



University Staff's Perceptions on Pedagogy in Agricultural Education in East and Southern Africa

Eija Laitinen^(✉), Satu Määttänen^(ID), and Ulla-Maija Knuutti^(ID)

Häme University of Applied Sciences, 13010 Hämeenlinna, Finland
eija.laitinen@hamk.fi

Abstract. In Sub-Saharan Africa (SSA), as in other parts of the world, universities are expected to produce competent professionals and workforce through education. University graduates enhance societal development by utilizing critical thinking and problem-solving skills to develop solutions to environmental and socio-economic sustainability challenges. Yet, higher education in SSA currently fails to provide its graduates the competencies needed for self- and wage employment and in becoming leaders of sustainable societal change.

To identify key areas for higher education quality improvement in SSA, this study investigated university teachers' perceptions on pedagogical knowledge, training and problem-based learning within agricultural programs of eight universities in Kenya, Zambia and Uganda. We distributed web-based survey, with closed-end questions to university staff during October 2020 to March 2021 and received 90 responses. The data was analyzed by calculating distributions and modal values.

Findings show that despite majority of the teaching staff have participated to pedagogical trainings, they do not feel competent on their pedagogical knowledge. Short pedagogical trainings, most commonly participated training types in the study universities, do not facilitate changes in teaching approaches. Teaching staff express keen interests and valuation towards problem-based teaching and learning, yet the actual knowledge and usage of this practice continues to be low. The results indicate that to improve teaching quality and change teaching approaches, pedagogical trainings with adequate length to gain professional teacher competencies, are needed. Pedagogical trainings need to be targeted to the whole teaching staff, but special emphasis should be given to the entry-level teachers and to the universities with currently lowest perceived pedagogical knowledge and training participation.

Keywords: Pedagogy · Higher education · Problem-based learning · Sub-Saharan Africa

1 Introduction

The rapidly changing world, in terms of demography, environment, technology, globalization and trade, poses challenges, yet also opportunities, to sustainable development

and natural resource management [1]. To solve current ecological and societal sustainability issues and grasp arising opportunities, requires competent and innovative workforce [1, 2]. This is especially the case in sub-Saharan Africa (SSA), that currently struggles with low level of tertiary education, low agricultural productivity, food insecurity, youth unemployment and poverty [3].

Higher education and higher education institutes (HEIs) have a crucial societal function on producing human capital, experts that can foster innovation, solve socio-economic and ecological sustainability challenges and contribute on achieving the United Nations' sustainable development goals (SDGs) [4, 5]. Access to quality education and development of competencies and skills relevant for employment and entrepreneurship, as targeted in SDG 4, will eventually contribute to economic growth, development of just and ecologically stable societies, and increased human well-being.

The quantity of higher education provision and graduates within SSA has grown rapidly within the last decades [3, 4, 6]. However, reports and studies show, that the quality of higher education has not grown with the same pace, but on the contrary, the competencies possessed by HEI graduates do not match on the competencies required by employers or for self-employment, leading to high unemployment rates [4, 6].

The low quality of higher education can be associated to inadequate resources and over-crowded classrooms, yet also to inefficient teaching methods and irrelevant curricula that do not match the labor market and societal needs [4, 6]. Higher education in SSA is mostly based on teacher-centered and lecture-form of teaching that rewards on rote-learning and memorization [7]. This maybe the easiest approach for teaching staff that often lack pedagogical qualifications [4]. However, this method leaves few or no space to information application skills and development of meta-cognitive and generic skills, all highly valued and needed competencies in the working-life [4, 8, 9]. To enhance employment of HEI graduates and provide grounds for solving sustainability challenges, the education in SSA must be transformed to provide skills and competencies utilizable and useful in the real-life context [6].

Student-centered teaching methods, such as problem-based learning (PBL), are suggested methods to improve the quality of education and answer the competence needs of working-life and society as a whole [9]. PBL generates competencies by exposing students to real-life problems, for which they need to develop solutions based on acquired information and its application. PBL is associated in development of both content knowledge, and application skills, and also generic skills, such as problem-solving, critical thinking, communication and management skills [8, 10, 11]. PBL approach can provide students both entrepreneurial skills and worker skills enhancing their career prospects and enabling them to become leaders of societal change towards sustainability.

