

Pan – Commonwealth Forum, September 2019, Edinburgh Scotland

Evaluating the Design, Development, and Implementation Experiences of the Digital Fluency Course.

Brenda Mallinson, OER Africa & Rhodes University

Abstract:

The Digital Fluency course is a suite of 5 openly licenced modules designed to enhance capacity for educators in identified topics to support their work in the higher education sector in the 21st Century. OER Africa and Open University of Tanzania collaboratively conceptualised, designed, developed, implemented, and published the modules encompassing Digital Fundamentals, Working with OER, Course Design and Development for Online Provision, Academic Integrity in a Digital Age, and Storage and Access of Digital Resources. Subsequently, a further existing course on Facilitating Online Learning (an OER remix) was implemented as a sixth module to complete the suite.

Evaluation data was collected via three related online surveys eliciting experiences from the module developers (who also facilitated their own modules), pilot participants undertaking facilitated online modules, and workshop participants who engaged more briefly and less formally with the DF modules. The developers' survey comprised questions around team composition, teaching and learning, project support, and an open reflection on the experience. The participant survey included questions on prior experience of online courses, evaluating the teaching and learning experience, support and motivation provided, and a final open reflection of the participant experience. The workshop survey was very similar to the participants' survey, but as the implementation context and format differed, the data was treated separately.

This paper explores, analyses, and presents the findings relating to the development experience and process adopted, the pilot participant experience, and the workshop participant impressions of potential usefulness in their own institutions. Implications of the implementation format on completion rates is be considered. Lessons learned by the project leaders and developers are identified, and potential improvements for the modules are suggested with reference to the survey findings, implementation format, and updating of the content.

Keywords: digital fluency; OER; professional development; developing countries; higher education institution;

Background:

Mallinson, Monyemangene, and Augusti (2017) note that many academic staff at African higher education institutions experience pressure to engage with using information and communication technologies (ICT) to support every aspect of their academic duties. In 2013, Open University of Tanzania (OUT) in collaboration with Saide's OER Africa initiative, recognised that more than computer literacy is needed in today's academic environment in order to take full advantage of the affordances of using ICTs for the full range of teaching and learning, research, administrative duties, and blended modes of provision. In order to address this, a Digital Fluency (DF) course was conceptualised to be provided as an Open Educational Resource (OER) and made available to academic staff for professional development (PD). The DF course comprising 5 modules was developed collaboratively by OER Africa and OUT within the Participatory Action Research Grant (2014-2017) funded by the William and Flora Hewlett Foundation (OER Africa, 2016).

Support for capacity building using eLearning is extolled in Zaheer, Jabeen, and Qadri (2015) whose study took place in a developing country context. Although this study surveyed former students, it noted that the role of eLearning in providing professional development opportunities for students and academic staff was significant. As OUT already used the Moodle Learning Management System (LMS), the decision was taken to provide the suite of modules comprising the DF course in 2 formats: online within Moodle and also a text version in order to promote widespread access.

A highly participatory approach was taken for each stage from conceptualisation and design through to development, piloting, implementation, evaluation, revision, and finally provision of the openly licenced modules to the wider academic community (Mallinson et al, 2017). The intention was to model shared open education beliefs at each stage of the DF development using existing OER where available, remixed where necessary, and to develop OER materials from scratch where none were found suitable. Repeated reviews of materials and structure were taken at each stage, and evaluations conducted via surveys at some of these stages including eliciting feedback from the developers, pilot online module participants and workshop participants.

Online Course Evaluation Tools and Models

Informing the development of the PHEA Online Course Evaluation Instrument (Saide, 2012), Mhlanga, Krull and Mallinson (2013) reported that many online course evaluation systems, processes and instruments exist such as the Quality Matters Rubric Standards, Essential Quality Standards, Online Course Evaluation Project, and OPEN e-Learning in Capacity Building (ECB) Check. These evaluation instruments all foregrounded the

aim of assuring quality in online courses. The Saide (2012) Online Course Evaluation Instrument was used as one of the evaluative checks for the DF modules when they had been mounted in Moodle.

