Global Leadership Training Programme in Africa 2019

Activity Report of Field Research

A Systematic Review and Meta-Analysis of Effective Teaching Approaches for Improving Students' Academic Performance in Literacy in Sub-Saharan Africa

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I. Summary

This report presents the results of a systematic review and meta-analysis of research studies to identify effective literacy intervention at primary schools in sub-Saharan Africa (SSA). The activity report is normally presented by the Global Leadership Training Program (GLTP) participants to share learnings and experiences from field research activities. As the COVID-19 pandemic struck African countries, my intended four months of field research in Zambia was shortened to one month. Consequently, before conducting my field survey in Zambia, I had to return to Japan. As I was not able to collect data from the field, I present here my review study on the improvement of literacy skills in sub-Saharan Africa.

Low academic performance is the biggest challenge in the Education sector in sub-Saharan Africa. Even for children who complete primary education, more than 85% do not reach the basic proficiency level for reading (UNESCO, 2017). Literacy, including reading skills, is the foundational skill for children's future academic career, health, and economic activity (Hanushek, 2005). Mastering basic literacy skills is thus crucial for children in SSA. African countries set educational goals to improve learning quality; however, there is no clear vision to overcome the above-mentioned challenges. A lot of research was conducted using various approaches, but few review studies cover all related research conducted in the SSA region. To address this lack of research, this study aims to discover effective approaches to improve literacy skills in SSA.

This study systematically reviewed published papers on teaching approach changes that impacted student learning achievement. An initial literature search yielded 76 studies that showed the effect of teaching methods on improving test scores. Out of the 76 reviews, eight were selected for further analysis using predefined inclusion criteria, and the impact of teaching approaches was analyzed. The analysis found that the usage of students' mother tongue, which is usually different from their local language in SSA, and effective use of Information Communication Technology (ICT) had a high impact on students' learning achievement. This study will serve as a stepping stone for further research on literacy improvement for students in SSA.

After discussing the study, I describe the benefits of participating in the GLTP, including the lessons learned during my stay in Zambia. I hope this report will help other students who consider joining GLTP to conduct field research in Africa.

サブサハラ・アフリカにおける学力向上に効果があったリテラシー教授法のメタ分析

本研究は、サブサハラ・アフリカ地域におけるリテラシーの学力向上に起因した教授法の効果をシステマティック・レビューとメタ分析の手法を用いて明らかにしたものである。本来、Global Leadership Training Program(GLTP)では、アフリカでの現地調査を実施して、その活動を報告することになっているが、著者が調査地のザンビアに訪問した際に、新型コロナウィルスがアフリカに拡大したため、止むを得ず調査を実施する前に日本へ帰国することになった。よって、現地調査は実施できなかったが、サブサハラ・アフリカの学力向上を目的とした介入におけるレビュー研究を進めることにした。本研究は、そのレビュー研究の一部を紹介するものである。

サブサハラ・アフリカは、世界で最も低学力の課題を抱えている地域である。小学校を卒業しても８５％以上の子どもが最低限の読み書きができるまでに至っていない(UNESCO, 2017)。読解力を含むリテラシーの能力は、全ての勉学の基礎的能力であり、健康な生活や経済的活動に関わる重要なスキルである(Hanushek, 2005)。したがって、最低限のリテラシーを得ることはサブサハラ・アフリカ地域の子ども達の将来にかかる重要な問題である。各アフリカ諸国は、教育の質の向上を教育政策の中核に置き、効果的な解決方法を模索しているが、いまだ明確な解決策には至っていない。また、先行研究において、サブサハラ・アフリカ地域に焦点を置いた学力向上に効果があったとするリテラシーの介入のレビュー研究はあまりない。

