WE WRITE BETTER TOGETHER: E-MENTORING TO INDUCT DEVELOPING COUNTRY RESEARCHERS INTO SCIENTIFIC LITERACY PRACTICES

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ABSTRACT

This paper describes the design and implementation of an e-mentoring programme to support early career and less experienced researchers from developing countries improve their scientific abstracts prior to submission for the International HIV/AIDS Conferences. An evaluation study was conducted on the impact of this programme over two conferences. Results from the evaluation show that distance learners improved their motivation, knowledge and skills of abstract writing, with the support of a template for scaffolding, mentor feedback, and an open access toolkit for self-study. They also overcame barriers such as lack of access to opportunities to learn an essential skill for scientific professional development. Based on this innovation, I consider the implications for reimagining universities, workshops and conferences as collaborative capacity-building spaces, via the use of Web 2.0 technologies.

KEYWORDS: Online mentoring, scientific literacy, learning as participation, learning technology, technology in education, research capacity building, university faculty, professional development, writing, online learning

1. ONLINE MENTORING FOR IMPROVING SCIENTIFIC WRITING

There is an urgent need for more and better research from the places where the issues and challenges of scaling-up health treatment, prevention, and care are being tackled currently, as they can impact the strengthening of health systems (Zewdie et. al, 2008). However, junior scientific, clinical, and social researchers who work in resource-limited settings often lack both 'hard' resources, such as basic laboratory equipment, and 'soft' resources, such as rigorous mentoring in research design and writing. They thus find it challenging to disseminate their research at international, peer-reviewed conferences and in journals. This group of professionals comprises not only scientists and clinicians, but also advocates, activists, community workers and social counsellors working in various disciplines. The situation is complicated by the lack of investment in improving national research systems (Kirigia and Wambebe, 2006), which inhibits the emergence of a research culture. In addition, training workshops on scientific writing in developing countries are not effective in producing writers because instructors focus more on the product rather than the process of writing, a cause of the limited understanding of learning as the mere transmission of procedural knowledge. Plagiarism and a lack of awareness of the ethics of research are rife in scientific writing from developing countries. Given these obstacles, many early career researchers are left low in morale, wondering when and if they would ever experience success in the 'publish or perish' academic culture.

As the custodian and convenor of the International AIDS Conference, the International AIDS Society (IAS) is tasked with enhancing access, widening participation, and increasing the quality of HIV research carried out by researchers from resource-limited settings. I was working at the IAS as Professional Development Coordinator, when this challenge to the potential scale and impact of my education programmes arose. I conducted a small-scale action research to find out past experiences and lessons learnt, gather perspectives from various stakeholders, and reviewed the literature on teaching scientific writing effectively to large cohorts with huge unmet needs, and with limited funding.

To this end, I led a project team to create an e-mentoring programme during the abstract submission period (Nov 1 '08 - Feb 25 '09) of the IAS 2009 conference (July 19-22 '09). This project is an expansion of a programme from the AIDS 2008 conference. The programme's aim is to help diverse types of researchers from around the world prepare abstracts of their work. These researchers submit draft abstracts online by filling in a form that provides step-by-step guidance on the format and content of an abstract. In addition, self-help tools are provided online to increase the researchers' understanding of the processes of abstract writing, submission, and selection. The mentoring is provided by experienced abstract writers, who give structured feedback on draft abstracts. The online platform is incorporated into the IAS 2009 conference website (www.ias2009.org/mentor), which all delegates visit as the one-stop portal for the conference programme and services. The site is also marketed to networks of HIV professionals and researchers, including IAS members, and previous conference delegates.

