Open and Innovative Schooling: An Implementation Experience in Fifteen Secondary Schools across Mozambique

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Abstract: This case study explores the open and innovative schooling model piloted in fifteen secondary schools across all regions of Mozambique in the period 2018 to 2020. The model involved provision of access to curriculum-based digital Open Educational Resources (OER) using an Aptus device to enable sharing offline. Learning support centres offering access to some ICT as well as opportunities for individual use or structured tutorials were established in fifteen schools around the country. A mixed methods tracer study was designed and implemented using quantitative analysis to ascertain student enrolment, retention and success and then used qualitative focus surveys and focus groups to gauge the satisfaction of students, teachers and managers with the OIS model to inform future planning. While the pilot was generally considered successful in augmenting existing secondary schooling provision, access to devices, teacher development and support and expansion of curriculum coverage were all found to be in critical need of improvement if the model is to be scaled.

Keywords: open schooling, secondary schooling, Open Educational Resources, Aptus, learning support, tracer study.

Introduction

According to the Ministry of Education and Human Development (MINEDH, 2020), in Mozambique, gross rates of secondary schooling have remained below 40% in the last seven years and net rates have followed the same pattern, being around 20%. However, given that, for this level of education, the vision is for a massified, quality, secondary education system that guarantees essential skills for young people, and continuing studies for adults, insertion in the labour market and in society, and so the country has chosen to go beyond traditional solutions.

As such, Mozambique recognizes that open and distance education is an effective response to the growing demand for secondary education, both as an end in itself and as a path to entry into higher education (Mays & Singh, 2020; Manyamba, et al, 2021). It is in the wake of this recognition that the MINEDH, through the National Institute of Distance Education (INED), with the support of the Commonwealth of Learning (COL), has been implementing, since 2018, the Open Innovative Schooling (OIS) model in fifteen (15) secondary schools across the country. The OIS model aims to extend access to and improvement of school performance for secondary education, both through OIS as well as the face-to-face model, using appropriate Information and Communication Technologies (ICT) in appropriate ways (Fletcher, et al, 2020).
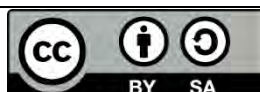
The OIS model involves provision of access to curriculum-based digital content shared as Open Educational Resources (OER) offline using an Aptus device provided by COL. INED wished to pilot the use of digital content due to the logistical challenges and costs associated with the provision of printed self-study materials for out-of-school youth. Access to the content is provided for use by individuals and teachers working alone or in structured distance education tutorial sessions within a learning support center (CAA) within a day school as well as being available also to day-school learners and teachers.

For the implementation of the OIS model, a monitoring and evaluation strategy is in place, which provides ongoing quantitative data on enrolled students, retention, pass rates and progression. However, there was a need to carry out a tracer study, to consolidate the lessons of experience from piloting the OIS model to make decisions about whether or how to scale the pilot. It is in this context that the present tracer study emerges:

> The tracer studies can provide valuable information about what happened to a group of children who were exposed to an intervention. Implementation agencies generally have a pretty good idea of what children are doing during the duration of the project, and by the time it ends. However, the real challenge is for interventions to produce lasting and long-term results. The final measure of the success of an intervention is that the desired changes in the lives of children and families are still present, in some way, after the project itself has been progressively eliminated. (International Labour Organization, 2011, p. 2)

Therefore, when we set out to undertake this study, we were interested in whether the students who participated in the OIS pilot were still in school. Moreover, we wanted to explore what changes had occurred in the lives of the OIS beneficiaries and how this intervention contributed to these observed changes, and, finally, to seek information on whether the OIS model could have been conceived differently to extend access to and improve school performance in secondary education provision, and to use this knowledge to improve decision-making and the design of future interventions/initiatives.

Methods

Methodology

A mixed method approach was followed in which both quantitative and qualitative data were collected and analysed. This approach of a mixed nature is also advocated by Gerhardt & Silveira (2009, p. 36), who state that "[...] according to the characteristics of the research, different research modalities can be chosen, being possible to combine qualitative with quantitative". We chose this combination to gain a better understanding of the problems of this study as "mixed methods designs resided in the idea that all methods had biases and weaknesses, and the collection of both quantitative and qualitative data neutralized the weakness of each form of data" (Creswell, 2014, p. 43).