Abdous (2009) proposes a process-oriented lifecycle model for ensuring quality in e-learning development and delivery. This model comprises 3 sequential non-linear phases, namely 'before' (planning and analysis), 'during' (design, prototype and production), and 'after' (post-production and delivery). In practice, this model embeds quality assurance (QA) within eLearning development phases, where practical steps including sample checklists are recommended for each phase. The Abdous (2009) model integrates content, design, and technology using a series of templates and checklists.

Mallinson and Nyawo (2008) recognise that higher education institutions (HEIs) are increasingly aware of the importance of quality in developing and implementing online teaching and learning and emphasise that evaluation is an appropriate mechanism to promote quality. Their eLearning Evaluation model (Figure 1) proposes a spiral structure depicting an iterative and continuous process framed by the phases (axes) of Analysis, Design, Development, and Implementation, taking place at all levels of the extended Kirkpatrick model (Van Dam, 2004) of evaluation: Participation, Response, Learning, Job Application, Performance, and Results. With eLearning taking place in a social context, Mallinson and Nyawo (2008) recommend that surrounding constraints such as contextual and organisation variables should be considered as these can change over the course of iterations providing flexibility during a multi-year project time period.

Recognising the synergy between QA and integrated evaluation, aspects of each of these models were adapted for use in the DF project taking note of the highly developmental nature of the process and the limited resources available in context. The link between integrated continuous review and evaluation and incremental quality improvement in the DF development process was highly important in the context of a different pedagogical approach that took some time to be assimilated by the team. Several evaluative reviews were undertaken at regular intervals to support and guide the team to achieve the project outcomes, using a number of templates and checklists.

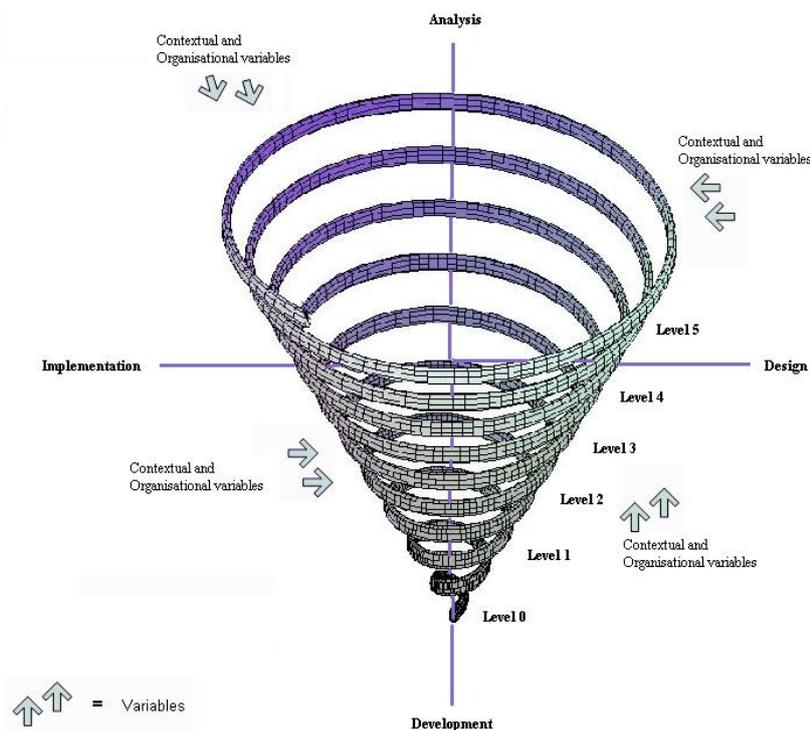


Figure 1. Proposed Model for E-Learning Evaluation (Mallinson and Nyawo, 2008)

Process

In examining how organisations in developing countries experience eLearning capacity building challenges, Aczel, Peake, and Hardy (2008) present a 4-part 'gap' framework comprising instructional design, production, tutorial, and community building. The context of their study was NGOs working in collaborative local partnerships in developing country contexts, and Aczel et al (2008) cite challenges such as "inadequate ICT infrastructure, lack of suitably skilled professionals, and internet access costs." Happily, these inhibiting factors have been somewhat alleviated over the past 10 years, although perceptions are that the current developing country context still has room for improvement in these areas. Indeed, one of the strategies to target these gaps

mentioned by Aczel et al (2008) of an eLearning developer working on transformation at the organisation is similar to the collaboration model embarked upon by OER Africa and OUT spanning 10+ years.

