Effectiveness of Multimodal Microlearning for In-Service Teacher Training

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Abstract: To meet the growing demand for continuing professional development of practising teachers, the integrated in-service teacher training (INSET) programme aims at making permanent improvements on the quality of teaching and learning for Junior Secondary School (JSS) Teachers in Sierra Leone. Within this context, a toolkit for School-Based Teacher Development was created and microlearning identified as an ideal mode to deliver the toolkit content. In this paper, we present the design considerations that informed this decision as well as challenges and lessons learned from the first implementation of the INSET project for junior secondary school teachers in Sierra Leone. A multimodal approach was considered and implemented to mitigate Internet access challenges and to expand learning opportunities. These include a mobile app version of the Toolkit, offline access to microlearning resources on the TeacherFutures platform via the Moodle mobile app, a mobile app version of one INSET module, an e-portfolio to be used by participants in sharing their learnings as demonstrated and practised during a face-to-face roll-out seminar, and finally, WhatsApp groups in which different schools engaged in discussions based on the questions on the Toolkit. Preliminary findings indicate a strong preference among participants for the use of WhatsApp as the main channel of communication within the communities of practice; and very limited use of the main e-learning Moodle platform and e-Portfolio. This necessitates a need to critically evaluate the effectiveness of the design of a multimodal approach for delivering microlearning content. From this, we seek to establish a set of design considerations, capacity building and technical support issues derived from analysis of data emerging from the ongoing project rollout. This will inform future integration of Microlearning resources in the teacher training project.

Keywords: teacher training, multi-modal, micro-learning.

Introduction

Several studies have supported the notion that ongoing teacher professional development is important for positively impacting their practice (Barrera-Pedemonte, 2016; OECD, 2015; Villet & Moon, 2017). In addition, teacher preparedness through continuing professional development is directly correlated to improved learning outcomes (Barrera-Pedemonte, 2016; Villet & Moon, 2017). With increasing demands on teachers, such as the need to keep up with rapid changes brought about by technology disruption, adoption of learner-centric methods and differentiated learning approaches needed to develop 21st-century student competencies, it is essential to explore new ways in which technology integration can be used to strengthen in-service training in order to meet these evolving needs.
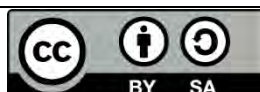
Traditionally, professional development has taken place in formal pre-service as well as in-service professional development in the form of periodic workshops, and in-class observations as well as single session workshops (Elliott, 2017). Such training sessions often occur when students are not present, are disconnected from each other, and are also detached from the teachers own classroom practice. As a result, teachers fail to sufficiently gain new competencies needed to support their students in acquiring the complex skills often associated with the 21st-century skills that are crucial for success in today's world. As indicated in the *OECD Annual Report 2005 45th Anniversary* report (2005), teacher training institutions should adopt in-service professional development to ensure quality of the teaching workforce and meet the needs of a hypercompetitive global economy. Thus, professional development that is packaged as part of an on-demand, active ongoing exchange in situated workplace learning environments, characterised by peer learning between and amongst teachers, portends increased benefits to help teachers acquire instructional strategies to teach these skills. Such workplace learning has long been used by large corporations in the form of short-focused microlearning modules aimed at building employee knowledge, continually reinforcing competencies, providing quick access to information, and even identifying and predicting problems. These targeted and personalised microlearning modules have been proven to help reduce knowledge gaps and build workers' confidence in performing tasks (Buchem & Hamelmann, 2010; Hug, 2005). We can thus deduce that in-service professional development can benefit from a microlearning strategy.

Microlearning involves the use of bite-sized (chunked), well-planned modules and short-term learning activities. According to Hug (2005) micro-learning matches the brain's limitation of working memory by reducing the cognitive load that is characteristic of more traditional long-format instruction. It enables flexible and self-paced learning and fits well into a teacher's work demands. As such, microlearning promises numerous benefits for in-service teacher training. First, since it makes use of existing web technologies and new trends in e-learning and educational technology, content can be deployed, curated, accessed and shared by users on multiple devices. For teacher training, this means that teachers can use tools that they are already familiar with to access, curate and develop content. Secondly, while traditional teaching methods are often instructor led and thus limit the level of interaction between learners (teachers), micro-learning is more "hands on" and collaborative. Collaboration tools enable learners to learn from subject matter experts within a group and therefore benefit from working together. In such a scenario, learners can also become content creators, by responding to questions on social forums, and blogging or providing feedback to other learners within a community of practice. Thirdly, since micro-learning lessons are short, they are also quick to produce. This is especially useful where content needs to be frequently updated since teacher educators can review the teaching content and edit out redundant information to ensure accuracy and simplicity. Furthermore, while developing content might require the use of technology that needs to be paid for, many tools and technologies that support micro-learning (such as social media) are freely available over an Internet connection. In addition, learners can often use tools that they already have, such as mobile phone devices, to record, edit and publish micro-learning lessons. Fourthly, when coupled with a Learning Management System (LMS), the in-built analytics system enables tracking of user participation, engagement and feedback. Lastly, micro-learning supports active interaction via synchronous and asynchronous channels of communication, such as discussion forums, messages, blogs, social media pages, etc. Here, teachers can raise questions, respond to questions, share learning outcomes and teaching methods, and learn from the experience of others. Teacher educators on the

