How do Academics Experience Use of Recorded Audio Feedback in Higher Education? A Thematic Analysis

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Abstract—**Our Work in Progress Paper in Research to Practice Category focuses on use of recorded audio feedback (RAF) in higher education. RAF is one method for providing feedback that is becoming increasingly popular, especially in e-education. According to previous studies, most learners have an overall positive attitude towards RAF. However, many of the studies have been carried out from learners' point of view. To complement RAF research, we study how academics experience use of RAF as a feedback method. We adopted a qualitative content analysis approach, applying thematic network analysis to the data received from four case academics. This approach proposes graphical networks as an aid for analyzing and synthesizing qualitative data into basic, organizing and global themes. The thematic network analysis produced two global, nine organizational and 45 basic themes. The two global themes were named "Dialogue diversification" and "Load reduction". Based on our analysis, academics can, by using RAF, provide learners more relaxed and dialogic feedback and reduce their own workload both mentally and physically.**

Keywords—Work in Progress, recorded audio feedback, RAF, academics, higher education, distance learning, e-education, thematic network analysis

I. INTRODUCTION

Recorded audio feedback (RAF) can be defined as formative and/or summative messages that are recorded and distributed by academics as digital audio files to individual learners or learner groups in response to both on-going and submitted work [1]. The aim of our study is to shed light on how academics experience using RAF as a feedback method. The objective is to identify academics' perspectives to RAF by thematic analysis of the research data, which might reveal challenges and indicate good RAF practices for engineering and computing (e)-education.

Based on our study, we propose that RAF can be a complementary or an optional feedback medium in engineering and computing (e)-education for daily practice. By means of RAF, academics can provide learners more detailed, richer and bespoken feedback and at the same time reduce their mental and physical workload. On the other hand, sensitivity in using human voice by oneself was experienced as troubling in the beginning.

Throughout this paper, the term 'learner' refers to the person receiving the feedback, while the term 'academic' refers to the individual giving the feedback. We begin by summarizing RAF research as our theoretical framework in Section II. Our study context and research method are introduced in Sections III and IV respectively. Preliminary findings are presented in Section V. We conclude and discuss our future work in Section VI.

II. THEORETICAL FRAMEWORK: RAF RESEARCH

The increasing use of technology-based e-education environments and tools in higher education promotes the development of new approaches to enhance the methods and the quality of feedback given to learners [2]. Providing feedback is an essential part of the teaching and learning process and can be utilized by learners to enhance their future academic performance [3, 4]. Effective feedback needs to (a) explain what progress is being made toward the study goal or study objective, (b) explain how the learner has performed and (c) provide advice to help the learner improve [5, 6].

Previous studies [2, 7-13] have found that most learners have an overall positive attitude towards RAF. The underlying reasons for this attitude include the following: (a) academics can say a lot more in five minutes than they can write in the same amount of time, (b) audio feedback means clearer feedback; more detail means less ambiguity, and speech can communicate meaning beyond the words, (c) vocal emphasis and variations of pace can focus attention on the most important or complicated aspects and (d) audio feedback feels more personal than written feedback, especially in the case of distance learning.

The studies of effectiveness of supervisors' RAF have concluded that learners utilized RAF in different and more meaningful ways than they did written feedback learning [14, 15]. It has also been noted that RAF bridges a gap between the learner and the supervisor and is a time-saver for the supervisor [6, 15, 16-18]. Some studies suggest that RAF may play an

important role because of its dialogic nature in Kolb's learning cycle, allowing learners to reflect on their experiences and use feedback from supervisors and peers to process, take ownership of, and integrate their new ideas into future assignments [10, 19-21].