そこで本研究は、これまでサブサハラ・アフリカ地域で実践された学力向上に起因した教授法の研究を網羅し、その中でリテラシーにおいて学力向上に効果があった事例のアプローチの有効性を検証した。まず、システマティック・レビューの手法を用い、これまで出版された研究を調べた結果、７６の文献が学力向上に影響した教授法の研究を行っていることが明らかになった。その中から選択基準を満たした８つの研究をメタ分析した結果、リテラシーにおける効果的な教授法は、母国語の活用と ICT を効果的に活用している傾向性があることが明らかになった。本研究は、サブサハラ・アフリカ地域の学力向上における教授法についての基礎研究としてさらなる研究へと繋がる基盤的研究となることを期待している。

最後に、GLTP に参加した利点についてまとめた。著者は、緊急事態のため途中で帰国となったが、帰国前にザンビア大学と合同で現地調査を実施するための必要なプロセスを学ぶことが出来たのは大きな収穫であった。この報告書が、GLTP を通してアフリカ研究を実施したいと考えている学生の後押しになれば幸甚である。

II.   Research Activity

1.   Introduction

The sub-Saharan Africa (SSA) region faces significant challenges regarding improving children's learning achievement (UNESCO, 2017). Reading is one of the essential skills for academic achievement and prosperous lives. However, in SSA, the proportion of children who did not achieve the minimum proficiency level in reading at the completion of primary education was 90% for female students and 81% for male students in 2015 (ibid). Overall, more than 85% of children in sub-Saharan Africa did not attain the minimum proficiency level. This percentage corresponds to about 138 million children of primary school age (ibid).

At the Program for International Student Assessment for developing countries (PISA for development), sub-Saharan countries ranked the lowest of all participating countries (OECD, 2018). The result of the assessment showed that 95% of students did not achieve the basic proficiency level in reading at the age of 15 (ibid). Because of these challenges, education policies in sub-Saharan countries have set goals to improve the quality of education, especially the quality of learning, to boost students' academic performance. These policies are aligned with Sustainable Development Goals (SDGs) which were endorsed by United Nations in 2015 and accepted by international societies as common goals of not only developing countries but also developed countries (United Nations, 2016). SDG No. 4 aims at inclusive and equitable quality education for all and specifically focuses on all youth achieving literacy and numeracy (ibid). In relation to the Goal 4, the present study aims to identify effective approaches for improving literacy skills of early grade children in primary education in SSA.

The quality of education influences the prosperity of individuals and society. Especially in developing countries, test scores results are directly related to individual earnings, productivity, and economic growth (Hanushek, 2005). For this reason, SSA countries and international organizations strive to improve academic performance through various interventions. Previous studies show which approaches impacted students learning achievement in developing countries. However, there are few review studies, systematic reviews, or meta-analyses about how to improve academic performance focusing on literacy intervention in the SSA region.

The only regionally focused review study regarding the topic was conducted by Conn (2014). She found that changing the teaching approach at the classroom level was the most effective intervention for improving students' performance compared with other approaches such as free school fees, school management, health treatment, and scholarships. Though the change of teaching approaches was shown to be the most effective approach, how the change in teaching approaches impacted learning achievement is not known. Therefore, this study aimed to identify studies of the effect of teaching approaches, especially focusing on literacy intervention to improve learners' academic performance in SSA. It further aimed to quantify the effectiveness of teaching approaches with a particular focus on primary education level education in the region.

2.   Study Target Area

The study area is sub-Saharan Africa, which includes 55 countries registered in the African Union. For the review study, all subjects that impact students learning outcome at kindergarten, primary education, junior

high school, and high school education were targeted. For the meta-analysis study, the targeted subject was literacy or reading. Education level focused on primary education.

3. Methodology

The study applied a systematic review method to identify related literature in SSA and meta-analysis review methods to quantify the effectiveness of teaching approaches. The study was conducted using the following procedure. Firstly, I searched for previously published papers, such as peer-reviewed articles, academic working papers, dissertations, and reports published through academic institutions and research organizations. Secondly, I reviewed the identified papers using predefined inclusion criteria. Thirdly, I coded relevant information in each study and checked if they provided appropriate data for meta-analysis. Finally, I identified the effectiveness of the method by using the general variance-based method on the final set of studies.