Project Conceptualisation

Subsequent to an OER Sensitisation and Deployment workshop conducted at OUT by OER Africa, the collaborative process was initiated in 2013 with OER Africa and OUT collaboratively conceptualising the DF course according to initial needs identified by OUT Senior Management. These needs were later verified by a survey of OUT academic staff conducted by the Educational Technology Department (EdTech) of the Institute for Educational and Management Technologies (IEMT) at OUT. The EdTech Department were designated as the central OUT unit to coordinate and collaborate with OER Africa in this project, as in-house expertise included instructional design, OER, and technical support for Moodle. Some of the EdTech staff also held concurrent academic lecturing positions at OUT which was considered useful to achieve the project outputs.

Initial topics identified as useful to academic staff PD were Digital Fundamentals, Working with OER, Learning Design and Development, and Storage and Access of Digital Resources, with Academic Integrity in Digital Age being added shortly thereafter. Much later in the project Facilitating Online Learning (FOLC) was seen as a necessary 6th module to complete the PD skill set of the DF suite. This OER course remix had already been developed at Saide as reported by Mallinson and Krull (2015). A highly participatory action approach was agreed upon and adopted, with some restructuring taking place as the work progressed in line with the approach.

A Learning Design capacity building workshop was conducted by the OER Africa consultant with EdTech and other selected OUT staff, during which time the 7Cs of Learning Design (LD) OER Toolkit (University of Leicester, 2012) was used for dual purposes – to establish the suitability of this LD process for designing the identified DF modules, and secondly to note aspects that could be incorporated into Module 3: Learning Design and Development for Online Course Provision. During this workshop, teams were assigned to work on the activities using 3 of the identified module topics: Digital Fundamentals, Working with OER, and Storage and Access of Digital Resources. This OER methodology was then adopted for the design of all the DF modules.

In 2014 project roles were assigned by the OUT EdTech Dept, and a team of developers was convened. Each of the 5 modules was assigned 2 co-developers to mitigate challenges of staff availability over the period of the project. Institutional stakeholders were identified from the outset and included personnel from the IEMT (Moodle support), ICT academic department, Quality Assurance Unit, and from the Library Directorate who played multiple roles including housing the OUT Institutional Open Repository (Figure 2). The OUT Senior management who had been involved in initial conceptualisation were highly supportive throughout and were kept informed as the work progressed. Because of the wide number of OUT staff (academic and support) consulted at each stage, the sense of ownership was high throughout the institution during the project.

