



Improvement of Mobile Computer Laboratories Services in Dar es Salaam, Tanzania

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ABSTRACT: The mobile computer laboratory is a standard computer laboratory that can be moved from one place to another to meet the predefined needs of the community. This can be achieved through mobile computer buses, mobile computer flex carts, or mobile computer vans, depending on the required capacity and level of mobility. Improving the services of mobile computer laboratories adds value by simplifying the process of community digital transformation and reducing the negative impact of the digital divide. Current studies on the challenges of mobile computer laboratories have identified areas for improvement, particularly in terms of education services and courses related to information and communication technology (ICT). One major challenge is creating awareness among communities about the existence and benefits of mobile computer laboratories, as government authorities are often hesitant to implement these services. The findings of this study suggest that effectively implementing mobile computer laboratories improves ICT education and enhances general community digital transformation, with a focus on specific community groups. Furthermore, the effectiveness of mobile computer laboratories can be measured in terms of resources, benefits obtained from the services provided, and the language used in communication. When implementing mobile computer laboratory services, it is important to consider the relationship between the expectations of the beneficiaries and the overall objectives of the program.

KEYWORDS: Community Digital Transformation, Computer, Computer Laboratory, Digital Divide.

INTRODUCTION

Since the 1990s, there has been rapid growth in the use of mobile computer laboratories for digital transformation, particularly in the education sector. The positive attitudes towards integrating ICT and the effectiveness of its use in teaching and learning processes have had a significant impact on the provision of education services [1]. In areas with limited access to ICT facilities, there is a great need for digital transformation, which can be met through the use of Computer on Wheel (COW) products that simplify the spread of computer knowledge to communities regardless of their locations [2].

Around the 2000s, computer knowledge was provided in rural schools in India using buses equipped with computers as part of an effort to achieve universal elementary education [3]. The introduction of mobile computer laboratories helps bridge the digital divide between urban and rural areas. In America, mobile computer laboratories, known as brilliant buses, were used to bring Wi-Fi facilities and computers to communities that seemed to lack access to computer knowledge. In some areas, these buses simply served as roving internet hotspots [4]. In South Africa, state-of-the-art buses have been converted into mobile computer laboratories to meet the growing need for computer knowledge [5]. In East African countries like Kenya, Tanzania, and Uganda, mobile computer laboratories are well-established, with buses equipped with several computers providing free computer training services [6].

In Dar es Salaam, mobile computer laboratories have been implemented to integrate the use of ICT and achieve educational policy objectives in Tanzania [7]. Given the importance of mobile computer laboratories for community digital transformation, especially in the education sector, this article aims to address the improvement of mobile computer laboratory services.

KEY QUESTIONS

This article focuses on two key questions: the first question addresses the challenges faced when conducting mobile computer laboratory services, and the second question focuses on providing advice for proper practices to ensure effective mobile computer laboratory services. The responses to these questions were collected from both employees of the service provider and beneficiaries of mobile computer laboratory services in Dar es Salaam.



Significance of the Studies

The objective of this study was to identify the best practices for enhancing the effectiveness of mobile computer laboratory programs. The study also aimed to provide valuable insights for other researchers to further investigate mobile computer laboratories and propose potential amendments to ICT teaching policies in various community groups.

LITERATURE REVIEW

Computer knowledge;

The increasing demand for computer knowledge in various communities, such as educational institutions, community groups, and health services, has made the presence of computer laboratories essential in meeting this demand. Since the beginning of the 21st century, there has been a growing need to integrate computer technologies with other services, such as educational learning materials, healthcare services, accounting services, and other computer-based operations. A study conducted by Kamaljit Kaur of Khalsa College in 2023 highlights the importance of incorporating ICT in the classroom to provide students with the necessary computer skills for significant improvements in teaching and learning in this digital era. Despite the challenges faced in integrating ICT in education, computer-based training offers learners more control over their instruction compared to traditional teaching methods. In the field of healthcare, the integration of computer technologies has shown great potential for advancing health research, disease prevention, improved treatment, reduced disparities, enhanced diagnostics, improved health education, cost reduction, and increased access to healthcare services in ways that were previously unimaginable [8]. The demand for computer knowledge has therefore emerged as a result of the need to integrate various services with computer technologies.

