Disturbances and contradictions in an online conference

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ABSTRACT

This article analyses participant experiences and statements about perceived problems in three online conferences to identify tensions and disturbances relating to external factors, conference technology, online discussions and design choices and then considers the underlying contradictions within the conference systems which generate both positive and negative experiences of participation. The analytic stance is based on cultural historical activity theory (CHAT) since this approach gives a framework to understand and explain dilemmas, tensions, disturbances and possible contradictions as drivers for change in socio-technical systems. The article ends with reflections on the implications for designers of online conferences as convenors and technology stewards.

Keywords: *Online conferences, disturbances, contradictions, design, cultural historical activity theory.*

1.0 INTRODUCTION

Online conferences are complex socio-technical systems. Designers of online conferences are both convenors (Cashman, Linehan, Purcell, Rosser, Schultz, & Skalski, 2014; Neal and & Neal, 2011) with a primary focus on design of social systems, and technology stewards (Wenger, White, and & Smith, 2009), with a primary focus on the effective use of online environments to support authentic and productive communication and learning across a conference. Both aspects require a subtle understanding of the constraints and opportunities presented by tensions within the activity system of the conference. The research setting for this article is the e/merge series of online conferences on the use of educational technology in African universities which were offered in 2004, 2006, 2008 and 2012 by the Centre for Educational Technology (2008) at the University of Cape Town.

This article uses theoretical resources of cultural historical activity theory (CHAT) to make sense of some of the dynamics of a series of online conferences in order to explain the source of both the successes and challenges experienced by conference organisers and participants. CHAT is particularly useful in the analysis of complex socio-technical systems because the analytic concepts and the explanations make it possible to understand how underlying historical contradictions affect the observed behaviour of the system. The analytic concepts support the analysis of multiple relationships within the system, including the influence of human agency, mediation of activity by tools and signs, and tensions and contradictions which create opportunities for change (Engeström, 1987; 2001; Engeström & Sannino, 2010). The change orientation of CHAT shifts attention from diagnosis of problems to devising responses which take account of, and sometimes consciously accentuate, contradictions within the system (Roth & Lee, 2007).

The research questions for the article are:
1. What were the key disturbances experienced by participants in the e/merge online conferences?
2. What do these disturbances imply about disturbances/tensions and underlying contradictions within the conference system?
3. What are the implications for the design of online conferences?

2.0 CULTURAL HISTORICAL ACTIVITY THEORY (CHAT)

The purpose of cultural historical activity theory is to provide a conceptual toolkit for understanding and designing for change. CHAT can be powerfully applied to the design of learning processes because of the concept of expansive learning which creates a direction for changes when whole communities within an activity system become aware of the forces driving the system, and collectively make changes to goals, practices and rules (Engeström, 1987; 2001). In this way, systemic change and human agency are inextricably linked. The design of a socio-technical system like the e/merge online conferences does not automatically create expansive learning yet it does create seeds of change that can lead to expansive learning under specific conditions.

This article applies cultural historical activity theory (CHAT) as a framework for 1) developing an understanding of the interactions between multiple elements of an online conference as a complex social and technical system; and 2) conducting a systematic analysis of disturbances and contradictions both within the system and in its relationships with other systems. This approach assumes that perceived disturbances within the functioning of an activity system provide evidence of the existence of tensions within the system and some indication concerning where these are located. Then an analysis of the contradictions can support a redesign process of future versions of the system to address the known contradictions.

2.1 Key Principles of Activity Theory

From Engeström's perspective, CHAT "needs to develop conceptual tools to understand dialogue, multiple perspectives, and networks of interacting activity systems" (2001, p. 135). Analysis of the system as a whole also depends crucially on engaging with the experience and perceptions of participants in "real life social contexts" in order to mobilise their agency in change interventions Engeström & Sannino, 2010, p.15). If we start with the perspective of cultural historical activity theory and consider multiple activity systems in relation to each other, then it is possible to describe CHAT through five principles: object-oriented activity: mediation by tools and signs; historicity; multivoicedness of activity; contradictions as a source of change; and the idea of a zone of expansive learning:

(1) The idea of object-orientation: All activity results from subjects responding to an object or problem space which is the motive for the collective activity. The object of an activity exists both as an external motive and as an internal representation (Leonteev, 1978, p.4). Engeström (1999b) emphasises that the object "is understandable as the trajectory from raw material to product in the emerging context of its eventual use by another activity system" (p.170). On further examination, this concept reveals potentially confusing and elusive complexity since the object itself is changing, contradictory and often not consciously available to subjects who may see it very differently from each other. Different subjects may sometimes even believe that they are pursuing different, mutually

incompatible objects. Nevertheless, there is still the possibility of a shared object which is available to multiple subjects. The object is simultaneously contested, constituted and revealed through activity. In well-established systems with activities which are stable over time the community may have a good shared understanding of historical objects. Where a system is newer or has a very short lifespan, we will need to focus attention on situational objects which may evolve quite rapidly (Damsa & Ludvigsen, 2016). In the context of an online conference some participants may simply intend to join a conference which doesn't require the expense and inconvenience of travel. Through their participation they may start to perceive learning about online interaction as part of the object.

(2) The idea of mediation by tools and signs: Interaction between humans is always mediated by tools and signs including language and conceptual systems. Even the most direct of interactions is still intensely mediated. In a complex socio-technical system such as an online conference, there is a proliferation of tools and signs including computers and underlying infrastructure, the Internet, and an online environment with a specific interface and mode of navigation. The processes of organising and researching an online conference are similarly mediated by technology. In an online conference there are diverse opportunities for learning supported by multiple forms of mediation. These include peer mediation within the conference community, and technological tools and environments which support communication about shared interests and interlinked practices.

(3) The idea of historicity: Activity systems exist within a historical context and undergo development. Any system is a manifestation of, and response to, an underlying historical contradiction. This implies that the system has a historical and social context and that changes in the historical contradiction have direct and subtle effects on all parts of the system as they respond to the transformations in the historical contradiction. Even the mediation of online conference activities with new digital tools and practices cannot in itself shift underlying historic contradictions which are deeply entrenched systemically and institutionally, and are part of the participants' trajectories as professionals. Activities which develop the agency and capacity of participants may start to address aspects of this contradiction.

(4) The idea of multivoicedness of activity: Any activity system contains multiple perspectives and voices. These arise from the multiple roles in the division of labour between the participants and the diversity of interests and perspectives within the community. Ultimately this diversity is at least partly a consequence of the historical contradictions which drive change in the system. An attempt to understand the character of the evolving object and motivating activity and the contradictions which offer potential for transformative change requires consideration of multiple voices which are involved in complex dialogues. Such dialogues include collaboration around shared objects and sometimes fierce contestation of the nature of the object. Making sense of activity in an online conference thus requires engagement with multiple perspectives of participants across several roles, locations, skills and professional priorities.