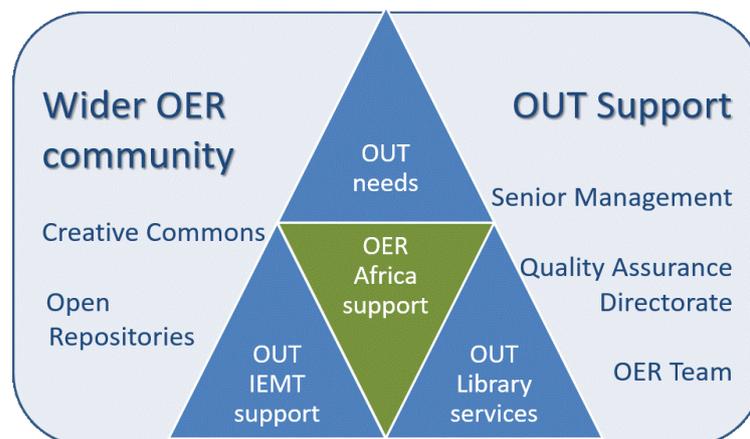


Figure 2: The OUT Digital Fluency Support Environment

Digital Fluency Course Structure

A framework for the DF course was established with some restructuring taking place as the materials development work progressed in line with the participatory approach. Each module topic was notionally designated as 1 week of online course work. While there was an attempt at standardising on 4 topics per module, 2 modules evolved into addressing 5 topics (Table 1) to cover the essential elements. Each module was required to adhere to the OUT in-house style template comprising title, code, description, learning objectives, content, summary, review questions, references and evaluation, which was extended to include extra elements such as teaching and learning topics, media and schedule, acknowledgements, licencing, an assessment plan, accreditation, and a glossary of terms. Each topic was structured to provide an introduction, specific learning objectives, and learning materials including informational narratives, resources and activities, concluding with a

reflection, summary of the topic, review questions, and references. Formatting and structure were regularly reviewed and rigorously monitored in order to preserve the clarity of the module presentations.

With the DF modules intended to provide a practical experience with active learning, the development team also workshopped the timing options. The mode of provision was considered semi-synchronous i.e. each module would start at a particular time and attempt to move the participants forward together at a weekly level. Within each week, participant engagement was asynchronous, with some flexibility provided for cross-week catchup of activities. It was decided that each topic (week) should comprise at least 6 notional hours engagement for the targeted participants, with the assigned activities taking up 3h20m and the remaining time allocated to reading and engaging with resource materials and software tools and applications. Each activity was designed and evaluated for use with respect to its alignment with the corresponding subject matter, appropriate digital tools both inside and outside the LMS were selected, necessary resources particular to the activity were identified, and an estimated time assigned.

Table 1: Digital Fluency Course Outline

Module	Identified Topics
1. Digital Fundamentals	Basic Computing Concepts and Operations; Digital Resource Editing; Internet Fundamentals; Virtual Learning Environments; Multimedia Fundamentals
2. Working with OERs	OER Concepts; Creative Commons Licensing; Mixing, Adapting and Reusing OER; OER Production
3. Learning Design and Development for Online Provision	Models, Frameworks and Processes; Designing for Learning; Digital Learning Development; Modes of Provision; Learning Analytics
4. Academic Integrity in a Digital Age	Introduction to Academic Integrity; Intellectual Property; Promoting Academic Integrity; Data and Information Privacy
5. Storage and Access of Digital Resources	Access to Digital Resources; The Nature of Digital Resources; Storage of Digital Resources; Content Management Systems

Materials development was challenging as the team searched for existing OER to match the identified topics within each module. Guidance on searching for OER was provided by the OER Africa consultant in a contact session and supported by the EdTech staff between site visits. The discovery of interesting materials prompted some realignment of topics between modules on occasion. It was discovered that while there was much material freely available covering Modules 1, 2, and 3, at the time of development no OER were found for Module 4 that could be used freely, which resulted in that development pair having to create materials from scratch. Module 5 was also tricky in that much of the material found was aimed at technical users rather than academic or administrative staff, which again led to considerable remixing and adapting of openly licenced materials. Nevertheless, the developers all persevered and completed their assigned modules.

Evaluative and Iterative Developmental Reviews

Several reviews were conducted during the development process, with the developers conducting formative informal reviews on their partner's work on a continuous basis. Reviews undertaken outside the development teams were internal to OUT and external (Table 2), and in each case the reviewers provided constructive feedback which the developers were required to address to improve their module incrementally. During this time the opportunity was provided for 1 developer from each module to undertake a capacity building online course (itself a remixed OER) Facilitating Online Learning (Mallinson & Krull, 2015). This course was later designated to be reused by OUT as Module 6 of the DF Suite to round off the Digital Fluency online experience.