<u>Literature search and inclusion criteria</u>

The present study chose research studies which were: (a) conducted in sub-Saharan Africa (in 55 countries), (b) published between 2000 and May 2020, (c) focused on teaching approaches at the classroom level, (d) measured the impact on students learning achievement (f) conducted as a Randomized Control Trial (RCT) or quasi-experiment, (f) targeted at populations of more than 20 students, and (g) written in English.

For the literature research, databases and websites were used, including ERIC, Science Direct, and research institution libraries of International Initiative for Impact Evaluation (3ie) and the Abdul Latif Jameel Poverty Action Lab (J-Pal).

For the database search, the following three sets of keywords were used: (a) "impact" or "effect" or "outcome" or "result" or "consequence," (b) "academic achievement" or "educational attainment," or "academic performance," or "academic success," or "academic outcomes" or "school performance" or "randomized" or "RCT," (c) "Africa" and every individual country name of SSA region (55 countries). For websites, manual searches were conducted.

4. Research Findings

<u>The results of the systematic review</u>

The systematic review identified 332 articles that examined the impacts of teaching approaches. Figure 1 illustrates the PRISMA flowchart describing the procedure of selecting articles. After applying the selection criteria, 76 eligible articles discussing teaching approaches in the classroom that impact students' academic performance were found. They were conducted in 13 out of the 55 countries in SSA; more specifically, 25 studies in Nigeria, 20 studies in Kenya, 13 studies in South Africa, three studies in Uganda, three studies in Ethiopia, two studies in Ghana, two studies in Malawi, two studies in the Democratic Republic of Congo, two studies in Liberia, one studies in Zambia, one study in Zimbabwe, one study in Rwanda and one study in Mali.

Nigeria, Kenya, and South Africa were the main places where studies were conducted (82.89%). The reasons for this considerable number of studies varies by countries. In Nigeria, most of the studies were conducted on mathematics and science at junior high school and high school levels by researchers at

universities in Nigeria. This focus may be influenced by an educational policy that focuses on STEM subjects. In Kenya, the studies at primary education were mainly on literacy and numeracy and where supported by international organizations such as USAID which introduced effective teaching approaches and conducted research on them. The reviews at secondary education in Kenya were mostly led by university scholars and where also be influenced by international cooperation. For example, Japan International Cooperation Agency (JICA) supported the education policy on STEM, teacher education, and research activities of teachers at school and professors at university. In South Africa, most studies were targeted at literacy and numeracy in primary education except for two studies focusing on science in secondary education. This focus by be influenced by international organizations that supported literacy and numeracy in the country.
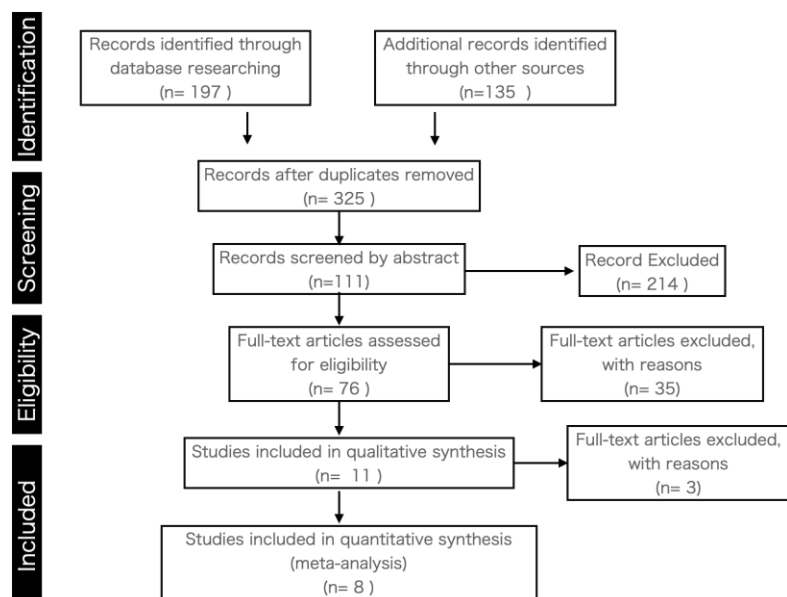