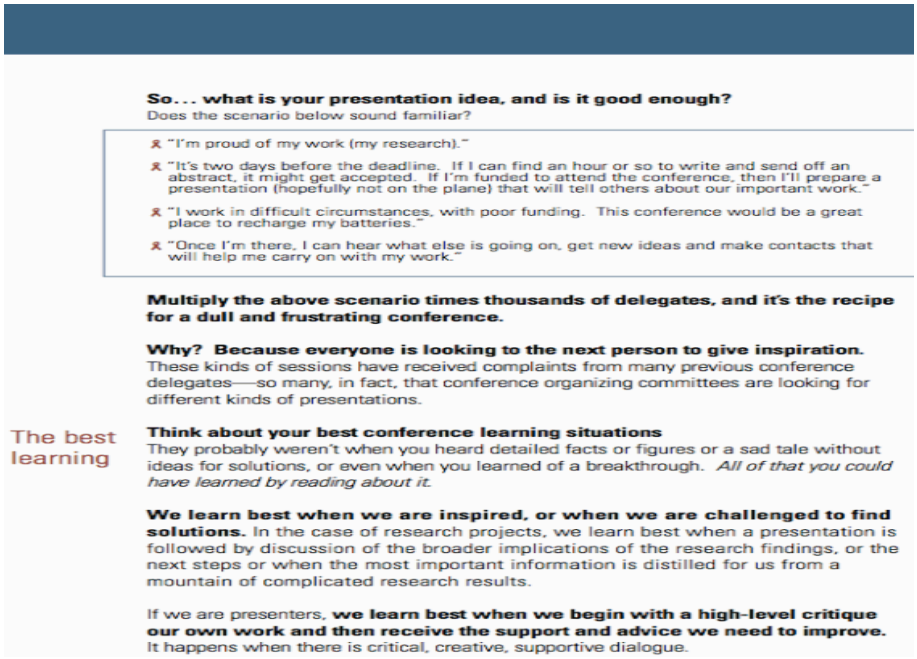
Incorporating this online abstract mentoring platform into the conference programme can potentially improve the secretariat's capacity to mentor early career researchers from a distance. This is a response to the need to improve access among under-represented groups, and reduce the rejection rate due to poorly conceived abstracts. Before online mentoring was provided, previous abstract reviewers were surveyed to find out their reasons for rejecting abstracts. In addition, a set of FAQs and examples of good/bad abstracts was developed. A pool of mentors was then recruited for each track in the conference.

This innovative and creative use of technology, informed by research into learning as participation in a community of practice rather than the transmission of functional skills, offers new possibilities for inducting novice researchers into a global scientific learning community. It takes into account that reading and writing science is a literacy practice that is socially situated, so that learning to participate is about acquiring desirable literacy practices.

2. E-MENTORING TO INDUCT NOVICES INTO A LEARNING COMMUNITY

As the global HIV epidemic enters its third decade, medical, social-behavioural and policy developments worldwide need to be shared. Historically, developed-country researchers have dominated international dialogue on infectious diseases, thanks to intensive scientific mentoring in university-based programmes that tend to be longer in duration and allow greater scope for nurturing relationships. In contrast, the level of mentoring available for early career researchers in developing countries has been insufficient. In recent years, the practice of e-mentoring for professional development and distance graduate education has increased, whether for nurses (Melrose 2006), teachers (Brady and Schuck, 2005; Thomas, 2005), or librarians (Hines, 2007). In fact, the use of e-learning for inducting early career professionals has also expanded to professions such as scientists and engineers (Malchow, 2001), managers, and entrepreneurs (APESMA, 2003). All of these are examples of e-mentoring networks with dedicated resources and systematic programming. The imperative is very clear: that more e-mentoring, which directly targets young and early career researchers in developing countries is urgently needed to rapidly and cost-effectively socialize them into global communities of practice, supported by collaboration between professional experts and peers, and newcomers to improve their performance through contextually relevant practice.

The IAS began a limited e-mentoring service directed at early career abstract submitters for the AIDS 2004 conference. Initially, it intended to provide abstract submitters an opportunity to improve their abstracts by asking questions to mentors through email. Over the years, it gradually expanded to include providing a downloadable abstract writing toolkit in a number of languages. The toolkit was prepared by John Miller from the Coalition for Children affected by AIDS, (CCABA), to support community-based organisations prepare abstracts to present and share their work with international audiences. It walks abstract writers through a process with the help of a conceptual checklist, a writing guide, probing questions, and oral and poster presentation drafting templates. Figure 1 shows Page 6 of the toolkit, which explores the notion of 'interesting' from the point of view of abstract reviewers and potential audiences at conferences.



So... what is your presentation idea, and is it good enough?
Does the scenario below sound familiar?

- "I'm proud of my work (my research)."
- "It's two days before the deadline. If I can find an hour or so to write and send off an abstract, it might get accepted. If I'm funded to attend the conference, then I'll prepare a presentation (hopefully not on the plane) that will tell others about our important work."
- "I work in difficult circumstances, with poor funding. This conference would be a great place to recharge my batteries."
- "Once I'm there, I can hear what else is going on, get new ideas and make contacts that will help me carry on with my work."

