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Crowd-sourcing higher education architecting the sustainable design and development of E-Learning in Africa

Post-secondary access in Africa hovers around 6%, in part because there is a lack of access to physical campuses. In Phase I of the African Virtual University's Multinational Project, 73 undergraduate courses were developed and published as OERs in English, French and Portuguese. These in turn were adopted and localized by African universities. While over 1.3 million downloads of the materials have taken place in the last 5 years, no attempt was made to harness the input of user to maintain or improve the courses. Seven years later, the African Virtual University will renew these courses along with another 50 or so in disciplines of high demand. But this time the AVU architecture will call for a sustainable approach to e-learning that challenges the 22 universities in 15 countries to not only help further develop the courses, but also to maintain them and sustain them across multiple languages.
This article discusses the potential role of crowd-sourcing in curriculum development, and sketches a preliminary architecture for building a community of practice to sustain e-Learning in Africa.

Keywords: *E-Learning, virtual university, learning design, crowd-sourcing, higher education.*

КРАУДСОРСИНГОВОЕ ВЫСШЕЕ ОБРАЗОВАНИЕ СОЗДАЕТ ОСНОВУ СБАЛАНСИРОВАННОГО ПРОЕКТИРОВАНИЯ И РАЗВИТИЯ ДИСТАНЦИОННОГО ОБРАЗОВАНИЯ В АФРИКЕ

Доступ к высшему образованию в Африке колеблется в области 6%, от части из-за отсутствия доступа к физическим кампусам. В Фазе I Многонационального Проекта Африканского Виртуального университета были разработаны и изданы как открытые образовательные ресурсы (OERs) на английском, французском и португальском языке 73 студенческих курса. Они в свою очередь были приняты африканскими университетами. Несмотря на то, что за прошедшие 5 лет имели место 1.3 миллиона загрузок материалов, никаких попыток использовать участие пользователей для того, чтобы поддержать или улучшить курсы. Через семь лет африканский Виртуальный университет возобновит эти курсы наряду с еще приблизительно 50 дисциплинами высокого спроса. Но на сей раз структура АВУ потребует сбалансированного подхода к дистанционному обучению в 22 университетах 15 стран, что включает в себя не только помощь в развитии курсов, но и поддержку и распространение курсов на разных языках.
В статье описывается потенциальная роль краудсорсинга в разработке образовательных программ, а также излагается предварительная структура построения действующего сообщества для развития дистанционного обучения в Африке.

Ключевые слова: *дистанционное образование, виртуальный университет, построение обучения, краудсорсинг, высшее образование.*

The word *university* is derived from the Latin: *universitas magistrorum et scholarium*, roughly meaning "community of teachers and scholars" (Wikiedia). The key notion of a university is it is a community of learned scholars who develop and share new knowledge. With the growth of Information Communication Technologies we have seen the boundaries of the community extend to embrace a world wide culture of knowledge sharing. There are two implications of this for higher education – the first is that one may no longer need the "university experience" to gain university knowledge – much of the information passed along in tertiary education is now available online and for free. The second implication is that those responsible for the guardianship of the world's knowledge are no longer operating in isolation. The knowledge of almost any discipline can be collaboratively curated online and published for general consumption.

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This is not to imply that all knowledge will always become available. Some information is kept from the public domain as "intellectual property" or "personal information" or "vital to national defence". Other knowledge is available to the public at a price under copyright protection. However, there is no reason to keep common knowledge of the sort available to high school students or undergraduate university students from the public domain. While the open publication and maintenance of this information is particularly important in areas of the world that cannot afford it otherwise, free knowledge is also of value to those in the developed world. For example, in writing this paper, the author accessed several articles that were available online.

The second caveat is that even the best structured knowledge does not of itself constitute an accessible and cohesive learning path. This is the role of "the course", and while many students would agree this is not always attained in face-to-face universities, the ultimate online course should provide a learning path of intentional learning activities that help the learner find the appropriate content and interact with it, with the instructor and with other learners to attain the requisite skills. Indeed the ultimate course designer is obsessed with meeting the needs of the learners and provides a wide variety of media to clarify basic concepts and help learners interact with it in a meaningful way.