other hand can monitor the effect of training by analysing the feedback received from teachers. The platform supports interaction among teachers, between teachers and teacher trainers (mentors) and between mentors from different institutions.

This study is based on the findings from the implementation of the INSET project at the Freetown Teachers Training College (FTC) in Sierra Leone. FTC (now Freetown Polytechnic) was established in 1975 following mergers of colleges to serve the Western region of Sierra Leone. It is one of the main teacher training institutions in the region offering pre-service and in-service training at the Secondary School level (HTC). In a move to break away from the traditional print-based, teacher-centric, distance education, in-service training, FTC, through the support of the Commonwealth of Learning, sought to integrate microlearning and educational technologies to improve the quality of its in-service teacher training programme. The INSET project was thus motivated by the need to make permanent improvements to the quality of teaching and learning by addressing the training needs of pre-service and in-service Junior Secondary School teachers in Sierra Leone.

As a result, the key research questions guiding this study include:

- How can a microlearning strategy be incorporated into ongoing in-service teacher professional development?
- What tools support access to content in low Internet resource areas?
- How can these tools help build virtual communities of practice and can they enable active learning and support for work-embedded collaboration?
- Do the microlearning objects offer opportunities for feedback and reflection?
- How can a microlearning strategy be effectively synchronised with a teacher's already packed daily schedule over a sustained duration?

This study sought to answer these questions as well as present challenges and lessons learned from the first implementation of the Integrated In-service Teacher Training project (INSET) project.

Methods

Research Design

The purpose of this study was to examine how effective was the integration of a microlearning strategy into the school-based Teacher professional development programme at FTC. Teacher professional development is a complex and multifaceted process that incorporates different forms of change that occurs over a sustained period and that is implemented within specific contexts. This study is therefore delimited to the implementation of microlearning as a strategy for dissemination of training materials related to the TPD programme only. Furthermore, it presents preliminary results to propel future investigation on whether participants implemented what they had learned in their teaching. As such, a mixed-methods approach that consists of multiple data sources was considered. This is supported by studies that indicated that such an approach is ideal for evaluating and making data-driven decisions regarding professional development such as how it should be developed and delivered (Thomson, 2020). Furthermore, mixed method research enables triangulation of data which yields better inferences and minimises weakness that may result from single-method bias, thereby providing an opportunity to test the consistency of research findings. Thus, the quantitative data

provided data against which to establish whether the microlearning approach was having the intended effect. The qualitative data was used to provide detail on the quantitative results.

The Integrated In-Service Teacher Training (INSET) Programme

The school-based teacher professional development program that provided the context for this study is known as the Integrated In-Service Teacher Training (INSET) programme. This programme was implemented at the Freetown Teachers College (FTC) in Sierra Leone. Like many training institutions in Sierra Leone, FTC has traditionally relied heavily on teacher-focused, paper-based, and largely theoretical distance learning for in-service training. This has resulted in a situation where teachers do not possess adequate skills to support students' learning, and, further, do not possess requisite skills to deploy technology enabled approaches to aid in teaching and learning.

Through technical and financial support from the Commonwealth of Learning (COL), FTC developed a technology enhanced School-Based Teacher Development (SBTD) Framework for the training of Junior Secondary School (JSS) teachers in selected secondary schools in the Freetown and Kono Districts. Through the INSET programme, COL supported FTC in the design and implementation of in-school strategies to improve the quality of its distance education training using mobile technology with a focus on microlearning to manage the delivery of content.

Following the results of a baseline study conducted by FTC (Junaid, 2018) to determine indicators for measuring the intervention process, the expected results, as well as how these could be measured, COL's *Blueprint and Toolkit for School-Based Teacher Development* (SBTD) was adapted for use in in-service training at FTC. Further, microlearning was employed as a strategy for disseminating content related to continuing professional development of both student teachers and teacher educators, as well as to stimulate peer learning through networked learning and Communities of Practice (CoPs). This was positioned to enable horizontal learning, to allow every participant to contribute to the learning process. Thus, the overarching pedagogy of the INSET programme is a socially mediated constructivist approach that uses microlearning to disseminate the toolkit contents as well us enable collaborative learning within a Community of Practise.