Multiply the above scenario times thousands of delegates, and it's the recipe for a dull and frustrating conference.

Why? Because everyone is looking to the next person to give inspiration. These kinds of sessions have received complaints from many previous conference delegates—so many, in fact, that conference organizing committees are looking for different kinds of presentations.

The best learning

Think about your best conference learning situations
They probably weren't when you heard detailed facts or figures or a sad tale without ideas for solutions, or even when you learned of a breakthrough. *All of that you could have learned by reading about it.*

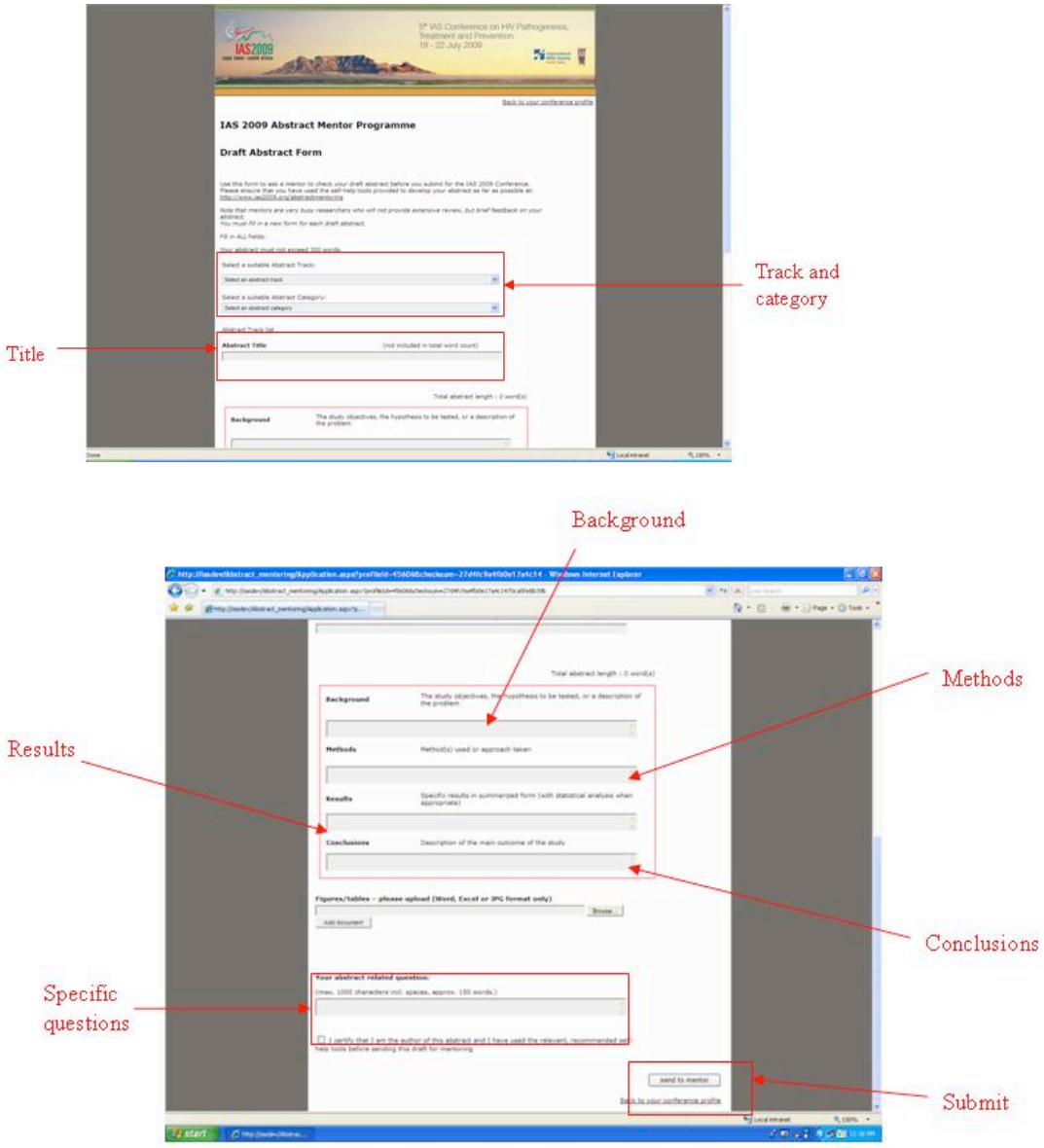
We learn best when we are inspired, or when we are challenged to find solutions. In the case of research projects, we learn best when a presentation is followed by discussion of the broader implications of the research findings, or the next steps or when the most important information is distilled for us from a mountain of complicated research results.