Figure 1. PRISMA flowchart (adapted from Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009)

Research in Uganda, Zambia, and Ghana was conducted in domestic universities and international organizations. The research in Ethiopia, Malawi, the Democratic Republic of Congo, Liberia, Zimbabwe, Rwanda, and Mali was conducted by an international organization such as USAID to evaluate educational support to the countries. The result of the systematic review shows that there is an extensive literature gap in effective teaching methods on students' achievement in the SSA region.

The results of the meta-analysis review

From the 76 eligible studies, eight studies were focused on literacy intervention, which made an impact on students' learning outcomes in primary education. Table 1 shows the content of the eight studies including quantitative synthesis and describes each study's author, year of publication, research field (country), type of intervention, sample size, targeted grade, duration of the intervention, and study design. Starkey et al. (2014) conducted a survey (Study No. 1) on the impact of a literacy project on student learning achievement in the Democratic Republic of Congo. This project provided literacy resources for learners and teachers, teacher training as well as a healing program for children to make a comfortable learning environment, as children experienced a conflict in the country. Abdi et al. (2016) conducted a survey (Study No. 2) on the effect of a teaching method focusing on mastering the necessary skills in students' local language of Amhara

at Grade one. The study also examined the influence of the following years' learning achievement compared with a group that was taught by a traditional teaching method. Study No.3 of Boezekowski et al. (2019) examined the effectiveness of using media in the form of a cartoon program for letter identification, writing skills, color recognition, drawing, body part recognition, health knowledge, and vocabulary for kindergarten to second-grade students in Rwanda. Study No. 4 of Friedland et al. (2017) identified the impact of using audiobooks for third-grade students to improve reading skills, by comparing students who learn to read while listening with a group of same grade students who did not learn to read with listening.

Table 1. Selected studies for meta-analysis

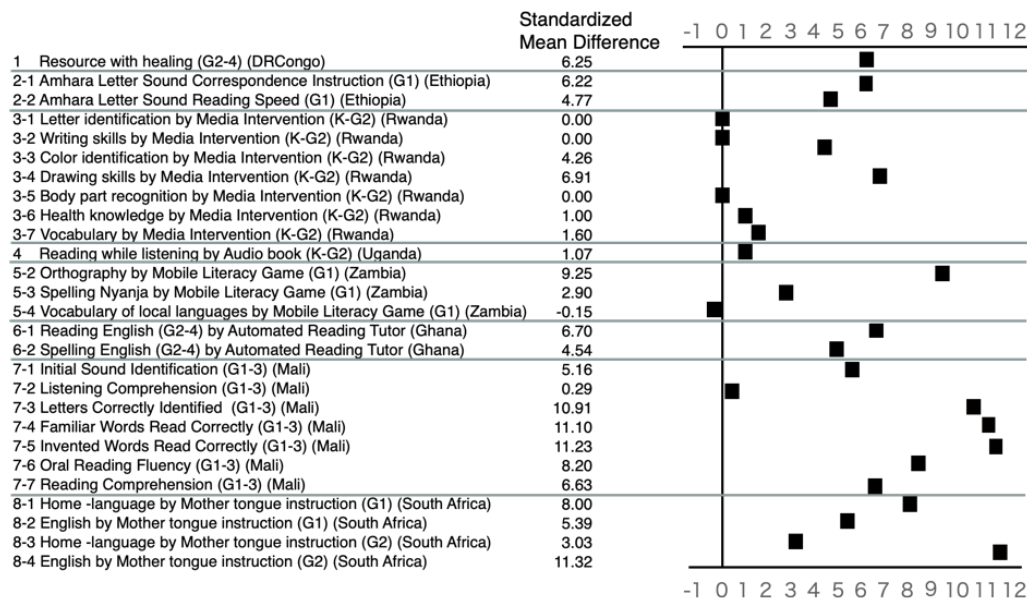| No	Study	Year	Country	Intervention	Sample Size (Student)	Grade	Duration	Study Design
1	Starkey	2014	Congo (DRC)	Resource, Healing program	1850	G2-4	One year	RCT
2	Abdi	2016	Ethiopia	Explicit instruction and fluency practice	33	G1	18 weeks	RCT
3	Borzekowski	2019	Rwanda	Media: Cartoon program	200	K-G2	Two weeks	RCT
4	Friedland	2017	Uganda	Reading while listening by Audio Book	23	G3	30 days	RCT
5	Jere-Folotiya	2014	Zambia	Literacy game by mobile	160	G1	Two weeks	RCT
6	Mills-Tettey	2010	Ghana	Automated Tutor	30	G2-4	Three weeks	RCT
7	Spratt	2012	Mali	Using mother tongue	1632	G1-3	Three years	RCT
8	Sailors	2010	South Africa	Mother tongue and local languages	538	G1-2	Three years	RCT