It is reiterated that the SBTD toolkit serves as the primary point of reference and is intended to provide "guidance and supporting resources for a school-based programme of around 12–15 weeks' duration". At the heart of the INSET programme are four modules at various stages of completion that have been adapted from Open Educational Resource (OERs) by teachers at FTC and that integrate microlearning. The modules are: Teaching and Learning for Sustainable Development, ICT for Teachers' Learner-Centered Approaches, Commonwealth Digital Education Leadership Training in Action (C-DELTA) and INSET Module 1 (Teaching and Learning for Sustainable Development).

Multimodal Approach

To break away from traditional print-based content delivery that characterised the distance learning programme at FTC, a multimodal approach was considered for dissemination of the toolkits' chunked content and to ensure completion within the proposed 60-70 hours. Use of mobile technologies facilitated the creation of a Community of Practice amongst the teachers and mentors. Furthermore, this approach was considered ideal to mitigate Internet access challenges and to expand learning opportunities by varying the mode of delivery thereby creating personalised learning experiences.

The learning design encompassed two face-to-face workshops (including a launch seminar), post-workshop activities targeting teacher trainers and school champions, as well as the multimodal approach detailed below. These made use of active learning techniques that encompassed a wide range of interactions as detailed in the project reports (Allela et al, 2018a, 2018b). The face-to-face sessions placed emphasis on learning by experience (by doing) as well as through interactions with other participants who formed the community of practice. The multimodal approach included the following components:

i. **Teacher Futures Moodle Platform:** The Teacher Futures website is a Learning Management System built on open source technology that contains different sections (metacourse areas) for participating countries. From the country page, users can link to their respective branded institution pages and, further, be enrolled into ongoing courses as listed on the institution pages.
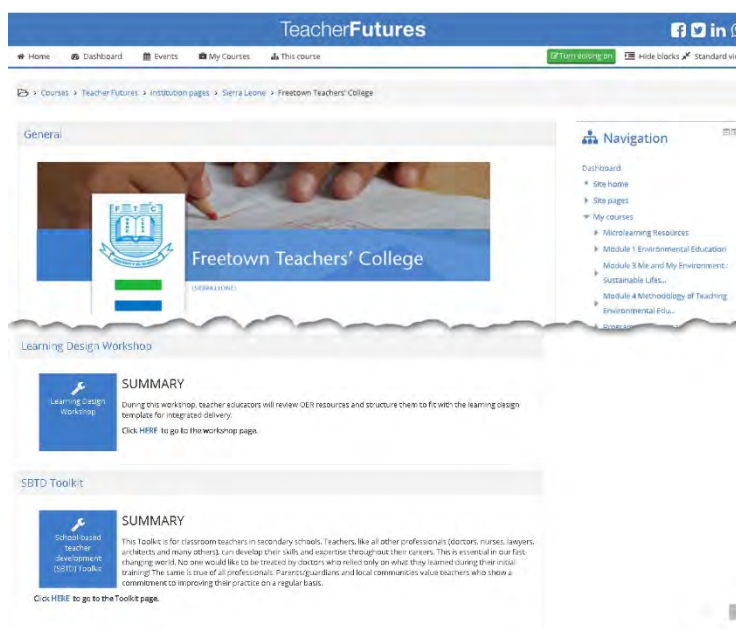

Figure 1: Freetown Teachers' College Page on the TeacherFutures Platform showing list of courses
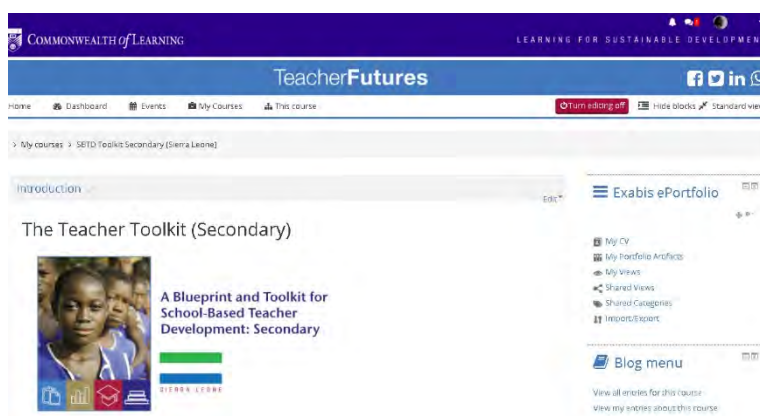

