Interface modalities that enhance or inhibit lecturers’ assessment ‘flow’ experiences

Anne Adams
Institute of Educational Technology
The Open University
Milton Keynes, UK
(44) 1908 858 430
A.Adams@open.ac.uk

Wendy Fisher
COLMSCT CETL
The Open University
Milton Keynes, UK
(44) 1908 274 4066
W.A.Fisher@open.ac.uk

ABSTRACT
Creativity and enjoyment in assessment practices maybe an ironic concept but enabling ‘flow’ through appropriate interface modalities (e.g. keyboard, tablet) could have a vital impact on assessment practices. A grounded theory approach was used to analyze a 9 month virtual ethnography of an online lecturer support forum (150 postings), 27 questionnaire responses (student & lecturer) and a further 5 lecturer in-depth interviews. A ‘flow’ analysis identified two levels of activities; the central activity (i.e. assessment focused & student communication tasks) and the physical interface interaction skills (i.e. task focused & interface modality level skills). A balance (both perceived & actual) between all levels of users’ skills and activity complexity is required to enable creative flow. A discussion is given of the concept of perceived asynchronous collaborative ‘flow’ experiences and personal assessment styles (i.e. interventionist and non-interventionist) and the impact of different modalities on these interactions.

Categories and Subject Descriptors
H.3.5 [Online Information Services]: Data Sharing.

General Terms
Design, Human Factors.

Keywords
Flow, Modalities, Online Assessment.

1. INTRODUCTION

Lecturers’ assessment practices are a critical part of the education process. It may be ironic to think of lecturers’ assessment practices as a creative or enjoyable experience (many academics avoid marking) but understanding the relationships between these factors may be invaluable in increasing effective assessment experiences.

Online assessment is perceived by many as related to inhibiting simplistic automated question and answer tools. However, within distance education the multitude of technology enhanced methods to support assessment are noted as invaluable [4, 10]. One critical point, that is poorly research, is how these developments impact on academics’ assessment practices. Interface modalities are argued as a potential barrier or enabler to an experience and its ‘flow’ [12]. The ‘flow’ of an experience has, in turn, been related to an individual’s creativity and enjoyment in that experience [3, 5].

2. BACKGROUND

Most reviews of online assessment systems discuss the developments and benefits of automated online assessments. Chalk [4] evaluated a virtual learning environment (VLE) as a teaching aid in HCI. Although online assessment was not undertaken 84% of the students questioned agreed that on-line assessment and management was a sign of the future of education. Joy et al [10] review the development of an automated assessment application for programming. The authors argue that computer programming is a creative skill that requires ‘deep’ learning that simple questions cannot measure. However, there is no discussion of the inevitable creativity required in marking what is denoted as a creative skill. Similarly there is little analysis of how this application impacts on the academics creative process or work-practices. Bancroft

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& Roe [1] have researched on academics’ assessment work-practices in relation to student perceptions and identified the importance of timely feedback for students from both lecturers and peers. This research also highlighted the usefulness of feedback to students that annotates the coursework (in this case programming exercises). However, as Marshall & Brush [11] identified people’s use of document annotations vary as do their acceptability to share them. A lecturer, for example, may annotate a piece of coursework to support their own assessment practices or as a means of communicating assessment issues with the student. An analysis of these and other assessment practices is poorly researched especially in relation to technical support for these practices.

Interface modality has for a long time been understood as a key element in effective human computer interactions. Oviatt & Cohen [12] argue that multimodal interface design will support a more natural and transparent experience. Recent research by Denning et al [6] into university classroom interfaces (comparing tablet PC pen-input devices with typed text) identified that the choice of modality was not only one of efficiency or naturalness but was also the result of personal, social and other factors. The pen interface was generally preferred over typed text, although the choice was identified as related to student creativity, collaboration and communication. Oviatt & Cohen [12] also refer to interface modality as related to a ‘flow’ within communication. However, there is no analysis of how different modality interact with the creative ‘flow’ for academics work-practices.

