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Richness, redundancy or relational salience? A comparison of the effect of textual and aural feedback modes on knowledge elaboration in higher education students' work

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ABSTRACT

This study examines the effects of formative assessment feedback commentaries utilizing textual and aural media on the quality of knowledge elaboration within the written work of a sample of 104 higher education students. A randomized, mixed methodological approach was adopted that examined changes within the students' work over a period of one academic year as a function of the feedback medium. The research outcomes indicated that whilst there were some improvements in very specific elements of the students' contextual knowledge elaboration that appeared to be related to qualities within the audio feedback, these were not significant and thus further research is required to explore the effects of audio media on elements of elaboration. However, analysis of students' qualitative comments suggests that feedback may serve simultaneously to reinforce and undermine tutor–student relationships as well as influencing the students' attitudes towards academic progress in general. This research assists not only in the furtherance of understanding the place of media in progressing students' knowledge elaboration within their studies, but also in comprehending the relationship between perception and actualization of learning development and progress.

1. Introduction

Learning in higher education necessitates not only the acquisition of disciplinary knowledge, but also the development of a diverse range of skills, ranging from metacognitive ones, such as critical thinking and problem solving, to socio-cultural ones, such as collaboration and communication. One process standing behind the structures in which cognitive and socio-cultural skill development intersects with disciplinary understanding is that of knowledge elaboration (Ding, 2009; Kim & Van Dusen, 1998; Reigeluth, 1999; Weinberger, Stegmann, & Fischer, 2007), the process of utilizing prior academic and personal knowledge to continually expand and refine novel material and construct new material. For teachers it is epistemologically significant because it provides a clear pedagogic rationale to both communicate 'privileged knowledge' (Toth, Suthers, & Lesgold, 2002; Walker, 2009) and to signpost paradigmatic points such as 'threshold concepts' (Flanagan, Taylor, & Meyer, 2010) that may act as gatekeepers to both greater learner engagement and deeper disciplinary understanding.

One critical factor in the development of skill in all knowledge building, including elaboration, is the effective application of formative feedback during assessments of learning (Shute, 2008; Taras, 2006). There is agreement in the literature (see for example Crisp, 2007; Walker, 2009; Goodman, Wood, & Hendrickx, 2004; Nicol & Macfarlane-Dick, 2006) that combinatory feedback is the most effective strategy in metacognitive process development. Such feedback utilizes both Verification, the judgement of whether an answer is correct or incorrect, and Elaboration, the informational and discursive component providing relevant cues to guide the learner towards a correct answer (Shute, 2008). According to Oh and Jonassen (2007), knowledge elaboration has particular challenges for formative feedback to be properly effective, since it rests on seemingly conflicting task domains, involving the understanding of tensions between personally and institutionally-acquired knowledge, and between accepted and contested disciplinary knowledge. Great demands are therefore placed upon assisting learners with knowledge elaborative assessments (Berlanga, Van Rosmalen, Boshuizen, & Sloep, 2012): feedback must be able to convey not only what high-level elaboration looks like, but also encouraging positive motivational beliefs around personal knowledge,

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whilst ultimately discriminating strong and weak performance. However, although research shows that students can improve their capacity to elaborate knowledge (Carvalho & Pimenta, 2007; Nicol & Macfarlane-Dick, 2006) the mechanism of how to enhance formative feedback in support of knowledge elaboration has not been fully explored in the current literature: our research helps to address this gap.

Recent assessment research (Cebeci & Tekdal, 2006; Chang, 2010; Evans, 2008; Kirkwood & Price, 2005; Lunt & Curran, 2010) suggests that multimedia has several distinct affordances in formative assessment-related knowledge development. Its multidimensionality, including the richness of knowledge and vocal cues, timeliness of feedback return, ease of access, culturally-appropriateness, discretion, and social presence, not only help learners identify superficially conflicting and overlapping core concepts, but also assist in equalizing diverse learning backgrounds and experiences (Berlanga et al., 2012; Rockinson-Szapkiw, 2012). Indeed, research makes ambitious claims for learning enhancement through multimedia feedback: Clariana and Wallace (2007) claim that visual graphics help learners understand individual and collaborative contributions to essays and thus model personal and social conceptual interpretations, whilst Sigrist et al. (2011) have found that independently superimposed aural feedback on discrete visualizations improve learners' complex motor tasks by matching task specificity to dynamic assessments of ability.

