, 2013) have been realised, with further growth still to come (CISCO, 2016). Digitalisation of video and advances of the internet and world wide web mean that almost anyone with reasonable internet access can learn something new via informal means at any time they choose, from *YouTube* to a *TED Talk*. Conversely, online video can supply erroneous material and/or overwhelm the viewer with a plethora of detail and choice. In a Delphi study (Snelson et al, 2012), experts in video use across educational sectors highlighted that to be able to effectively use video-sharing technologies within and beyond formal education, students need to develop skills to successfully navigate and utilise video content.

University educators need to rise to the challenge of deep involvement with student learning processes, as well as guide student development of digital literacy skills (Laurillard, 2012), to enable them to intelligently curate and learn from digital information. University teachers set the learning conditions (or conditions for learning). They establish the context within which students learn, by selecting teaching strategies, modes and methods of learning and assessment, supporting tools, and the overall activities required of their students. Learning conditions are inherently complex (*ibid.*), and require of the teacher cycles of scholarly reflection, planning and preparation, monitoring and facilitating, and evaluating and adjusting.

2.1 Technological and/or Pedagogical Solutions

To help students navigate learning with video resources some advocates attempt solely technological solutions, e.g., rendering video more book-like by additional navigational features. Zhang et al (2006) purport that media such as books allow the user to navigate, while videos can be conveyed as "fixed bodies of information… [with] students as passive recipients" unless navigation features of video are optimised, and they developed video interaction "based on queries or search targets" (p.17). In work of a similar nature, Merkt et al (2011) compared 'common' controls of start, stop, forward, rewind with 'enhanced' video navigation. The latter added interactive features of an index and table of contents to enhance video navigation, comparable to navigating a book. Contrary to Merkt and colleagues' expectations, students who had the video experience with basic controls tested better than those with enhanced controls. These responses have a technological rather than pedagogical focus, emphasising ease of nuanced access.

Technology is not the magic enabler; while it has been proven a learning enabler when coupled with pedagogical design (Hannafin et al, 2009), it is not unusual for the advantages of technology to assume attention at the expense of pedagogical design (Ifenthaler, 2010). Deep learning requires purposeful student engagement. This should include reflection on challenging tasks, where student thinking is alert and thorough while searching and inquiring to sum up a situation or formulate a conclusion (Dewey, 1933). Concerted focus on expert representations, effective action, and deliberate practice in complex domains are required to build student performance levels and develop problem-solving processes transferable to other situations (Spector, 2008). Such organisation of thinking may need to be learnt and can be guided by teachers.

The analysis of several practice models of video-based learning with video annotation led to the development of an improved pedagogical framework for tertiary teaching with video (Colasante & Douglas, 2016, evolved from the work of Rogow, 1997, for classroom learning for school children). The prepare-participate-connect process offers a range of strategies adapted for the affordances of digital video use in the tertiary sector (with or without video annotation). It offers foundational pedagogical design considerations that may become lost within the attractiveness of the media and technology on offer. Reminders for teachers to 'prepare' learning experiences include ensuring constructive alignment between video/segments, activities and assessment, specific pedagogical strategy, depth of analysis required, as well as student preparation, such as clarity of purpose of video and expectations. The 'participate' stage refers to teacher guidance in setting the conditions for students to purposefully interact, to monitor student

participation to ensure they interact to purpose, and to provide formative feedback to promote the expected depth of learning. The 'connect' stage refers to explicit connections between the new learning to other experiences including vocational/professional experiences, and methods of debrief, application, journaling, etc. Notable in the evolved framework (Colasante & Douglas, 2016) is the explicit reference to analysis categories.

2.2 Analysis Categories to Guide Student Cognition and Exploration Processes

Students are neither inherently deep nor surface learners; the academic tasks set for them will determine whether they learn deeply from the content (Ramdsen, 2003). "If we are serious about preparing students to succeed in the world, we should not require that they memorize facts and repeat them on demand; rather, we should provide them with opportunities to interact with content, think critically about it, and use it to create new information" (Razzouk & Shute, 2012, p.345). The ideal for many teachers in schools, colleges and universities is to develop independent learners, but when an institutional focus is on passing exams rather than on ways of thinking and practicing, the responsibility rests with the teacher to provide the scaffolding environment that develops independent learners (Laurillard, 2012).