Table 2: Evaluative Constructive Review Cycle

Review intention	Designated Reviewers	Module Format
Subject matter is relevant & comprehensive	OER Africa OUT project lead OUT Senior academic staff	Text
Language and basic referencing	OUT Library services	Text
Compliance with structure & templates	OER Africa OUT project lead	Text
Quality Assurance	OUT Library QA staff	Text
Pedagogical	OER Africa OUT project lead	Text
Technology Alignment	OER Africa OUT project lead	Text & Moodle
Copyright Clearance	OER Africa Information Services Manager	Text
Overall contextual relevance	Selected ACDE ¹ institutions	Moodle
Copy Editing for publishing	Consultant to OER Africa	Text

¹ African Council for Distance Education <http://acde-afri.org/>

The pre-pilot ACDE institutional overall contextual reviewing was conducted on an ad hoc basis. Although academic staff from 10 member institutions were provided with access to the OUT eLMS (Moodle) modules, many had unresolved access issues and unfortunately no meaningful feedback was received. The ACDE were initially interested in OUT providing the DF suite as a series of MOOCs but this has not yet come to fruition.

Module Online Pilots and Associated Evaluation Instruments

The modules were piloted sequentially to provide the participants with the opportunity to engage in each in turn. Although a logical order to undertake the pilots had been established, they were piloted in an alternate order according to readiness. A call for participation was sent out to selected regional (East African) higher education institutions (HEI) resulting in n=25 pilot participants. Each module topic provided opportunity for reflection and in addition, standard COLLES² evaluations were required at each module conclusion. Unfortunately, participation in these evaluations was poor with only 10% of participants completed the evaluations. However, the COLLES survey option is built into Moodle (Moodle.org, 2019) and is interesting as it provides 3 forms: preferred, actual, and combined preferred and actual, with the latter used as a standard at OUT at the conclusion of online courses/modules. COLLES comprises 24 statements grouped into 6 scales namely relevance, reflection, interactivity, tutor support, peer support, and interpretation (Taylor and Moar, 2000), with each of the statements rated on a five-point Likert-like scale: Almost Never (1), Seldom (2), Sometimes (3), Often (4), Almost Always (5). However, with the small sample of respondents (n=2) the data gathered was insufficient to draw any meaningful conclusions.

Each pair of developers was also required to report on their module pilot stating their challenges and recommendations. The Modules 1 and 2 feedback is shown in Table 3. Perceptions of subject matter experts with respect to the level of effort required to develop OER courses was investigated by Dudek, Duran, and Parscal (2019), who reported that 80% said it took ‘more - much more time’ than expected. The developers within this project continually cited effort level and insufficient time as factors inhibiting their module progress.

Table 3: Developer Post-Pilot Challenges Experienced and Recommendations

Challenges	Recommendations
Poor accessibility of the Moodle system	Upgrading of the Network and Moodle
Workload and Time management of the Instructors	Facilitation should be officially recognized as part of institutional responsibilities
Poor response from the Students; Low participation rate due to tight academic schedule;	Motivation mechanism for both students and instructors; Progress tracker should be provided weekly to keep students aware of their tasks; More advertisement of the course to be made in order to attract more students.
Participants were more active in activities involving discussion forums than file submissions.	Pre-module guidance should be firmer around what is required from participants for the module.
Participants requested that the module stay open in order to complete activities.	Duration could be increased to provide participants with more time to undertake activities.

Web-based online surveys

Web-based online surveys were also conducted after the pilots to ascertain experiences of the developers / facilitators. Given that the participation rate was so low for the COLLES module internal surveys, a similar web-based survey for pilot participants was also developed in an attempt to obtain data around their experience. Subsequently, when the DF modules were engaged with during workshops, these experiences were also solicited. The developers survey responses comprised all developers and 10/10 responses were received. Pilot participants survey responses were gathered from 5/25 which roughly comprised the group who had persevered through the suite of DF modules. 35 responses were gathered from 3 pre-conference workshop groups over a subsequent period of 12 months.

