COMMONWEALTH of LEARNING

Increasing Access to Open Schooling through an e-Learning Intervention: A Case Study from Zambia

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List of Abbreviations

COL	Commonwealth of Learning
CPD	Continuing professional development
DOI	Diffusion of innovation
ICT	Information and communication technologies
OER	Open educational resources
OIS	Open and innovative schooling
OOSC	Out-of-school children
OS	Open schooling
TEL	Technology-enabled learning
ZSA	Zambia Statistics Agency

Executive Summary

During 2019–21, the Ministry of General Education in Zambia piloted an open and innovative schooling (OIS) programme. It used an e-learning model that involved developing and sharing curriculum-based open educational resources (OER) to supplement other teaching and learning processes. The resources could be accessed through both online and offline means. The programme was implemented in 15 centres that supported distance learners and five schools where traditional face-to-face learning took place. A tracer study was conducted among learners, teachers and head teachers who participated in the programme. The study was informed by a diffusion of innovation (DOI) theory perspective, and a mixed methods approach was used. The findings showed that while the e-learning strategy employed was partially successful in expanding and enriching learning opportunities, several systemic, infrastructural and capacity issues must be addressed before the pilot can be effectively scaled.

Introduction

Education remains a key determinant of success in terms of achieving the United Nations' Sustainable Development Goals (United Nations, n.d.). It is regarded in most countries as crucial to breaking the cycle of poverty, and thereby reducing inequalities. It also helps to empower people everywhere to live in a healthier and more sustainable way.

Zambia's long-term development agenda of becoming a middle-income country, as expressed in its Vision 2030, cannot be achieved without highly skilled human capital. The seventh national development plan states in part that improved education and skills development are instrumental in creating societies that are better able to respond to the social and economic development challenges they face (Ministry of Development Planning [MNDP], 2017, p. 95).

Zambia has made remarkable progress in terms of the increased number of primary schools over the last decade and a corresponding increase in enrolment. Other factors that have contributed to the increased enrolment rates are ongoing construction of infrastructure, implementation of a 50:50 (50% girls and 50% boys) enrolment initiative at the entry grade level (Grade 1) and implementation of the Re-entry Policy from 1997 (Zuilkowski et al., 2019) and the School Feeding Programme (Lusaka Times, 2022). However, the country is still seeing continual growth in the number of out-of-school children (OOSC): according to data published in 2019, Zambia had 857,576 OOSC, 436,815 of whom are male and 420,761 female (Ministry of Education [MOE], 2019). In 2018, 8% of women and girls and 4% of men and boys aged 15–49 had no formal education, and only 43% of women and 50% of men had attended or completed secondary school (Zambia Statistics Agency [ZSA] et al., 2019). Furthermore, approximately 65% of learners make the transition from Grade 7 to Grade 8, and only about 45% make the transition from lower- to upper-secondary education.

In light of these figures, the Ministry decided to pilot an open innovative schooling (OIS) strategy to provide education to those unable to pursue or continue with their education through traditional modes of education delivery. OIS uses both print and electronic media to provide education. In 2017, the Ministry of General Education launched OIS in 20 pilot centres across the country partnership with the Commonwealth of Learning (COL) (see Table 1). The programme was developed and implemented using an e-learning model that provides for both Internet-based and offline teaching and learning. The model included a mix of purely distance learning and mainstream schooling under which the approximately 5,000 curriculum-based open educational resources (OER) developed near the start of the pilot were used as supplementary resources. Of the 20 centres, five are mainstream schools and 15 are OIS support centres. The 15 support centres offered junior-/lower-secondary education through e-learning and the five mainstream schools functioned as control schools by using the OER to complement and supplement mainstream teaching and learning offline. At the start of the pilot in 2019, 942 learners were enrolled in the 20 centres.

Purpose of the Study

The purpose of the study was to identify factors that would improve management of OIS in Zambia.

Objectives of the Study

The study had four main objectives:

1. To learn how learners perceived their experience of studying using OIS.
2. To check pass rates.
3. To establish whether the OIS programme met learner needs in terms of increased access to learning resources and improved learner performance.
4. To identify key issues that affected the implementation of the OIS programme.

Table 1: Open innovative schooling centres in Zambia by district and province, 2020

School number	Name of OIS institution	District	Province	Female learners	Male learners	Total
1	Kabwe SCE[1]	Kabwe	CENTRAL	16	0	16
2	Mufulira SCE	Mufulira	Copperbelt	10	0	10
3	Mazabuka SCE	Monze	Southern	11	06	17
4	Solwezi SCE	Solwezi	North Western	09	01	10
5	Chingola SCE	Chingola	Copperbelt	06	05	11
6	Mongu SCE	Mongu	Western	85	17	102
7	Kaputa SCE	Kaputa	Northern	05	8	13
8	Mansa SCE	Mansa	Luapula	13	10	23
9	Kasama SCE	Kasama	Northern	18	28	40
10	Luanshya SCE	Luanshya	Copperbelt	16	26	42
11	Ndola SCE	Ndola	Copperbelt	07	06	13
12	Kawambwa SCE	Kawambwa	Luapula	14	14	28
13	Chipata SCE	Chipata	Eastern	6	4	10
14	Highland SCE	Livingstone	Southern	26	6	32
15	ZACODE	Luanshya	Copperbelt	07	08	15
16	Chingwele Primary School C[2]	Lusaka	Lusaka	330	05	335
17	Chibote Girls Secondary School C	Kitwe	Copperbelt	03	02	05
18	Kabwe Secondary School C	Kabwe	CENTRAL	02	10	12
19	Monze Secondary Schools C.	Monze	Southern	98	78	176
20	Shikoswe Secondary School C.	Kafue	Lusaka	30	2	32
TOTAL				712	230	942

[1] CE: school for continuing education (support centre for OIS)

[2] C: control (mainstream school)

Source of data: Enrolment data sent by schools to MoE-DODE (unpublished)

Literature Review

The demand for secondary education is rising faster in Africa than in any other region in the world. To meet this increased demand, countries must:

- construct additional classrooms, laboratories, workshops and entire schools;
- provide furniture, equipment and learning materials; and
- provide supporting infrastructure, all of which entails more expenditure.

The speed of the increase in learner numbers is forcing some countries to employ emergency solutions (Verspoor, 2008). In Mozambique, for example, secondary schools have taken over the buildings of primary schools, which are then forced to use open-air classes or adopt a shift arrangement. Double- and triple-shifting are increasingly common in many countries including, for example, Senegal, Guinea and Mozambique (Verspoor, 2008).

The UNESCO Institute for Statistics cautioned as early as 2018 (UNESCO Institute for Statistics [UIS], 2018) that reductions in the rates of out-of-school children, youths and adults had plateaued across all levels of education provision worldwide. A recent study by the Commonwealth of Learning (COL, 2022) indicates that in African countries that are members of the Commonwealth, while significant progress has been made towards universal primary education, primary and secondary completion rates remain an issue, as do the key transitions from primary to secondary and from lower-secondary to senior-secondary school. Many countries have large and growing numbers of youths who are not in either employment or education and training and who will need some form of alternative open schooling provision.

Factors Related to the Out-of-School Situation

A scan of the literature on the global scale of out-of-school children (OOSC) revealed that children tend to be out of school for a variety of reasons. These reasons can be grouped into four broad categories, each of which is discussed below.

School-related factors

Various school-related factors contribute to learner absenteeism and dropout. They can include lack of appropriate hygiene facilities for girls, poor teacher-learner relations, inadequate resources and facilities in general, dated curricula and harassment (by teachers or other learners) among other issues (Ali et al., 2022; Ussif et al., 2020; Zira & Zumo, 2020).

Teacher-student relationship

A good teacher-student relationship draws the learner to the teaching and learning process and builds their motivation to complete their studies. Thivya and Francisca (2015) observed that there is a correlation between the teacher-pupil relationship and feelings of security among adolescents.