To guide students' critical and purposeful exploration of video within one university, a video annotation tool (MAT) was deployed that required teachers to set video analysis categories. Once set, these presented as titled, colour-coded categories within the tool (Douglas et al, 2015). The students were tasked to critically reflect on and interact with the video content, and to identify and discuss associations to the various concepts (represented by the analysis categories) within the complexity of the content. The intent was to guide students along a process of how experts in the field might structure their thinking to deal with the presented scenario. Specific categories guided students' exploration of work relevant/preparation video content, set by the university teachers in consultation with industry experts and/or educational designers, or as established by relevant professional bodies. Using analysis categories as guidance for critical reflection and interaction with content proved valuable (*ibid.*), however, teachers should be mindful not to over structure the learning for students, e.g., where they are given materials already "defined, refined, subdivided, classified, organized according to certain principles… worked out by… expert[s]" as if their minds are "indifferent or even averse to all logical achievement" (Dewey, 1933, p.81). Over-structuring learning conditions to a point of tasking students to look for individual signs may result in surface learning such as not noticing relationships, compared to deeper learning, initiated by finding the significant concepts or solving problems by relating prior and new knowledge to structure and reorganise content coherently (Ramsden, 2003).

Analysis categories were used to guide the exploration of video content within an Australian university with the aid of MAT, an annotation tool, across trial, pilot and multiple case studies, in vocational, undergraduate and postgraduate courses in a range of disciplines. Some examples are summarised below.

2.2.1 Diploma of Laboratory Medicine

To prepare for hands-on activities in a practical laboratory session, Laboratory Medicine students viewed a teacher-produced video that demonstrated electrophoresis (specific medical science procedures) within MAT (Colasante & Fenn, 2009). The analysis categories, aligned to equipment familiarisation, procedural steps and safety aspects, were utilised over two activities. First, students explored the video in pairs to seek out and enter video-anchored notes on *Recognised equipment/solutions*, and *New equipment/solutions*; then analysed the video again to *Identify the* [procedural] *steps*, and to *Identify hazards*.

2.2.2 Bachelor of Physical Education

To "critically reflect and evaluate physical education teaching practice" (Colasante, 2011, p.66), a third-year undergraduate Physical Education (PE) class (n=31) analysed video recordings of their own teaching practice during placement and that of their peers' practice. The analysis categories were based on eight beginner teaching factors. Students analysed their practice with structural lesson factors such as *Introductory activity* and *Demonstrations*, and periodic actions such as *Checking for understanding* and *ALT-PE* (academic learning time when school students are engaged in PE at their level). A second cycle of recording and analysis was undertaken later in the semester, then each student determined their most improved analysis category to write a reflective development report. The students largely appreciated the ability to analyse their PE teaching practice in MAT using the analysis categories to dissect their practice and to receive feedback.

2.2.3 Bachelor of Chiropractic

To promote clinical thinking, second-year undergraduate Chiropractic students (*n*=72) analysed videos in two cycles of learning (Colasante, et al, 2014). One video of a patient's clinical episode was divided into two parts, (1) establishing the patient history, (2) the physical examination. In the first cycle of learning (and first video instalment), analysis categories were structured with 14 clinical chiropractic analysis categories for building a patient history applicable to a headache presentation. These were the same categories as an eight-point process for non-headache presentations, which were used for history taking in other chiropractic subjects, plus an additional six factors specific to headache. In the second cycle of learning (and final video instalment), each group self-generated their analysis categories based on their findings from the guided analysis of the first video. The students sought evidence that confirmed or negated any of the diagnoses they had shortlisted, then determined a working diagnosis for the patient that they submitted to their teachers. The chiropractic students valued the expert practitioner modelling in the videos. Some students thought that the activities were too controlled by not allowing the flexibility of pacing ahead of the class (*ibid.*). The teachers appreciated the development of the students' clinical reasoning skills and also noted how annotating to each of the analysis categories helped the students to develop chiropractic report writing skills.