Sawyer [15] identified that most studies on creativity have tended to focus on creative activities that result in concrete outcomes. Csikszentmihalyi [5], in contrast, attempts to consider contextual and cultural factors on creativity through the ‘flow’ experience whereby a person is so involved in the activity that nothing else matters. Ceraulo [3] goes on to add that ‘flow’ experiences are an important part of online learning as they increase the quality of the experience. One field of interface research where ‘flow’ has been researched in more depth is that of gaming. The relationship between games and elearning is a growing field of research and it highlights the importance of immersion within elearning environments. Cheng & Cairns [2] have identified that once task immersion (i.e. game immersion) has been achieved it can overcome deleterious usability elements. They go on to argue that system immersion is not only an affective state but also a cognitive one. Pace [13] break-down ‘flow’ in web searching practices into some more detailed elements in relation to activity and related skills, goals and feedback, task concentration, sense of control, action and awareness, and affective experiential issues. The balance between the online activity challenge and relevant skills required is an important point.

Ultimately, the research into flow of assessment practices has been very limited with even less related to the impact of online assessment. This paper, therefore, aims to identify the perceived effectiveness of lecturers’ assessment work-practices when using two different modes of interaction; a keyboard and a pen with tablet PC interface.

2.1 Assessment Interface Modalities
The lecturers used a standard PC and keyboard for their initial assessment process and then used a tablet PC and pen for the second marked coursework. Lecturers routinely used embedded comments, macros, tables, tracked changes and additional comments pages. In figure one the first three examples show positioned and summarized student feedback using a keyboard and PC interface.

Using Tablet PCs Lecturers (fig. 1 last two examples) could provide graphic or textual feedback (using digital ink technology) written on a virtual layer above the students coursework, retaining the coursework lay-out. This then gave the lecturer a reasonably realistic representation of marking with a pen on paper.

Figure 1. keyboard & digital ink positioned and additional comment feedback

3. DATA COLLECTION & ANALYSIS
Perceptual data was gathered about the use of the two technologies for the two courseworks (i.e. coursework 1 / Keyboard, coursework 2 / tablet PC & Pen). A nine month virtual ethnographical study was conducted of an online lecturer forum (for staff development & peer support) which included a tablet PC support guide. A total of 150 postings were analysed. Also, 22 questionnaires were completed by students and 5 by lecturers. Respondents were all assured of anonymity in their responses. Finally, a further 5 lecturer in-depth interviews were conducted to expand on open ended responses within the questionnaire. Questions focused on perceptions of the assessment process (e.g. positioning of feedback) and the impact of the technology on this process.
The strauss & corbin [16] ‘grounded theory’ approach was taken for the analysis of the different data sources. Grounded Theory [7] is a social-sciences theory building approach that can incorporate both qualitative and quantitative data sets. Pace [13] argues that this is an ideal analysis approach for formulating theories about ‘flow’.

4. RESULTS

For both the conventional technology and Tablet PCs, between 80% and 100% of Lecturers believed that it is ‘very’ important to have feedback positioned close to the point being raised in the coursework (see table 1).

An in-depth analysis identified two threads in the online assessment activities that the findings have been grouped into; an assessment focused task and an assessment communication task.

4.1 Assessment Focused Task

The findings identified that modality interface interaction skills either enabled or inhibited flow experiences. A flow experience was identified as supported by the balance between the modality (i.e. keyboard, Pen) and a specific skill (e.g. speed typing, writing) they had:

“If I was typing this as we were talking now I would just be typing it all out; I don’t tend to have to think about what I’m writing. Whereas what I found with tablet PC was going back to handwriting, it was so much slower …” (Lecturer E)

“because you’ve used a pen since you were a toddler, it’s almost a natural part of us whereas the keyboard is an input device … It’s just that psychologically it feels different…it is freedom”. (Lecturer B)

For some ‘flow’ experiences occurred across modalities:

“You know it’s a direct connection between the brain and the finger…immediate flow of the keyboard or the mouse or the tablet, it’s just an extension of my hand. And you know, my thoughts…” (Lecturer A).