The developers survey analysis revealed that 9/10 had less than 10 years’ experience in higher education, and 9/10 had prior experience as either student or facilitator in an online course. All 10 responded that this experience was essential (8) or helpful (2) to facilitating their online module. Regarding teaching and learning questions, only 6 had previous experience of an engaged and active approach to learning. The primary indicators reflecting experiences within the DF project revealed that all 10 noted the implementation of new learning approaches and practises, 9 noted increased participation with others and meaningful engagement (activity/interaction), with 7 noting that they acquired new skills/expertise and were ‘inspired to do new things’. Other indicators chosen by the majority (>5) included integrated reflections, being exposed to new views on learning, implementation of innovative practices, social connections formed, and developing tools and documents. All the groups were also asked to what extent they believed the Digital Fluency modules contributed to the value statements as described by OER Africa. Figure 3 shows the response to this question of the developer/facilitator team as they had the most familiarity with OER Africa methods and processes.

² Constructivist On-Line Learning Environment Survey

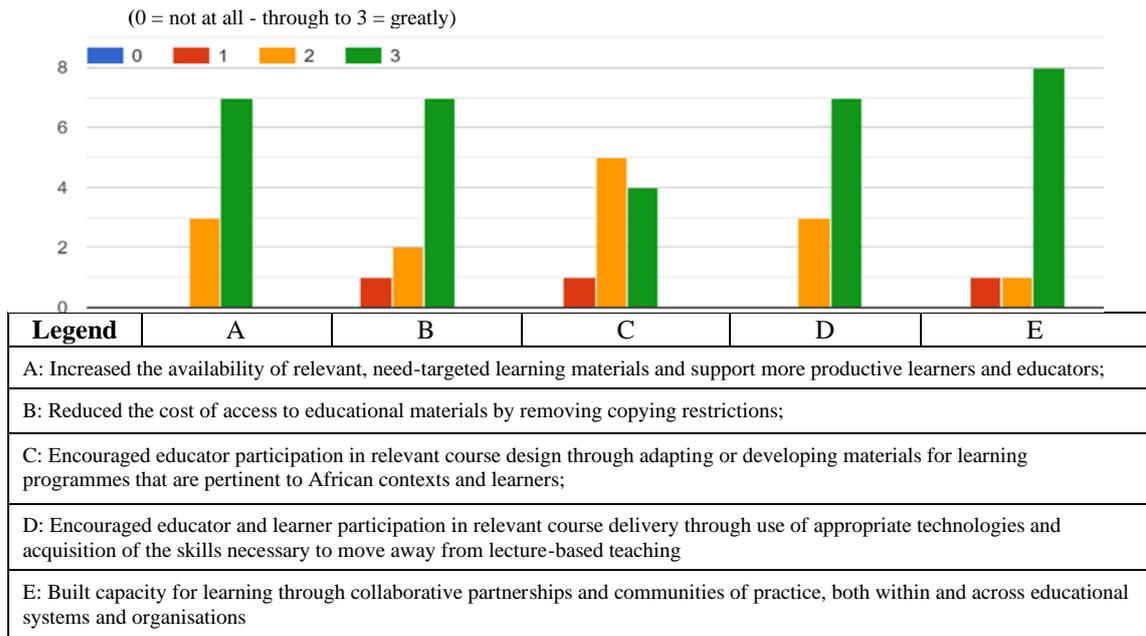


Figure 3: Developers - Extent to which DF modules contributing to OER Africa Value statements

The extent to which a variety of activity types were deployed in the modules is shown in Figure 4 with the majority being experiential and interactive. These activity types were from University of Leicester (2012) 7Cs of Learning Design activity profile. The level of project support received was also positive as shown in Figure 5.