What constitutes "a course" varies from academic community to community and the paradigm of instruction. For some it is simply an outline of key points and references, a series of text pages, or single topic videos, while others take a more interactive approach with learning activities or connectionist discussions. In the early years of computer-based education it was estimated that it would take 300 hours of design and development to produce one hour of fully interactive self-instructional coursework. This was an expensive undertaking and thus the movement of courses online has focused more on replication of face-to-face processes – pages of text or video introductions that are equivalent to the lecture and demonstrations, followed by small group discussions equivalent to the seminars. Where time and creativity are available, these modes are peppered with simulations, interactive quizzes and constructivist projects – usually where there is a face-to-face tradition of such activities. It might take three or four years for an instructor to get a "good" course functioning. The limiting factors are the tools for development and time available and the methodology for development. It helps a lot if there are proven models of effective instruction and templates for learning activities to ease the process. Drawing on the experience of others can greatly accelerate the course development process and improve the learning experience.

The goal of this paper is to explore the potential of collaborative online authoring or "crowdsourcing" as a means of developing, extending and maintaining open educational resource courses. Community building and crowdsourcing help bring creative and qualified experts together to collaboratively produce and extend open learning resources. While the paper examines their potential use in Africa, examples are drawn from around the world and it is anticipated that general findings should generalize elsewhere as well.

What is collaborative writing?

> The term **collaborative writing** refers to projects where written works are created by multiple people together (*collaboratively*) rather than individually. Some projects are overseen by an editor or editorial team, but many grow without any oversight. Collaborative writing is also an approach for teaching novice authors to write. (Wikipedia)

Just like the above quote, collaborative writing can help speed up production and improve the clarity (and hopefully accuracy) of presentation. Providing there is some process to resolve disagreements collaborative writing can bring many hands to make light work.

What is crowdsourcing?

The term crowdsourcing is a fairly generic term to indicate **the harnessing of human talent over the internet to achieve a goal** – usually one that could not otherwise be completed. Crowdsourcing, was initially a phenomenon of the open source software movement where several programmers would contribute code to create a program that everyone could use. It has since been used for a variety of purposes – from recruiting highly skilled individuals to solve problems (Innocentive.com) or to provide technical support (justanswer.com), to recruiting human skills where machines fail e.g. for picture recognition or data entry of handwritten forms (Howe, 2006). Often these commercial tasks are performed for a bounty, a prize or a piece payment. A variant of the process called "crowdfunding" has also been used to raise millions of dollars of start-up funding for artistic and creative ventures on kickstarter.com (Steinberg, 2012). Less successful have been attempts to have audiences submit home videos since the bulk of which are rejected for technical reasons (although the reality TV series America's Funniest Home Videos has run over 500 television episodes of rather tasteless clips of foolish people and their smarter pets).

Bratvold (2012) identifies five advantages of crowdsourcing for content creation:

1. It speeds up the content creation process
2. It gets your customers & potential customers involved
3. It gets your target audience invested
4. It offers you diversity and creative choice
5. It drives the development of scalable processes.

Thus crowdsourcing not only provides labour, but it provides engagement and the potential of attracting diversity and creativity yet in a controllable fashion. A distinction is made between a "crowd" that is rational and goal oriented and a "mob" that is running on emotion. Indeed, James Surowiecki's The Wisdom of Crowds (2004) offers three criteria for intelligent crowds:

1. **Diversity**. A group with many different points of view will make better decisions than one where everyone has the same information.
2. **Independence**. People's opinions are indeed their own opinions and not determined by those around them.
3. **Decentralization**. Power does not fully reside in one central site or a rigid hierarchy. Key decisions can be made or influenced by individuals based on their local and specific knowledge.

For a successful crowd, Surowiecki adds the important functional criteria of

4. **Aggregation** – a mechanism for turning a large number of individual judgments into a collective decision

The challenge to an organization wanting to crowdsource talent is basically three-fold:

- **Recruiting** a sufficient pool of clients and qualified contributors to make each project doable and **rewarding** them in a way that maintains their participation
- **Microtasking** – defining the work to be performed in a way that it can be done quickly in the quality required to enable efficient reassembly
- **Strategically Managing** the process in a way that it not only fulfills the current requirements, but also builds capacity for future needs.