Household reasons

Moya (2017) states that poverty and poor nutrition can contribute to learners dropping out from school. Greever (2014) also notes that poverty has an adverse effect on student performance. Studies have shown that students who live in poverty typically perform below grade level at much higher rates and that they generally have poor or average grades. Poverty remains the single biggest barrier to

educational access for adolescent girls, and the most vulnerable and marginalised children — that is, those living in rural areas or urban slums, and those with disabilities — constitute the last mile to parity in access to education in Africa and Asia (Jolley et al., 2017; Ramanaik et al., 2018; Stark, 2018). Many parents have low levels of literacy and education and may not place high importance on the value of education, which is another factor that contributes to the OOSC situation (Wedekind & Milingo, 2015). Adam (2005) and Donkor (2010) reveal that parents with low literacy levels tend to have more limited active involvement in their children's education.

Gender-Related reasons

Gender issues also contribute to school dropout rates, especially among adolescent girls. According to Shahidul and Zehadul Karim (2015), early marriages, pregnancy, cultural beliefs and stereotypes affect learners in many ways. For instance, Holcamp (2009) found that in rural areas, dropout rates among girls were higher than among boys because parents considered schooling was of no benefit to the girls because they leave their own family after getting married. Mansory (2007) found that early marriage is the foremost cause of school dropout among girls in Afghanistan. A lot of research has focused on girls' ages in the context of education and found that when girls reach puberty, many parents decide they should be married rather than continue their schooling.

In a similar manner, UNFPA (n.d.) identified teenage pregnancies as a social problem, especially in poorer nations. Most teenagers who become pregnant are still in school, and if they drop out because of their pregnancy, it undermines the fight against illiteracy and gender equity in education. Dunne et al. (2005) state that the dropout rate is higher for girls than for boys, primarily because of pregnancy. Cultural norms and beliefs are another gender-related factor that affects girls' education, especially in many developing parts of the world. In some parts of the world, girls are treasured, but once they become of age, they are married. Child marriage is also a major cause of girls not completing school (Nguyen & Wodon, 2014).

In the quest to provide education and training to marginalised populations, and simultaneously respond to the challenge of access and equity in education, many developing countries are scaling up open schooling (OS) programmes. However, Rumble and Koul (2007) noted in one study that even if one new secondary school were built in India and Namibia every month for the next ten years, the increased demand would still not be met. Thus, OS can be seen as the best answer to the question of access. Open innovative schooling (OIS) is a concept that is drawn from the philosophy of open learning and offers alternatives to rigid timetables and admission restrictions.

COL (2020) indicates that open learning

> refers to policies and practices of openness in entry requirements (with minimal or no restriction on qualifications), choice of courses, place of study and time, etc. It is an educational philosophy where learning can happen anywhere, anytime from any resource, and therefore, can also inform practice in face-to-face institutions. (p. 4)

OS began as a way to provide education to children who had no access to schools, and the rationale for its provision has varied according to the times and the context. For example, in Australia and Canada, government correspondence programmes were developed so that families who lived in isolated and remote rural areas and could not afford to hire a personal tutor or send their children to boarding schools

could get access to education for their children. In both countries, this model of education provision spread rapidly as new settlements in sparsely populated areas outpaced the capacity of the local governments to provide schools.

The "open" in OS refers to the openness of the system — for example, youth who missed out on schooling in their childhood can enrol in courses that will provide them with the equivalent of secondary education without experiencing the embarrassment of being in classrooms with children much younger than themselves; young mothers can continue their secondary-level education by studying at home and attending tutorials only when necessary and when their responsibilities permit; working adults can enrol in one or two courses at a time and study whenever their personal and work commitments permit; and young adults can acquire skills training coupled with learning academic subjects while self-employed or working as non-skilled labour. COL uses "open schooling" to refer to studying whenever the learner's personal and work commitments permit.

Theoretical Framework

Osanloo and Grant (2014) describe a theoretical framework as one of the most important aspects to consider when planning a study as it justifies the study's significance and validity. They also argue that theory can help with selection and analysis when there is so much knowledge available on various issues. Added to this is the notion that a theoretical framework connects the writer/researchers to the existing knowledge from which assumptions and research methods can be drawn (University of Southern California, 2022).

E-learning is an approach that unites two distinct entities: the teaching and learning process and the technology that drives and facilitates the learning process. E-learning implementation and adoption are likely to be affected by resistance to or slow adoption of information and communication technologies (ICT) at various levels within organisations. Konayuma (2015) emphasises that the growth and speed of adoption of technology-enabled learning (TEL) depends very much on policy provisions and support for such policies at all levels of education delivery systems.

We therefore opted to use diffusion of innovation (DOI) theory to analyse the implementation of the OIS. In an update of his classic 1962 text, Rogers (2003) describes the spread of an innovation, idea or culture as a process of diffusion. He notes that certain innovations are successful because of their compatibility with existing values and practices, simplicity and ease of use but typically require a sequence of sharing knowledge, persuading, making decisions, implementing and confirming. Furthermore, some people will be quick to adopt new ideas and approaches while others will be slow to adopt and may even resist adoption. Different communication strategies are needed for different sub-groups of innovation adopters. Similarly, e-learning in Zambia follows the theory of DOI in that there is no homogeneous adoption of it. For example, some key players at the policy and implementation levels are resistant to change, and others may take some time to accept the change.

Rogers (1962) noted that the population into which an innovation is introduced will have different behaviours in terms of their adoption levels, which results in the creation of segments or categories of adopters. This point is very important to consider when promoting an innovation. According to Rogers (1962), there are five categories of adopters (listed here from most likely to least likely to adopt): innovators, early adopters, early majority, later majority and laggards.

In line with DOI theory, the adoption of the e-learning platform in Zambia, which is the enabler for OIS implementation, depends on how the key stakeholders — for example, learners, teachers, parents and education administrators, among others — respond to it. Some will be early adopters, others will be late, and some may not adopt the model at all.

Methods

The purpose of this study was to trace learners in the OIS programme who attended junior secondary school during 2019–2021 to gather information about what they did after they graduated from junior secondary school, identify potential links between the OIS programme and learner performance and generate feedback to improve the programme. Eligible participants were learners who accessed the OER content in the 20 centres, and teachers and head teachers who were key administrators and facilitators of knowledge and skills acquisition in both the control and experimental centres. We used a combination of Likert scales and open-ended questions.

Teachers and head teachers were provided with hard copy semi-closed questionnaires and learners were interviewed. The questionnaires and interviews were considered to be effective ways of collecting data for the survey. Opdenakker (2006), for example, notes that face-to-face interviews allow researchers to gather extra information about interviewees' responses to questions or issues by watching and assessing the interviewees' body language, tone of voice, intonation, etc.

The questionnaires were considered suitable for the survey because they are an efficient method of collecting data, mean that standardised questions can be posed to all the respondents and are likely to generate high returns.

The researchers conducted their survey among learners and teachers who were available during the third term of the school year. Some schools also brought in former learners who had experienced the programme to respond to the questions. The programme was launched mid-year in 2019, so most of the learners were from the 2020 and 2021 cohorts. It was expected that learners who joined the OIS in 2020 should have progressed to Grade 10, an indication that they sat for the Grade 9 examination in 2021. It was also assumed that for the first entrants to the OIS in 2019, the cohort would be in Grade 11.

The status of OIS was assessed by analysing data generated through the use of the KoboToolbox. The data are presented in tables and figures in this report. In addition, data were also obtained using a qualitative approach through observations (the research team visited schools that offered OIS before beginning the interview process) and forming themes from discussions with learners, teachers and administrators. Thus, qualitative data were analysed thematically. According to Braun and Clarke (2006), thematic analysis is an approach of identifying, analysing and reporting patterns within data. In this survey, thematic analysis was obtained by finding and identifying predominant recurring patterns and themes in the responses given.

Target Population and Sampling

The target population for the survey was 220 participants in 20 centres.

Purposeful sampling was undertaken to select both control and experimental OIS centres. In this case all 20 centres were picked to be part of the survey respondents. Teachers and learners were randomly

selected. The OIS centres were informed about the study and hence had information about the exercise well in advance. Thus, the sampling exercise did not pose any challenge.