(5) The idea of contradictions as source of change: According to Engeström (2001) "the central role of contradictions as sources of change and development" (p. 137) is one of the principles of activity theory. Engeström (1987) regards the contradictions within an activity system as "the source of dynamics and development in human activity" (p.97). It

is possible to identify and analyse contradictions at four different levels within an activity system. A rigorous analysis of the contradictions within an activity system can facilitate design choices to improve the functioning of the system. Such an analysis has been applied to organisational change (Kerosuo, Kajamaa and & Engeström, 2010), redesigning processes in a surgical unit (Engeström, Kajamaa, Kerosuo, and & Laurila 2010), e-learning (Fjuk and & Berge, 2004), classroom teaching (Lim and & Hang, 2003), and to the design of online resources (Hauge and & Dolonen, 2012). In an online conference this may require consideration of the synergies and tensions between the social and technical design elements.

(6) The idea of zone of expansive learning: Proponents of CHAT draw on the Vygotskian concepts of mediated learning and the zone of proximal development to suggest that fundamental transformation in an activity results from the profound exercise of human agency when the intensity of contradictions within the system pushes participants to realise that previously accepted objects are so problematic that the whole system becomes dysfunctional. This process of reaching a new awareness of the need for, and possibility of collectively shaping a new object, is known as the first step towards expansive learning. This is an emergent possibility rather than an expected outcome. In the context of an online conference this may involve learning about the opportunities for transformation of the activity systems of participant workplaces or of the conference itself. Some potential indicators of expensive learning from an online conference by participants might include 1) a new awareness that similar systemic challenges are experienced by colleagues across several contexts; 2) experiences of learning in a community of colleagues beyond local face to face networks; 3) the persistence of cross-organisational peer learning relationships after the conference; 4) changes in practices after the conference; and 5) re-evaluation of organisational processes and goals. Expansive learning is also a feature of review and improvement processes by a conference team which requires systemic analysis based on observation, and presenter and participant experiences and feedback. This article is also offered as an expression of expansive learning.

2.2 Disturbances and Contradictions

The concept of contradictions is fundamental to the explanatory framework of CHAT. Contradictions exist as tensions which can cause disturbances in the expected functioning of a system, yet can also shift a system into another level of functioning (Engeström, 1987; Kuuti, 1996). A conversation about contradictions requires engagement with visible instances of disturbances since contradictions are underlying relationships which may explain these disturbances or "deviations from the scripted procedure" of a normal workplace (Hasu & Engeström, 2000, p. 65). The existing literature concerning disturbances and contradictions within activity systems includes contexts such as educational technology (Murphy & Rodriguez-Manzanares, 2004; Peruski & Mishra 2004), workplaces (Launis and & Pihlaja, 2007) and organisational change (Engeström & Sannino, 2011).

We expect disturbances because technical and social design choices in online learning communities exist in tension with processes beyond the control of designers, including changes in tools and community practices. Disturbances can either confound the best efforts of the designers of online learning community spaces and processes or they can provide opportunities for expansive learning and bold redesign interventions. Engeström (2014) suggests that

"Conflicts, dilemmas, disturbances and local innovations may be analysed as manifestations of the contradictions" (p. 78).

3.0 THE E/MERGE ONLINE CONFERENCES

The e/merge online conferences in 2004, 2006, 2008 and 2012 about the use of educational technology in African universities were "primarily designed to share good practice and knowledge about educational technology innovation within the further and higher education sectors in the region, as well as to strengthen communities of researchers and practitioners" (Centre for Educational Technology, 2008). Each conference took place over two weeks in July and included four phases of substantive discussion of clusters of papers and presentations which were grouped by topic and framed by the opening and farewell phases. The e/merge conferences used both asynchronous and synchronous interaction, although the bulk of the conversation happened in the asynchronous discussion forums. The use of synchronous communication became more prominent in the 2008 and 2012 conferences with the improved bandwidth available to many participants. The last two e/merge conferences also made increasing use of social media, mostly as part of an online workshop in e/merge 2008, and then as an essential part of the conference ecosystem in e/merge 2012.

The e/merge conferences were an explicit response to persistent historical contradictions between the conditions faced by educational technologists in Africa and those faced by their counterparts in developed countries, as well as the widely differing conditions within individual countries and across different regions in Africa. These well-known disparities (Farrell & Isaacs, 2007; International Telecommunications Union, 2015) exist at multiple levels including internet connections, bandwidth, investment in technology, qualifications, skills and experience within the sector, tools in us, the resourcing and maturity of e-learning projects, and the geographical isolation of many practitioners and researchers. Constrained use of online learning environments in tertiary education in several African countries has been well documented (N'gugi 2007; Muianga, Hansson, Nilsson, Mondlane, Mutimucuio, & Guambe, 2013).

Initial research concerning the e/merge conferences focused on an explanation of the conference design model and explored the importance of peer facilitation in the interaction between participants Carr, Marquard, Cox, & Brown, 2005). There were several indications that these conferences worked well to create and facilitate interactions about domain and practices in a boundary zone. These activities extended across and between practitioners, researchers and specialists in different areas of educational technology use and with varied specialist interests across geographical divides (Carr, Czerniewicz, & Brown 2010). Carr (2016) reviews the literature on conference design and considers the nature of highly engaged online conference participation in the e/merge conferences. Some of the features of their online conference experience described by engaged participants included interaction across space and time, scope for reflective engagement, learning within a community, and learning about online interaction.

While the e/merge conferences were very successful in convening and facilitating professional development activities, they didn't always proceed exactly as planned. The resilience of the conference design and process was seen in responses by organisers, facilitators, presenters and participants to a range of mostly minor disturbances related to the characteristics and context of the online conferences. The conference environment was new to most participants and occasionally failed in random or unpredictable ways. The local contexts experienced by participants were widely varied both within and across African countries, including the universities with different missions, cultures, resourcing, infrastructure and human capacity. Most participants in the 2004 and 2006 e/merge conferences had no prior experience of other online conferences, however many were immersed in various forms of online interaction. The relationships between

practitioner and researcher focused conversations were not always harmonious. As well as producing powerful boundary learning experiences for many engaged participants, e/merge also seemed to generate some experiences which were frustrating, disappointing or even obstructive for participants with varied levels of engagement. Ultimately a conference that was designed as a response to unequal access to bandwidth, infrastructure, skills and professional development opportunities across African universities, was itself characterised by skewed participation and widely varied experiences.

4.0 ONLINE CONFERENCES AS REMEDIATED DESIGNS

In one of the few specialist texts on designing and organising online conferences, Anderson and Anderson (2010) define an online conference as "a structured, time delineated, professional education event that is organised and attended on the Internet by a distributed population of presenters and participants who interact synchronously and/or asynchronously by using online communication and collaboration tools" (p. 15).