Figure 2: The SBTD Toolkit page on the TeacherFutures Website

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ii. **Accessing the TeacherFutures platform via the Moodle mobile app:** The Moodle mobile app allows users to access and interact with content on the Moodle platform whilst offline such as posting on discussion forums, replying to messages, attempting quizzes and activities, reading forum posts, or submiting assignments. These are automatically synchronised with the live content on the Learning Management System when the device is connected to the Internet. During the programme roll-out workshop session, participants (mentors, teachers, and School champions) were instructed on how to access and download the Moodle App from the Android store, Apple and Windows App store, and through practical demonstration, were shown how to log in to the TeacherFutures Moodle platform via the app in order to view and access the SBTD Toolkit resources offline.

iii. **Mobile app version of the SBTD Toolkit:** The eLearning XHTML editor (eXe) was used to create a resource package of the SBTD Toolkit containing both questions and discussions for the Mentors' version, and only the questions in the Teachers' version. eXe is an easy-to-use material authoring tool, that allows for the creation of interactive learning materials. It can be used to package pages containing various media formats such as text, images, video, and audio clips, and also supports attachments of different file type such as PDFs. Further, it exports content that can be embedded as a SCORM package on a Learning Management System (LMS), or be made available as a downloadable resource containing several interlinked webpages for offline access on a browser.

iv. **Mobile app version and print version of one INSET module:** While the SBTD Toolkit focuses on giving "detailed introduction from which schools and teachers can develop further programmes and activities" and addresses key topics around literacy, numeracy, and subject pedagogic knowledge, the INSET modules are a set of four topics that teachers, working in teams, adapt to fit the Sierra Leone context and integrate microlearning as well as learner focused approaches in its delivery. Of the four topics, the INSET Module 1 (Teaching and Learning for Sustainable Development) was presented during the programme roll-out seminar to show how the module is structured, and its embedded microlearning resources, and how it can be implemented. A print version and mobile app version of the document was made available to all participants. The print version had embedded multimedia based microlearning resources using QR codes that can be accessed using the Print2Screen app (Abeywardena, 2016) that embeds multimedia resources into the print based material.

Figure 3: Page from INSET Module Teaching and Learning for sustainable development showing embedded resources

The print version of the modules was based on the INSET Course Design template which served as an integrated course design template for print, eLearning and microlearning delivery in line with the relevant COL guidelines on learning design as well as standards for design and development of microlearning. This was intended to be used as a guide for developing module content in a consistent manner for further uploading to the LMS as well output on other mobile formats. The INSET Course Design Template was first presented to the FTC Teacher Educators during a Learning Design Workshop that served as a technical and pedagogical quick start guide on developing content for print and eLearning microlearning delivery.

    v.   **E-portfolio used by participants to share their learning as demonstrated and practiced during the face-to-face roll-out semina**r: During the roll-out seminar, participants engaged in active learning through demonstration, prompt, and practice exercises *(I do, you do, we do)* on how to create ePortfolios on the Teacher Futures' Moodle site. ePortfolios make visible student learning and are a digital collection of resources containing course-related work and may also contain other aspects of a student teacher's life such as their interests and employment history.

Each participant was required to log in to the LMS and access the *exabis* portfolio block on the SBTD Toolkit page. The demonstration session entailed instructions on creating CVs, creating categories and enabling sharing settings, creating ePortfolio artefacts, uploading Files (Images, Documents and Videos) to the ePortfolio and, lastly, adding a shared "My Views" page and to share the portfolio content with other participants. Participants were also shown how to view posts that had been created and shared by others.

    vi.   **WhatsApp groups in which different schools engaged in discussions based on the questions on the Toolkit:** During the programme roll-out, 12 WhatsApp groups were created for the 12 participating schools in the Freetown and Kono areas. JSS teachers (trainees) and School Champions from the schools were enrolled into the groups as well FTC mentors (experts outside the school) who formed the basis of the Communities of Practice. Further, an additional WhatsApp group (the SBTD Toolkit Group) was created in which participants from across the different schools could join and interact with each other.

Microlearning in the CoP involved (i) receiving impulses in the form of "bite-size bursts" of content knowledge, short videos, links to online web resources, or models of classroom best practices, which teachers can adapt and use from the FTC mentors, (ii) acquiring experience by engaging in carrying out assigned tasks, and (iii) learning from colleagues on the basis of shared knowledge and generation of new knowledge and improved practice within the 'community that learns' (Por, 2001). It was anticipated that the results of discussions (responses to questions from the toolkit) would be gathered in the trainees' electronic portfolios on the Teacher Futures Moodle site to demonstrate competence and improved practice of the trainees. This is currently ongoing.