All 20 head teachers were invited to respond to the questionnaire, five learners were sampled from each of the 20 centres and invited to participate to give the respondents' perspective, and five teachers were sampled from each centre and invited to participate to give the teachers' perspective.

Data Analysis

Interviews and focus group sessions were recorded and transcribed. The transcripts were analysed for recurring themes and then quantified using simple statistical analysis. The survey data were analysed using basic percentages.

Findings

The results analysed and discussed below cover six thematic areas addressing the original research questions and recurring themes from the analysis: the number of respondents; enrolments over a three-year period, 2019–2021; the perceptions and experiences of learners in studying through the OIS; the motivation of learners to learn through the OIS programme; whether the OIS programme met learner needs; and management issues affecting the implementation of the OIS programme.

Gender of Respondents

The respondents were a mix of head teachers, teachers and learners. Twenty OIS head teachers were purposefully sampled. Fifteen were male and five were female, which points to a gender imbalance in the administration and leadership of the centres.

The target number of teachers to participate in the survey was 100, but of those approached, only 87 participated in the survey. Fifty-five of those teachers were male and 32 were female. The skewed number of male teachers could be attributed to the fact that there were few female teachers with digital skills.

The target number of learners to participate in the survey was 100. However, only 62 learners participated. The other 38 who were invited to participate declined for personal reasons. Of the 62 learners interviewed, 22 were male and 40 were female.

Enrolments

As illustrated in Figure 1, in 2019, there was a total of 1,948 learners; of those, 1,038 were male and 910 female. In 2020, there was a total of 1,670 students, 696 male and 974 female; and 2021, there was a total of 1,614 students, 806 male and 808 female.

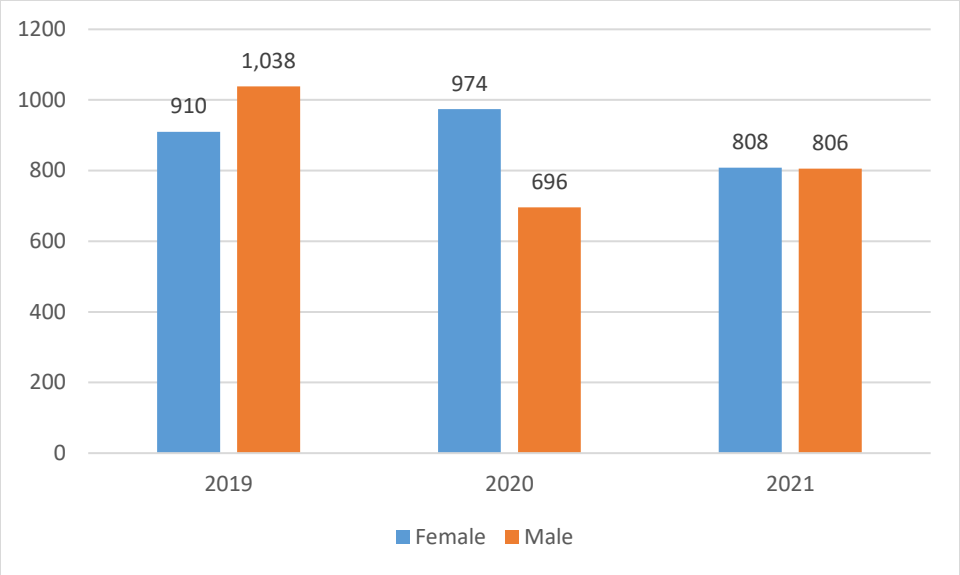

Figure 1. Number of learners enrolled in 2019, 2020 and 2021.

The findings of our study (see Table 2) show that over the three-year period of the study, there were 5,232 learners in the programme. Enrolment rates have gradually declined since the OIS programme was launched. This may be due in part to the COVID-19 pandemic, which restricted access to centres. Zambia was subjected to a lockdown in 2020, for the first term and second terms, which affected learner enrolment.

Table 2. Grade 9 enrolment for 2020 and 2021

Centre	Grade 9 learners (2020)			Grade 9 learners (2021)		
	Female	Male	Total	Female	Male	Total
Chibote Sec Sch	3	2	5	56	24	80
Chingola Sch for Continuing Ed	6	5	11	15	10	25
Chingwele Pri Sch	0	0	0	325	3	328
Chipata Sch for Continuing Ed	6	4	10	25	25	50
Highlands Open Sec Sch	26	6	32	37	43	80
Kabwe Sec Sch	2	10	12	52	48	100
Kabwe Sch for Continuing Ed	16	0	16	30	20	50
Kaputa Sch for Continuing Ed	5	8	13	11	9	20
Kawambwa Sch for Continuing Ed	14	14	28	43	37	80
Kasama Sch for Continuing Ed	18	28	46	22	18	40
Luanshya Sch for Continuing Ed	16	26	42	17	28	45

Centre	Grade 9 learners (2020)			Grade 9 learners (2021)		
	Female	Male	Total	Female	Male	Total
Ndola School for Continuing Ed	7	6	13	19	21	40
Mansa Sch for Continuing Ed	13	10	23	11	9	20
Mazabuka Sch for Continuing Ed	11	6	17	5	7	12
Mongu Sch for Continuing Ed	85	17	102	16	23	39
Monze Sec Sch	98	78	176	23	10	33
Mufulira Sch for Continuing Ed	10	0	10	5	6	11
Shikoswe Sec Sch	30	2	32	15	9	24
Solwezi Sch for Continuing Ed	9	1	10	3	1	4
ZACODE	7	8	15	10	5	15
TOTALS	382	225	607	740	356	1,096

In 2020, there were 607 learners in Grade 9. This was the cohort that started the OIS in 2019. However, some learners joined the 2019 cohort in 2020, as the programme started mid-year in some centres, such as Chingwele Centre. Table 2 shows that Monze had the highest number of Grade 9 learners, followed by Mongu Centre. Chibote Centre registered the lowest number of learners, which could be attributed to slow take-off of the intervention or the insufficient number of digital tools at the centre.

In 2021, the total number of Grade 9 learners enrolled across all the centres was 1,096, an increase of 80% from 2020. The highest number of learners was recorded at Chingwele Primary School (328), followed by Kabwe Secondary School (100), while the lowest was at Solwezi (4). The increase in the number of learners could be attributed to the popularisation of the OIS intervention in the centres. It was observed that Kabwe Secondary School had a good supply of computers and Internet access. In this centre, learners were reported to be successfully accessing the OER through the online system which they perceived as having more benefits compared to the offline option. The analysis further showed that Solwezi, which had the fewest learners, also had challenges relating to computers and weak management.

As noted above, in 2020, 607 learners were enrolled in Grade 9. They were a mix of learners who began the OIS programme in mid-2019 and learners who joined in 2020. Note that there is some mobility among the student population, with some learners moving from one school or centre to another and some who were previously out of school being enticed by the OIS programme to complete or improve their secondary education. Out of the cohort of 2020 learners who sat for the examinations, 502 (83%) progressed to Grade 10 in 2021, as shown in Table 3. More female than male students progressed to Grade 10, which can be attributed to the fact that there were more female than male students registered in the 2020 Grade 9 cohort. Monze had the highest number of learners, and Chingwele had none. Monze Centre is a control centre, and it is located in an area where there are very few schools offering secondary education. Chingwele, as explained earlier, began the programme late and learners were registered for examinations in 2021. Chingola and Chibote Schools registered a low number of learners. This could be attributed to management issues surrounding the programme. Mongu recorded the second-

highest number of learners who progressed to Grade 10. This is attributed to the school's catchment area. Mongu School for Continuing Education is near a high-density area, with many youths and young mothers who dropped out of school prematurely. In addition, the ICT teacher offered particularly strong support to learners on both the offline and online use of the resources.

The 2022 Grade 10 progression rate stood at 77%, a drop of six percentage points in terms of pass rates. The data show a gender imbalance between female and male students. The OIS seems to respond to the educational challenges of women who want to complete and improve their secondary education. Chingwele Centre had the highest number of learners progress to Grade 10 in 2022 — these are the ones who progressed from the start of the programme. Kabwe Secondary School recorded the highest number of learners on the programme, which could be due to the provision of Internet access at the school and strong support from both management and technical staff.