Online conferences have been used to mediate professional learning since the 1980s using a variety of technologies including online discussions, chat, email, live meeting rooms, 3D virtual environments and social media. One of the key challenges to online conference designers is how to remediate the concept of a conference by using technological affordances for learning interactions distributed across time and space. As stated by Dianna Laurillard (2006), "[w]e have not fully exploited the medium of web-mediated conferencing as a transformational medium for education, in part, I suspect, because it has no historical equivalent" (p. 81). This challenge is well worth addressing given several widely recognised benefits of holding online conferences including engagement of participants who cannot afford the economic costs and time of attending face to face conferences (Anderson & Mason 1993; Thatcher, 2006), a more international set of participants (Thatcher, 2006), and a reduced carbon footprint (Anderson & Anderson, 2009). Kimura and Ho (2008) refer to participant perceptions of an online conference as "equal to or better than a traditional event" (p. 64) while Thatcher suggests that the quality of papers and discussion may be higher in an online conference. The arguments in favour of online conferences are strengthened during political, economic or environmental crises (Kimura & Ho 2008; Anderson & Anderson 2009) when the practice oftravelling significant distances to international conferences is more likely to be questioned.

As described above online conferences have multiple affordances. The design challenge for the e/merge online conferences was to use these potentials to support professional development within an emerging profession across a continent with severe disparities in infrastructure, bandwidth and experience of online interaction.

4.1 **Purpose and Target Participants**

Organisers of online conferences need to make very specific design choices relating to both generic parameters of conference design, and to parameters which are specific to online and hybrid events. Effective convening of online conferences requires attention to alignment between purpose, target participants, social and technology systems. Convenors of online conferences are focussed on bringing participants with related interests into a landscape of practice (E. Wenger-Trayner & B. Wenger-Trayner 2014) for authentic engagement around shared objects of inquiry within an environment which is conducive to interaction (Cashman, Linehan, Purcell, Rosser, Schultz, & Skalski, 2014; Neal & Neal, 2011).

Purpose: The conference design is driven by the purpose of the conference whether this is the dissemination of new research or innovation, networking and professional development of

participants, growth of particular communities or networks, or an intensive engagement with an important issue or question by an organisation or intellectual or professional community. While the purpose may continue to develop either spontaneously or by design through the process of the conference, an explicitly stated purpose signals intent and attracts participants and presenters of events and papers. The initial goal of the e/merge conference series was to convene and support interactions about good practice and good research in a temporary conference community of practice, however the nature of the learning community was far more complex. It soon became evident that learning interactions often took place across and at the edges of multiple communities of practice present in the conference.

Target participants: This is the community or network for which the conference is designed. Design choices can be made more accurately if the contexts and characteristics of the target participants are well understood. If this is not the case the organisers need to allow for a wider and possibly less predictable range of interests, priorities and modes of engagement. The core target participants and presenters for the e/merge conferences were educational technology researchers and practitioners based in African higher education as well as some presenters from other continents.

4.2 Social Learning Design

Both face to face and online conferences enable social learning (Bandura, 1977, Csibra & Gergely, 2006, Wenger, 2010) within and across communities and networks of participants (Wenger, 2010). This is an affordance of even the most conventional face to face conferences which allow for a measure of unscripted interaction during question time, and provide spaces and opportunities for informal and spontaneous interactions such as those in meal and tea breaks and in conference socials. Attempts to redesign conventional conferences may include featuring participant initiated conversations within the conference programme, and the design and facilitation of workshops and other participatory activities. Online conference designers can face some challenges in supporting informal and social interaction among participants, however these forms of interaction may be essential to develop the safety and trust required for effective engagement in formal conference activities, as well as the formation of professional relationships that last longer than the conference. The social design parameters available to conference organisers include boundaries, facilitation, modes of interaction, the balance between synchronous and asynchronous events, relevant modes of knowledge, the duration of the conference, and the conference outputs.

Every conference has boundaries which serve to ensure its coherence and identity (Wenger, 1998, p.103-121; Girvan & Newman, 2002). The boundaries of a conference may be sharply defined and rigid, or they may permit some degree of communication and movement of resources, ideas and people between the conference and networks and communities in the broader society. Thus, a conference may be more closed or more open to the import and possibly appropriation of ideas, artefacts, event genres and conversations contributed by potential presenters and by participants. It will also be more or less open to participation by delegates who are not members of the target group/s of participants.

Most conferences include some measure of facilitation (Heron 1999; Collison, Elbaum, Haavind, & Tinker, 2000), even if only through the activity of session chairs. Increasingly conferences which incorporate participatory processes to support knowledge sharing and learning use the services of skilled facilitators to include participants in these interactions, and to enliven and deepen the conversations. With effective convening and facilitation, conference activities may also benefit from extensive peer facilitation among participants.

In the most conventional conferences, the primary role of delegates during scheduled sessions is to be the audience for a stream of short presentations, which follow each other in rapid succession with very little time for questions or discussion. Designs which seek to optimise social learning may include discussions driven by participant interests in groups with common practices and issues, time in the conference schedule for shared, small group reflection on conference events, workshops, and a range of participatory formats. One of the more radical variants is the unconference where the conference schedule may only be determined by participants after arrival.

By definition, face to face conferences almost entirely rely on synchronous interaction, although there are some opportunities for flipped conference sessions where papers are shared and read before discussion at the conference. Online conferences can use a mix of synchronous and asynchronous interaction depending on the context, internet access, perceived digital literacies and preferences of the target participants (Laurillard, 2002, p.146-151; Bender, 2003, p.128-130; Palloff & Pratt, 2007, p.67-71). Synchronous events are often useful for mobilising energetic conversation and a sense of shared presence in a community, however asynchronous interaction supports reflective engagement and flexible participation by participants with conflicting schedules or from different time zones.

For designers of professional development processes, the knowledge base of the profession includes deep knowledge of practices which are core to the profession (Lave & Wenger 1991; E. Wenger-Trayner & B. Wenger Trayner 2014), as well as awareness of new and emerging practices within the local community, the profession, and within a larger landscape of practice. Some of the potential implications for the e/merge conferences include a focus on practice based presentations and workshops, as well as a broad definition of the target participants to include members of several related communities of practice.

The temporal aspects of the design could be important. In general face to face conferences last up to three days with professional development conferences sometimes assigning one day to workshops. Two to three days may be perceived as an acceptable period for employees to spend at a conference given the related accommodation costs and time spent away from normal work activities. Improvements in internet access and bandwidth, especially in developed countries, have supported a growing bias towards synchronous activities in online conferences which attempt to emulate the structure and duration of face to face conferences. By contrast the e/merge online conferences which made far more use of asynchronous communication to enlarge the community, support reflective engagement and to respond to most varied bandwidth and internet access conditions, lasted two weeks with multiple, optional phases of activity.

Conferences can have a variety of planned and emergent outputs including conference proceedings, special issues, reports, knowledge shared in social media, new collaborations and new projects. Each of the e/merge conferences resulted in the publication of a special issue consisting of improved versions of a curated selection of e/merge conference papers. The online conference proceedings served as an interim output while the special issue was in preparation.