2.2.4 Postgraduate Juris Doctor

To develop the knowledge and skills of advocacy, persuasive argument, and court etiquette (Douglas, et al, 2015), postgraduate Juris Doctor (JD) students (*n*=32) analysed a video of a moot (simulated) court proceeding. The JD teachers in consultation with a practising lawyer determined six video analysis categories. These included particular areas that required skill development, such as *Structure of the argument* and *Final submission*, plus a category of *Ethical dilemmas* to signal exploration of a deliberately planted error in practice. The practising lawyer continued to play a role in the students' video analysis, including giving them feedback on their interpretations of the moot court via the analysis categories. The JD teachers noted the value of students' vicarious access to experts in their chosen profession and endorsed the use of the categories to help the students to structure their analysis more like an expert.

3. TEACHER-DESIGNED CATEGORIES FOR VIDEO EXPLORATION

Three published higher education practice examples of video-based learning within other universities are used in this section to explicitly examine their use of categories of analysis in their pedagogical designs, without employing video annotation technology.

3.1 Practice Example: Undergraduate Business

For first year Business degree students (*n*=46) studying a property subject in an Australian university (Barry, 2012), the teacher trialled an activity aimed at improving evaluation and feedback of students' formal in-class presentations. The reason to employ video was to enable critical appraisal of actual performance rather than perceived performance. Group presentation skills were evaluated because they related to future work roles.

Recordings were made of in-class student group presentations delivered via group member turn-taking at a lectern supported by presentation slides. A wiki enabled access to their own group presentation videos, and an assessment sheet guided self and peer evaluations. This allowed "students to view their own group presentations, for self-assessment, in a timely and secure manner" (ibid., p.858). The teacher provided five broad analysis categories in the evaluation/feedback sheets, including background to the topic, three specific property industry themes, and overall presentation quality.

Students viewed their group's recorded presentations for critical evaluation. Direct video interaction enabled only routine player controls; however, student groups used their respective wikis for other communication purposes beyond their original intent for ease of video access and viewing. Each student received feedback on their performance from their group peers and a tutor.

The author (Barry, 2012) identified further measures for deepening the learning experience into the future. The first was to add an interim step post-presentation but pre-viewing to critique their own

presentations from recall alone, for comparison to their eventual video critique to gain additional insight. The second was to add a requirement of writing a short reflective piece on the benefits of the experience.

Student responses to open survey questions indicated appreciation such as "[gaining] a more accurate perspective of how the group performed" from the "audiences' point of view", which tended to suggest a reflective approach was facilitated (*ibid.*, p.858). The analysis categories seemed to help the students to identify "[a]reas to work on", "own faults", "strengths" and "weaknesses" (*ibid.*).

3.2 Practice Example: Undergraduate Speech Pathology

Videos were introduced into two supervised clinical practicum subjects for third-year Speech Pathology students (n=20), in an Australian university (Lewis et al, 2015), to support a new peer review activity to record and peer-evaluate student-to-client interactions with adults or children who had communication difficulties. During placement, the students video-recorded their professional interactions with client consent. The university clinical coordinator supported the students via concurrent on-campus weekly tutorials.

Each week, one student from each group reviewed their own video and chose segments that demonstrated their 'best practice' to bring to a tutorial for peer review and discussion activities. They played their segment/s to their group, sandwiched between explaining the context and later their judgment on why it was good. Their peers were to give encouragement, and then allow silent reflection time before adding comments positively and relating to their own experiences. At the end of each presentation and feedback session, additional reflection time allowed the video-presenting student to deliver a summary of what they learnt from the group, and for the whole group to collate key learning points to submit for assessment purposes.

The speech pathology students reportedly applied theory to practice even though most did not see a strong theory-practice link. The authors interpreted this to mean that the students did not yet see the relevance of relationship building with clients. The video-based learning was found to be "useful in facilitating peer feedback and self-reflection" (*ibid.*, p.12). Some students stated that they would have preferred to receive constructive criticism rather than a solely positive analysis lens. Not all students followed the learning process as expected; either abbreviating or skipping some steps. One student suggested repeat analysis opportunities, including later in the semester to reflect on improved performance.

The authors noted a need to better scaffold reflection activities (e.g. to promote affective learning), and that the purpose of the activity required better communicating as their students "seemed to work through the activity quickly, perhaps not taking the time to reflecting [sic] deeply" (*ibid.*, p.12).