On the other hand, based on the idea of when we want to study something unique that has a value in itself, we must choose the case study (Amado, 2014). In this case study, we intended to explore in a unique way the implementation of the OIS model in Mozambique, specifically in the fifteen secondary schools selected, at the national level, on the motivation for their involvement and levels of satisfaction of students, tutors and school managers. Levels of satisfaction were to be gauged in

relation to what was offered to them, in terms of content, training, support and training for the implementation of the OIS model.

Instruments and Analysis

For the scientific quality of the results and conclusions of this study, it was essential to determine the departure for the "what" and "how" of the data which would be collected and what instruments we would use (Coutinho, 2015, p. 104). In terms of the timing of the mixed method approach, for data collection we had to make a mixture of the sequential and concomitant techniques, inspired by Creswell (2009, 209-210).

Indeed, from June to July 2021, we collected and analysed indirect documentation linked to OIS implementation, covering documentary research on the OIS model in Mozambique, as well as the literature review on the OIS documentation existing in INED and in the fifteen pilot schools, such as memoranda of understanding and contracts between COL and INED, and statistical maps of students' pedagogical achievement.

Similarly, based on Coutinho (2015, p. 111), we determined as a *sine qua non* condition for the final quality of this study, the adequacy of the survey by questionnaire and the survey by interviews, already used by INED during the OIS monitoring process, for gathering feedback from the participants of this study.

Therefore, supported by a script prepared for this purpose, we applied a semi-structured interview technique to complement the survey and document analysis. Nevertheless, during the interaction we allowed great freedom of response to focus group interviews, composed of centre managers and teachers from the fifteen pilot schools, as well as enquiry by questionnaires, which were answered in writing by learners, teachers and managers.

An external validation of the questionnaire was made, through the opinion of a panel of OIS CAA managers, on the quality and adequacy of the questionnaire to measure the desired construct. To ensure the reliability of the instrument, as well as the data collected, we opted for the reliability calculation of the questionnaire, and for this we used the stability indicators (test-re-test), equivalence (parallel forms), split-halt estimation for internal consistency and, finally, observation among observers in categorisation, coding and manual release in spreadsheets.

The qualitative data was analysed by clustering related themes/issues that emerged from the survey and interview responses, allowing us to identify common recurring issues.

In order to address all ethical issues, a consent form was included in questionnaire surveys and interviews (Bogdan & Biklen, 1994; Creswell, 2007).

Population and Sampling

Based on the idea that when intact groups are constituted one can choose to sample for convenience (Schutt, 1999, as cited in Coutinho, 2015, p. 95), but also in view of the purpose of this study, we used the *criteria of criterial judgmental sampling,* referred to by Charles (1998), where the schools that were implementing the OIS model were accessible, had school managers, as well as support staff, who were directly involved in the management of these schools in both distance and contact modes, and tutors and students who were an integral part of the teaching/learning process in using appropriate technology, in this case, Aptus.

The quantitative analysis revealed that between 2018 and 2020, 15,675 learners (7,633 females) were supported through the OIS model, with 6,895 learners (3,253, or 44%, females) passing one or more subjects.

A total of 276 students (about 2% of the whole population), 123 teachers and 31 school managers and 15 CAA managers participated in the study as summarised in Table 1.