4.3 Technological Design

Designers and organisers of online conferences act as technology stewards when they adopt "a community's perspective to help a community choose, configure and use technologies to best suit its needs" (Wenger, White, & Smith, 2009, p. 24). The technological design of a conference is driven by alignment with purpose, the needs of target participants and the social/learning design of the conference. Ideally designers of online conferences will act as technology stewards when they select robust, sustainable technologies with affordances which are well matched to the requirements for the conference (Bower, 2008). In practice, technology choices are as likely to be

driven by considerations of cost, familiarity with existing tools, and the convenience of customisation and maintenance. Given the pervasiveness and importance of social networks, online conference designers are challenged to develop an ecosystem which includes both the formal conference environment and interactions in social networks.

Tool choices: The characteristics and context of the target participants may imply some constraints on the technological options which are appropriate for a specific conference. Organisers of a face to face conference may have limited scope to incorporate virtual enhancements and extensions if their participants have no experience of online interaction and there is limited internet access and bandwidth in the region and venue. Organisers of an online conference will consider the digital literacies of their participants and their access to bandwidth in terms of speed and cost. Online conferences can feature a range of tools including some that are familiar to many participants and others which offer participants opportunities to learn about new tools and practices. This might imply the dual strategy chosen for the e/merge conferences of using the most familiar and easily comprehensible technologies for the bulk of conference interactions, and using a newer generation of leading edge practices and tools mostly for optional processes for more experienced and adventurous participants with faster, more reliable internet access. Thus, conferences designed for professionals in developed countries are also more likely to rely on media rich synchronous communication in an attempt to replicate a face to face conference online.

Integrated environment or ecosystem: An integrated environment which includes several different kinds of interaction spaces and tools for all conference interactions may offer easier navigation for participants and the advantage of controlled access for conferences internal to a specific network or organisation which require the use of confidential data. Integrated environments have several disadvantages since they rarely contain 'best of breed' tools and limit flows of information into and out of the conference. For this reason, an online conference may develop an ecosystem including specific tools outside of the main environment and access to interactions in social networks. These interactions allow conference participants to share resources, debates and news from the conference with a global network and provide access to the conference for participants beyond the registered delegates. The e/merge conference design opted for an ecosystem of loosely joined components including an open source environment for navigation of the conference, resource sharing and online discussion; a live collaboration environment; and the use of social networks for more free flowing interaction including colleagues who were not registered participants.

5.0 SKEWED PARTICIPATION IN ONLINE CONFERENCES

Skewed participation in asynchronous interaction may be a normal feature of online communities (Baldi, Frasconi & Smyth 2003; Shirky 2003; Nielsen 2006). Information received from two leading organisers of online conferences is consistent with this. Lisa Kimball, Producer of Group Jazz online conferences, stated in e-mail correspondence that it was normal for just under 20% of delegates to account for 80% of discussion postings (Kimball, 2011). Raw data for eight online conferences convened and hosted by iCohere with between 150 and 250 logged in delegates, showed that the percentage of delegates responsible for 80% of discussion postings ranged between 5% and 44% (Kaplan, 2011). This variation may be related to factors such as the purpose of the conference in relation to community characteristics, the role of synchronous communication, and the nature and effectiveness of online facilitation.

After excluding posts by members of the core conference team 41 highly engaged participants accounted for just over 80% of the 1490 forum postings across the e/merge 2008 conference

There was a large group of 93 participants who did not post in the forums. When synchronous participation data is considered the participation patterns become more complex. The 32 most active synchronous participants in e/merge 2008 accounted for 80% of the time spent in online meeting rooms, however the 112 delegates who spent no time in the live meeting rooms, on average logged in to the conference website 2.87 times and posted 4.5 messages each. Conversely, the 93 delegates who posted no messages on average logged in to the conference website 3.9 times and spent 143 minutes in live meeting rooms. The 57 participants who neither posted messages nor spent any time in the online meeting rooms nevertheless logged in to the site an average of 2.23 times. The e/merge 2008 participation data thus suggests several combinations of preferences for synchronous and asynchronous participation, and that posting messages online cannot be considered as the only form of engagement.

The statistics cited here reveal the skewed structure of participation, however they provide little insight about how participants learn by using new technological and informational resources, and in interaction with members of the temporary conference community. Engagement by a significant proportion of participants, primarily as readers and observers, may be consistent with the concept of legitimate peripheral participation within communities of practice which offers a potential trajectory towards core participation (Lave & Wenger, 1991). While the concept of legitimate peripheral participation is relevant, it is also useful to consider how structural inequalities may influence differences in measured participation levels.

As an example, while 56% of the logged in e/merge 2008 participants were based in South Africa, just over 63% of the top 41 posters in the forums participated from South Africa. This was consistent with prevailing regional differences in bandwidth and familiarity with online learning and suggested the profound influence of unevenly distributed resources on participation practices in the online conference. Over time these differentials are shifting as indicated by the declining Global ICT ranking of South Africa and the improvement in Kenya's ranking in the 2015 Global Information Technology Report (World Economic Forum, 2015), as well as Ghana's rapid increase in ranking in the Global ICT Development Index produced by the International Telecommunications Union (2015).

6.0 FROM DISTURBANCES TO CONTRADICTIONS

To map the perceived experiences of obstructed participation in the e/merge conferences the first author gathered a range of descriptive participant statements which may indicate several disturbances in the conference system. Then the first author tried to identify contradictions which are likely to cause the most prevalent disturbances. The next step will be to use the analysis of the observed disturbances and contradictions within the conference as a move towards redesigning key elements of the system.

6.1 Research Questions

The key questions for the article are:

1. What were the key disturbances experienced by participants in the e/merge online conferences?
2. What do these disturbances imply about the contradictions within the conference system?
3. What are the implications for the design of future online conferences?

6.2 Methodology

The 224 participants in e/merge 2008 and 272 participants in e/merge 2012 were mostly based in Africa, however the conference also included presenters and participants from 5 other continents. Feedback from participants and facilitators suggests that the e/merge conferences were able to promote engaging and useful community of practice interactions for educational technology practitioners and researchers, however more rigorous research is needed to improve the conference design in response to the maturing of the educational technology profession in Africa, and access by future participants to new collaboration and teaching tools. The existing dataset already suggests several forms of disturbances including sporadic failure of technology and striking disparities in participation metrics among registered participants.

This paper is based on a content analysis of 256 statements by participants in e/merge 2006, 2008 and 2012 which refer to disturbances in the conference. In the language used by participants the statements more directly refer to frustrations and problems which they experienced during the conference or a sense of what went wrong during the conference. The 2006 dataset of 84 statements was drawn from a question in the end of conference survey about frustrating experiences, and from four selected online discussion forums which included descriptions by participants of problems experienced during the conference. The 2008 dataset of 107 statements was drawn from a similar range of sources including participant blogs which were an innovation in the 2008 conference. The 65 statements from the 2012 conference were drawn from two forums, the closing meeting and the end of conference survey.