Mobile computer laboratory;

A computer laboratory is a designated space in any community that provides computer services. Technology is rapidly advancing and shows no signs of slowing down. Currently, technology is ubiquitous through the use of computer-aided technologies. The increasing need for computer knowledge and the availability of digital public and private services have led to the introduction of mobile computer laboratories to meet the growing demand for computer knowledge in diverse communities. A mobile computer laboratory is a standard computer laboratory that can be easily transported from one location to another to fulfill the specific needs of a community. This can be achieved through the use of mobile computer vans, mobile computer buses, and mobile computer flex carts, depending on the required capacity and mobility level. In the United States, mobile computer laboratories, known as the Brilliant Bus, have gained recognition. These buses, equipped with Wi-Fi facilities and computers, travel to serve communities in areas that are often left behind in terms of computer knowledge. They act as roaming internet hotspots, targeting areas such as churches, city parks, and youth groups to narrow the digital divide [4]. In 2015, the Monsoon Education Foundation in India introduced a modern tech wheel computer laboratory equipped with twenty-one computers and internet access to enhance computer training at night [9].

The objective of introducing mobile computer labs is to bridge the digital divide between urban and rural areas. The Schools on Wheels project is a unique ICT-supported learning initiative that can reach non-urban areas, as computer-equipped buses bring education to the doorsteps of beneficiaries. To optimize cost, mobile computer labs can utilize N-Computing technology, which saves energy and maintenance costs [10]. Another way to implement mobile computer laboratories is through the use of flex carts. These mobile laptop carts can be shared among classrooms to integrate the curriculum with computing technology and teaching techniques [5]. In South Africa, state-of-the-art buses are converted into mobile computer laboratories to meet the growing demand for computer knowledge [11]. In East African countries, Craft Silicon Foundation operates mobile computer laboratories, providing free computer training services in buses equipped with multiple computers [12].

Benefits of mobile computer laboratories include addressing the lack of computer labs, office computers, and teaching skills for basic computer applications in many public schools. Teaching computer applications often remains theoretical, with limited emphasis on ICT education [13].

METHODOLOGY

The research encompassed the necessary steps for conducting the study, including formulating the research problem, conducting an extensive literature survey, developing the research hypothesis, preparing the research design, determining the research parameters,



collecting research data, executing the project, analyzing the data, testing the hypothesis, generalizing and interpreting the findings, and preparing the final report or presentation of the results [14].

The study focused on a population of 55 individuals, consisting of thirteen employees from a mobile computer laboratory service provider and forty-two beneficiaries of the mobile computer laboratory in Dar es Salaam. The researcher utilized a Small Sample Technique, as used by the National Education Association, to determine the appropriate sample size from the population [15]. For this study, a purposive sample of forty-four participants was selected, consisting of thirty-four beneficiaries of the mobile computer laboratory service and ten employees of the service provider.

Data collection involved interviews and observations to ensure the acquisition of valid and reliable data. The collected data underwent thematic analysis, which involved identifying, analyzing, and interpreting patterns in qualitative data, coding information according to a list of themes or patterns [16]. The interpretation process incorporated the cognitive complexity, cognitive style, perception, synthesis, and analytical capabilities of the researcher, as well as their competence and intellectual insights [17].

FINDINGS

Findings on challenges of mobile computer laboratories.

Table 1: Challenges expressed by beneficiaries

Theme	Participants	Percentage
Language barrier	3	9%
Absence of reliable facilities	20	59%
Inferiority Complex	11	32%

The study found that 9% of beneficiaries expressed concerns about the presence of a language barrier between service providers and beneficiaries of the mobile computer laboratory. It was observed that service providers primarily used English instead of the national language, Swahili, when conducting the training and preparing training materials. One beneficiary was quoted during the interview saying, *"Why are the service providers using a foreign language? Don't they know that we have our own national language?"*

The findings revealed that 59% of beneficiaries faced the challenge of limited availability of training facilities, which hindered their continuous knowledge development. Since the mobile computer laboratory services shifted from one place to another, the beneficiaries did not have access to computers for practicing the knowledge gained from the mobile computer lab. One beneficiary expressed their concern, stating, *"I benefited from the mobile computer laboratory program, but I don't have the facilities to practice the knowledge I gained. I am worried that this knowledge will be useless if I don't have the opportunity to practice."*