The 87 teachers were asked about the impact of the OIS model on learners' acquisition of skills and knowledge. Eighty-three (95%) stated that the OIS model had an impact on learners' acquisition of skills and knowledge, while three (3.5%) stated that it had no impact and one (1%) did not respond. The results of the analysis show that the OIS model had a positive impact on learners as it helped them to acquire the skills and knowledge they needed to be successful in their learning.

Table 3. Grade 10 progression for 2021 and 2022

Centre	Grade 10 (2021)		Total	Grade 10 (2022)		Total
	Female	Male		Female	Male	
Chibote Sec Sch	3	2	5	53	20	73
Chingola Sch for Continuing Ed	3	2	5	14	8	22
Chingwele Pri Sch	0	0	0	209	1	210
Chipata Sch for Continuing Ed	4	3	7	15	18	33
Highlands Open Sec Sch	25	5	30	30	41	71
Kabwe Sec Sch	2	10	12	50	44	94
Kabwe Sch for Continuing Ed	11	0	11	20	14	34
Kaputa Sch for Continuing Ed	3	5	8	9	8	17
Kawambwa Sch for Continuing Ed	14	11	25	38	31	69
Kasama Sch for Continuing Ed	15	25	40	19	13	32
Luanshya Sch for Continuing Ed	16	15	31	14	19	33
Ndola School for Continuing Ed	5	3	8	10	11	21
Mansa Sch for Continuing Ed	10	9	19	8	5	13

Centre	Grade 10 (2021)		Total	Grade 10 (2022)		Total
	Female	Male		Female	Male	
Mazabuka Sch for Continuing Ed	7	5	12	4	5	9
Mongu Sch for Continuing Ed	52	14	66	15	20	35
Monze Sec Sch	92	70	162	23	9	32
Mufulira Sch for Continuing Ed	8	0	8	3	4	07
Shikoswe Sec Sch	27	2	29	13	8	21
Solwezi Sch for Continuing Ed	9	1	10	2	0	2
ZACODE	7	7	14	10	4	14
TOTALS	**313**	**189**	**502**	**559**	**283**	**842**

Learner Performance

Of the 20 head teachers, 17 (85%) stated that learner performance was good, while two (10%) said it was poor and one (5%) did not respond. Overall, the Grade 10 progression is positive, with 83% progression in 2020 and 77% progression in 2022. The researchers did not manage to extract the actual results per learner because these could not be obtained from the Examination Council of Zambia which communicates individual results only to individual candidates. The centres could only show the number of learners who obtained school certificates to guarantee progression to Grade 10.

Table 4 summarises the teachers' thoughts about how the OIS programme affected students' progress.

Table 4. Learner performance

Learner performance rating	Number of respondents
Good	17
Poor	2
Not sure	0
Number of respondents	19

Access to Content Offline and Online

The survey revealed that both offline and online systems were used by learners across the 20 centres, but the online system was the more popular of the two (of 53 learners who completed the survey, 19 used the offline model while 34 used the online model). Of the 87 teachers, 65 (75%) used the online platform and 22 (25%) used the offline option. The researchers looked into why the offline option was not being used as much as the online option. They discovered that learners used their parents' phones to access the online platform, which was easily accessible. The learners said that offline access was a challenge because the system did not allow for many learners to use it at a time and it could only be used at the centre. Also, sometimes the offline device was not working because it needed to be charged or the SD card needed to be replaced. Teachers offered similar comments. In contrast, the online option

allowed learners and teachers to take part in online chats, post learning notes and create classes whenever they had Internet access.

Duration of Use of the Offline and Online Systems

The teachers were asked to indicate which e-learning systems they used over a two-year period to establish duration of use. Forty (46%) stated that they had used the online platform for less than six months, 39 (45%) had used it for one to two years, and eight (9%) had used both the online and offline systems for two years. The results show that the online platform was used more than the offline system. The offline system was probably used less because of the limited radius, limited number of lessons and activities and the fact that the devices were in a fixed spot, so offered less flexibility of use.

Acquisition of Digital Skills

The 87 teachers were asked whether learners acquired digital skills through their learning experience with the OIS programme. Forty-eight (55%) agreed that learners had gained digital skills, 34 (39%) strongly agreed, two (2%) did not agree and three (3%) did not respond to the question (see Figure 2). These results suggest that apart from gaining knowledge and skills in the various learning areas available under the OIS, most teachers felt that learners also acquired some digital skills.

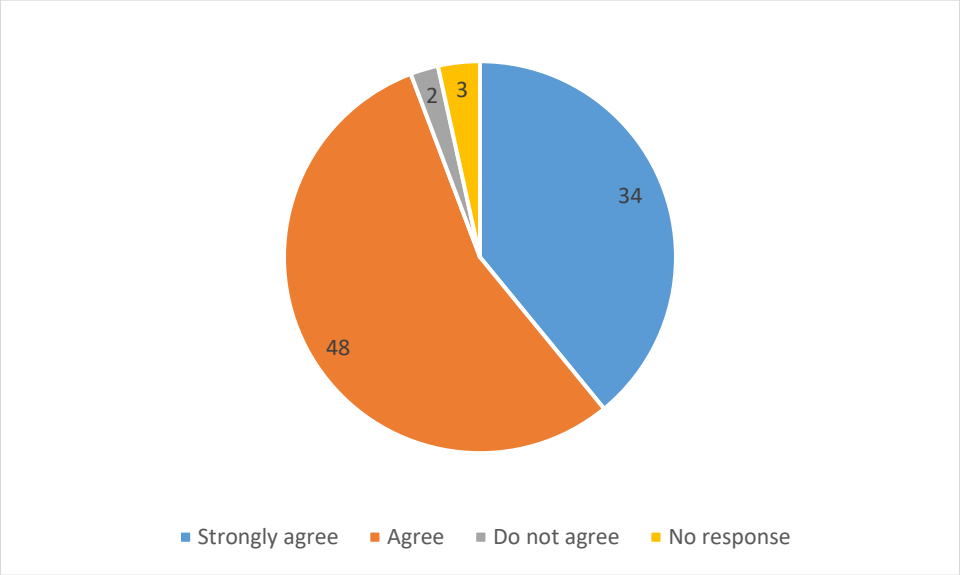

Figure 2. Acquisition of digital skills.

Motivation of Learners Using the OIS Model

The researchers sought to establish if the OIS model motivated learners to learn.

The study revealed that 52 learners out of 62 (84%) agreed that they were motivated to learn by the OIS model, eight (13%) strongly agreed and two (3%) were not sure. (See Figure 3.)

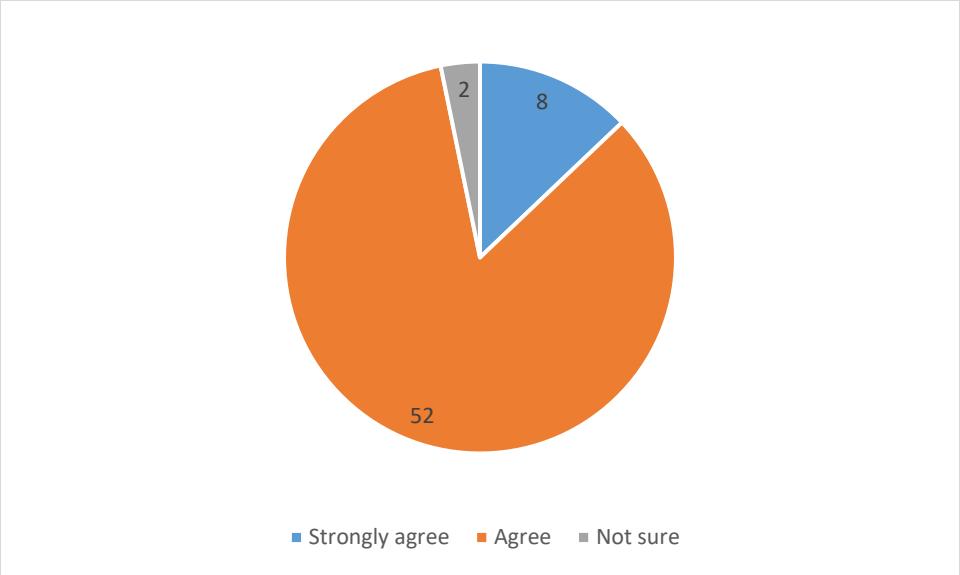

Figure 3. OIS model's influence on learners' motivation to learn.