The 256 statements by participants reveal their perceptions and understandings of participation in the online conference in relation to both the larger context of engagement in an international landscape of practices, and to the more specific context of their own workplaces and professional practices. The initial choices of codes and further development of coding categories presented interesting dilemmas, since codes which arise from the data may map poorly to any well recognised theoretical framework. The initial dilemma was between choosing coding that arose from the key features of the data, and the need to abstract sufficiently from the details of the data to devise coding categories which may be useful at an analytical level. The second dilemma was between the framing of more abstracted categories specific to this dataset, and defining categories which could be mapped against elements of a system to facilitate an analysis of the contradictions implied by the disturbances. Thus the statements referring to problems with the access to and use of the conference meeting room technology are part of a broader category of statements describing difficulties with the conference technologies and tools. This would map easily to an activity system. By contrast, there is a category of statements about the experience of participation in the online discussions which requires a more subtle mapping to elements of the conference system. Some of the longer statements referred to two different kinds of disturbances and were assigned a double coding. The tool for the initial analysis was Microsoft Excel. This was chosen for ease of use with a small dataset and a simple coding process. A sample of the coding for 20 statements involving 12 variables was checked by an independent coder. The intercoder reliability was calculated after a coding meeting to reach consensus about small differences in interpretation of two codes then minor corrections were applied by the author to the coding of three variables across the whole dataset. The inter-coder reliability measure using Cohen's Kappa and Krippendorff's Alpha is 0.82.

7.0 RESULTS

The first pass of the coding process resulted in 26 detailed codes. At the next stage combinations of similar codes resulted in 22 detailed codes. The summary of the coding draws on activity

theory heuristics in combination with a more inductive or grounded reading/analysis of the data. These processes together lead to four broader categories which describe 1) disturbances which originate externally to the conference (shown in blue), 2) disturbances experienced with conference technologies (shown in orange), 3) disturbances within the online discussions (shown in green), and 4) other disturbances which arise from varied design features of the conference (shown in yellow).

At 52.3% of the statements coded, the issues external to the conference provided the largest category of disturbances. The next most prominent category at 34% consisted of disturbances directly related to the conference technology. In total approximately 87% of the statements were coded for external issues or difficulty with conference technology. The percentages of statements coded for external factors and conference technology were slightly lower than the total percentages of all detailed codes within the category because of a small amount of double coding. The five most frequently used of the detailed codes were: time for participation (17.6%); Adobe Connect (16.8%); Internet Access (10.9%); Difficult to keep up (10.5%); and forums (9.0%).

	2006	2008	2012	total			
Statements	84	107	65	256			
Time	15	15	15	45	17.6%		
Internet Access	6	15	7	28	10.9%		
Bandwidth	7	7	6	20	7.8%		
Firewalls	2	6	0	8	3.1%	external	52.3%
Technical Problems	10	6	6	22	8.6%		
Own skills	3	5	7	15	5.9%		
Illness	1	1	0	2	0.8%		
Registration	0	3	0	3	1.2%		
Logging In	2	6	0	8	3.1%		
Adobe Connect	15	12	16	43	16.8%	conference technology	34.4%
Forums	8	10	5	23	9.0%		
Survey	0	2	2	4	1.6%		
Conference technology failed	2	0	6	8	3.1%		
Limited Participation	10	2	3	15	5.9%		
No response to posting	2	0	0	2	0.8%		
Long forum messages	0	1	0	1	0.4%	discussions	12.9%
Low Quality Discussion	3	7	0	10	3.9%		
Unresolved Issues in Discussion	1	4	0	5	2.0%		

						design	
Navigating Conference	5	7	5	17	6.6%		
Too little use of newer technologies	1	3	0	4	1.6%	design choices	21.5%
Programme Choices	2	5	0	7	2.7%		
Difficult to keep up	9	14	4	27	10.5%		

If we focus on the disturbances at a symptomatic level across all four categories and ignore whether these arose from technical problems within or outside the conference, then it seems clear that most of the disturbances described by participants related to the use of the conference technology. The conference environment in its evolving iterations over several conferences proved to be remarkably stable and the few failures experienced during the conferences were quickly fixed by the highly experienced technical team or external service providers. Some of the participants with significant online experience noted minor flaws in some of the conference tools which could not be modified during the conference. At a more basic level the unfamiliarity of many participants with the online conference environment resulted in queries about use and navigation. While most of these were rapidly addressed by the technical support and conference hosting team, issues experienced by several participants such as power failures, bandwidth disparities, and organisational firewalls, were not amenable to an easy resolution.

A more qualitative turn is needed now to consider a sample of the statements categorised within the four broad categories of: external factors; conference technology; online discussions; and other design issues. For each of these the range of disturbances encompassed by the broad category is described, and examples of statements which exemplify some of the more prevalent sub-categories are provided. This first level analysis will then provide an empirical base for considering the contradictions within the system of the e/merge conferences.

7.1 External Factors

This broad category captures a range of factors which were beyond the control or influence of the conference organisers. These include several key factors which affect participation including: insufficient time for engagement (mentioned in 17.6% of the coded statements); Internet Access (10.9% of coded statements); and Bandwidth (7.8% of coded statements). Other factors included firewalls, varied technical problems, participant skills and experience with technology, and periods of illness during or just before the conference. This category maps well to the concept of other activity systems, such as workplace or family activity systems, which can have a profound influence on the conference system. The factors mentioned were subject to variation across the continent, within the countries where participants were based, and even between individuals depending on their working conditions and family circumstances.

- Time: The 45 statements describing how participants had too little time to engage fully include reference to family holidays, participation in face to face conferences, and normal work commitments during the e/merge conference. There were "clashes between face to face schedules and online conference events" (e/merge 2006 participant) and an e/merge 2008 participant blogged that "It is a fun experience even with the lack of sleep that accompanies it. I have been online a long, long time." An e/merge 2012 participant referred to "bitty participation due to interruptions of daily work."

- Internet Access and bandwidth: There were 28 statements by participants which related to disrupted Internet access. Causes included travel to places without an internet connection, unreliable cell phone access, unreliable workplace internet access, and extended power failures which affected participation by colleagues in two Zimbabwean universities and a Nigerian facilitator. Bandwidth problems featured in 20 statements which referred to issues such as slow Internet connections, slow page loads and some connections timing out. These experiences were clearly related to structural disparities in bandwidth across Africa, within countries and sometimes even between institutions within the same city.

7.2 Conference Technology

The statements in this broad category refer to technical problems which arose during interaction with the conference environment. The most prevalent problems mentioned by participants include the Adobe Connect (formerly Macromedia Breeze) live meeting server (16.8% of coded statements), and the discussion forums (9.0% of coded statements). Participants also reported some problems in relation to online registration, logging in, and the end of conference evaluation survey. The prevalence of particular issues in this data was very likely to be unrepresentative of the problems experienced by all e/merge participants since many of these issues relating to logins and access to Adobe Connect were resolved outside of the conference environment through e-mail or phone support.