Additionally, the study found that 32% of beneficiaries reported feeling a sense of inferiority complex due to the significant age difference between themselves and the trainers of the mobile computer laboratory service. Adult trainees were uncomfortable being trained by younger trainers, and the younger trainers also felt uncomfortable training older individuals. One beneficiary shared their experience, stating, *"Sometimes I don't attend the training sessions because I don't feel comfortable being trained by these young trainers. Their communication with us lacks respect for their elders."*

Table 2: Challenges expressed by employees of service provider

Theme	Participants	Percentage
Insufficient fund	6	60%
Absence of modern facilities	3	30%
Illiteracy of beneficiaries	1	10%

The study revealed that 60% of employees of the service provider informed the researcher about several challenges faced as a result of insufficient funds to meet the basic requirements of the mobile computer lab program. They also explained the challenge of delays in receiving funds from donors, which led to inefficiencies in implementing planned programs. One employee suggested, *"Our*



organization could consider changing its status from a pure NGO to a social enterprise organization in order to generate its own revenue. With this change, beneficiaries would be able to pay a minimal fee to cover operating expenses."

Another finding was that 30% of employees believed that the program did not reflect the mobility of computer laboratory services due to limited resources. The program was intended to be dynamic, allowing for training in different locations on the same day, rather than being static. One employee explained, "Normally, we fix our computers in one location and move with them after completing our training program. Currently, we do not have the capability to use buses equipped with computers/laptops to train beneficiaries in different locations."

The results also indicated that 10% of employees were concerned about training beneficiaries in computer knowledge that was not applicable to their daily operations. This situation of not practicing what was taught during training discouraged the service provider, as they were responsible for monitoring and evaluating the success of the program and reporting to donors. One beneficiary in a mobile computer lab expressed their dissatisfaction, stating, "They didn't benefit from the training because they believed that the mobile computer lab program was designed for the service provider to eat up donors' funds."

Findings on improvement of mobile computer laboratories.

Table 3: Advices on improvements of mobile computer laboratory programs

Theme	Participants	Percentage
Facilities	18	41%
Program Coverage	14	32%
Funds for running the program	12	27%

The study revealed that 41% of all participants recommended improving the facilities to ensure the effectiveness of the mobile computer laboratories. The recommendations included the use of modern computers, projectors, and accessories such as dusters and display boards. They also suggested providing mobility facilities such as vans or buses and reliable power supplies. One participant was quoted by the researcher, saying, "The current mobile computer lab is only conducted in places with electricity. I advise service providers to consider using generators or solar-powered computers."

Additionally, 32% of all participants suggested expanding the mobile computer lab program beyond just the education sector. They recommended conducting the program for the entire society, including entrepreneurs, civil servants, secondary school students, and registered community groups. Service providers were encouraged to consider conducting the mobile computer lab program in remote areas rather than just in towns. One participant stated, "This is a great program for digital transformation in the community, especially in rural areas where there is limited access to ICT facilities and knowledge."

Another participant advised the management team of the service provider to have a plan to extend the mobile computer lab services to other professionals instead of solely focusing on the education sector.

The findings indicated that 27% of all participants advised the service provider to change their registration status from being a pure non-government organization (NGO) to a social entrepreneurship organization. This change would allow them to charge a minimal fee, generating revenue to cover the expenses of running the program effectively and providing the necessary computer knowledge to the intended society. The participants believed that this change would eliminate the dependency on donor funds and allow for the expansion of services through self-generated revenues. One participant expressed this, stating, "We have been relying on donor funds, which are often received late. Our management must find alternative ways of raising revenue and not solely depend on donors. We could even start charging a minimal fee to the beneficiaries of our services."

The researcher's observations of the mobile computer laboratories suggested the need for improvements in facilities to accommodate both the program beneficiaries and trainers. They also highlighted the importance of program efficiency and conducting pre-implementation programs for discussing the needs of the beneficiaries before starting the mobile computer lab program. This approach would allow for a customized mobile computer lab program instead of providing the same training materials to all beneficiaries.



DISCUSSION OF FINDINGS

The study revealed that beneficiaries were not comfortable with general arrangement of training materials used by mobile computer laboratory trainers and language used by trainer while conducting the mobile computer laboratory program. Employees of service provider especially junior trainers and volunteers were not happy with existing facilities; their main concern was to have modern laptops and other training facilities to reflect professionalism. Participants explained on weaknesses that happened as results of having donor funds that doesn't satisfy requirements of mobile computer program. Researcher observed that due to insufficient fund the good intention of implementing mobile computer laboratory program is compromised by use of very old training equipment which was not entertaining beneficiaries of the program and trainers of mobile computer laboratory program.