The learners were asked to state whether they were interested in the OIS. Fifty-four (87%) stated that they were interested in the OIS programme and eight (13%) said that they were not (see Figure 4). An overwhelming majority of the learners were therefore generally interested in the OIS programme.

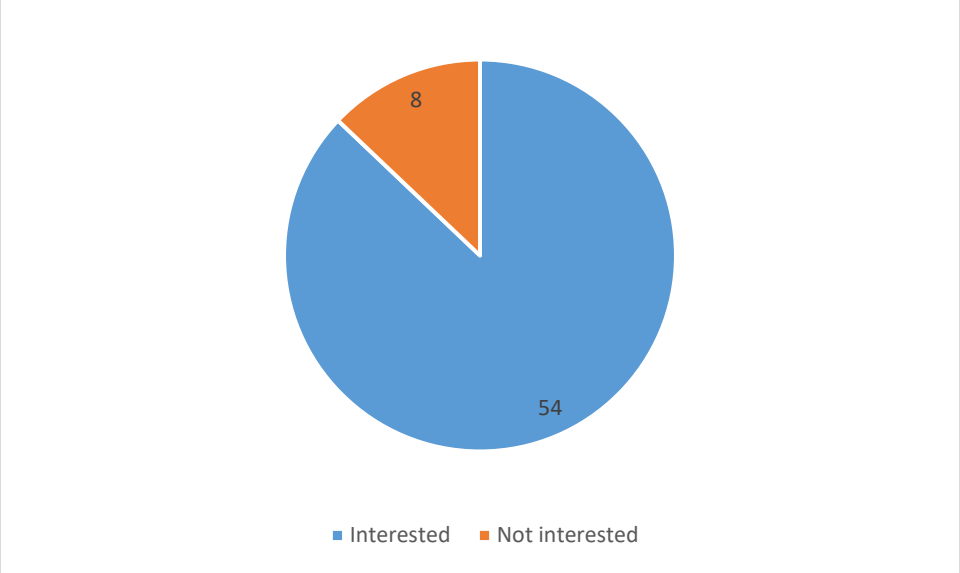

Figure 4. Learners' interest in the OIS model.

The learners were also asked to state reasons why they were interested in the OIS intervention. Their responses were analysed and grouped into four themes: flexibility, learner-centredness, motivation to learn and continuity of learning.

Thirty of the 62 (48%) learners indicated that they were interested in the OIS strategy because it provided summarised notes, and so increased the chance of gaining much knowledge; 20 (32%) stated that they were interested because they found it easy to learn; ten (16%) stated that the offline and online provision motivated them to learn; and six (10%) stated that the OIS learning mode was interesting because it provided flexibility through self-learning. The results show that most learners were interested in the OIS strategy because it increased their chances to gain more knowledge and provided flexibility in learning. (See Figure 5.)

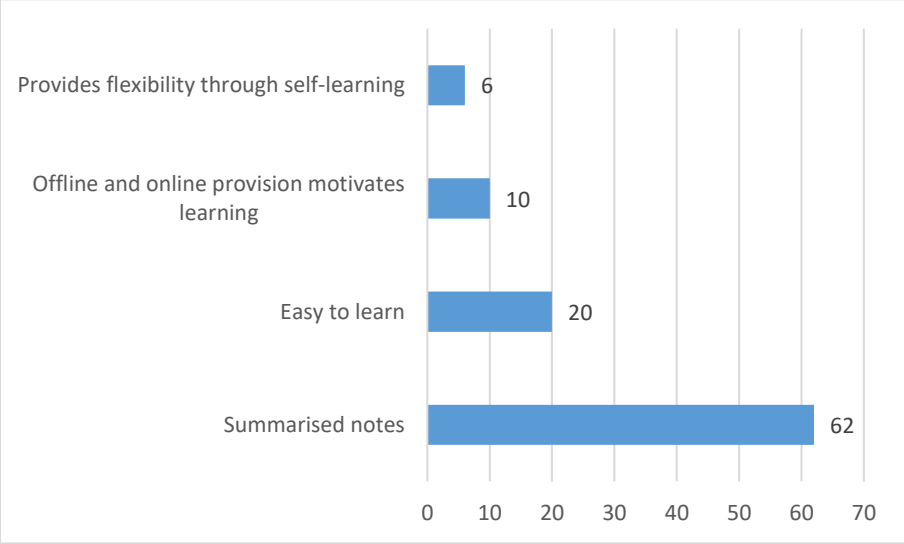

Figure 5. Reasons learners were interested in the OIS intervention.

Fifty-four (62%) of the learners agreed that the OIS contributed to improving the lives of learners by equipping them with life skills that enhanced their chance of being self-employed, 23 (27%) strongly agreed, eight (9%) were not sure and two (2%) did not agree (see Figure 6).

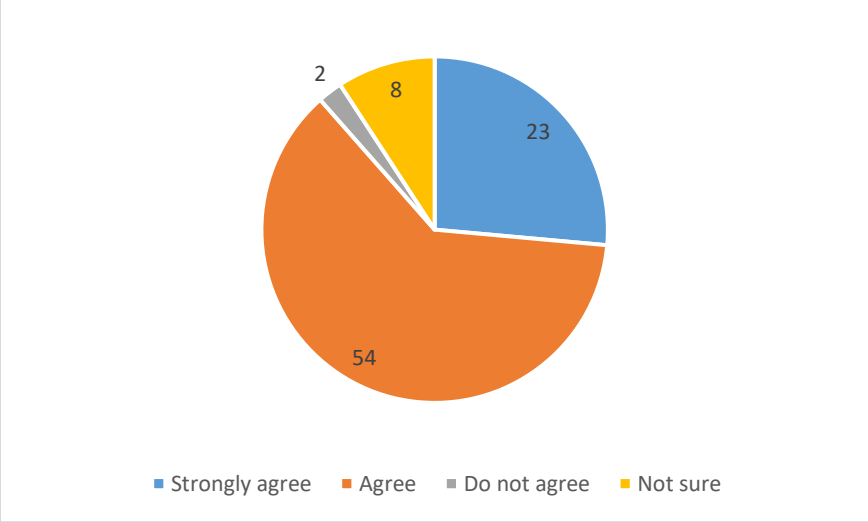

Figure 6. The programme helped learners to gain life skills that enhanced their employability.

The teachers were asked to rate the user-friendliness of the OIS e-learning model according to eight categories: easy navigation, easily accessible resources repository, variety of learning resources, smooth communication, simple and streamlined, attractive interface, easy and effective administration and reporting system, and automated learning journeys. The respondents were asked to choose all the features they considered to be user-friendly.

Out of the 87 respondents, 64 (74%) stated that both the online and offline systems were easy to navigate, 63 (72%) that both the online and offline systems had an easily accessible resource repository, 55 (63%) that there was a variety of learning resources, 50 (57%) that the systems offered smooth communication, 48 (55%) that both the online and offline systems were simple and streamlined, 47 (54%) that the systems had a good interface, 40 (46%) that the systems were easy and effective to use and 37 (43%) that the systems had automated learning journeys. The overall results from the analysis show that the offline and online systems were both seen as user-friendly. (See Figure 7.)