- Adobe Connect: The 43 statements coded for Adobe Connect (formerly Macromedia Breeze) referred to a narrow range of problems especially where firewall problems in participant workplaces prevented access to live online meetings (8 coded statements) resulting in a need "to convince the IT administrator" to allow access to the server (e/merge 2008 participant), and a Breeze server problem during e/merge 2006 which had required the rescheduling of a live online presentation. Other problems described in some of the coded statements included intermittent loss of connection to the server, a usability issue faced by presenters when screen sharing, and the inability of one participant in a low bandwidth setting to view narrated presentations.

- Discussion Forums: The wide range of technical problems described by participants in 23 statements about using the forums was partly attributable to changes in the main conference environment in 2008 and 2012 and the increased use of Facebook groups as part of the discussion ecosystem in the last two conferences. The change of forum package in 2008 replaced a very flexible forum with threaded discussions, with a less flexible system with a linear discussion interface. Then the move to Wordpress in 2012 resulted in a change to linear discussions using bbPress. Some of the problems mentioned in 2006 included difficulty in dealing with emoticons and using the html editor. In e/merge 2008 the problems reported by some participants included finding their own postings, and the lack of a specific URL for each message. From the perspective of one of the e/merge 2012 participants "the threading in the forums was a bit difficult to follow." One of the trade-offs evident here is that online learning or community environments which provide a good combination of integrated tools often have discussion forums with limited functionality.

7.3 The Online Discussions

The most common problems coded for this category referred to a lack of overall participation (5.9% of coded statements) and to conversations of poor quality (3.9% of coded statements). Other problems reported included a lack of resolution of open ended discussions, long forum messages and some messages which received no response.

- Limited participation: The limited participation in the discussions by most e/merge delegates drew an emotive response from presumably more active participants. The 15 statements coded for this issue included an assessment by an e/merge 2012 participant that there were "[t]oo few active participations (willing to make mistakes / take risks)," while a statement by another e/merge 2012 participant simply referred to "TOO MANY LURKERS." Some of the more reflective statements suggest an attempt to understand the constraints which impacted on participation such a speculation whether "the 'multiplexity' of papers/forums did not 'disperse' (and perhaps 'dilute') participation" (e/merge 2008 participant). An e/merge 2008 participant stated that they were "unsure of whether my contributions would be replied to/ well-received," while an e/merge 2006 participant reflected that "The problem is not in what is said, but in my view from the value lost because people do not participate. Feedback I get indicates they do not do so mainly because of fear of humiliation." An e/merge 2012 presenter asked "how can we make it less threatening for people to jump into the discussion?" Reading without posting can simply be an indication of legitimate peripheral participation in a conference where participants treat each other with respect and generosity, however it may also be consistent with fear induced by prior experiences of an agonistic culture (Tannen, 2002) of ruthless criticism in academic settings.

- Conversations of Poor Quality: The 10 statements with this coding from e/merge 2006 and e/merge 2008 suggested that some participants experienced both an uneven quality of discussions within e/merge and an absence of key voices and perspectives from the conference. An e/merge 2008 participant suggested that the discussions featured "more clarification and less getting to the bottom of the issues and debates." The missing voices identified by various participants included "some key gurus in this field" (e/merge 2006 participant), and "admin or industry people to explain their frustrations about "high minded" academics" (e/merge 2008 participants). One e/merge 2008 participant perceived that there was "Little presence of technophobes and outspoken techno sceptics … [and] too much consensus about the benefits of ICT". Some of the statements referred to the role of presenters. These included the late delivery of some of the papers and presentations by the presenters (e/merge 2006 host) and the absence of presenters from some of the discussions on their papers (e/merge 2008 participant). The e/merge conferences were intentionally developmental spaces to allow a welcoming platform for newer researchers and for practitioners moving into research, as well as more experienced researchers and recognised experts. By e/merge 2008 there was strong bias towards practitioner concerns and some of the most rigorous researchers from the earlier conferences had moved on.

7.4 Other design choices

This broader category gathers four codes for problems which are related to design choices made by the conference leadership concerning interface, balance between older and newer technologies, choice of topics and presentations in the conference programme and choices

concerning the duration and intensity of the conference schedule. The main problem experienced as shown in 10.5% of all coded statements was that participants found it difficult to keep up with developments in the conference. A further 6.6% of coded statements related to difficulties in navigating the conference site and ecosystem.

- Difficulty in Keeping Up: With 27 statements, this was the fourth most prevalent coding across all four categories. Nine of these statements were also coded for insufficient time for participation because both factors were present. Statements with this coding communicated experiences of being overwhelmed, participants needing to manage their own attention, and a question as to whether the conference was too long. An e/merge 2006 participant in their first online conference said that "as a newcomer I was overwhelm[ed] by so much to see, so much to hear and so much to read," while for an e/merge 2008 participant there was "[t]oo much going on at the same time." Another e/merge 2008 delegate managed the risk of overload by "skimming (or browsing through)" some of the conversations. An e/merge 2012 participant stated that "I had underestimated the amount of time I would need set aside for the conference." Even for a minority of participants who arranged for time away from their normal duties, time allocation between the conference and their work and family lives remained a zero-sum game in the short term.

- Navigation: A total of 17 statements were coded for navigation across the three conferences. An e/merge 2006 participant stated one of the dilemmas of interface design when he declared that "What feels natural to me, may not be instinctive for you." Another requested "links between talks and [the] discussion forum." Two of the e/merge 2008 participants noted that there were no unique URLs for each discussion posting," while a participant in both e/merge 2006 and 2008 found that "the layout is all different this time, so will have to find my way around." An e/merge 2012 participant noted in the closing meeting that "there seemed to be a few versions of the programme and links not working as they should." Most participants were likely to have the resilience to work around these issues with the support of peers and members of the conference team however they could present obstacles to participants with limited digital literacies.

8.0 FROM DISTURBANCES TO CONTRADICTIONS

It is now time to consider how the highly visible disturbances are located within the activity system of the online conference. This analysis will start by considering the most obvious tensions within the conference relating to community, rules, tools and objects as explanations for the disturbances. Then attention will shift to considering the location of the more systemic contradictions which shape the tensions at play within the activity system of the conference. Ultimately the identified disturbances relate to contradictions in the relationship between the activity system of the conference and the closely linked workplace and family activity systems of participants which transmit the deep historical contradiction of unequal access through every aspect of the conference. Insights concerning the ways that tensions and underlying contradictions affect participant experiences of the conference can provide very useful guidance to online conference designers in their roles as convenors of interaction and technology stewards.