However, the findings also highlighted the importance of ‘direct manipulation’ in the interface interactions that pen and tablet modalities afforded and enabling a perceived creative freedom, spontaneity and focused thought:

“Being able to put a pen on the screen and do what you want with it, it just gives you a freedom…You’re doing something with one thing and it’s appearing somewhere else, whereas with the pen technology it’s direct, it’s immediate” (Lecturer B)

“I think with the tablet I was more spontaneous …the tablet was easier to do immediate focused comments”(Lecturer C)

4.2 Assessment Communication Task

When the lecturers referred to their perceptions’ around the student assessment communication activity, similar interaction issues where noted. Again, for some, interface skills allowed a flow in asynchronous communication activities: “how kind of comfortable I was with talking to students through typing” (Lecturer E). The speed of perceived interface interaction was noted as supporting a communication ‘flow experience’. This experience was noted as increasing perceptions of a more synchronous dialogue between students and lecturers. “There was the feeling that you were instantly relating to what they were saying and the thoughts that you had could go in quickly.” (Lecturer C in reference to pen and tablet)

“As I was reading what the student was writing I was thinking about what they were saying and then I was writing what I was thinking using the tablet” (Lecturer C)

It was interesting, however, that the lecturers considered the student’s intended coursework flow. Some lecturers avoided destroying coursework flow with their feedback: “With the conventional one (feedback mechanism) then I am breaking up their flow and in some cases their formatting.” (Lecturer D)

How the student would interpret the positioning of their feedback was also considered:

“That is messy (comments positioned at coursework issue point)... I just reference the different parts which means it doesn’t really matter where I type things…” (Lecturer A)

Some lecturers, however, considered their comments as part of the coursework ‘communication flow’ (between lecturer & student) with comments located close to relevant points:

“I ended up basically inserting comments either in the text where it was relevant to a particular thing in the text or at the end of paragraphs…” (Lecturer B)

The findings highlight that lecturers’ coursework marking behaviours are determined by different approaches to student communication: an ‘interventionist’ or ‘non-interventionist’ approaches. This approach was consistent regardless of interface modalities.

5. DISCUSSION / CONCLUSION

This paper has identified two distinction assessment related tasks; an assessment focused task and an assessment communication task. In the assessment focused task
interface modality impacted on task ‘flow’ most especially when individual skills and abilities clashed with the modality (e.g. speed typist using tablet interface). According to Csikszentmihalyi’s [5] research, ‘flow’ relates strongly to the environment in which a participant engages. His research identifies that only a small percentage of people, known as ‘autotelic’ personalities, have the ability to create flow experiences regardless of the environment. Most people, he argues, only engage in flow experiences when the environment is conducive to it. Our findings also corroborate these and those of Pace [13] who defined one characteristic of flow being the balance between activity challenges and the skills to deal with them. We have found, however, that with online assessment there are two levels to these activities; the central activity or task (i.e. assessment focused task, assessment communication task) and the interface modality level skills. Ultimately an academic may have flow in the assessment task which is stopped by poor interface modality skills. Conversely a lecturer could be ‘flow’ enabled within the interaction by the modality & their skills in using it but not in the assessment task.

An interesting finding is the impact of ‘flow’ in social interaction within a personal task with asynchronous communication. Ultimately even when someone is working individually on a personal task (e.g. marking) there is a perceived collaborative element. A lecturer may empathize with how the student meant the coursework to look and responds accordingly, they may also tailor their tasks to support appropriate feedback. There is, therefore, a perceptual asynchronous collaborative ‘flow’ experience (e.g. assessment communication & feedback) as well as a personal one (e.g. assessment task). A perceived social context is therefore an important factor within some personal tasks.

Reeves & Naas [14] previously identified that within real and virtual worlds the assumptions people make, and thus their perceptions, are often governed by social norms whether a computer system was designed to cater for them or not. Both Goffman [8] and Giddens [9] suggest that our behaviours are framed within a specific situation where social norms guide our ‘presentation of self’ for others. The findings of this paper, identified that social norm factors interacted with the mode of interaction to inhibit ‘flow’ and ‘creativity’. Ultimately when analyzed an assessment task is full of rich creative and social complexities which must be fully understood to help design effective online support.

6. ACKNOWLEDGMENTS

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7. REFERENCES