Study No. 5 of Jere-Folotiya et al. (2014) used literacy games on mobile phones for first-grade students in Zambia to measure the impact on the learning performance on orthography, spelling, and vocabulary in the local language (Nyanja). Study No. 6 of Mills-Tettey et al. (2010) identified the effect of using a computer-automated tutor program for second to fourth-grade students to learn English in Ghana. Study No. 7 of Spratt et al. (2012) examined the impact of a literacy program that supported learning resources for first to third-grade students and teaching resources for teachers, using students' mother tongue (not local languages) as an instructional language to teach the official language of French in Mali. Study No. 8 of Sailors et al. (2010) examined the influence of instructional languages on students' learning outcomes between students' mother tongue and their local official language in the region in South Africa. The study compared the learning outcomes of two subjects; local language in the region and English when a student group was taught in the students' mother tongue and another group was taught in a local language as an instruction language.

The meta-analysis examined the effect of eight approaches on literacy learning skills. Figure 2 shows the standardized mean score for each measured skill. Measures from -1 to 2 are considered as Low impact, from 3 to 7 as Moderate impact, and from 8 to 12 as High impact.

High impact approaches were orthography by mobile phone (Zambia), letter identification/familiar words and invented words identification by teaching in the mother tongue (Mali), home language learning, and English learning in the mother tongue (South Africa).

The middle impact approaches were resource provision with healing program (DR Congo), letter-sound recognition by mother-tongue instruction (Ethiopia, Mali), color identification by media (Rwanda), reading and spelling by an automated tutor (Ghana), English teaching by mother-tongue instruction (South Africa) and reading comprehension by mother-tongue instruction (Mali). The low-impact approaches were media and mobile game intervention for the identification of letters (Rwanda), vocabulary (Rwanda and Zambia), writing (Rwanda), body part and health knowledge (Rwanda), reading while listening (Uganda), and listening comprehension (Mali).