8.1 Tensions within Community, Rules, and Tools

Community: Participants in the four online conferences came from six continents. Most participants were based in Africa and the majority of these were based in South Africa. e/merge participants also have diverse professional identities in relation to educational technology. Many of the most active participants work in educational technology or e-learning units, or are educational technology researchers based in research or teaching departments. There are also university managers, university educators, and key support staff such as librarians who use educational technologies as part of their work. The university based researchers within e/merge include both highly experienced researchers and postgraduate students. Beyond the university sector, participants have also come from government departments of education, primary and secondary education, non-governmental organisations and private sector software developers and training providers. The range of professional identities, locations and levels of experience implies a diversity of orientations and goals which may provide both a springboard for learning within the community and a source of conflict and frustration if key groups of participants experience their learning needs as unacknowledged or unmet. Such participants were likely to include colleagues who needed support for digital literacies that were assumed by the conference design, researchers who were hoping for an abundance of deeply theorised debates, and colleagues based in the school sector.

Rules: The e/merge conferences included several rules some of which were clearly stated while others were often implicit. The rules included processes for acceptance of papers, the scheduling and clustering of community building and topic driven conversations as well as the varied rights which participants with different roles had to features of tools within the conference environment. Among the rules that structured the logistics of the conference was the choice to cluster online discussions and workshops within two overlapping three day phases of interaction, from Monday to Wednesday and from Wednesday to Friday, within each of the two weeks of the conference. A key contradiction relating to rules was the potential for tension between the rules needed to scaffold interaction and the looser guidelines needed by participants who were participating in their first online conference in particular.

Tools: The conference organisers and designers chose from a diverse array of technologies to support the engagement of participants with widely varied internet access and bandwidth in conference activities. The conference technologies included e-mail which was extensively used for announcements and updates, a re-interfaced open source online learning environment for asynchronous interaction, and integration with a proprietary live meeting server for online workshops, live presentations and question and answer sessions. The discussion forum used in the first two conferences allowed participants to subscribe to specific topics and to post messages by e-mail while the forums used in the 2008 and 2012 conferences allowed participants to subscribe to alerts of new postings in chosen topics. Other tools used in the conferences include alerts by text message, conference blogs for participants which were introduced in 2008, and conference interactions in a Facebook group and on Twitter in the 2008 and 2012 conferences. Perhaps the key contradiction relating to the choice of conference tools is the tension between using tools which are fully available to all participants and using tools which best support a flexible, engaging online conference experience for a smaller group of participants.

8.2 Tensions between nodes of the activity system

The described disturbances predominantly related to tensions between tools and community; tools and division of labour and community and objects.

Tools and Community: Several of the disturbances seemed to be located in the relationship between tools and community. This included the problems experienced by some participants in

using the forums and perhaps also difficulties experienced navigating the site. The challenges experienced by many participants in accessing the Adobe Connect live meeting server are also located here. Along with several technical support queries related to other issues, this would suggest that there is a secondary contradiction between tools and community. This tension sometimes presented an obstacle to participation where an e/merge participant was unable to persuade an administrator to open the ports for access to the live meeting server, or had limited technical skills or familiarity with some of the standard tools of the conference. On other occasions, such as a successful resolution of a technical problem with the help of conference technical support staff, conference hosts, or other delegates, this disturbance may have facilitated participation and learning.

Tools and Division of Labour: The designers of the conference always attempted to ensure that participants had access to multiple modes of participation so even participants with shaky internet connections and low bandwidth were not excluded from the conference. Nevertheless, the presence of a core team based in one of Africa's best resourced universities, in an era of improving bandwidth, implied a bias towards use of newer technologies (sometimes with higher bandwidth requirements) to enhance the potential conference experience and to facilitate participant engagement in emerging technological practices. This is of course linked to the tension mentioned earlier between using tools which are fully available to all participants and using tools which best support a flexible, engaging online conference experience for a smaller group of participants.

Community and goals: The goals of the conference were perceived differently across the diverse communities from which the participants came, to the extent that collective objects of professional development in the e/merge conferences become contested among the participants. Some of the critical comments about the quality of conversation and the selection of presentations and papers echoed a very lively conversation in the first conference in 2004 about the relationships between researcher and practitioner perspectives within the conference. The tensions initially manifested as conflicts between a focus on research and a focus on practice and between a focus on support for emerging researchers as opposed to sharp, critical engagement with new contributions by leading researchers. Over time the conference became more clearly oriented to the needs and interests of practitioners and emerging researchers than to those of established researchers and more particularly theoreticians.

8.3 Underlying Contradictions

It is likely that most of the disturbances experienced by participants resulted from contradictions between e/merge as an online conference and the external world that participants bring to the conference. Ultimately many of the most serious disturbances arose within the relationships between the online conference activity system and the related activity systems of the workplace and the family (and sometimes even of the competing face to face conference), since participants exist within multiple activity systems. These disturbances included constraints such as time, internet access, bandwidth and organisational firewalls which were beyond the control of the online conference organisers.

The contradictions across the workplace activity systems and family activity systems of participants were embedded in the online conference interactions. Participants brought the constraints and power relationships experienced across these activity systems with them into the conference. Within the conference this manifested as tensions within the nodes of community, tools and division of labour, and tensions between community and tools, between tools and division of labour, and between community and objects.

8.4 Making sense of tensions and contradictions in the conference

Explaining the relationship between disturbances and contradictions requires understanding phenomena at three different levels: 1) disturbances; 2) tensions; and 3) the underlying contradiction. Disturbances are observable "deviations from the scripted procedure" (Hasu & Engeström, 2000, p. 65). In the case of the e/merge conferences a wide range of disturbances described by participants related to factors external to the conference, the conference technology, the online discussions and the conference design. The most obvious explanations for these may be found in tensions within an activity system. The underlying explanation for both the disturbances and tensions is to be found in systemic contradictions which directly manifest the historical contradiction on which the system is based.

The concept of contradictions is a powerful tool for the analysis of the e/merge online conference series as a specific set of social practices designed to respond to a specific historical contradiction concerning unequal access to infrastructure, technology, expertise and professional development opportunities. Ultimately the conference series is subject to the same contradiction (though hopefully in an ameliorated form). Over several years the disparities in access have narrowed. At the time of the e/merge 2004 conference South Africa was the leading sub-Saharan African country for internet connectivity however by 2015 the South Africa Global ICT Ranking was declining relative to several other African countries (World Economic Forum 2015).

In cultural historical activity theory, contradictions are seen as drivers of change. An understanding of some of the key tensions within an activity system and the underlying contradictions may facilitate a more accurate analysis of how contradictions both enable and constrain action by participants. The same analysis can also highlight opportunities for the redesign of some aspects of the activity system. Section 7 of the article reported results for disturbances related to external factors, conference technology, online discussions and other design choices. In particular the disturbances described by participants suggest contradictions within the community, rules, tools and objects, and tensions between tools and community, tools and division of labour, and community and goals. The underlying contradictions are more likely to be found in the relationship between the activity system of the conference and workplace and family activity systems of participants. These articulated systems then transmit deep historical contradictions related to infrastructure, physical access to technology, and digital literacies through every aspect of the conference. While these contradictions are shifting over time they become a conscious factor which shapes the design choices available to conference organisers. In particular the underlying contradictions with deep historical roots can only be partly repaired by design and human action within a specific activity system.