3.3 Practice Example: Undergraduate Psychology

An introductory subject for Psychology students in a university in the USA, with 128 students across four discrete classes (Blessing & Blessing, 2015), aimed to introduce the 'breadth of the field'. Concerns were raised for how students could tie the information together for later recall. A solution was trialled involving a subject-based capstone activity centred on a movie. The activity integrated the content and allowed practice application in contexts outside the subject domain (the scenario depicted in the movie). Students chose one of four themes set by the teachers (aligned to textbooks) as an overarching theme to reflect on the semester of work and relate to the video. However, granular analysis was handled differently between student groups.

The four classes were divided into two experimental and two control classes. The video selection for the former was the movie *12 Angry Men*, which the teachers assessed as having over 90 instances of embedded dialogue or action aligned to psychological concepts. The teachers provided the experimental classes with their pre-determined conceptual breakdown of the movie, that is, all 93 instances of psychological concepts were provided to them by timeline, dialogue, and psychological theming. Students in the control classes were given free choice of movie but not given a conceptual breakdown. Each created a written assessment based on their analysis. All classes held student-generated discussions during their final session, which was viewed as a strength of the overall activity. Other assessment pieces were the same for all the psychology classes.

The authors concluded that the capstone activity for the students across all four classes, "allowed the students to consider how the various psychological phenomena could occur outside the classroom", that is, applied in other contexts (*ibid.*, p.54). Student impact was evaluated through their assessment results. The experimental classes outperformed the control classes in identifying central psychology themes in their video, however, were below the >70% average scores in their another assessment task.

4. DISCUSSION

Designing video-based learning activities utilising analysis categories—like any teaching intervention—does not automatically guarantee learning success. However, as the reviewed practice examples attest to, teacher attention to designing structured guidance to analyse video content can lead to active student engagement and positive learning benefits. The range of published cases presented in summary in this paper used analysis categories to interrogate digital video representations of (1) practical demonstration, (2) own and peer's performance, (3) expert modelling, and (4) complex non-discipline-specific scenarios.

In the undergraduate business case (Barry, 2012), active student exploration of videoed student presentations was promoted by categories in an assessment sheet to guide the novice to articulate their findings. The activity allowed multiple perspectives via feedback on performance, and suggested a deliberate, reflective approach. The activity design would seem to have inspired motivation and trust (ability to see own and group peers' performance in a secure environment), which, by default, seemed to encourage positive learning interactions between the students beyond teacher-set requirements (e.g. some took advantage of interactive affordances of the wiki to further interact beyond set expectations). Barry (2012) suggested future improvements of students further articulating their experiences in both a comparison activity and a journal.

The undergraduate speech pathology case (Lewis et al, 2015) illustrates planned purposeful and collaborative engagement with video content to allow reflection/critique of the students' performance in practical work placement. However, things did not go completely as expected. It seems some constructive alignment was lost when the aim of engaging in reflective practice was circumvented by artificial parameters of reflecting on and articulating good examples of practice only; essentially providing only a single analysis category lens. This seemed to affect the students' ability to recognise conceptual links between theory and practice. Students chose to skip various steps of the activity, illustrating some lack of motivation or commitment to the task, and, possibly, a structure that was too prescriptive, inhibiting authentic interaction. Lewis et al (2015) identified the need to better explain the purpose of the activity to increase motivation.

These business and speech pathology cases employed video representations of own and peers' performance. Both authors identified elements of design improvement, demonstrating a scholarly approach of reflection on university teaching practice. These reflections relate to Laurillard's call for the professional educator to take into account "a complex set of iterative transactions between teachers and learners, and between concepts and practice of the individual learner: to motivate or enable the learner to generate their articulations and actions that modulate their concepts and practice" (2012, p.103).