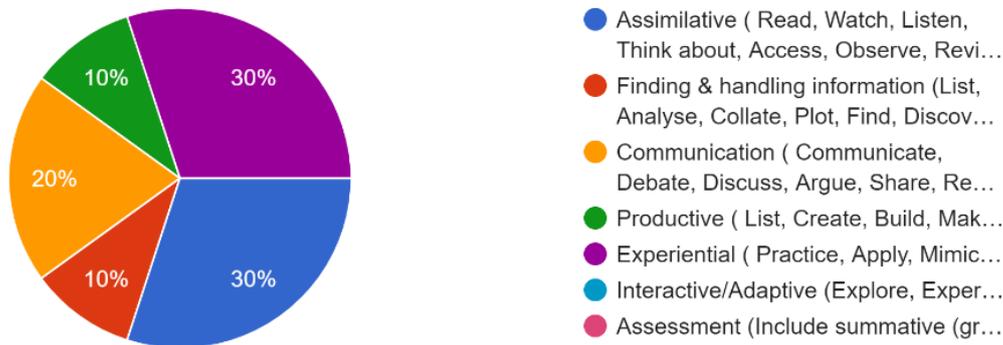


Figure 4: Variety of activity types deployed as reported by the DF module developers.

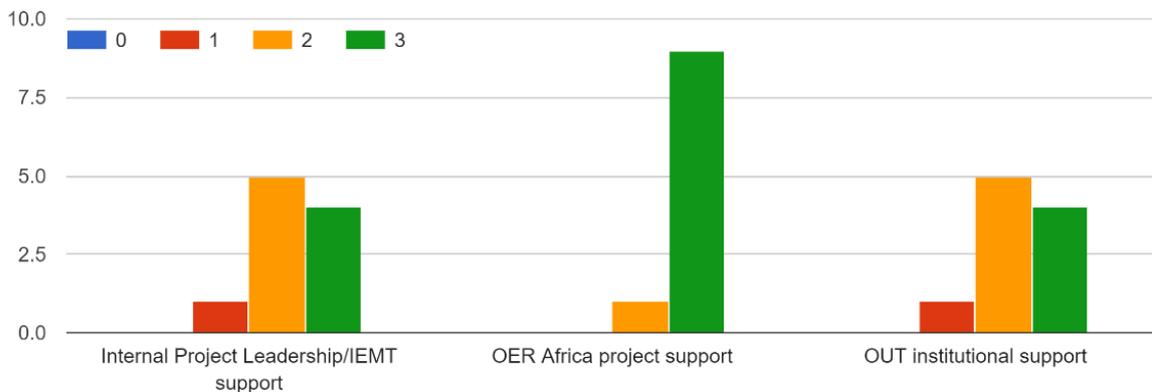


Figure 5: Level of project support received as reported by DF developers.
(0 = not at all - through to 3 = considerable support)

Overall positive developer/facilitator reflections shared in the web-based survey included (verbatim quotes):

- *Honestly it was exciting training people from different areas (Country, away from OUT) and the participation was awesome at the beginning even though participation came down at some point, the training part was still fascinating*
- *I think it should be made a compulsory course for all new academic staff so that it exposes them to good digital foundation.*
- *There was such a great support from an OER Africa expert that made the Digital Fluency course successful through out the process of design, development, review, implementation and pilot process.*
- *It the first kind of project i attended ,was interesting and looking forward for its improvement as per comments/suggestions given to our reports*
- *Improved knowledge and skills to access learning resources from online sources and repositories as well as improved collaboration among learners and facilitators*
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Challenges expressed were related to:

- *The main issue we have experienced is participant's commitment in engaging with all activities in the modules. There should be a way of managing active participation.*

Suggested solutions and improvements and general comments:

- *In the future we can also enrich the modules with more multimedia resources to enhance the learning experiences*
- *Facilitation skills are more needed to the developers especially during the pilot process to help the participant being aware of what is going on and engage with the course*
- *Support from course manager and the availability of internet connectivity are important in online courses. Courses need to appear all the time so that students can register if missed the previous round.*
- *Improve the network; Accessibility and availability, the course (DF) should be included in Open Performance Review and Appraisal System (OPRAS)*

An Additional trial of Module 2 - the DUCE experience:

The Working with OER module was rerun by OUT at the Dar es Salaam University College of Education (DUCE) in order to try out the module in a different context. DUCE is an on-campus face-to-face institution and were not as familiar with online learning as many of the original pilot participants had been. This instance of Module 2 was cofacilitated by a highly successful DF pilot participant who was a member of the DUCE staff. However, of the 30 registered participants, only 21 accessed the online module, and course retention eventually whittled down to 4. This mirrored the course retention in the pilots at OUT.