Population and Sample

The target population consisted of Junior Secondary School Teachers and Teacher Educators in Sierra Leone. A subset of this population consisting of twenty (20) teacher educators from the Freetown Teachers' College who took part in the first Learning Design workshop, forty-four (44) participants (School Principals, Secondary School Teachers, and Teacher Educators from FTC) who took part in the rollout seminar, as well as eighty-six (86) teachers from the participating project schools who were enrolled after the programme launch, constituted a representative sample. The teachers in the sample set were drawn from fourteen (14) secondary schools within the Freetown and Kono districts. Eleven (11) of these schools had taken part in an earlier baseline study (Junaid, 2018).

Data Collection Process

Qualitative and quantitative data was gathered from the baseline studies, observations during the face-to-face Learning Design workshop and programme launch seminar, as well as from post-workshop evaluation. The instruments for data collections entailed questionnaires (Head Teacher interview questionnaire, Teachers questionnaire) administered by enumerators to inform the baseline study, the classroom observation schedule and students' environmental awareness questionnaire used by enumerators ahead of the roll-out of the programme, observation during the Learning Design workshop and Launch Seminar, post-workshop evaluation questionnaire and discussion on the Whatsapp Communities of practice. Piloting of the instruments (questionnaires and observation schedules) in a school context during the baseline study was integral towards establishing content validity.

Data Analysis and Results

The ensuing data was reviewed against the levels of the Kirkpatrick model of program evaluation based on the work of Guskey (2000) in applying this model to educational contexts. These levels are participants' reactions to the professional development programme (reaction); whether participants achieved the desired learning outcomes (learning), participants' use of new knowledge and skills in their teaching, and resultant improvements in participants learning (behaviour). The first three levels (reaction, learning and behaviour) represent the dependent variables, while the independent variable pertains to the microlearning approach employed in the INSET school-based teacher professional development project reported in this study.

Results

Results from INSET Baseline Study

From the INSET baseline study conducted in 2017 (Junaid, 2018), it was evidenced that the prospects for success for a technology enabled training approach were quite high. The data for the INSET baseline was obtained from 130 Junior Secondary School Teachers in the participating project schools. Results indicated individual teachers' readiness at 77%, willingness to experiment with technology at 88%, eagerness to use computers and Internet in teaching and learning at 95%, teachers' perception of e-learning as a viable alternative to traditional methods (89%) and the strong need for e-learning in their schools at 97%.