If we are presenters, **we learn best when we begin with a high-level critique our own work and then receive the support and advice we need to improve.** It happens when there is critical, creative, supportive dialogue.

Figure 1: Page 6 of the Conference Abstract & Presentation toolkit offered as a self-help tool for abstract submitters for the International AIDS Conferences. Complete toolkit available for download at www.ias2009.org/mentor.

For AIDS 2008, this service was expanded to include other resources, such as a list of FAQs, a list of the 'Top 5 reasons why abstracts are rejected', and samples of good and bad abstracts for the purpose of comparison. While these self-study resources are enabling, submitters desired an opportunity for actual review and inquiry of their ideas with peers and experts that they were not able to access at home. Based on the evaluation of the 2008 programme, an online submission system was then developed in-house for 2009, with the collaboration of the Conference Programme, Professional Development, and IT departments. The project team also felt that such a process, linked to delegates' profiles, would strengthen relationships by providing a value-added service to the community we serve. With this in mind, the team designed and implemented a system leveraging online technologies to scaffold learning, rather than the informal Q&A approach used hitherto, thereby instituting a conceptual leap forward.

Through this system, submitters were guided to develop their draft abstract according to its sub-sections – background, methods, results and conclusion – as well as upload accompanying figures or tables, and ask questions on specific issues they might have. Figures 2 and 3 show screenshots, from the conference website, of the online form through which abstract submitters are guided to submit their work for mentoring:



Figures 2 and 3: Screenshots of the Online Abstract Mentor Programme for IAS 2009

It is anticipated that through such scaffolding, abstract submitters will learn how to compose an abstract sequentially, while being exposed to a rich online learning environment before actually submitting a completed abstract for review. Importantly, the abstract scoring guidelines were also published. This helped to familiarize submitters with the peer-review process for their abstracts, and enhance their understanding of what can be perceived as a confusing and opaque process. Mentors

are recruited from the group of expert HIV researchers on the IAS Governing Council, as well as from the pool of high-scoring abstract submitters who had won scholarships and prizes at the previous conference. Mentors are provided with a feedback form to guide their responses, although some mentors prefer to use the 'track changes' and 'insert comments' function in Microsoft Word to edit the abstracts directly. The feedback is intended to: a) clarify confusion over research design (such as hypothesis testing) and the appropriateness of the methods used, b) provide suggestions on grammar, structure, and the choice of track and 'category', and c) clarify the maturity of the study, that is whether the data was too preliminary, or if the research would be a useful contribution to research on HIV. Figure 4 shows an example of feedback provided by a mentor who used the guidelines provided.

Track and Title

1. Is the track chosen appropriate? **Yes**
2. Does the title reflect the content of the abstract? **Yes though on the topic sessions "health" they did not say what is included.**

Structure

1. Does the abstract follow scientific and formal criteria? **Yes**
2. Do the ideas cohere together? **Yes**
3. Does each section provide relevant information? **Yes though nothing has been mentioned what they do rather than skills sessions are which are held two -three days in a month.**

SCIENTIFIC DESIGN:

Background

1. Are the objectives clear and well-presented? **Yes**
2. Is the research design sound? **Yes**

Materials/methods

1. Is the methodology used appropriate for the study? **Yes but they should also involve caregivers and guardians who look after the infected and affected children.**
2. Is it easy to understand what methods the authors have used and why? **Yes they are involving the infected & affected.**
3. Is the data analysis and interpretation appropriate? **Not sure according with current data in India of affected children.**

Results/Conclusions

1. Are the conclusions clearly explained and appropriate to the study? **Yes though short (I know because of limited words).**
2. Is the study innovative? Does it provide new insights? **Yes, more will be encouraged to attend these sessions if they see other children have increased their self esteems.**
3. Are the results analyzed in a broader context? **Yes**
4. Are the future implications of this study discussed? **No**

Figure 4: Example of feedback provided by a mentor

Online resources on scientific writing are also provided, such as linking to the AuthorAid self-learning resources and e-mentoring system (www.authoraid.info). This provides practical ways to stimulate the interest and understanding of early career researchers on the various genres of scientific writing.