Table 1: Number of survey respondents

School name	Respondents									
	Students		Tutors		School Managers		Learning Support Centre Managers		Total	
	Total	Propotion	Total	Propotion	Total	Propotion	Total	Propotion	Sum	Propotion
Pemba Secondary School	24	8,70%	10	8,13%	0	0,00%	1	6,67%	35	7,87%
Cuamba Secondary School	16	5,80%	8	6,50%	4	12,90%	1	6,67%	29	6,52%
Nampula Secondary School	17	6,16%	4	3,25%	3	9,68%	1	6,67%	25	5,62%
Namialo Secondary School	19	6,88%	9	7,32%	3	9,68%	1	6,67%	32	7,19%
Mocuba Secondary School	20	7,25%	5	4,07%	5	16,13%	1	6,67%	31	6,97%
Nicoadala Secondary School	16	5,80%	6	4,88%	4	12,90%	1	6,67%	27	6,07%
Daússe- Changara Secondary School	17	6,16%	12	9,76%	2	6,45%	1	6,67%	32	7,19%
Macombe Secondary School	10	3,62%	7	5,69%	1	3,23%	1	6,67%	19	4,27%
Eduardo Mondlane-Gorongosa S.S	9	3,26%	6	4,88%	1	3,23%	1	6,67%	17	3,82%
Emilia Daússe- Inhambane Secondary	21	7,61%	3	2,44%	1	3,23%	1	6,67%	26	5,84%
Manjacaze Secondary School	24	8,70%	12	9,76%	2	6,45%	1	6,67%	39	8,76%
Xai- Xai Secondary School	24	8,70%	10	8,13%	2	6,45%	1	6,67%	37	8,31%
Manhiça Secondary School	24	8,70%	12	9,76%	2	6,45%	1	6,67%	39	8,76%
Machava Sede Secondary School	11	3,99%	10	8,13%	0	0,00%	1	6,67%	22	4,94%
Noroeste 1 Secondary School	24	8,70%	9	7,32%	1	3,23%	1	6,67%	35	7,87%
Total	**276**	**100,00%**	**123**	**100,00%**	**31**	**100,00%**	**15**	**100,00%**	**445**	**100,00%**
Propotion	62,02%		27,64%		6,97%		3,37%		100,00%	

A focus group was made up of fifteen (15) centre managers from the fifteen (15) pilot schools. The moderation was done by four (4) members of the Monitoring and Evaluation/Research Group from INED, UEM and IEDA, as well as the three (3) INED technicians who collaborated in the data collection. Their contributions are gathered in the same section of responses by the school managers, as they are an integral part of the school and OIS management.

Analysis and Discussion of Results

The results reported here, take into account the sequential order of the specific objectives proposed, and the discussion was constructed by issues addressed by the instruments. As noted, information was collected from 276 students, 123 tutors, 31 school managers and 15 CAA managers.

Students

As noted by Jordan (2020) and Onesmus (2020), technology comes to the fore when face-to-face provision is not possible but that, in turn, raises issues about access and support. This was confirmed by the findings of the tracer study. The results show that 69% of the students involved in the OIS pilot had an electronic device but 31% did not have any electronic device that they can use. Asked about the type of device they had, 39% had a basic mobile phone, 37% a mobile phone with advanced smartphone features, 9% a desktop computer, 9% a laptop and 6% a tablet.

However, the students pointed out several benefits of the use of technologies in education, namely: better and more varied content media; help in research of the subject and of the work to be covered;

facilitates assessment preparation, study at any time and place and perception of the content matter; improves academic skills through use of multiple resources; facilitates in clarifying doubts; does not require presence at school every day; helps when there is a lack of printed materials; allows learners to study from where they are (home, work, etc.) as learning content can be downloaded to a digital device for those who have them; facilitates research and increases skills in reading, since once downloaded the learning content can be accessed any time in any place as often as needed.

The fact that the results show that more than half of the students do not have an electronic device compatible with Aptus technology, can be seen as a weakness for the effective implementation of the project, since the OIS model implies that both students and teachers should have access to appropriate devices and skills which allow them to access, download and re-use the digital OER stored in Aptus.

According to Balaji (2015), George Maeltoka of the Ministry of Education in Vanuatu recognises that the government in its new ICT initiative for schools is embarking on the supply of tablets to schools and it is timely to have its new device to take the government's ICT project to the next level of e-learning materials for students from all over the archipelago.

Based on the experience of Vanuatu, which is also implementing a similar project, we believe that the Ministry of Education could take responsibility for the allocation of compatible electronic devices for the use of Aptus by students, tutors and centre managers for the successful implementation of the OIS project.

Teachers/Tutors

Access and support for teachers is also critical for the successful use of technology to support schooling provision (Allela, et al, 2020). Out of the 123 teachers/tutors who participated in the study, 71% had an electronic device that they could use in the teaching process, 13% did not have a device and 16% did not answer the question. Asked about the type of device they had, 32% said they had a basic mobile phone, 26% a mobile phone with advanced smart phone features, 10% a desktop computer, 13% a laptop, 3% a tablet, 1% another device and 15% did not respond. This shows that nearly half of the teachers had devices that allowed them to access content stored in Aptus.