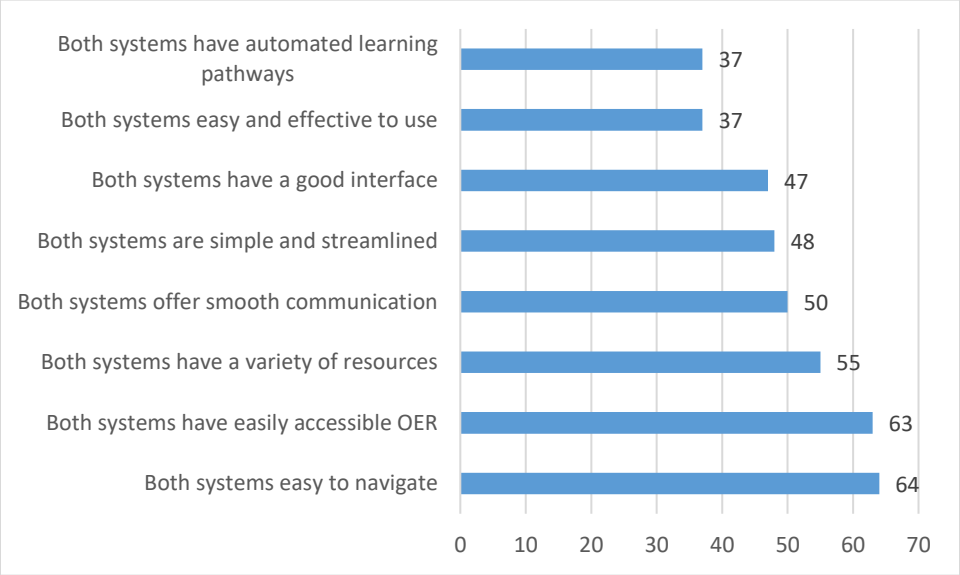

Figure 7. User-friendliness of the offline and online systems.

Efficiency in Delivery of Education

The OIS was established as a way to provide education to OOSC and adults who require flexible education to continue, complete or improve their education. It is based on principles of efficiency in the sense that self–teaching materials (i.e., OER) can be used by thousands of learners who do not need to be in a classroom, as long as they have access to a digital device and the Internet. This is the premise on which the OIS was assessed for its efficiency.

Fifty-four (62%) of the 87 teachers agreed that the OIS model increased efficiency in the delivery of education, 21 (24%) strongly agreed, nine (10%) were not sure and three (3%) did not answer the question. (See Figure 8.)

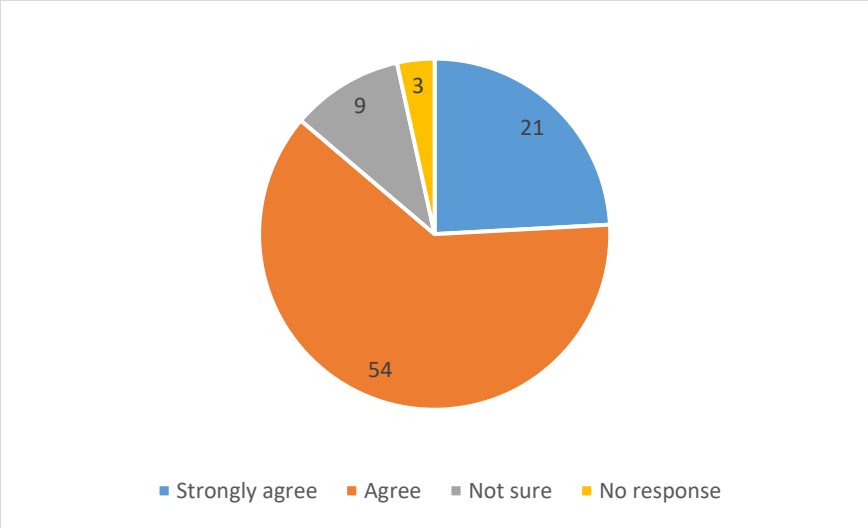

Figure 8. OIS model increases efficiency in delivery of education.

Quality of OER Content

The teachers were asked to rate the quality of the OER content. The scale used to measure the parameters was very good, good, fair and poor.

A majority (61%) of the teachers rated the OER content of the OIS platform as very good (36 teachers), good (15) or fair (2). This suggests that the content for the OIS programme was of good quality overall. This could be attributed to the quality assurance principles that were applied during the development of the OER over a two-year period. In addition, a team of subject matter experts were engaged to review and validate the OER content for both the online and offline systems. However, a significant proportion of teachers either had no opinion (because they had had little or no engagement) or rated the content as poor. The latter rating was partly because the content covered only a limited selection of curriculum-aligned subject content while the rest of the OER were more generic. (See Figure 9.)

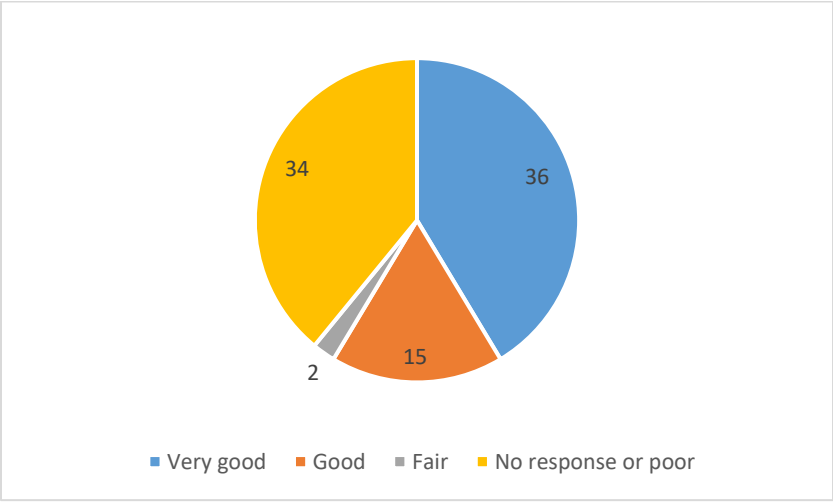

Figure 9. Quality of OER content

Assessment and Feedback

Forty (76%) of the 62 learners stated that the quality of assessment and feedback was good, seven (13%) that it was very good and six (11%) that it was fair.

Management Structures for OIS

The existence of management systems to implement the OIS was a key issue in terms of the programme's likelihood of success. The researchers sought to establish if there were management structures in place to coordinate and promote the OIS model in the various communities where it was being used. The study revealed that 45 (52%) of the 87 teachers agreed that there were structures in place to implement the programme, 12 (14%) strongly agreed, nine (10%) did not agree and 21 (24%) were not sure if there were structures in place to implement it. The teachers who participated in the study expressed a mixture of thoughts about the implementation structures for the OIS, which comprised initial training offered centrally and ongoing support provided by the Ministry through centre visits. The training was supposed to be cascaded at the centre level by those who had been trained (typically a principal/deputy principal and a senior teacher) and these staff were also expected to set up the necessary structures at the local level. The researchers believed that transfers of head teachers and teachers affected the growth of the programme as the people who had been trained to advocate for and implement the programme moved to schools where it was not being offered and there was no strategy in place to train the replacement staff in the centres/schools piloting the OIS programme. (See Figure 10.)

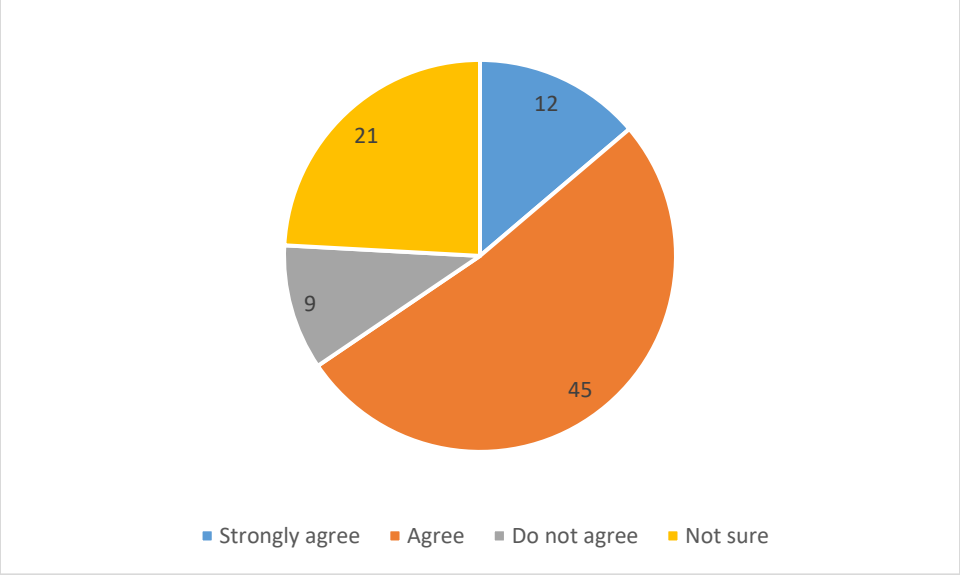

Figure 10. Existence of structures to implement the OIS programme.