The project is unique as it aims to induct researchers into scientific literacy practices, moving away from teaching them disembodied writing skills. This is in line

with current thinking that literacy is a social practice (Street, 2001), situated and mediated through our connections with the world around us; the meaning of writing an abstract is thus produced and enacted in a particular social context. The International AIDS conferences provide such a context for young and early career researchers. Enabling and equipping them with e-mentoring exposes them to the norms and practices of abstract preparation and submission, thus facilitating their gradual participation in a community of practice (Lave and Wenger, 1991; Wenger, 1998), even before the actual physical conference experience. Learning is now conceptualized as a process of "apprenticeship", where apprentices collaborate in social practices with mentors to acquire and construct new forms of interaction and thinking (Vygotsky, 1978). Through such apprenticeship, abstract submitters (novices/apprentices) take on tasks, explore artefacts, and 'learn to be' through a process that has been described as 'legitimate peripheral participation' (Seely, Brown and Adler, 2008), consequently developing a sense of belonging and constructing their identity as they learn quite new ways to use and value their literacy.

3. THE IMPACT OF ONLINE ABSTRACT MENTORING

There are promising results from the e-mentoring programmes conducted prior to AIDS 2008 and IAS 2009 conferences. Impact can be assessed in two ways: the quantifiable outcome of the number of mentored abstracts that were successfully accepted for the two conferences; and the perceptions of mentors and submitters about the programme itself. The number of successfully accepted abstracts was obtained from the organization handling abstract submissions, while the perceptions of participants were gathered through online surveys sent immediately after the programme closed.

The total number of mentors and abstract authors, and the number of abstracts received, mentored, submitted and accepted for AIDS 2008 and IAS 2009 is summarized in Table 1 below.

Table 1: Snapshot of the online Abstract Mentor Programme

Indicators	**AIDS 2008**	**IAS 2009**
Number of Mentors	42 signed up; 26 received an abstract, out of which 18 reviewed at least one abstract	63 signed up; of which 43 reviewed at least one abstract
Number of Abstract Submitters (some submitted several abstracts for mentoring)	66	95
Number of abstracts received for mentoring	80	118
Number of abstracts reviewed by mentors	78	118
Number of mentored abstracts submitted for the conference	59	73
Number of mentored	47	46

abstracts eventually accepted for the conference	*(30 Poster Exhibition, 13 CD-ROM, 2 Oral Abstract sessions, 1 Poster Discussion and 1 poster back up). Note: 6 authors had more than 1 abstract accepted.*	*(2 poster Exhibition, 25 CD-ROM, 1 Oral Abstract session, 18 Poster Discussion sessions) Note: 3 authors had more than 1 abstract accepted; 2 authors from non scientific background had an abstract accepted*
Number of successful mentored abstracts from low- and middle-income countries (based on World Bank classification)	42	43

The above table shows that for AIDS 2008, among e-mentored abstracts, 76% were finally submitted for the conference programme, out of which 80% were accepted. Therefore, the programme helped about 40 conference delegates successfully submit an abstract for AIDS 2008. For IAS 2009, the data reveals an increase in the number of abstracts submitted and e-mentored, and an almost similar number of successful abstracts. For both, a large majority of the successfully mentored abstracts (89% and 93%) came from low- and middle-income countries, demonstrating the effectiveness of distance learning. This can be attributed to better promotion of the programme, at workshops, and through the Internet.

As part of the continuous evaluation process, abstract submitters who used the programme were surveyed for both conferences. The vast majority of respondents (n=35, n=66) reported to have used the self-help tools available on the conference website and rated them as useful. The most commonly used tool was the "Top 5 reasons why abstracts are rejected" (71% and 70% of respondents). The three other tools, namely the online toolkit, FAQs and prize-winning abstracts from previous conferences were used by more than 40% of respondents. As for support from mentors, most submitters who responded (97%) indicated that their answers were "useful" or "very useful" and 73.5% reported it was quick. For IAS 2009, 45% of the 66 respondents perceived the feedback they received from mentors to be either 'easy' or 'very easy' to interpret. One positive indicator of the quality of mentoring was the decline in the use of the online self-help tools among surveyed abstract submitters to complement the feedback they received from mentors. While 95% of them accessed these tools at registration time, only 57% did so after e-mentoring.