Ultimately the attempt by the conference designers and organisers to address a historical contradiction reproduced the contradiction at the core of the conference. This is an inevitable consequence of bringing together participants with different levels of research and operational experience and expertise across contexts with wide differences in technical infrastructure, resource constraints, bandwidth and educational technology practices. At the same time engagement with these differences within a diverse landscape of practices may be a precondition for learning across and within communities of practice from varied places and contexts. Other conditions required to support learning across difference may include a widespread sense of membership and mutual alliance in a conference community, willingness by participants to share knowledge and learn from each other, and conscious celebration of innovation by participants in resource poor constraints. This may mean that a conference which echoes the historical contradictions in an ameliorated form can support the development of agency and professional capacity by participants.

The online conference exists to convene and facilitate interaction between participants within and across communities of practice from multiple locations who would be highly unlikely to meet in a face to face setting. These interactions take place in a mutual boundary zone where participants are involved in research and practice focused conversation with colleagues focused on similar and related practices. Thus, the conference creates spaces for community of practice interactions and for interactions within a landscape of practices. The conference is only possible because of a network of overlapping activity systems and the contradictions experienced as disturbances by participants can most easily be seen through the lens of multiple linked activity systems. Each participant in the conference negotiates shifting and sometimes unstable balances between the activity system of the conference and the activity systems of their own workplace and family. While in the conference environment participants then experience the ways that the ripple effects of the historical contradiction, mediated through the contradictions between multiple workplace and family activity systems, manifest in interactions with other participants and the online conference technology. Sustained and deepening engagement among the most committed participants leads to a more informed and nuanced understanding of each other's workplace and family activity systems. In turn this feeds back into a stronger conference community and richer online interactions across social and formal conversations. Participants with more peripheral engagement also benefit as readers and viewers from access to the informational and technical resources as well as to the formal presentations, live meetings and participant generated knowledge assets of the conference.

While the underlying historical contradictions, mediated through the interactions of multiple activity systems, have profound effects on the nature and extent of online conference interaction they may also have hidden and shadow effects on the potential interactions. Potential participants may remain uninvolved due to unfamiliarity with the notion of online conferences; resource constraints which affect their time allocation, unreliable internet connections, limited bandwidth and poor online skills; or perceptions that online conferences are only for more advanced professionals. At the other end of the spectrum, many of the highly experienced, globally networked educational technology researchers in the best resourced African universities may refrain from participation in an African online conference which is focused on reflective practice and practice related research.

Finally the underlying contradictions in the relationships between the conference, workplace and family activity systems were manifest in the following tensions within the conference system: 1) Often participants experienced dilemmas concerning the allocation of time to the conference because of undiminished expectations within their work places and families; 2) With an unequal distribution of internet access, bandwidth and familiarity with online learning the organisers faced a dilemma concerning the appropriate balance between advanced tools and those accessible to all participants; 3) Across a diverse conference community there were disagreements about the goals the conference which were sometimes played out in the wide range of participant orientations towards research and practice; and 4) The rules designed by conference organisers mostly resembled those of a conventional conference which may have led some participants to expect modes of interaction which were typical for formal academic conferences.

9.0 IMPLICATIONS FOR ONLINE CONFERENCE DESIGN

Online conference designers are convenors when they focus primarily on the social design of the conference. They are technology stewards when their effort is primarily focused on using technology to implement conference environments which support authentic and productive interactions between participants. Both aspects of their work require a sound understanding of the dynamics of the conference activity system and its potential for change and transformation.

Conference designers need to work from conference goals which are aligned with the priorities and contexts of the participants for whom the conference is to be designed and run. This is likely to become more difficult to gauge as the gradient of expertise and range of interests among educational technologists in African higher education continues to expand. This can be addressed through ongoing engagement with the community through an ongoing network, shared attendance at periodic face to face conferences and gathering snapshot data through surveys. The original e/merge design of sourcing events from a large diverse community and then catering for shared and specialist interests and practices may still have currency. There may also be opportunities for in depth professional development processes which are designed for a specialist group of educational technology researchers or practitioners since the growth of the profession increasingly permits the achievement of critical mass in online interaction.

Since the initial e/merge conference in 2004 the conditions for online educational technology conferences across African higher education have changed considerably. Institutions in several regions have experienced exponential improvements in connectivity and after several years many African universities have e-learning projects which are reaching maturity. The professional development of educational technologists has also been transformed by large regular face to face conferences such as eLearning Africa and IST Africa, and the growing trend towards postgraduate training of African educational technologists within and beyond the continent. The technological environment across Africa has also changed radically. Smartphone users are driving the rise of pervasive mobile Internet access to open communication in social networks such as Facebook and Twitter, as well as increased use and sharing of open resources and open research. There is also growing use by African professionals of Massively Open Online Courses for self-directed professional development. These changes can be expected to continue for several years including predominant use of smartphones and tablets for mobile online interaction and a diminishing role for laptops as mobile devices.

Some of the most immediate implications include core elements of the e/merge conference design such as using examples of innovation in African universities and globally as stimulus for conversation and providing active facilitation and a range of online activities to scaffold engagement in familiar and unaccustomed environments by conference participants. The ongoing contradictions between community and tools (and even within community), will require conscious modulation to ensure that participants are enabled to engage in interactions and a wider community (including unregistered participants) using smartphone accessible contemporary tools such as conference apps for multiple forms of participation which will influence e-learning in African higher education into the future. Any new online conference will require a custom evolved interaction ecosystem. It will need to operate across multiple platforms and tools as designed for the context and practices of the conference community, as well as opportunities for emergent learning about a new generation of technologized practices.

Disturbances are unintended yet unavoidable products of any complex system which indicate the existence of tensions within the system. The contradictions within an online conference drive the system and simultaneously generate both positive and negative experiences for participants. The positive experiences described by engaged participants will always be accompanied by other experiences which are perceived by some participants as disturbances in the conference system. Any attempt to eliminate these disturbances will fail and also reduce the opportunities for creative responses and learning. When the contradictions within the conference system are instances of historical contradictions within the broader social environment, conference designers need to consider these contradictions as conscious assumptions of the design process rather than as obstacles to the expected operation of the system. Designing online conferences then requires conscious exploration of how deep historical contradictions affect conference experiences and object. Then it is possible for conference designers to plan for an expected range of disturbances

including developing appropriate support procedures and contingency plans. It important to design communicative and community affordances into the conference technology and processes for the support of participants. Participants will then have the tools, spaces and facilitation needed to individually and collectively learn resilience to disruption and to develop creative solutions and workarounds which enhance participant agency, and support learning about community, contemporary tools and modes of online interaction.

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