CONCLUSION AND RECOMMENDATION

Effective mobile computer laboratory service providers are required to use modern facilities, use trained trainers, use reliable review materials, use language which are easily understood when communicated to beneficiaries and consider proper relationship between objectives of mobile computer laboratory program and expected benefits of people obtaining services from mobile computer laboratory program.

Professional trainers: Trainer recommended to have general knowledge teaching techniques for coping with different environment or trainees while conducting trainings. In addition to that trainers must be of different gender and age groups.

Common Language: Language used for communication and in training materials when providing mobile computer laboratory service must be compatible with common language used by trainees for effective and successful program.

Modern facilities: Mobile computer laboratory program must consider having modern and professional facilities which cope with growing science and technology. This expected to motivate trainers and increase effectiveness of mobile computer laboratory programs.

Source of fund: Service providers of mobile computer laboratories should not to depend on done funds only, instead they can operate as social entrepreneurs for allowing them to operate as NGO and business oriented company at the same time.

Policy Implications: Presence of mobile computer laboratory program created proposals for amendments of educational policy in Tanzania especially ICT teaching policies in public schools. The policies can also be extended to ensure marginalized communities like youth, children and women have ICT knowledge through mobile computer laboratory to integrate their innovative ideas with ICT.

REFERENCES

1. Kilag, O.K.T., Segarra, G.B., De Gracia, A.M.L., Del Socorro, A.S., Abendan, C.F.K., Camangyan, G.A. and Mahasol, E.T., 2023. ICT application in teaching and learning. *Science and Education*, 4(2), pp.854-865.
2. Strømme-Bakhtiar, A. (2020). *Introduction to Digital Transformation: and its impact on society*. Informing Science Press.
3. Maurya, D. K. (2022). The challenges of education in rural areas of district Balrampur (UP), India. *Thanuj International Publishers, Tamil Nadu, India*, 147.
4. Zhang, H., & Lu, X. (2020). Vehicle communication network in intelligent transportation system based on Internet of Things. *Computer Communications*, 160, 799-806.
5. Ajayi, O. O., Bagula, A. B., Maluleke, H. C., & Odun-Ayo, I. A. (2021). Transport inequalities and the adoption of intelligent transportation systems in Africa: A research landscape. *Sustainability*, 13(22), 12891.
6. Hellström, J., & Tröften, P. E. (2010). *The innovative use of mobile applications in East Africa*. Swedish international development cooperation agency (Sida).
7. Mtebe, J., & Raphael, C. (2017). A decade of technology enhanced learning at the University of Dar es Salaam, Tanzania: Challenges, achievements, and opportunities. *International Journal of Education and Development using ICT*, 13(2).
8. Doswell, W. M., Braxter, B., Dabbs, A. D., Nilsen, W., & Klem, M. L. (2013). mHealth: Technology for nursing practice, education, and research. *J Nurs Educ Pract*, 3(10), 99.
9. Sharma, D. C. (2022). *Indian Innovation, Not Jugaad-100 Ideas that Transformed India*. Roli Books Private Limited.



10. Maliberan, E.V., 2018. NComputing Adoption: Issues and Challenges. *JOIV: International Journal on Informatics Visualization*, 2(4), pp.257-261
11. Abdugulova, Z. (2017). Allowing schools access to affordable computers: How schools can benefit from switching to inexpensive, cloud-based computing technologies. *International Journal of Learning and Teaching*. 9(3), 326-331.
12. Feng, Y. (2012). Empowering youth in resource poor community in Kenya through ICT training.
13. Shahid, F., Aleem, M., Islam, M. A., Iqbal, M. A., & Yousaf, M. M. (2019). A review of technological tools in teaching and learning computer science. *Eurasia Journal of Mathematics, Science and Technology Education*, 15(11), em1773.
14. Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center.
15. Konietschke, F., Schwab, K. and Pauly, M., 2021. Small sample sizes: A big data problem in high-dimensional data analysis. *Statistical Methods in Medical Research*, 30(3), pp.687-701.
16. Clarke, V. & Braun, V., 2017. Thematic analysis. *The journal of positive psychology*, 12(3), pp.297-298.
17. Arif, M.F., (2018). Happiness and justice. (Doctoral Dissertation, State Islamic University).

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