However, the existing studies co-relating learning development and feedback medium expose conceptual gaps, typically focussing solely on either person-related success factors, such as learner resilience and learner self-efficacy, (Lane & Lane, 2001; Mory, 2004; Nicol & Macfarlane-Dick, 2006) or alternatively, situation-related success factors, such as the technical limitations of the technology used (Lunt & Curran, 2010; McKinney, Dycka, & Lubera, 2009; Sandars & Schroter, 2007). In addition, research explicitly linking knowledge elaboration to aural feedback is scarce. As both Irons (2008) and Nortcliffe and Middleton (2007) have suggested, and more recently, Olesova, Richardson, Weasenforth, and Meloni (2011) have pointed out, there is little published empirical research on the use of audio feedback within the higher education context, whether to investigate particular learning gains such as knowledge elaborative skill, or to evaluate the relative impact of feedback on student attainment.

Our study aims to contribute to the literature, intending to deepen the relation between knowledge elaboration and the mode of formative feedback through both quantitative analysis of elaborative structures and qualitative exploration of students' experiences of feedback. Two purposes framed the investigation:

1. To compare the impact of two formative assessment feedback mechanisms, one textual, one aural, on the nature of written work within a group of university students, and to examine the efficacy of each mechanism in relation to the extent of knowledge elaboration;
2. To gain an in-depth understanding of the experiences of the students as they encountered differing types of media within their feedback and to explore their perceptions of the efficacy of multiple media use in assessment and learning.

2. Theoretical background

2.1. Affecting the processes of knowledge elaboration: the role of formative feedback

Over the last decade, many studies in the higher education context have shown that mechanisms by which learning can be enhanced appear to centre on the notion of 'deep learning', a key concept intrinsic to this being 'knowledge elaboration' (Gardner & Wood, 2009; Race, 1999; Shute, 2008; Taras, 2006). There is agreement in the literature (Ding, 2009; Kalyuga, 2009) that all knowledge elaborations will contain some of these basic elaborative elements: Organizing concepts, Sequencing ideas, Integrating novel information, Integrating prior knowledge, Restructuring information, and Constructing new knowledge.

These elaborative elements may be structured into three levels, that are hierarchical in their conceptual demands: 'Organizing concepts' and 'Sequencing ideas' together constitute 'superficial fact' elaborations (Scheiter, Gerjets, Vollman, & Catrambone, 2009), and may be understood as 'categorization' activities; 'Integrating novel information' and 'Integrating prior knowledge' comprise 'deep principle' elaborations, and are next in the hierarchy of complexity, principally requiring imaginative and consequential thinking. Finally, 'Restructuring Information' and 'Constructing new knowledge' require synthesis of the former two elements, and therefore involve performing steps to accomplish some outcome-related knowledge purpose, for example a novel idea, or innovative method. The extent of knowledge elaboration may be measured through the proportion of 'deep principle' elaborations – the integration elements – compared to 'superficial fact' elaborations – the organizing and sequencing elements.

Knowledge elaboration is not necessarily progressive however: the mechanisms by which levels of deep principle elaboration are attained are frequently cyclic and iterative and rest both on learners' appreciation of their academic and personal prior knowledge and the significance that they attach to it (Hounsell & McCune, 2002). This is a most important point in the context of many current higher curricula: according to Luntley (2002) and Maire (2010) the increasing inclusion of practice placement learning in many academic programmes is problematic for many students since it requires them to discriminate the epistemological legitimacy of personally acquired experiential knowledge and institutionally acquired academic knowledge. Several studies (Gibbs & Simpson, 2004; Kirschner, Paas, & Kirschner, 2009; Piolat, Olive, & Kellogg, 2005) have demonstrated that the cognitive links between new and prior elements of knowledge are frequently tenuous, but they may be strengthened and sustained when either personal critical factors are present during learning episodes, such as 'psychological contracts' or personal salience (Gleaves, Walker, & Grey, 2008; O'Keefe, 2008), or when particular situational exposing and reinforcing activities are utilized, such as dialogic learning in the form of regular formative feedback (Ding, 2009; Moreno, 2004).

Studies of learners' development of knowledge elaboration (Gardner & Wood, 2009; Goodman et al., 2004) indicate strongly that the practice of formative feedback on written work may be significant in moving learners' conceptual development from surface to deep levels, marking a clear shift from the lower hierarchical elaborative structures of organization and restructuring to the higher levels of connecting and constructing. However, formative feedback attends to elements of knowledge elaboration in diverse, often implicit, ways. For example, formative feedback carried out as a group exercise exposes students to the process of knowledge discrimination due to the greater extent of shared prior knowledge but individuals have different levels of elaborative ability so their use of the group feedback may not be as intended for the least able (Weinberger et al., 2007). Likewise, Graesser, McNamara, and VanLehn (2005) point out that many textual feedback commentaries impact on the overall development of knowledge elaboration only at a quantum level. Moreno (2004) disagrees however,