The survey sought to establish if training in e-learning had had a positive effect on the programme. The teachers were therefore asked if the limited number of teachers who were trained in e-learning strategies and processes adversely affected programme outcomes.

A majority of respondents agreed that the relatively low number of staff trained initially had negatively affected delivery, with 15 (17.24%) strongly agreeing and 41 (47.13%) agreeing. However, a significant number — 18 (20.69%) — did not agree and 13 (14.94%) were not sure. The researchers surmised that

centres/schools that had experienced significant staff turnover were more likely to agree with this assessment. (See Figure 11.)

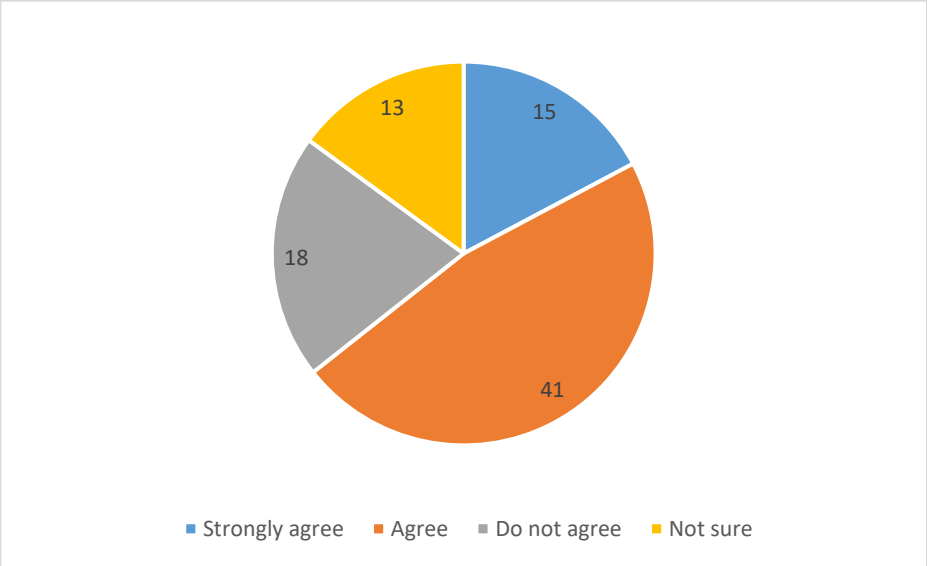

Figure 11. Too few teachers are trained in e-learning.

Management of the OIS Programme

The teachers were asked how they perceived the management of the OIS. When asked if they thought that poor management of the OIS programme at an institutional level had had a negative effect on implementation, 15 (17%) teachers strongly agreed and 41 (47%) agreed. However, 18 (21%) did not agree and 13 (15%) were not sure. Again, it was surmised that staff in centres/schools that had been affected by higher staff turnover were more likely to agree with the proposition or to be unsure. (See Figure 12.)

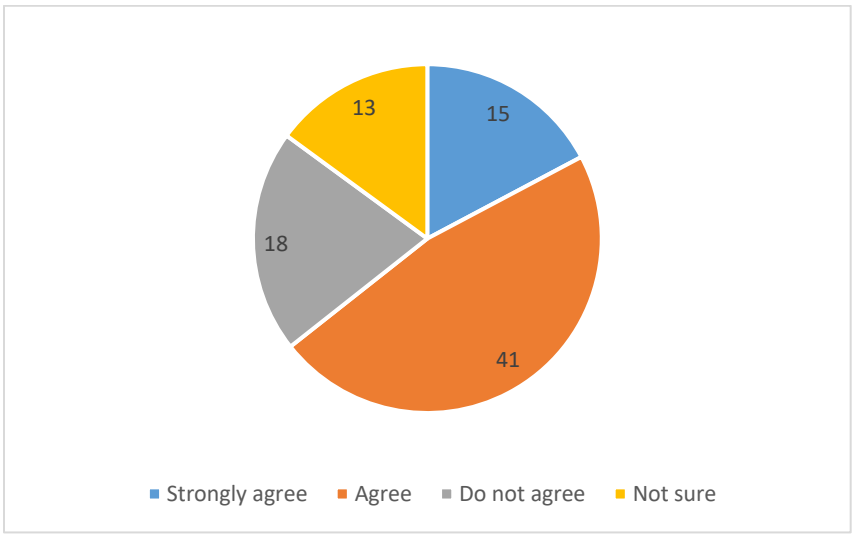

Figure 12. Management had a negative effect on the programme.

Discussion

The implementation of e-learning in Zambia is a great achievement, and it opens the way for further development of more OER in other learning areas. In addition, the need for a policy on ICT has become clearer by exposing teachers, learners and other stakeholders to e-learning. At time of writing, such a policy has been drafted and is under review. However, this study has identified some additional system issues that need to be addressed.

Policy Considerations

Zambia's ICT Policy (2006) specifically mandates the government and the Ministry of Education to adopt and adapt NEPAD[1] E-Schools and other initiatives to promote e-learning as well as life-long learning within the population at large in order to expand access to education and training. The development of the OER used in the OIS pilot was therefore in line with the government's policy of using ICT in education. This also resonates with an assessment of OER as offering a strategic opportunity to enhance access to education through the provision of quality teaching and learning materials and to improve inclusion and equity, among other factors (Ferreira & Gauthier, 2013). Some additional policy issues that have emerged include the need to:

- speed up the process of connecting schools to the Internet,
- complete digitisation of schooling curricula and materials, and
- introduce a platoon system to increase the capacity of the existing physical infrastructure to offer secondary education.

The final point will be possible if all learners have access to high-quality digital curriculum content for self-study when off campus.

Equity and Inclusion

In terms of inclusion and equity, access to offline OER significantly improved access to education for disadvantaged eligible learners in rural parts of Zambia. The OECD (2012) defines equity in education as personal or social circumstances such as gender, ethnic origin or family background not being obstacles to achieving one's educational potential. In other words, every person should be given the opportunity to learn and reach at least a basic minimum skill level, no matter what their personal or social circumstances are. The offline OER made this possible by providing teaching and learning resources to the Zambian learners who might not have access to the prescribed physical textbooks for various courses or the online platform.

Two groups in particular who benefited were youths who had previously dropped out of school in Kaputa District and were able to come back and continue with their education, and female students who had dropped out for various reasons and were able to resume their education.

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[1] *"The New Partnership for Africa's Development (NEPAD) was adopted by African Heads of State and Government of the OAU in 2001 and was ratified by the African Union (AU) in 2002 to address Africa's development problems within a new paradigm. NEPAD's main objectives are to reduce poverty, put Africa on a sustainable development path, halt the marginalization of Africa, and empower women" (United Nations, n.d.).*

Supplementary Materials

According to the MOE (2019), the pupil to book ratio at the secondary education level was 1:6, which means one book is shared by six learners. This is just one example of why supplementary materials are important in schools and learning centres. Teachers commonly face the challenge of not having enough textbooks for learners, which makes it difficult for the teacher to achieve the set lesson outcomes (Samoseminar, 2012). They therefore often need to find supplementary resources to ensure that all learners have access to appropriate content for learning. Supplementary materials can also support teaching and learning even when sufficient textbooks are available. For example, teachers can use a greater variety of media and more contemporary illustrations to keep the teaching and learning process fresh and active. Many teachers find the Internet a good source of supplementary materials for teaching.