On the question of whether they had heard of Aptus, the majority (89%) said yes, compared to those who said they were not aware of Aptus (11%). In response to the question "Where have you heard about Aptus?", the school was the main source of information (77%), followed by those who did not respond (12%), and others indicated "elsewhere" (11%).

The introduction of Aptus technology as a teaching/learning tool in school was considered a good initiative by 66% of teachers; followed by excellent initiative (30%), no opinion (3%), makes no difference (1%) and bad initiative (1%).

One fact that caught our attention in these results was that there were about 9% of students and 11% of tutors who said they had never heard of Aptus technology, despite this being the main technology used in the OIS model. This result may indicate that the sessions for the dissemination and training of the use of Aptus by both students and tutors should be more comprehensive and regular.

Teachers were also questioned about their perceptions of the degree of student satisfaction with the learning supported by technologies and about half (48%) responded very satisfied, followed by perhaps (19%), certainly yes (15%), a little (13%), not satisfied (4%) and unresponsive (2%).

As for the question about the opportunities that the OIS model brings to the provision of secondary education, the answers that stood out were: improved take-up and use of ICT; facilitation of secondary education provision more generally; extension of access to education; improvement of the quality of education through the use of multi-media OER on the Aptus device; emergence of opportunities for the young people who do not have time to be physically present in school to continue with their studies by enabling teaching using distance education methods; increased access in the educational system; creation of a future vision for students who want to continue their studies through alternative modalities; emergence of opportunities for all students who wish to continue studying and do not have access to face-to-face teaching; reduced demand for face-to-face teaching since there was availability of Aptus content; and reduced dependence on the physically printed modules due to the availability of digital study material. In addition, through tutorial sessions using the digital content, it can increase interaction, create more opportunity for communication, and reduce school dropout. The use of digital and audiovisual material can enable more students to be enrolled, develop skills in the use of ICT, decrease pressure on the Mozambican education system, and provide quick access to knowledge content. Also, facilitation of the interaction and exploitation of the digital subject matter in day school provision could alleviate challenges due to lack of books and printed study modules; enable more autonomous learning without much dependence on the teacher; increase use of electronic devices for learning (since Aptus content can be downloaded and used on a variety of devices); improve communication and lower costs; increase participation of students in the classroom, since the teacher is no longer the only source of content; reduce writing time on the board; facilitate application of multiple choice tests; facilitate greater understanding of the subject matter and related communication (since content can be engaged with in multiple formats); motivate students and other actors in the learning process; and reduce costs for the acquisition of teaching materials. Importantly for flexible provision, the student does not need to go to school every day, attending less frequent tutorial sessions to discuss content already engaged with and downloading new content. In this way, the model accommodates students who do not have daily availability for face-to-face classes and creates a broad and innovative vision for education provision, while also improving skills in the use of ICT.

Although the results point to OIS as being a good initiative, a considerable number of tutors resist the introduction of technology as a teaching/learning tool in school. This resistance may be related to a lack of training in the use and benefits of Aptus and related technology.

Combing through the documents about the OIS model in Mozambique, as well as reports from the project managers, we saw that there was never a centrally organised cascade training for tutors on Aptus technology. COL's training workshops focused on the managers and teachers involved in the piloting but the training was not subsequently cascaded to other teachers in the pilot schools, with two limited exceptions. This responsibility has always been entrusted to local management, that is, to the school managers and CAA managers who have benefited from the different training offered by COL but only two schools have cascaded the training and only to some teachers. The negative attitude of some tutors may also be influencing students' perception of the non-effective exploitation of Aptus technology.

School Managers and CAA Managers

As Wright et al (2014) observe, effective management of accessible support centres may be the key to success when using distance learning methods. Therefore, it was important for us to interview our CAA managers. There were thirty-one (31) school managers, comprised of school directors and their deputy school directors, as well as fifteen (15) CAA managers, from the 15 piloting OIS, from whom we collected information. When asked about the introduction of Aptus in the OIS model, the majority (65%) considered it a good initiative and 35% considered it excellent. In a question about student satisfaction in relation to e-learning, 52%, felt they were satisfied, 23% indicated some uncertainty, 19% thought they were somewhat satisfied and 3% thought they were not satisfied.