III. STUDY CONTEXT

Using a semi structured questionnaire approach (Table 1), the experiences of four academics (participants P1, P2, P3 and P4) were collected, transcribed, and analyzed. All participants were academics in engineering and computing education with over ten years teaching and supervising experience. Pedagogical models used by three case academics (P1-P3) working on e-education environments were problem based learning (PBL) [22], progressive inquiry (PI) [23] and social learning (SL) [24]. Common to these models are: (a) they are suitable and often used in e-education and (b) supervising teachers adopt the role as facilitators of learning, guiding the learning process and promoting an environment of inquiry for attempting to get learners to apply knowledge to new situations.

Participant P1 and P2, both females, were experienced users of RAF and two (P3, P4), both males, were novices with RAF. The participants used RAF in advanced and basic level courses both in contact and e-education environments for commenting exact programming exercises, writing assignments, learning diaries and group work reports as well as for commenting bachelor and master theses. All participants were teaching and supervising with their native language. The study was carried out during the autumn term 2017.

Technical preparedness and skills related to RAF and e-education environments were very good among the participants. Audacity, a free, open source, cross-platform audio software for audio recording, and Moodle, a free and open source e-education environment, were used for RAF creation and delivery by two participants (P2 and P3).

TABLE I.   SEMI-STRUCTURED INTERVIEWS FOR ACADEMICS

Why did you decide to use recorded audio feedback?
What other forms of feedback are you using and how does these work with the recorded audio feedback?
Does the recorded audio feedback replace or complement other feedback that you have been using?
How deep (scale: very general - very deep and detailed) feedback did you give and what structure did you use in your RAF?
What was your RAF teaching/supervising context?
How did you experience recording audio feedback? Did you find advantages and/or disadvantages or barriers (tone of voice)?
How long (in minutes) are your RAF files - generally speaking?
How and where did you produce the audio feedback?
How use of RAF has impacted on your workload?
How scalable is the RAF approach you are using?
How and when did you distribute the audio to the learners?
How have your learners responded to the feedback ?
Did RAF support your pedagogical model?
Will you continue to use recorded audio feedback?
If any, what will you change in your feedback methodology and why?

Also university's own e-education environments, which included built-in support for RAF, were used (P1 and P2). RAFs were delivered via Dropbox by one participant (P4).

The lengths of the RAFs were most often 5-10 minutes. The RAF structure (template) (Figure 1) created by the first author of this paper [12] was given to the participants as an introductory reference, and they were free to use or not to use the template when they prepared their RAFs.

Course name and code
Feedback phase in case RAF is given in several phases
Supervising teacher
Learner/learner group
Assignment objectives and evaluation criteria
Message for the learner/learner group
MODULE_1: meta-level RAF including comments that concern the assignment as a whole
MODULE_2: middle-level RAF including comments that focus on ideas and the evidence supporting them, as well as how the ideas were expressed at the paragraph/sentence level
MODULE_3: micro-level RAF including all the basic technical issues of writing and referencing sources
MODULE_4: criticism
MODULE_5: appreciations of learners' work
MODULE_6: discussion and advice at the general scientific level

Fig. 1.   RAF template.

IV. THEMATIC NETWORKS ANALYSIS

Thematic networks analysis is a step-by-step method for analyzing and synthesizing qualitative data [25]. The method collects textual data and organizes the information into a network diagram. By means of thematic networks analysis the textual data is broken down into manageable clusters of patterns and themes. It explores the relationships between an idea or a topic from a micro to a macro perspective. Thematic networks analysis has three classes of themes (Figure 2) [25]. (1) Basic Themes are simple premises, lowest-order themes, of the collected data. Basic Themes say very little on their own. As they are clustered together, they start complementing each other and form organizing themes. (2) Organizing Themes, as middle-order themes, assemble basic themes into similar clusters forming an argument or position about the situation. They both group the main ideas proposed by several Basic Themes, and dissect the main assumptions underlying a broader theme that is especially significant in the texts as a whole. In this way, a group of Organizing Themes constitute a Global Theme. (3) Global Themes filter organizing themes into one insight that summarizes a comprehensive issue. They are super-ordinate themes that summarize and make sense of clusters of lower-order themes abstracted from and supported by the data. Thus Global Themes tell us what the texts as a whole are about within the context of a given analysis.