In short, the role of the sustainable crowdsourcer is to become the catalyst in an efficient process that matches needs with talent. As long as there are needs to be fulfilled and contributors with talent, the crowdsourcer only needs to find sufficient resources to keep the process rolling. Developing talent and managing client expectations takes energy. The crowdsourcer must feed itself. This could be through fees and commissions (Kickstarter takes 5% of the funds raised) or though sponsorships (Wikipedia is always on the lookout for new donors) but regardless of its social impact, without a supply of on-going funds, a croudsourcing enterprise is not sustainable.

The world of open content has some interesting heuristics. Probably the most important one is the **one percent rule**. In Wikipedia (www.wikipedia.org) a core of unpaid users, roughly 1% or the user base, has taken it upon themselves to exercise guardianship of the commons. Another 9 % of users have become minor or occasional contributors to the encyclopedic wiki while the other 90% are lurkers and observe and consume without contributing (Wikipedia, n.d.). With its users volunteering for content development and maintenance, the Wikipedia organization needs to find funds for its management, its technical staff and server space.

Other projects such as Wikieducator (http://wikieducator.org) have also used crowd-sourcing tools to great effect (Udas, 2009). With sponsors such as the Hewlett Foundation and the Commonwealth of Learning, Wikieducator has been able to develop a complete learning ecosystem – providing content, learning activities, and online training materials for academic authors and editors. Another example of open crowd-sourcing is the Open source open courseware prototype system (OOPS) championed by Lucifer Chu who encourage an estimated 20,000 individuals to contribute to the translation of MIT Open Knowledge Initiative content from English to Chinese.

Unfortunately, the OOPS project came to a close after Chu ran out of money to sustain it. (He describes himself on his Wikipedia page as an "ex-millionaire".) A question remains about the sustainability of such projects. Many "open" projects start off with a financial push from private or public benefactors that enables the technical and expert resources to come together to launch the project, but the activity slows or ends with the funding. Clearly organizers and participants must realize the importance of benefits to themselves and the larger community for sustaining contributions to continue. Although it is has charitable status, Wikipedia has grown to the point where its expended over $29 million dollars in 2011. Fundraising must keep pace with the growth of its services.

Some examples of crowdsourcing in education

MERLOT.org – Crowdsourcing peer review

The Multimedia Educational Resource for Learning and Online Teaching (MERLOT) began as a cooperative faculty development effort in the USA when learning objects and online teaching were moving mainstream in the early 2000's. From its inception, MERLOT sought to provide an online repository for the learning resources faculty were developing, and while the term crowdsourcing had yet to be coined, to encourage continuous improvement through open academic peer review. MERLOT also went on to build community through face-to-face conferences and workshops, and to spawn special interest communities that were based on disciplines or regions (such as the MERLOT African Network). One lesson learned early in MERLOT was to encourage a formative approach to peer evaluation by letting authors post drafts of their material in order to solicit feedback, improve their materials, and then post for general review. The formative reviews are discarded once the author "publishes" their materials.

WikiEducator.org – Crowd-sourcing the curriculum

The concept of using wiki technology for small projects has been used for several years, but Wikieducator.org takes collaborative writing to the level of open curriculum development. One of the key success stories in the OER world, WikiEducator was launched in 2006 under the sponsorship of the Commonwealth of Learning. The strategy was to use a simple wiki to enable educators from around the world to contribute to the common development of courses and learning resources. Fortunately, the leaders of WikiEducator realized to build a community they needed to equip potential members with a basic set of course authoring skills. WikiEducator continues to offer free online training sessions that are open to anyone to become a contributor. Like Wikipedia, Wikieducator follows the 1% rule (1% write, 9% edit, and 89% lurk) but has a much higher participation rate in terms of the number of edits each community member makes, and in the number of edits per page of information.

Clearly, providing the target audience with essential skills is a key lesson learned. Udas (2010) notes that the hit rates on wikieducator have grown exponentially – and in 2012 WikiEducator served 2,524,818 unique visitors on the site compared with 1,738,748 in 2011 (Wayne McIntosh –personal communication of March 2013). The tools and experience of the development process are available to benefit others, and WikiEducator recently assisted the elearning community in India in spawning its own section. WikiEducator has recently become the base technology for OERu, an international university based on open courses build of OERs (http://wikieducator.org/OERu). As with the success of Wikipedia, Wikieducator must need to continue to grow and evolve to meet the expectations of its users.