As an indicator of the added value of such a programme, more than 90% of respondents for AIDS 2008, and almost all for IAS 2009, would recommend the programme to other abstract authors and would use it again. As one author commented,

> *"As a junior researcher, I valued the opportunity provided by participating in the abstract mentoring, to get into print and present at AIDS conferences. It extended my sense of the worth of my contributions from Argentina, studying issues that are not discussed elsewhere as cryptococcal meningits and Chagas' disease. This programme allows fellows physicians to improve their writing skills and gain confidence for submitting abstracts to leading events such as IAS conferences."*

The opportunities to get into print and present at conferences enabled a professional valuing of the experience and extended the sense of the worth of early career researchers' contributions. Learning to write and argue for a wider readership was significant in repositioning them as more than data collectors who fit their bit into developed country university researchers' work. Showing their own research to the wider profession impacted their self-esteem, promotion opportunities and professional credibility.

The six mentors who shared their opinions on the AIDS 2008 programme indicated their willingness to offer their services again for the IAS 2009 conference. Of the 31 mentors who completed the online survey for IAS 2009, 83% perceived the guidelines provided for mentors had allowed them to save time, and were a good way to provide abstract writers with structured feedback.

However, the small size of the mentor team (18 for AIDS 2008 and 43 for IAS 2009 respectively) and their considerable existing workload precluded significant expansion of e-mentoring beyond the short abstract submission period, without allocating dedicated funding. Other suggestions for programme improvement include giving more attention to abstract writers for whom English is not a first language, and those from non-scientific backgrounds. Thus, in order to facilitate continuous collaboration between mentors and abstract writers, more investment in developing online forums and tailored e-mentoring would also be necessary, given the great unmet needs.

4. THE PROMISE OF E-MENTORING FOR PROFESSIONAL INDUCTION IN DEVELOPING COUNTRIES

Beyond the measurable outputs, there are also other factors that enable mentoring-at-a-distance to be successful in inducting novices into literacy practices. First of all, with online scaffolding, and exposure to relevant artefacts, writing becomes a social, visual and collaborative process, rather than a solitary one. Technology connects a learner in a 'resource-poor' setting to improve her learning engagement, thereby developing her expertise in a crucial literacy practice for success in the scientific community. Second, an online space contributes and builds on the social aspects of learning, which this pilot project can develop further. Third, while there is a strong history of North-South research capacity building projects for health workers and scientists, IAS understands that such projects often marginalize participants who do not come from a scientific background, but still have compelling evidence to share and need support to do so. Such research, from community-based NGOs, faith-based groups, and vulnerable populations, is crucial because it can provide alternative perspectives from those who have the experience of living with HIV, and how they translate such experience into programmes in community settings. As one mentor, who is also an editor for three international health and HIV journals, wrote, in response to the survey question 'Would you be interested in becoming a dedicated mentor helping early career HIV researchers from resource-limited settings publish their research?":

> *"Yes I would. But there are obstacles. Mentoring after the event is more difficult than a process of preparation well in advance. Often it is not the writing or presentation per se, but the fact that the analysis or design is limited…Enhancing these aspects as well as mentoring would be a real boost and capacity contribution…In fact, there could be a selection process for promising endeavours with a good chance of publishability that could be allocated such assistance. I would be really interested in this process."*

This project allowed a conference secretariat to connect with and engage potential abstract submitters online, to raise awareness of the scientific standards, and help improve the quality of abstracts. More attention needs to be given to online social learning strategies aimed at developing country researchers and students preparing research and programme findings for conference and journal submissions on a more ongoing basis. Such a development is made possible thanks to the rise of Web 2.0 technologies, such as social networking sites, wikis, blogs and microblogs, which support and expand the possibilities of social learning by inducting newcomers faraway into the norms and practices of a particular community.

