

Learning by Doing: Informed by University Mathematics Students' Participation in Field Practical Training

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Abstract: *This paper presents the findings on how university mathematics students linked theoretical knowledge into practices in the field during a four-week field practical training (PT). The findings are important to equip university mathematics students with knowledge and skills by theorizing knowledge into practices.*

Keywords: learning by doing, field practical training, university students, mathematics

1. Introduction

This paper presents the findings how university students learned mathematics by doing through participating in field practical training (PT) at the host institutions. The findings are a result of nine university mathematics students (2 female students and 7 male students) who participated in the practical training for the year of study 2019/2020. All students were in Year 2. These students participated in PT at the end of semester 2. These students were in three host institutions: 2 students were at city council, 4 students were at Tanzania Livestock Research Institute (TALIRI), and 3 students were at Sokoine University of Agriculture Laboratory for Interdisciplinary Statistical Analysis (SUALISA).

2. Findings

The findings are presented based on three aspects: activities conducted/learned by the students in the field, students linking theoretical knowledge into practices, and observed benefits acquired by the students during PT.

2.1 Activities conducted/learned by the students in the field

Students performed/learned various activities at their respective host institutions. The paragraphs below present the activities conducted by the students during PT.

Students at TALIRI learned how to record and enter daily milking data in the excel, prepare and grow good pastures for animal feeding, code and analyze milking data using excel and SPSS, and conduct pasture analysis for data collected in the region using SPSS, manage farm for cattle, and record number of times for each cattle delivery.

Students at SUALISA learned how to prepare online questionnaire using kobo toolbox and open data kit (ODK) for data collection, analyze data using statistical packages such as SPSS, R-software, STATA, excel, SAS, and R-studio, create online meeting links on google using email

address, clear data using excel and SPSS, and import data from excel to SPSS and R-studio.

Students at City Council learned how to prepare TASAF budget for the City using excel, prepare development budget for the City Council in its departments using excel, create questionnaire template, enter, code and analyze data in SPSS for TASAF support for students at primary schools in the City such as food, sports and games and attendances, and sort letters for City Council committee to its respective departments, and enter data in the excel about local authority account committee (LAAC) wards.

2.2 Students linking theoretical knowledge into practices

Students demonstrated theoretical knowledge into practices in different ways. For instance, Students at TALIRI demonstrated how to record and enter milking data in the excel and SPSS, code, interpret, suggest, and recommend to the administrators at TALIRI. Students at SUALISA demonstrated how to use excel solver to find optimal solution in linear programming and how to use SPSS to analyze data. Students at City Council linked theoretical knowledge (MT 110: Introduction to ICT) into practice through using excel to prepare budget. Also, the students demonstrated how to use SPSS to enter, code, analyze and interpret data for the City Council development projects.

2.3 Observed benefits acquired by students during PT

There are various benefits acquired by the individual students during PT. The individual students linked theoretical knowledge into practices at the host institutions. For instance, using SPSS to analyze primary data. Individual students also gained new knowledge and skills that they were unfamiliar before participating in PT at the host institutions. For instance, students at SUALISA learned how to prepare online questionnaire using kobo toolbox for data collection. Also, students gained new knowledge how to prepare a report. For instance, students at City Council learned how to prepare a report for the council's development projects, budgets, and expenditures in its respective departments. Individual students also

demonstrated how to behave professionally at the host institutions during PT.

Recommendations

The recommendations are presented below based on the opinions from the host institutions.

- Students should be ready and willing to learn new things at the host institutions.
- Students should offer new knowledge and skills to the host institutions.
- The university should be able to design/develop software because the current situations make use of information technology to execute the tasks.
- Students should be well equipped with statistical software starting Year I before attending PT.
- Duration for PT placement should be extended to help students learn a lot of field related activities.
- There should be alternating duration for PT placement with other universities. This will help individual students to learn a lot of activities through performing various tasks at the host institutions.

Conclusion

Practical training is potential for the development of university students' knowledge and skills. Students link theoretical knowledge into practices. The role of the university is to offer follow-up and monitoring of the PT activities while the students are at the host institutions. In doing so, assessors—host and university supervisors play a major role of equipping students with knowledge and skills during PT. Students can become better mathematicians working at various institutions after completion of their degree programs.

Author Profile

Emmanuel Deogratias received the B.E.D. and M.Sc. degrees in mathematics from University of Dar Es Salaam in 2008 and 2011, respectively. Also, Emmanuel received a doctoral degree in mathematics education (Ed.D) from the University of Alberta in 2020. He is working as a lecturer in the department of mathematics and Statistics at the University of Dodoma.