Bawa (2016) lists some critical reasons for attrition in online courses including: Misconceptions Relating to Cognitive Load, Social and Family Factors, Motivational Factors, and Technological Constraints. Similarly, Lee and Choi (2011) grouped factors influencing student dropout into 3 categories relating to the Student, Course / Program and Environment. Some solutions to address these issues are noted by Bawa (2016) as being: “Make Orientation Programs Mandatory”, “Using ‘Live’ Interaction and Transparency in Computer Mediated Communication”, and “Creating Classes Structured for Collaborative Learning”, whereas Lee and Choi (2011) proposed mitigating strategies of “understanding each student’s challenges and potential”, “providing quality course activities and well-structured support”, and “handling environmental issues and emotional challenges”.

In the case of DUCE, as the participants were all co-located a remedial intervention was organised. The initiating meeting was attended by a limited number of participants, with all facilitators and OUT Moodle technical support personnel. Participants voiced their difficulties with the course, and technical staff assisted those who had experienced access issues. A practical demonstration took place illustrating Moodle navigation and module features and elements of which to take particular note. An introduction to the concept of Learning Circles was provided by the OER Africa consultant and the group agreed to engage with this as a form of face-to-face support. The implementation of Learning Circles as described by P2PU (2015) appeared to be relevant with the issue being addressed applicable to our context: “Learning Circles are lightly-facilitated study groups for learners who want to take freely available online courses together, in-person. ... The volume of high quality online learning resources and the mounting evidence that they have not levelled the educational playing field”.

Despite this attempt at remediation, the reboot of the course was not entirely successful and further ideas to promote such interventions were sought. Some of those suggested by DUCE included the introduction of OER into the Teacher’s curriculum, the possibility of starting an OER Club at DUCE, and the formalization of the Working with OER course at the institution. This was a valuable experience as it led the project team to reflect further on where the implementation challenges lay and what could be done to mitigate them.

Discussion and Recommendations:

Developer challenges included English language for academic purposes as it was not the mother-tongue of the developers, and half of the developers were technical support rather than academics staff resulting in a steep pedagogical learning curve. Even for academic staff, there was a learning curve with respect to designing and implementing a more active approach to teaching and learning rather than the traditional distance methods previously employed. The sporadic support site visits of the OER consultant meant that there were long periods where little project activity was taking place and developers would lose the thread of their endeavours.

Despite the DF modules being designed for light facilitation or independent study, the target participants clearly needed more guidance and motivation than was provided. The inhibiting factors ranged from limited experience with online learning, to severe time constraints for engagement. Suggested solutions included forming supporting Learning Circles from the beginning of the module where participant demographics permitted and holding pre-module training on using the online LMS. As challenges were experienced around the time and costs associated with intensive facilitation, some thought was given to scalable interventions as both these resources are scarce for both the implementing team and participants.

Going forward, a new venture involving shorter professional development interventions (2-3 hours) has already been conceived by OER Africa, with 1 pilot multimedia package having been designed, developed and piloted at OUT on the topic of 'Designing an activity for your online course'. This is in fact one of the activities from Module 3 of the DF suite, and it is planned that further shorter interventions of this nature be developed from the DF activities which were clearly structured in detail. Early experiences indicate that academic staff welcome these shorter interventions that can be accomplished in a few hours and selected at the exact time the skill is needed. Overall, the developers themselves have a new appreciation for active teaching and learning and understanding the rigorous processes to produce a useful good quality, relevant online course for academic staff.

Given the nature of this evolving area of professional development, and the multi-year process to complete the DF suite, the materials are already in need of updating. As all the modules are published as OER, it is hoped that other HEIs may find the modules useful and worth updating and sharing with the OER community.

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