Connexions.org and Siyavula.org– Crowdsourcing Open textbooks

Connexions.org provides a platform for collaborative writing and publishing of open textbooks aimed at higher education, and usually a number of authors contribute part or all of various chapters. However while Connexions has an open invitation to participate it has not cultivated a community of practice the way WikiEducator has, possibly because the writing teams are smaller, self=organized and the unit of contribution is a book or a complete chapter rather than a few pages or some minor edits. Siyavula.org focuses on crowdsourcing textbooks for K-12 education in Africa. In fairness, Siyavula is newer and much of the methodology and technology for developing open textbooks is available off the shelf. For example, A.nnotate.com is software that enables multiple contributors to annotate a manuscript thus making it easier for an editor to assemble the best suggestions. Siyavula also uses Transifex web software to microtask the translation of the final book version from English into Afrikaans or other desired languages. Microtasking keeps the level of commitment to a few paragraphs rather than inundating a volunteer translator with too high a level of commitment – small parcels are easier and more likely to be completed. Siyavula tightly coordinates the volunteers by alternating face to face planning workshops with online writing sessions – thus creating a spirit of teamwork and commitment among the volunteer writers. The final textbooks are made available as OERs for free download or the can be ordered as printed text on an at-cost basis. Siyavula (like WikiEducator) also awards "badges" to members of the team who follow through on their volunteer commitments, and the badges can be displayed on personal web sites to denote membership and status in the community.

Communities of Practice

To be precise, crowdsourcing as a labour outsourcing approach is independent of the notion of a community of practice although a community of practice can develop around a crowdsourcing project (such as wikiEducator) and a community of practice can serve as the recruiting base for crowdsourcing (as in Siyuvula). Crowdsourcing can also be an important part of creating awareness and participatory valuing of resources that will aid in their dissemination and use. It really depends on the intentions of the project coordinators whether they want or need to build a community for longer term goals.

Crowdsourcing may also be applied at various stages in the development of educational material. If is possible to think about the degree to which crowdsourcing is used in the five phases of Open Educational Resource development: Planning, Writing, Reviewing, Translation, Elaboration and Maintenance. Some OER repository projects focus on only one phase – for example, MERLOT, org primarily uses crowdsourcing to invite faculty reviewing each others' contributions, while Siyavula. org uses a crowdsourcing approach to Planning, Writing, Reviewing and Translation. The difference of course is that MERLOT was developed as a showcase for individual faculty to show and share what they have produced, and to get feedback for the improvement of their products.

Siyavula seeks community collaboration from the start of each textbook project, thus an invitation is sent out to recruit potential contributors and the contributors can decide their level of commitment and time to the project at hand. Another push for volunteers is made when each project is completed, and Siyavula seeks community assistance to translate to other languages.

WikiEducator sits in between these two positions. Each topic is posted by an initiating author or team of authors, but then the community is openly invited to edit the wiki's pages to improve and extend the content. In many respects, WikiEducator is not really a repository of "courses", but a rich repository of academic topics where instructors share and merge their perspectives into a generally agreed upon presentation. While WikiEducator builds a corpus of instructional materials, it's focus is on faculty development and making up-to-date academic knowledge accessible particularly to those in developing countries who might not otherwise have access to expensive texts, or journals.

What emerges from these cases is not just the variety of ways on which crowdsourcing can be used but how careful planning and coordination are important to OER development. Also emerging is a pattern of community maturation similar to Tuckman's (1965) four phases of group development: (Forming, Storming. Norming and Performing) are evident, but as a crowdsourcing venture matures, an apprenticeship type model seems to appear where seasoned volunteers take over part of the task of nurturing the newer members. The key to a successful crowdsource community of practice is to keep projects well planned, with a clear statement of outcome and a reasonable deadline, and to ensure that the proper tools, training and supports are available, and finally to not burn out the contributors but to reward them with recognition of their individual contribution and accomplishment as a team. A well-nurtured community of practice is capable of completing several projects in a quality fashion and evolving to be a major change force for local, national and global impact.