INSET Baseline Study

- Need for e-learning in their school 97%
- Teachers' perception of e-learning as a viable alternative to traditional methods 89%
- Eagerness to use computers and internet in teaching and learning 95%
- Willingness to experiment with technology 88%
- Idividual teachers' readiness 77%
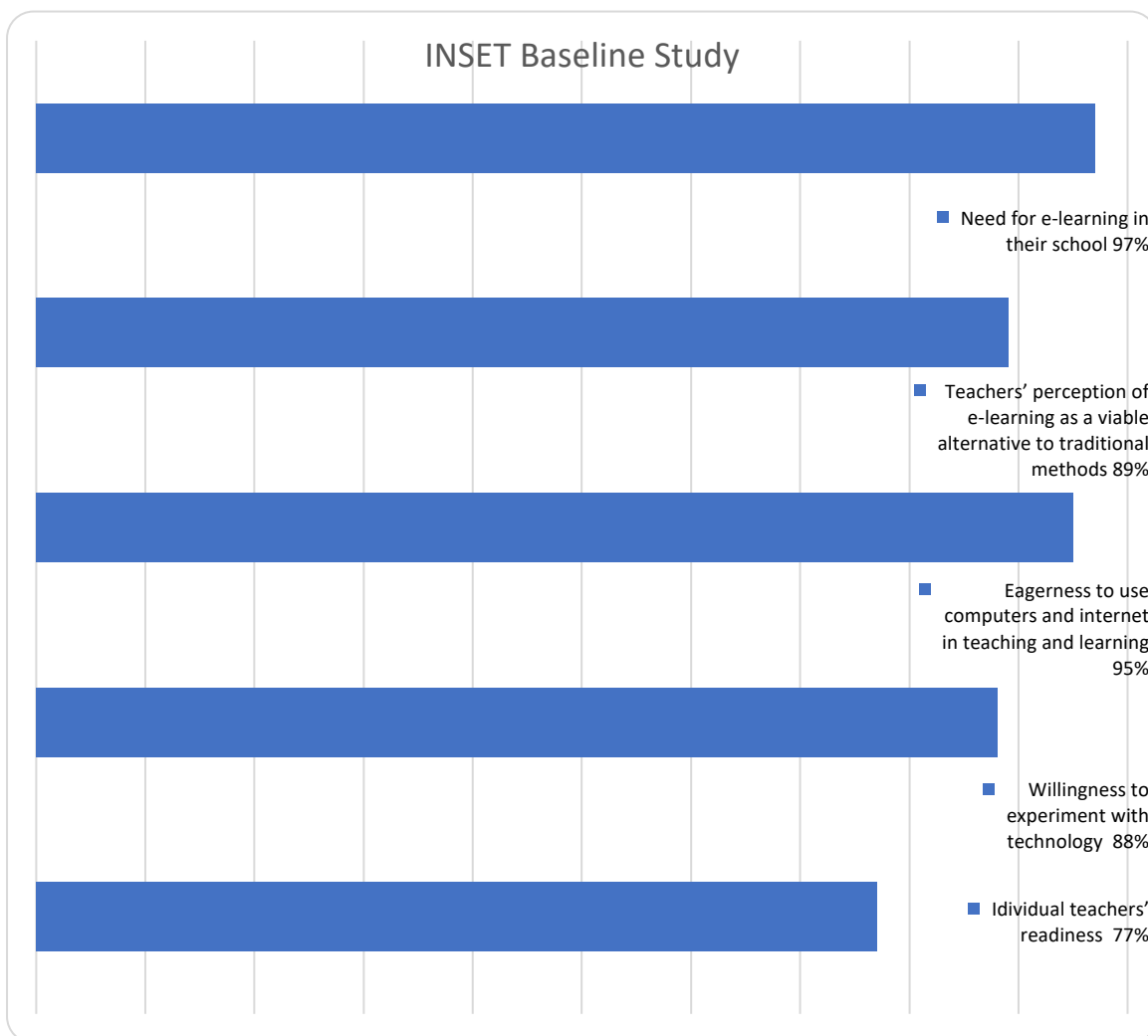
From the data, it was evident that teachers had a positive attitude towards the use of ICTs, perhaps due to the pervasiveness of ICT tools in everyday life, 55% of the teachers at the participating schools owned smartphones and 62% reported that they use social networking platforms such as WhatsApp in their regular communication. Conversely, 70% of the teacher educators at FTC indicated that they possess smartphones and 80% reported that they actively used social media tools.

From the baseline study, it was apparent that the teachers were willing to engage in collaborative learning that entailed sharing and exchange of knowledge, information, ideas, and practices. This is important for teacher empowerment through "connection to" and "participation in" a Community of Practice that drives horizontal learning.

Furthermore, the baseline study indicated low ICT infrastructure readiness at both the participating schools and the Freetown Teachers College. This was in reference to Internet connectivity, hardware and software availability as well as technical support. While this has improved in recent months, particularly at FTC, at the time the baseline was conducted, the lack of adequate enabling technology to support effective deployment of technology mediated training, seemed like an initial impediment. However, high rates of ownership of mobile devices and access to Internet via low cost data bundles was an apt alternative for content delivery and training.

From the recommendations of the baseline, it was suggested that the choice of technology used should be based on "its accessibility, reliability and compatibility". Using this criteria, mobile technology owing to its widespread use among teachers and teacher educators becomes a promising contender.

Results Following the Roll-out Seminar (Workshop)

Twenty-three (23) participants completed an evaluation form upon conclusion of the roll-out seminar. On a scale of 1-5, 63% of the participants indicated that they were satisfied with the session, while 76.9% expressed satisfaction with the contents of the training. The 23.1% who gave a rating of 4 out of 5 indicated that hardware limitations, such as laptops and Internet modems, would hamper how the mentors and school champions effectively engage in the CoPs. On a similar scale, 100% of the respondents rated the training as relevant and helpful towards their own professional development. An open response question on key take-aways leaned heavily on the use of new technologies that they previously had no experience with, such as creating e-portfolios, using social media in a structured manner to support learning and communication within a Community of Practice, as well as active learning through practice exercises relevant to their day-to-day activities in the classroom. Regarding potential areas of improvement, there were several sentiments that the face-to-face training should be conducted over a longer period to ensure that individuals who are not well versed with the technologies being used have time to learn. Overall, the participant's responses in the post-workshop evaluation indicated that the face-to-face session explaining the Toolkit and associated microlearning resource, created a positive learning experience and that the intended learning outcomes from the week-long session was achieved.