All managers stated that they still had the Aptus in use in their school, and 39% evaluated the state of Aptus at that time as very good, 35% as having been in good condition, 19% as having been in a functional state and 6% as having been damaged.

Regarding the use of Aptus in school, almost all managers (87%) stated there was regular use, 10% a little use and 3% very little use. Almost all managers (81%) stated that students with compatible devices were able to access the learning resources hosted in Aptus, although 6% answered that they did not have access.

The managers posed as challenges the following: equipping the rooms with computer equipment; lack of training of the stakeholders (tutors, students and directors); lack of dissemination of the project; lack of availability of modules for the various curricular disciplines; lack of availability of the Internet; too few students, tutors and managers with eletronic devices compatible with the requirements of the project; lack of awareness of pupils, tutors and managers about this teaching model; too few solutions for the maintenance/or recovery of Aptus devices; and a lack of capacity for the number of simultaneous users of Aptus, among other challenges directly affecting implementation with success of the OIS model in schools.

The measures taken by managers to solve the difficulties of some students unable to access Aptus content were: photocopying and distribution of physically printed modules; training of students and tutors; sensitisation of students to the acquisition of compatible phones; acquisition of portable computers for the CAA; mobilisation of students for collaborative learning; restriction of the number of simultaneous Aptus users; reminders on how to access and activate the Aptus signal; sharing the devices; observing the health protocol for prevention of COVID-19; using a giant screen so multiple learners could access the same resource at the same time; use of mobile phones of students by tutors; training of students to access Aptus content independently; downloading the materials and disconnecting from Aptus in order to decongest the network and allow others to access Aptus; division into workgroups and switch over.

The managers pointed to several opportunities that the OIS model brought to their schools, especially the following: migration to the use of digital platforms; reduction of the rate of withdrawal of students who for various reasons did not prosper in the traditional classroom; the abolition of the night course at school; reduction of energy expenses; promotion of inclusive education; and use of technology for the exploitation of curricular content. They also valued the training of some tutors in the implementation of the OIS model; and stimulus to individual learning; advent of classes with video support; independent classes; improved facilitation of the learning process; increased provision of

learning resources for schools; better aiding of the ability to research; decongestion of classrooms; improved understanding of the subject in relation to certain difficult content; facilitated access of teaching material; ease of downloading modules; completing the 10th class in this modality and also properly tutored classes.

Conclusion

The OIS project in Mozambique is an initiative that is being implemented, with the use of Aptus technology, to provide offline access to curriculum-based digital OER and to complement secondary education provision. The project is in its pilot phase in fifteen (15) secondary schools in the country and covers students attending the 1st cycle Secondary Education Programme (ESDP1), which includes the 8th, 9th and 10th grades.

The students, tutors and managers involved in the implementation of the OIS pilot confirm the potential that Aptus technology has in expanding the sources of access to study materials, namely texts, images, videos, self-assessment exercises of learning, among other materials that facilitate the learning process.

However, the study also revealed that for its successful implementation, and to extend access and improve school performance, several aspects of the model need improvement. This points to the following recommendations.

Recommendations

i.   Create an institutional capacity that is able to source, update and maintain Aptus technology;

ii. Ensure that those involved have devices compatible with the requirements of accessing, downloading and using the digital OER saved on Aptus;

iii. Increase the number of users who can access Aptus simultaneously;

iv. Extend content coverage on Aptus to cover more of the curriculum; and

v.   While drawn from the Mozambique experience, these recommendations may resonate with other countries piloting the OIS model or using Aptus.

Other studies show that student motivation is fundamental to the success of learning and if all the operational conditions of a programme are created, extrinsic motivation can be created for students, which is key to the success of the programme (COL & MINEDH, 2019). Similarly, in the OIS model, it is to be expected that the creation of support conditions that respond to the needs of those involved will lead to a better and proper implementation of the OIS model in schools.

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