The OER that were used in the OIS pilots were developed to provide learning, teaching and research materials to learners in Zambia. Through collaboration between teachers and learners on the online platform, learners, and especially those in urban schools like Chibote and Kabwe Secondary, benefited not only from the availability of resources developed but also from what their teachers were able to provide through the platform such as links to video, audio and animated resources, interactive quizzes and discussion forums. Marginalised and vulnerable children were provided with an opportunity to interact with their peers on the platform and share information. The five control schools used the OER as supplementary materials for their classroom teaching and learning.

Strengthening ICT Skills

Successful e-learning requires good ICT skills, and the modern workforce needs increasingly good ICT skills. The government's and Ministry of Education's hopes around ICT will only be realised if Zambia's population can use ICT. One way to help this happen is to integrate ICT into education. In Zambia, ICT education is therefore included in the curriculum to expose learners to technology and the opportunities it offers and to build their knowledge and skills in it.

Everyone who interacted with the online platform or the offline device used ICT skills to some extent. During the training in Lusaka in June 2019, the centre managers (i.e., managers and/or lead teachers in the continuing education centres and principals, deputy principals or lead teachers in the control schools) in the 20 OIS pilot locations were exposed to using both the online platform and the offline access device. In addition, the adoption of the OER and roll-out in the centres began with training for the teachers, including in some aspects of ICT. The learners needed some ICT skills to use the OER on the platform.

In the 21st-century workplace, which makes significant use of collaboration, networking and exchange of ideas, ICT skills are a "must." Throughout this pilot, the OER and their use through both offline and online means provided learners and teachers with an opportunity to build their ICT skills. Other opportunities are increasingly available online for a fee (ICT Solutions, 2022) or for free (COL, n.d.).

Challenges Faced

This study identified some of the benefits of the OIS programme in terms of increasing access to education. However, there were also several challenges. Following Zirnkle's (2001) system of categorisation, these can be grouped into three categories: individual, instructional and institutional. The

centre managers and teachers were asked about the challenges they faced in the implementation of the OIS. The five options were:

1. Inadequate ICT devices and accessories in some schools that were implementing the OIS strategy.
2. Limited ICT skills in some teachers teaching through the OIS model.
3. Limited number of teachers in some schools implementing the OIS model due to attrition.
4. Failure of some teachers and learners to accept the model in that some teachers and learners were sceptical of the effectiveness of the OIS model.
5. Limited Internet connectivity in some schools, especially where teachers used blended or flipped learning approaches with learners.

It is worth noting that while the Ministry of Education acknowledges the value of and promotes e-learning, it does not compel OIS centres to have all the equipment and infrastructure required to successfully implement the programme. The centres receive grants from the government, but not all centres receive the same amount of funding and they each decide how and where to spend it. In addition, OOSC learners do not receive bursaries from the government to help them with their educational costs. Of the 20 head teachers who participated in the survey, 16 (80%) strongly agreed that their school had a limited number of ICT devices and accessories during the implementation of the OIS programme, and four (20%) agreed. This suggests that few centres had support in the event of problems with their ICT devices. Similarly, centre managers noted the inadequacy of teachers' and learners' digital skills as a challenge too, and the results of this study support that opinion. Ten (50%) head teachers agreed that most of the teachers having limited digital skills during the implementation of the OIS programme was one of the challenges the programme faced; seven (35%) strongly agreed and three (15%) were not sure. These findings point to what Nhando (2015) observed in Africa: it is an emerging market for e-learning but is still lagging behind due to challenges of Internet access, non-availability of e-content and inadequate digital skills. Africa as a whole has 20.8% Internet penetration, while Zambia has just 15.7%. Related to Internet connectivity is the challenge of ICT devices and accessories. The Ministry of Education, in collaboration with partners and other agencies, has made progress in providing computers and other ICT tools to schools. However, there is still a lack of equipment. The Ministry of Education (MOE, 2019) notes that there are 997 computer laboratories in primary schools and 705 in secondary schools (see Tables 5 and 6).

Table 5. Number of computer laboratories in primary schools by region, 2019 and 2018

Province	Temporary	Incomplete	Permanent	2019	2018
Central	11	7	111	129	102
Copperbelt	9	11	227	247	254
Eastern	5	8	54	67	54
Luapula	4	9	56	69	44
Lusaka	53	5	223	281	247
Muchinga	4	6	34	44	41
North western	0	3	41	44	33
Northern	4	1	31	36	33

Province	Temporary	Incomplete	Permanent	2019	2018
Southern	14	19	170	203	201
Western	9	4	50	63	44
Total	113	73	997	1,183	1,053

Source of data: MOE (2019)

Table 6. Number of computer laboratories in secondary schools by region, 2019

Province	Temporary	Incomplete	Permanent	Total (2019)	2018
Central	132	8	80	220	88
Copperbelt	3	3	151	157	134
Eastern	11	6	73	90	98
Luapula	5	14	39	58	30
Lusaka	13	5	108	126	97
Muchinga	5	9	30	44	32
North western	6	4	49	59	41
Northern	9	1	44	54	46
Southern	4	6	94	104	98
Western	2	2	37	41	46
Total	190	58	705	953	710

Source of data: MOE (2019)

Inadequate digital skills is one of the challenges that faced teachers in the implementation of OIS in Zambia. At the start of the programme, centre managers and their ICT teachers were trained in Lusaka so that they would cascade their knowledge and skill to their colleagues. The challenge of digital literacy was increased by the attrition of the teachers in the centres due to a combination of transfers and management issues. Singh (2016) observes that education has undergone a transformation in the era of ICT. With that in mind, teachers must take an active role and not only take advantage of the many benefits of ICT, but also be facilitators for its uptake by other stakeholders. Singh (2016) emphasises the need for continuing professional development (CPD) to keep teachers up to date with developments in education. This view reflects that of Hyatt (2017), who stresses that CPD is an important part of teacher education and keeps teachers up to date.

The fact that 47% of the teachers who participated in the survey felt that centre managers were not doing enough is a signal that good management is a strong influence on the success or otherwise of the programme. This indicates the need for active and informed engagement among centre managers, which is in line with Haggai's (2009) advice that leaders must create concrete objectives that should be pursued by a sequence of specific goals. In addition, the study revealed that the centre managers needed constant updates on the e-learning programme in terms of suggested changes to practice based on the monitoring and evaluation process, re-training existing staff or training new staff, and new content developed or in development.

Conclusion and Recommendations

This study has established that the OIS programme has the potential to increase access to education for OOSC in Zambia, due in no small part to its flexibility. Learners who have access to a digital device and the Internet can learn when and where it suits them, no matter what age they are. The programme has also demonstrated that OIS is one way in which Zambia can develop a resilient education system that can respond to the educational needs of society in times of crisis, such as the COVID-19 pandemic, when the online platform was used extensively by mainstream learners outside of the 20 centres that participated in the study.

The findings revealed that both teachers and learners have varied levels of knowledge about e-learning and the OIS in general, which is something to keep in mind for future development of the programme. The study was based on a set of research questions designed to establish the status of the OIS and why participants had varied levels of knowledge. The cascade training model employed, and staff redeployment were likely contributing factors to the latter. As more teachers and learners migrate online, it should be possible to manage communication better.

The study has shown that the OIS programme contributed to the achievement of the Ministry of Education's goal of providing education to all irrespective of one's status. Head teachers, teachers and learners have all confirmed that the programme is important and that it increases access to education. Some learners who had left school were able to have a fresh start and complete their education, for example. However, as noted earlier, the programme had its challenges. As such, the researchers recommend the following:

1. The government, through the Ministry of Education, should allocate adequate funding for the procurement of ICT devices.
2. OIS centres should be connected to the ICT grid.
3. OIS centres should ensure that some funding from the school grants is used to pay for Internet connectivity.
4. The Ministry of Education headquarters should enhance sensitisation and awareness-raising about OIS.
5. The online platform should include senior secondary education content.
6. The offline technology should be clear and easy to use by both teachers and learners in OIS centres.
7. OIS centres should create a management structure specifically for OIS implementation.

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