Pedagogical Considerations

One of the main concerns in moving away from traditional print-based distance education training is whether technological integration can promise the same (or better) results as traditional instruction. To address this concern, it is useful to take into account additional benefits of this approach such as instructional methods (associated feedback, collaboration activities, self-paced study, personalising learning paths based on learners' needs) that are ideal for teacher training. Structured well, technology integration can be as effective as traditional training at a lower cost and can reach a wider target audience who have challenges attending conventional face-to-face classroom training. Such challenges were attributed to proximity from the main training location such as the Freetown Teachers' Training College, teachers' limited time due to family and work commitments, and even

restricted mobility. As such, technology mediated school-based teacher training using microlearning and mobile technologies was considered as an ideal option for low-capacity environments.

Collaboration

The need for collaboration between teachers and mentors within one school and across different schools (Bruns & Luque, 2015, p. 200 cited in the SBTD Toolkit) was considered as essential towards enabling learning from each other's practice based on various thematic issues addressed in the SBTD toolkit. Collaborative learning within a Community of Practice is key towards contributing to quality teachers' professional development since new knowledge can be applied and integrated into the learner's world.

Such a collaboration is attainable in low Internet resource areas using social media platforms such as WhatsApp, Facebook and Twitter, which enable social learning (i.e., learning with and from others). Furthermore, the bite-sized communication that takes place on social-media platforms — characterised by a preference for smaller pieces of information — is very much aligned with micro-learning. Content can be easily accessed and shared across multiple devices using features such as chat, forward, comment, share, like, etc. For academic and professional development, they are ideal for sharing information, engaging in discussion, and curating content as well as professional networking. Of the aforementioned platforms, WhatsApp is one the most popular messaging applications in the world with over 1.5 billion monthly users in 180 countries (Iqbal, 2019). WhatsApp was also already installed in many of the participants mobile phones. Its big advantage over regular messaging is that it is 'free' over an Internet connection and supports the transmission of varied media such as video, images and audio files. As such, it was an ideal platform to establish the CoPs within and across the participating schools. At present, the main limitation with the WhatsApp application is that it caps the group members numbers at 256, and that new users cannot see older posts created before they joined the group.

Microlearning

Micro-learning objects/lessons are typically short in duration — not longer than ten minutes if in the form of time-based media (such as video), or as single images that contain condensed information (such as infographics). In the dissemination of the SBTD toolkit contents, the microlearning resources were presented as short videos, short audio clips, images, quick reading materials, brief quizzes and the requirement to contribute to discussion threads. The content capacity of micro-learning lessons is generally small and carries the overarching advantage of focused emphasis and a clear theme. Microlearning was well suited to accommodate the demands of teacher training, which include the following:

- **Lifelong learning**: Junior secondary school (JSS) teachers are constantly required to reflect on current ideas about education and teaching such as learner-focused teaching approaches, apply new knowledge, adapting to changes in curricula, as well as identifying current and future needs for professional development.

- **Fragmented learning:** JSS Teachers already have busy schedules and heavy workloads that include teaching, administrative and curriculum-related activities. In addition, they have social responsibilities, which may take up most of their spare time. Thus, traditional long-

format e-learning or distance education in-service training is no longer effective in achieving expected results and may result in inefficient training.

- **Self-learning:** Learning motivation and the intention to stick to a professional development programme is often prompted by the individual. Because of this, teachers place great emphasis on the practicability or usefulness of knowledge and its application to problem solving. This prompts the need for flexible and personalised training, where teachers can choose what to learn and at what pace, according to their own requirements. They can reference the content as often as they wish, and competence can be evidenced through micro-learning assessments at the end of each lesson. This was identified as crucial towards maintaining enthusiasm, avoiding burnout and ingraining a sense of professional fulfillment. Further, as teachers adapt and use OERs in their day-to-day practice, they must also possess the skills to create OERs as part of their professional development.

Challenges and Lessons Learnt

Face to Face Training

The importance of face-to-face sessions in technology mediated training cannot be overstated. There were several challenges that could only be addressed in actual face-to-face encounters vs doing so remotely. As a result, several targets were attained that facilitated the implementation of the INSET programme remotely via WhatsApp using Microlearning.

i. *Demystifying Microlearning*

Although teachers unconsciously engage in creating and sharing microlearning content, by composing and sending messages or sharing videos over social media, it is not an obvious strategy for in-service teacher training.