The thematic network analysis approach also encourages discussing possible connections and tensions inside and between the networks, which is illustrated by dash line in Figure 2.
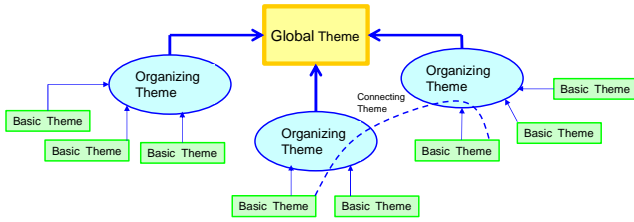
Fig. 2. A basic structure of a thematic network analysis [25].

The analysis process proceeded as follows. The participants were told that they can record or write down their answers to the semi structured questionnaire. The data received were transcribed. The first author filtered out 61 samples from the transcribed data and derived basic themes from these samples. The same person grouped the basic themes into similar clusters forming organizational themes, and finally summarized organizational themes in the form of two global themes. Thus, the analysis produced two thematic networks. Validation of the process was carried out by randomly separating 20 samples of the 61 samples corresponding 33 % of the whole data. The cross-checking was carried out by the second author of the paper, who was not a participant of the case study itself. As a result, one basic theme was added and three basic themes could belong into two organizational clusters depending on the viewpoint. The process altogether included iterative reviews of the data, and, resulting from discussions between the first two authors, one of the global themes was renamed. The paper was reviewed by the last two other authors who were study participants. They regarded the themes as illustrative, indicating internal validity.

V. FINDINGS

The thematic networks analysis of our study produced two global, nine organizing and 45 basic themes. The two global themes were named "Dialogue diversification" and "Load reduction". Dialogue diversification refers to versatile and enrichment aspects of RAF reported by the participants. Load reduction concerns topics related to decreased mental and physical stress due to use of RAF reported by the participants.

A. Dialogue diversification

A thematic network titled *Dialogue diversification* is illustrated in Figure 3. The network shows the different organizational and basic themes of dialogue diversification in RAF context.

All participants reported experiences of *communication style*. They felt that they could use their *tone of voice* to add semantics (supportive, instructive, critical in constructive way, motivational, conversational) to RAF. However, only the participant P2 reported to have used it whereas others kept their voice neutral. The participants P1, P2 and P3 felt *relaxed* when talking to their learners via RAF. P1 and P2 said: "I felt like I am discussing with my learners when I am creating a RAF. It is *personal*, as my learners have pointed out, and *fun* to work with RAF."
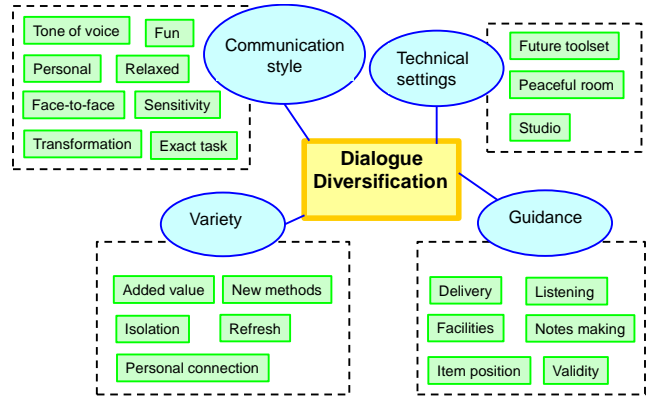

Fig. 3. Thematic network for global theme "Dialogue diversification". Themes are indicated in *italics* in the text.