Evaluation of the effectiveness of crowdsourcing approaches

While effectiveness can only truly be measured from the point of view of the creator and director of the crowsourcing project, social media can have impacts other than those directly intended. The developers of Twitter has no idea it would become the communications platform of the Arab Spring upheavals of 2010. WikiEducator's Measurement and Evaluation Plan (http://wikieducator.org/WikiEducator:M_and_E_Logic_model) clearly focuses on goals for faculty development, but the content has additional benefits in facilitating direct learning by those who consume the materials to meet formal or informal learning goals. As MacIntosh himself comments – it is impossible to separate learner traffic from faculty traffic. Equally, it is difficult to estimate the impact of any OER approach because OERs are not used in isolation, but have become a part of the ecology of on-line learning. Perhaps the best indicator is web traffic and site popularity. In a survival of the fittest sense, if resources are not used, then they will not long be supported, their community will disperse and move on to other endeavors. The evolution of technology enhanced learning is cluttered with many cast-off projects that failed to have sustainable impact, or happened to have been implemented on a platform that was discarded for market reasons. Just as libraries cull many well-written books to make room for new ones, OERs are becoming a cluttered space and if community fails to form and endure, many will be the transient phenomenon of progress.

Applying the lessons learned to the AVU situation

As internet connectivity in Africa improving, many of the barriers to distance learning - both physical and social continue to persist. The African Virtual University (avu.org) has been actively developing capacity among African universities to develop and deliver distance education online. With over 1.5 million free course downloads, AVU has been recognized as a contributor to open education not just in Africa but around the world, for example a significant number of downloads of materials published for Lusophone Africa are made in Portuguese-speaking Brazil. However, in a market where the product is give away for free, success must also be measured in the sustainable participation of its community and ongoing contributions of new courses and in maintenance and enhancement of older resources.

The goal of AVU is to develop capacity to develop and deliver distance education courses in Africa. In earlier projects, AVU has succeeded in both building physical facilities, training academics, and publishing large numbers of courses in multiple languages. However, as access to the internet evolves, the expectations of clients (universities, faculty and their learners) will also evolve. The definition of "a course" will evolve to something more than a course outline and suggested readings. The open education world is offering a cornucopia of learning resources and learning activities that need to be woven together to provide the best learning experiences possible.

First – AVU needs to create structures to enable the community of users to maintain its current courses. While there have been 1.5 million downloads, and many instances of local customizations of the core materials, there have been few corrections, additions, elaborations, or ancillary materials added back to the repository. Crowdsourcing could open the path for users from around the world to maintain the core course, and add ancillary materials to the AVU repository.

Second – AVU could use crowdsourcing to enable translation of core materials to other languages. AVU currently publishes in English, French and Portuguese, but Africa is rich in other languages including Arabic and Swahili which have become *lingua franca* in certain regions. Rather than investing heavily in the costs of translation, AVU could invest in a crowdsourcing site to encourage linguistic groups to translate their own versions of core materials (and vice versa).

Third – AVU could couple its resource logs with a crowdsourcing strategy to encourage open learning

analytics research into the use of its materials and its methodologies (including crowdsourcing). The resultant flow of empirical information could go a long way to improving the design and delivery of open courses. Many OER creators focus on documenting content rather than developing and testing innovative learning activities. The academic world (particularly the learners) was pleasantly surprised when the Khan Academy started pumping highly effective single-concept videos out on Youtube.com, but research on media effectiveness and the need to create efficient paths has been slow in coming. To be an innovator every OER organization needs to collectively participate in the search for best practices.

Fourth – AVU could borrow a page from MERLOT to encourage its participating faculty to document and exchange their open learning practices, and a page from WikiEducator to make orientation and training materials constantly available. (In fairness, AVU already has a community page on MERLOT, but its usage fluctuates with project activity.)

Fifth – AVU needs to continue to strengthen its alliances with other OER groups and with other groups working to improve education at all levels in Africa, and around the world. While it is good to have a strategic focus, it is also beneficial to look for synergies that can create the most impact with the limited resources available. AVU needs to share not just its content, but its methods and hopefully its capacities to other communities. Open Education is a global movement and in some respects the many agencies are both cooperating and competing for long-term sponsorships. Perhaps as a potential crowdsourcer, AVU should look at the opportunities that crowdsourcing presents for generating new ideas and supportive sponsorships for expanded functionalities and services.

Disclaimer: *The opinions expressed in this paper are those of the author and do not necessarily represent the policy nor position of the African Virtual University nor its sponsors.*

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