Figure 2. The effect size of approaches by literacy skills

	Standardized Mean Difference
1 Resource with healing (G2-4) (DRCongo)	6.25
2-1 Amhara Letter Sound Correspondence Instruction (G1) (Ethiopia)	6.22
2-2 Amhara Letter Sound Reading Speed (G1) (Ethiopia)	4.77
3-1 Letter identification by Media Intervention (K-G2) (Rwanda)	0.00
3-2 Writing skills by Media Intervention (K-G2) (Rwanda)	0.00
3-3 Color identification by Media Intervention (K-G2) (Rwanda)	4.26
3-4 Drawing skills by Media Intervention (K-G2) (Rwanda)	6.91
3-5 Body part recognition by Media Intervention (K-G2) (Rwanda)	0.00
3-6 Health knowledge by Media Intervention (K-G2) (Rwanda)	1.00
3-7 Vocabulary by Media Intervention (K-G2) (Rwanda)	1.60
4 Reading while listening by Audio book (K-G2) (Uganda)	1.07
5-2 Orthography by Mobile Literacy Game (G1) (Zambia)	9.25
5-3 Spelling Nyanja by Mobile Literacy Game (G1) (Zambia)	2.90
5-4 Vocabulary of local languages by Mobile Literacy Game (G1) (Zambia)	-0.15
6-1 Reading English (G2-4) by Automated Reading Tutor (Ghana)	6.70
6-2 Spelling English (G2-4) by Automated Reading Tutor (Ghana)	4.54
7-1 Initial Sound Identification (G1-3) (Mali)	5.16
7-2 Listening Comprehension (G1-3) (Mali)	0.29
7-3 Letters Correctly Identified (G1-3) (Mali)	10.91
7-4 Familiar Words Read Correctly (G1-3) (Mali)	11.10
7-5 Invented Words Read Correctly (G1-3) (Mali)	11.23
7-6 Oral Reading Fluency (G1-3) (Mali)	8.20
7-7 Reading Comprehension (G1-3) (Mali)	6.63
8-1 Home -language by Mother tongue instruction (G1) (South Africa)	8.00
8-2 English by Mother tongue instruction (G1) (South Africa)	5.39
8-3 Home -language by Mother tongue instruction (G2) (South Africa)	3.03
8-4 English by Mother tongue instruction (G2) (South Africa)	11.32

5. Discussion

The systematic review analysis found 76 studies on how interventions impact learners' achievement in sub-Saharan Africa. More than 80 percent of the studies were conducted in Nigeria, Kenya, and South Africa. These three countries may be able to afford to conduct research by domestic universities because the countries are economically more developed more than other countries and show a higher number of researchers and universities in the countries. On the other hand, other counties such as Uganda, Zambia, Ethiopia, Ghana, Malawi, the Democratic Republic of Congo, Liberia, Zimbabwe, Rwanda, and Mali face challenges of low proficiency level in literacy and numeracy; however, only a few studies are conducted in those countries. This discrepancy points to a large literature gap on the topic, especially in countries where improving academic performance seems particularly necessary. To improve learning outcomes, more studies should focus on those countries to accumulate evidence of effective approaches.

The results of the meta-analysis identified that mother-tongue instruction as the most effective teaching approach to improve students' learning achievement. The result supports the 'home language advantage' hypothesis that describes a universal trend in all communities regardless of language or culture (Nag et al., 2019). Most SSA countries are linguistically complex. For example, in Mali and South Africa, there are different mother tongues, regional languages, and official languages. The mother tongue can be the tribal language on the mother's or father's side and either or both are used mainly at home. Children can

understand when teachers use the children's mother tongue and learn effectively to master the regional language and official language. Especially the lower grade children need to be taught in a language that they can understand. However, when some children in a class have a different mother tongue from other children, teachers have difficulties teaching in the children's mother tongue, especially at the level of reading/listening comprehension. Graham and Kelly (2018) found that the mother tongue instruction had a high impact on basic literacy skills but not on reading comprehension in other developing countries. The present study, however, found that mother-tongue instruction approaches made a moderate impact on reading comprehension in Mali. The Mali case showed a high effect on letter/word recognition and reading fluency. This may indicate the cumulative effect of mother-tongue instruction because it has a strong impact on basic literacy skills (letter/word, reading fluency) and an even stronger impact on reading comprehension. Additionally, there may be an effect of teacher training and the provision of teaching and learning resources focusing on mother tongue instruction teaching.

The effectiveness of ICT intervention on literacy improvement varies depending on the level of skills, grade, and type of ICT. A remarkable result is that the automated tutor used in the Ghana study made a moderate impact. In the study, a teacher's role is to explain how to use the automated computer but not to teach. If a mother tongue instruction literacy program is made to meet each child's need, there will be a possibility for more children to master the necessary skills of literacy in the SSA region regardless of teacher's knowledge on children's mother-tongue.