The participant P4 highlighted a very interesting theme, *transformation* of supervisor's thinking process to a learner while creating a RAF by thinking and speaking–"RAF is like a comment soundtrack." According to P4 the thinking process is easy to transmit with RAF but not with email feedback. However, P4 emphasized the *sensitivity* of giving negative (constructive) feedback via RAF without *face-to-face* dialogue: it felt difficult and unpleasant. To overcome this challenge, *face-to-face* dialogue would be needed first, before continuing with RAF. In this case, RAF served as a complementary feedback medium. In some elementary level courses related to programming assignments, the participant P4 reported that it is much easier to provide exact feedback through writing as compared to RAF. The RAF research literature also supports this observation, reporting that RAF is more suitable feedback method for writing style assignments than for *exact tasks* such as mathematical or programming exercises [8, 13].

Furthermore, related to global "Dialogue diversification" theme, all participants highlighted the importance of *guidance* to learners about RAF. The guiding included both technical and content related aspects. First, it is important to inform learners the technical issues such as the *facilities* they need to listen RAFs, how their RAFs will be *delivered*, how learners are informed, when RAFs are available–is it done by the academic via email or by automatic message from their e-education system, and how long the RAFs are *valid*. Secondly, related to guiding communication about RAF content itself, learners should be given instructions on *listening* and *making notes*. The participants P1 and P2, both experienced RAF users, guided their learners first to listen the whole RAF once and then listen to it comment by comment and *make notes*. The participant P3 pointed out that in case where learner's assignment was very well done, it is pedagogically good practice to set appreciations at the end of RAF instead of in the very beginning of RAF. The reason for *positioning* appreciations at the end of RAF was that the learner will more probably listen the whole RAF than if appreciations will be at the beginning of RAF.

Three participants (P1, P3 and P4) reported ideas related to *technical settings* for RAF such as a *peaceful room* or *studio* for creating RAFs and special "*future toolsets*" for creating, editing, managing and archiving RAFs.

By *variety* participants wanted to *refresh* their everyday working processes to avoid getting bored of their work–variety is the spice of life, they think. All participants thought that RAF can indicate *added value* to traditional feedback methods. As all participants of this study have long experience in higher education, they were also enthusiastic to search, implement, test, and develop *new methods* in communication, dialogue and feedback giving, especially important issues in engineering and computing e-education context. Three participants (P1, P2 and P3) reported that they could reduce learners' feel of *isolation* and lack of *personal connections* by means of RAF, which can be features of studying in an e-education mode.

B. Load reduction

The second global theme related to *load reduction,* in other words how case academics felt that their *cognitive load* and *physical load* decreased by using RAF. The thematic network is shown in Figure 4. The network illustrates the different organizational and basic themes related to load reduction.

Related to *cognitive load*, the participants P1 and P3 highlighted how they felt *positive mood* when they spoke to their learners via RAF by *informal* manner. P3 said that the *cognitive load* decreased when speaking the *dialect* of his own instead of using *literary language*. The argument was that a colloquial language is generally acceptable in speech. Instead, in emails the *literary language* is commonly expected in dialogue between an academic and a learner. Writing *literary language* was considered to take longer time and thus cause cognitive stress, especially under heavy *workload* in big courses and with tight *schedules*.

Flexibility came up from a pedagogical viewpoint. The participants P1, P2 and P3 reported that RAF is *pedagogically* flexible. It can be used with *pedagogical models* such as *PBL, PI* and *SL*–models used by P1, P2 and P3 in their e-education.

All case academics reported the *scalability* of RAF, in other words that RAF can be used with different *types* of learners' writing *assignments* such as course reports, group works, individual works, learning diaries, theses and article drafts. However, they highlighted that clear, assignment specific
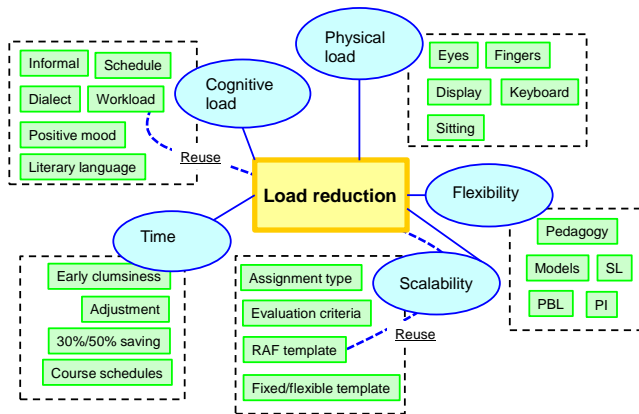