The face-to-face training sessions prior to the launch of the INSET programme were integral in building understanding amongst teacher trainers regarding Microlearning. This included module content and structure for the INSET modules, determining the duration of modules as well as identifying microlearning materials to include in the modules. Teacher educators gained competencies in choosing available tools and technologies for specific pedagogical contexts to integrate microlearning resources into the four INSET programmes. Furthermore, following a detailed presentation on the structure of the INSET Modules using the course template, teacher educators were able to effectively adapt existing courses whilst integrating Microlearning in the delivery of core activities.

Further, the face-to-face session enabled Teacher Educators to understand and experiment with the varied forms of microlearning objects, how to address different learning outcomes and how they can be used across multiple devices such as desktop/laptop computers and smartphones. This included creating videos from Voice-Over-PowerPoint presentations, Interactive PDFs, Animation, Infographics, Social Media, Quick Response Codes and URL Shorteners.

ii. *Simulation of Working within the Communities of Practise*

During the face-to-face training session, it was possible to simulate how the training would be conducted on the selected platforms (WhatsApp and the Teacher Futures Moodle platform). The

teacher educators (mentors), school principals and teachers were able to demonstrate how they would interact with one another in real life outside the FTC training environment whereby schools would be working independently. Participants in each group were able to: set up WhatsApp groups (Mentors), access their accounts on the Teacher Futures platform, access the Toolkit content via the Moodle app, message within the Moodle App, post feedback on the Teacher Futures platform, and reply to posts on the discussion forums. It would have been difficult to demonstrate this remotely.

Access to Resources on the TeacherFutures Moodle Platform

Following the conclusion of the Roll-out seminar, it was anticipated that teachers and mentors would continue to access the resources on the SBTD toolkit page on the TeacherFutures website as they worked on the online versions of the INSET modules. As such, Teacher educators and teachers from different schools were granted access to Microlearning resource page which served as a guide to assist content creators (teachers, teacher trainers, and the support team) in developing microlearning content in a consistent time saving manner.

Surprisingly, this was not the case. Instead, usage statistics indicate that the teacher educators did not access the SBTD toolkit content on the Teacher Futures Moodle platform after the face-to-face session. Several reasons were attributed to this including lack of confidence in authoring their own content, forgotten login credentials (passwords and usernames) and lack of knowledge on know how to reset it themselves. Furthermore, during the face-to-face training sessions, participants learnt how to create ePortfolios on the Teacher Futures's Moodle site and were required to populate their ePortfolios. Although all the participants demonstrated competency in creating an ePortfolio during the training, this activity did not continue once the face-to-face training concluded. The mentors at FTC continued to work on four modules of the INSET programme and were able to identify existing OER resources to integrate into the courses as microlearning objects.

Cost implications and Technology Barriers

Although microlearning is touted as inexpensive to implement, concerns arose about feasibility of the implementation of the INSET programme owing to electricity and Internet constraints in some of the participating schools. To guarantee programme success, it was proposed that Principals encourage teachers to participate by providing funds to purchase data and power banks.

Relevance

Teachers are more motivated to engage in training that fulfils their professional needs. As a result, while certificates of participation were awarded to workshop attendees, participants were concerned about which body would award the Certificates of Completion upon completion of the INSET programme. This need for accreditation is linked to new requirements for professional development set by the newly formed Teacher Service Commission in Sierra Leone. This indicated stronger motivation to participate if the programme is linked to the established standards and competencies that must be met and critical points for promotion (academic achievements, awards, proficiency, activities that pertain to academia) that must be demonstrated in a teaching portfolio.

Casual Learners

The success of microlearning is largely dependent on the motivation for self-learning. As a result, lack of self-motivation by the learner may lead to poor reception of the microlearning objects. This concern

was raised about how to manage teachers who are considered as not 'hardworking' and who rely on the work done by other teachers. It highlighted the need to address teachers' attitude towards professional development and to seek ways to identify teachers who will fully participate in the programme.

Conclusions

The analysis presented the main the design considerations that informed the implementation of the INSET at the Freetown Teachers' College (Sierra Leone) using microlearning as a strategy for in-service teacher training. Following the programme rollout, it is evident that microlearning promises numerous benefits for in-service training. Furthermore, face-to-face training in the early stages of programme implementation is equally important to build awareness and technical competency in authoring microlearning objects. Since the programme is ongoing, there is an additional need to empirically measure the impact of the programme vis-à-vis the indicators for measuring programme success. Furthermore, teachers still need additional technical support in authoring multimedia-based microlearning objects particularly in scenarios that require the use of new and emerging technologies such as Augmented and Virtual Reality. Data is already being yielded from the interactions in the Communities of Practice within and across different schools that will inform future evidence-based evaluation.

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