The psychology activity (Blessing & Blessing, 2015) provided an example where extensive preparation was partially undermined by the amount of guidance provided to the student groups. The movies provided non-discipline-specific scenarios for the students to work with as novices to cognitively apply abstract concepts. Only students in the experimental classes received detailed analysis categories; not the control classes. From the case detail, it can be surmised that the former evidenced more learning of a quantitative nature (more concepts identified albeit with much assistance) while the latter evidenced more qualitative learning (fewer concepts identified as a result of students' own inquiries). Students who received arguably over-prepared analysis categories found more concepts in the videos but did not do as well in a parallel assessment as the other students. This contradiction might initiate a new solution, such as a middle-ground approach where all students receive a set list of psychological concepts to guide exploration of videos, particularly in an introductory class where students are very much novices and require some guidance. Regardless, the individual student analysis and articulation of concepts noted in their respective scenario-based movies, and the culminating class discussion, were key to establishing conceptual understanding.

In these cases as well as those with video annotation, the exploration of own and peers' performance in particular benefitted from structured interrogation by way of analysis categories. In the cases of PE teaching practice (Colasante, 2011), business presentation skills (Barry, 2012), and speech pathology client interactions (Lewis et al, 2015), the provision of focal categories facilitated the ability to look beyond the novelty of seeing self/peers in audiovisual format and focus on key attributes for explicit articulation and identification of further development. Even where the analysis categories were presented perhaps too simplistically via one positive perspective category only, as identified by the students in the speech pathology case (Lewis et al, 2015), value was still noted by a student suggestion to repeat the activity later in the semester for comparison. Miller and Zhou (2007) reviewed two published studies to conclude that explicit instruction of tasks to complete while watching video is required for a deeper level of learning, and in cases

of reviewing teacher practices, to go beyond looking at the personalities in the videos to deeper issues of professional practice. They noted that even "simple variations in viewing instructions can lead to very different experiences with the same video case" (p.329).

Interestingly in the psychology case (Blessing & Blessing, 2015), students were able to apply concepts in scenarios presented in movies regardless of whether they received teacher-determined concepts specific to the movie. Therefore, this case could technically disprove the benefits of guiding student learning via analysis categories. Students without the analysis categories had to formulate their own analysis approach and rose to the challenge. Comparatively, the chiropractic students (Colasante et al, 2014) were tasked to use the guided activities for their first video to develop their own analysis categories for the second video, hence allowing increasingly independent thinking. Clearly teacher design of categories to interrogate video content for learning needs further investigation. However, it is worth pursuing. Students as novices may not yet see the significance of what an expert sees, therefore it may be "necessary to educate their perception because people tend to assimilate what is familiar rather than accommodate to new subtleties… learning to discern often requires special provisions to help people notice" (Sherin, 2007, in Schwartz & Hartman, 2007, p.338).

5. CONCLUSION

This position paper encourages university teachers to take on a designer mind-set in utilising digital video in higher education. While similar calls have been made previously (e.g. Laurillard, 2012), this paper focuses on teacher-set analysis categories to increase student engagement and motivation to learn purposefully from video. Active student participation with video can be aided by the use of well-designed analysis categories that help scaffold student thinking without overly structuring or organising, that may risk robbing students of some of the learning challenge. This paper reviewed published learning with video practice examples that placed emphasis on pedagogical design elements rather than claiming that the media and/or technology was the sole learning enabler. In each case teachers prepared categories of analysis for student participation with video content in various ways, illustrating that such design factors can be applied in higher education with or without an annotation tool. The use of a video annotation tool has proven to be an enabler across multiple prior cases for facilitating learning via analysis categories (as detailed earlier in this paper). Indeed, advances in digital technology have potential to better support and transform learning processes (Spector, 2008). But it is pedagogical design that has been proven time and time again as necessary to underpin effective use of educational technology (e.g. Roberts Becker et al, 2015), despite technology often being attributed with driving engaged integrated learning and higher levels of cognition (Puentedura 2008, in *ibid.*).

Further work could establish which analysis categories are particularly beneficial in guiding student learning with digital video. Categories drawn from this paper include: practical 'how-to' factors to explore a demonstration; performance evaluation; breakdown of expert structured thinking to explore performance or expert modelling; and application of theoretical concepts to general but complex scenarios. Work is also required on a wider plane: what university teachers are broadly achieving with digital media and whether this is transformational parallel to other industries. The author is currently investigating one slice of this, by examining how university teachers' practices leverage digital video to facilitate learning in higher education.

ACKNOWLEDGMENT

Presentation of this paper at CELDA2016 was made possible by an HDR International Conference Grant, granted by the Faculty of Arts and Education, Deakin University.

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