Fig. 4. Thematic network for global theme "Load reduction". Themes are indicated in *italics* in the text.

evaluation criteria should be created and used with RAF. The given *RAF template* (Figure 1) which participants were free to test or not to use at all caused different opinions. On the one hand, the *fixed* template was considered as a good solution. On the other hand, an on-demand structure of RAF was considered *flexible*. The RAF structure was the issue that caused most opposite reactions among the participants. One reason for this might be the diversity of teaching assignments.

The participants P1, P2 and P3 reported about *physical* aspects when using RAF. P1 noted that *eye* strain decreases with RAF compared to working with *display* terminals. This is very important issue if a person has problems with eyes. P2 commented that continuous use of a *keyboard* exposes to painful cracks in *fingers*, which forces to use gloves–this problem can be avoided with RAF. Moreover, too much *sitting* during a working day was considered unhealthy; academics can flexibly stand when creating RAF.

All participants reported issues related to *time*. Novice users of RAF (P3 and P4) told that in the very beginning RAF took more time than writing feedback by email–*early clumsiness*. However, this was a passing phenomenon, and very soon they felt to be more *adjusted* to RAF. The participant P3 approximated *30% saving* of working time compared to time used when writing feedback via emails. The participants P1 and P2, expert users of RAF, approximated *50% savings*. Under tight *course schedules*, time savings affect cognitive workload decreasingly.

VI. Conclusions

This study reported academics' experiences of use of RAF. The benefits reported concerned more versatile communication measures and reduction in cognitive and physical load. Overall attitude of the participants towards RAF was positive. Participants also reported unpleasant feelings from sensitivity of using human voice, sitting alone in workrooms. Altogether the participants said they will continue using RAF. Three of them reported that they intent to use RAF only or a combination of detailed RAF and written summarizations. One participant, who noticed difficulties in applying RAF to programming related feedback, will continue testing RAF in non-exact task settings. The participants highlighted that RAF is more suitable for writing type learning tasks than exact exercises. All participants asked their students to communicate back about RAF. Their learners had sent positive feedback.

Our future research questions will be based on the identification on connections and tensions between the themes. An example of a connection is *reuse*, which describes the relationship between *scalability* and *cognitive load*: by means of the *RAF template* academics are able to scale their RAF to different types of learners' assignments (Figure 4). Reuse can decrease academics' *cognitive load* by diminishing *workload*.

To make adoption of RAF smoother, a supporting colleague or even creating RAF together with a colleague could provide the means to decrease the threshold of RAF implementation. Also, technical facilities should be made accessible.

REFERENCES

[1] A. Middleton and A. Nortcliffe, "Audio feedback design: Principles and emerging practice," International Journal of Continuing Engineering Education and Life-Long Learning, vol. 20, pp. 208-223, 2010.

[2] A. J. Cavanaugh and L. Song, "Audio feedback versus written feedback: Instructors' and students' perspectives," Journal of Online Learning and Teaching, vol. 10, pp. 122-138, 2014.

[3] E. K. Molloy and D. Boud, "Feedback models for learning, teaching and performance," in Handbook of Research on Educational Communications and Technology, J. M. Spector, M. D. Merrill, J. Elen, and M. J. Bishop, Eds. New York: Springer, 2013, pp. 413-424.

[4] M. Taras, "Assessment – summative and formative – some theoretical reflections," British Journal of Educational Studies, vol. 534, pp. 466-478, 2005.