Web 2.0 also raises new challenges for organizers of scientific conferences and workshops by questioning a model of practice derived from behaviouralist education. It opens up the debate on how technology can facilitate 'participation' and engagement actively, beyond normative rhetorical claims, as precursors to stimulating the behaviour change required to improve professional practices. With the rise of digital technologies, what is pedagogically possible changes; digital technologies could change our instructionist, factory model of education into a constructivist model focused on the creation of knowledge, as McClintock (1999) argues. He contends that this can be accomplished through the creation of virtual learning communities that "engage a diversity of people with challenging learning activities, providing each with appropriate resources and useful intellectual tools." (1999:136)

In addition, e-mentoring for scientific writing is one of the practical ways in which the Internet can enhance the economic and pedagogic value of informal learning (Cross, 2006). As compared to the current reified but ineffective practice of training workshops in scientific writing, informal learning is characterised by features such as self-directed, self-paced, situation-dependent task performance, to fulfill a present need. These features increase learners' affective engagement, relevance of the learning opportunity, and overcome the ineffectiveness of formal instruction for a diverse group of students brought together for a one-off short, intensive course with little or no follow-up. In today's lifelong learning (Longworth, 2003) context, educators thus need to think about redesigning their pedagogy such that participating in scientific conferences becomes the experience of networking, and connecting, an intentional dialogue for actionable knowledge to solve practice problems, rather than a transaction between an 'expert' paid to impart facts and figures to passive audiences. More research is thus needed to assess the pedagogic effectiveness of e-mentoring vis-à-vis training workshops, to develop a connectivist (Siemens, 2004) and networked learning (Steeples and Jones, 2002) framework that enhances and accelerates knowledge sharing and skills development, especially in a more challenging financial environment for HIV and health research capacity building.

Looking at transferability, universities in developing countries partnering with institutes in developed countries to accelerate knowledge transfer could easily replicate this model. Theories of e-learning now point to the emergence of Pedagogy 2.0 (McLoughlin, 2009) that repositions universities for the net-gen learner. A feasible approach would be to offer professional development to university faculty in developing e-mentoring programmes by adapting their current writing workshops and programmes into modular web-based self-paced courses, and then gradually linking into a wider global knowledge network step-by-step. Research design mentoring could feature as one of the targeted interventions prior to research writing mentoring to reduce wastage and churn. Faculties in developing countries could build their capacities in e-learning through action research during the design, adaptation and implementation stages.

5. CONCLUSION

Given the need to scale up access to learning to complement the scaling up of access to HIV prevention, treatment, care and support, and improve Universal Access to health and education as human rights, it is imperative that developing country universities seize the opportunity to leverage online technologies by reconceptualising onsite courses as ongoing learning spaces where what counts as literacy is developed and utilized. Otherwise, a 'top-down' approach to what counts as knowledge determines who succeeds and who is labelled as 'lacking'. With platforms such as WikiEducator for collaborative authoring, and through synchronous communication tools, peers can rehearse presentations, provide instant feedback, clarify misunderstandings, and share perspectives - globally. They would not have to wait for a single teacher to find the time to address their pressing needs in the face of a large class of equally demanding students. Instead, they could access any number of mentors anywhere in the world any time. Experts from developed country research centres have a significant amount to offer based on their lengthy careers about what really supports early career researchers to learn and make successful careers as published scientists and practitioners. In turn, novices on the frontline have vast experiential knowledge that can be captured by expanding their scientific literacy repertoire to reduce the knowledge gap. Thus, instead of separate disjointed initiatives around teaching the writing of science in face-to-face workshops, and the submission of abstracts and journal manuscripts online for grading and assessment akin to the traditional school system, this online mentoring case study enables us to propose a new paradigm for integrated research capacity building that sustains workshops and conferences into ongoing learning experiences. For organizations involved in research capacity building policy and programmes, this paradigm can overcome the barriers to access to learning, improve the flow of knowledge, and solve the deficiencies shown in the lack of transferable skills in current capacity building models based on limited learning theories (Nunes and McPherson, 2002).

Achieving the vision of widening access to and improving the participation of early career researchers, so that they become legitimate professionals in a 'scientific learning community', is possible through knowledge sharing around a virtual global university. However, more research is required on the conditions for supportive online social learning, the struggles developing country professionals encounter, and the systems of power in which science is conducted. This will happen as the distance education field develops models of online and ongoing research capacity building that can be extended to universities and professional societies, thus enriching the induction of novices into the global scientific learning community. After all, as Dewey observed, a quality learning experience "lives on in further experiences" (1938:27).

In the 21st century, managing the ecology of learning, its interactions and activities, and the related epistemologies to create a rich space conducive for scientific apprenticeship is the next challenge for university programmers, capacity builders, and learning facilitators - onsite, online and ongoing.

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