Based on these results, policymakers who want to improve the quality of learning and students' learning achievement, should focues especially on the foundational skills of literacy, and they should consider designing a curriculum focusing on mother -tongue teaching for early grade primary education and effective usage of ICT in literacy.

6. Conclusion

This study aimed to identify the literature of practical teaching approaches to improve learners' academic performance in the SSA region and examined the effect of teaching approaches in literacy. 76 studies that found out the effective teaching approaches were identified. On the other hand, more efforts of studies are necessary in the most challenging areas of low academic performance in SSA. In literacy teaching, mother-tongue instruction and automated computer programs were significant for improving students' academic performance, especially for early grade learners. Using the effective approaches will be a key to enhance children's literacy skills, especially in the areas where children are not reaching the basic proficiency level in literacy in SSA. The present study is a first step towards filling the literature gap on improving learning achievement in Sub-Saharan Africa and can be used as a steppingstone for further investigation into the topic.

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III.   Reflections on the GLTP in Africa

⚬   Motivation to participate in the GLTP

The Global Leadership Training Program (GLTP) in Africa was established with the purpose of supporting graduate students in improving their leadership skills by conducting research in Africa, which contributes to Sustainable Development Goals in the region. I was impressed by the purpose, therefore, I decided to apply for the program. After joining the program, I realized that GLTP was not only providing an opportunity to research in Africa but making a platform for young researchers who were fascinated with Africa to gather and inspire each other through sharing ideas to solve a piece of a problem they found in Africa. Through participating in the GLTP, I gained precious opportunities to learn from numerous people who were involved in the GLTP.

⚬   Field experiences

My field research experience was all about preparation before collecting data in the field. My research field was primary schools and Ministry offices; therefore, I had to apply for research permission from the University of Zambia and the Ministry of General Education. The procedure I undertook was as follows.

1. Agree on the research with a professor at the partner university
2. Submission of a proposal of research
3. Submission for permission from the ethics committee at the university
4. Submission for permission to survey public schools to Permanent Secretary at Ministry of General Education (including research purpose, content, duration, list of schools, list of interviewees)

The School of Education, University of Zambia

After gaining the permissions from the university and the Ministry, I was allowed to conduct a field survey in Zambia. This process usually takes more than one month; therefore, it is advisable to allocate enough time to get permission from the authorities for the whole duration of the field research in the country.

- ○ Challenges

I faced two challenges during my stay in Zambia. Firstly, there was a security problem. There was a murder case in which a gang threw gas into a house and killed people, and the Social Network System spread the rumors that the gangs were coming to villages. As a result, locals overreacted to strangers, and some were lynched and killed by village people. The situation in Lusaka was stabilizing while I stayed, but there was a caution against visiting schools in one of the targeted rural areas for my survey.

Secondly, COVID-19 pandemic occurred during my stay in Africa. Consequently, before conducting the field survey, I had to evacuate to Japan. After returning, I had to change my research plan due to a lack of field data. It was a painful experience but gave me an excellent opportunity to find another research topic that widened my knowledge of studies in sub-Saharan Africa.

- ○ How to make use of this experience for your future career development

My future career plan is to work for educational development in Africa. Through participating in the GLTP, I developed a critical skill that I can make use of in my future career. The skill is to be flexible whatever happens, never afraid to change a plan and direction, and take up the challenge of a new endeavor to go forward. In Africa, unexpected incidents happen all the time. It will also occur in my life, especially because the society where we live is changing so quickly because of advances in new technology. My flexibility will be the most vital power for me to work in the field of education development in Africa.

- ○ Encouragement to other students

When it comes to conducting field research in Africa, it is not easy for a student who does not have any support or network in Africa. Primarily, conducting collaborative research with a local university professor in Africa is hard to implement in a limited time. The Institute for the Advanced Study of Sustainability of United Nations University (UNU-IAS) has established a relationship between universities and social networks with professors and researchers in Africa. As USU-IAS provides the GLTP, it helps participants connect with a local university in Africa and supports them in conducting field research in the country.