[5] D. J. Nicol and D. Macfarlane-Dick, "Formative assessment and self-regulated learning: A model and seven principles of good feedback practice," Studies in Higher Education, vol. 31, pp. 199-218, 2006.

[6] B. M. Schwartz and R. A. R. Gurung, Evidence-based Teaching for Higher Education. Washington, DC: American Psychological Association, 2012.

[7] L. A. Stern and A. Solomon, "Effective faculty feedback: The road less travelled," Assessing Writing, vol.1, pp. 22-41, 2006.

[8] A. J. Cann, "Engaging students with audio feedback," Bioscience Education, vol. 22, pp. 31-41, 2014.

[9] A. J. Cavanaugh and L. Song, "Audio and written comments in an online undergraduate composition class: Student and instructor approaches and preferences," American Journal of Distance Education, vol. 29, pp. 248-259, 2015.

[10] E. Chew, "To listen or to read?" Audio or written assessment feedback for international students in the UK," On the Horizon, vol. 22, pp. 127-135, 2014.

[11] +B. Eckhouse and R. Carroll, "Voice assessment of student work: Recent studies and emerging technologies," Business Communication Quarterly, vol. 76, pp. 458-473, 2013.

[12] A. Heimbürger and V. Isomöttönen, "Moderating cultural effects in a higher e-education? Supervisor's tone of voice in recorded audio feedback," IEEE Frontiers in Education Conference, Indianapolis, Indiana, USA, pp. 1-5, October 2017.

[13] A. Heimbürger, "Using recorded audio feedback in cross-cultural e-education environments to enhance assessment practices in a higher education," Advances in Applied Sociology, vol. 8, pp. 106-124, 2018.

[14] J. McCarthy, "Evaluating written, audio and video feedback in higher education summative assessment tasks," Issues in Educational Research, vol. 25, pp. 153-169, 2015.

[15] W. Munro and L. Hollingworth, "Audio feedback to physiotherapy students for viva voce: How effective is "the living voice"?," Assessment and Evaluation in Higher Education, vol. 39, pp. 865-878, 2014.

[16] J. Gould and P. Day, "Hearing you loud and clear: Student perspectives of audio feedback in higher education," Assessment & Evaluation in Higher Education, vol. 38, pp. 554-566, 2013.

[17] T. Lunt and J. Curran, "Are you listening please?" The advantages of electronic audio feedback compared to written feedback," Assessment & Evaluation in Higher Education, vol. 35, pp. 759-769, 2010.

[18] A. Ryder and C. Davis, "Using audio feedback with distance learning students to enhance their learning on a postgraduate certificate in higher education programme," Student Engagement in Higher Education Journal, vol. 1, pp.1-10, 2016.

[19] D. A. Kolb, "Experiential learning: experience as the source of learning and development," 2nd ed., Upper Saddle River, NJ: Pearson Education, 2015.

[20] C. Hennessy and G. Forrester, "Developing a framework for effective audio feedback: a case study," Assessment & Evaluation in Higher Education," vol. 39, pp. 777-789, 2014.

[21] R. Trimingham and P. Simmons, "Using audio technology for student feedback," The Higher Education Academy, pp. 1-7, 2010.

[22] J. R, Savery, "Overview of problem-based learning: definitions and distinctions," Interdisciplinary Journal of Problem-based Learning, vol. 1, pp. 9-20, 2006.

[23] K. Hakkarainen, "Emergence of progressive-inquiry culture in computer-supported collaborative learning," Learning Environments Research, vol. 6, pp. 199-220, 2003.

[24] A. E. MacGillivray, "Social learning in higher education: A clash of cultures," in Communities of Practice, J. McDonald and A. Cater-Steel, Eds. Singapore: Springer Nature, 2017, pp. 27-45.

[25] J. Attride-Stirling, "Thematic networks: an analytic tool for qualitative research," Qualitative Research, vol. 1, pp. 385-405, 2001.