PBL has been applied for decades in many disciplines in the Global North [12], yet the approach has not taken hold in SSA higher education. HEI teachers play a critical role in adopting and implementing teaching approaches, such as PBL, which in turn have direct effect on the students' learning outcomes and competences. Yet, there is a lack of understanding on teachers' perceptions on the pedagogical context. Investigating teachers' perceptions on the current situation is crucial to be able to pinpoint where changes are most critical to enable PBL adoption and implementation, and how to find ways to narrow the mismatch between graduate competencies and work-life needs.

This study focuses on teaching staff's perceptions of eight universities in Kenya, Uganda and Zambia. Within AgriSCALE and PBL-BioAfrica projects¹, an online survey was distributed to university staff, with questions regarding perceptions of pedagogical knowledge, pedagogical training and problem-based learning approach.

2 Materials and Methods

The research is part of AgriSCALE (<https://www.agriscale.net/>) and PBL-BioAfrica projects' (<https://www.pbl-bioafrica.net/>) activities. In the preparation phase of the projects, a feasibility study was conducted for projects' eight African partner universities: Egerton university, Jomo Kenyatta University of Agriculture, South Eastern Kenya University and University of Nairobi in Kenya, The Bishop Stuart University and Gulu University in Uganda, and The University of Zambia and Mulungushi University in Zambia. This article presents findings of the feasibility study.

A structured questionnaire was developed together with AgriSCALE project partner staff from HAMK, Egerton University and Jomo Kenyatta University of Agriculture. A piloting survey was done for eight staff members of HAMK, resulting to rephrasing questions and other grammatical corrections. The final structured online survey consisted of background questions and substance questions on respondents' perceptions on pedagogy and especially on PBL. Substance questions were closed-ended, with either yes/no or ordinal five scale Likert response options.

Research material was collected between October 2020 and March 2021 using anonymous online survey powered by Webropol 3.0 software. We used purposeful sampling to reach university staff within agricultural programs of the AgriSCALE and PBL-BioAfrica projects' eight partner universities. With the help of local project coordinators, we contacted all agricultural staff within the universities with an email invitation and link to the survey.

University staff members participating to the survey were divided into four categories, based on their work position. This research focuses only on university teaching staff. Respondents of this research includes full-time teachers and teachers with double-role on teaching and university management.

As a descriptive variables, we used home universities and length of teaching experience. Before data analysis, we pseudonymized the home universities of each respondent. From one university, we received only three responses, making the data unrepresentative, especially taking into account the large size of that university. Thus, we excluded this university and these responses from the analysis. The remaining universities of respondents are referred as HEI 1-7 in this article. We categorized length of teaching experience into three categories: (1) junior teachers with 1–5 years of teaching experience, (2) mid-career teachers with 6–10 years of experience, and (3) experienced teachers with over 10 years of experience.

To map the availability and length of pedagogical trainings, we categorized participation to trainings as: no participation, training of one day or less, training of two to

¹ AgriSCALE and PBL-BioAfrica projects aim to improve agricultural education within sub-Saharan Africa. Both projects are coordinated by Häme University of Applied Sciences (HAMK) in Finland.

five days and training of 6 days or over. The categorization was designed by the African partner universities, to correspond to the main training types typically offered.

Data was analyzed using Microsoft Excel Version 2102. In accordance with the ordinal scale data analysis, we computed the distribution and mode values for each Likert scale variables.

3 Results and Discussion

3.1 Descriptive Variables

We received total of 90 responses from university teaching staff from the eight universities. After removing one university from the analysis due to small number of responses, we ended up with total of 87 responses from seven universities. The number of responses from each university (Fig. 1) corresponds rather well with the size of the universities, as generally we received more responses from the bigger universities than from the smaller ones. One third of all respondents identified themselves as female and rest as male. The age of respondents varied from age group of 26–30 years to age group over 60 years, and the teaching experience from 1 year to over 30 years.

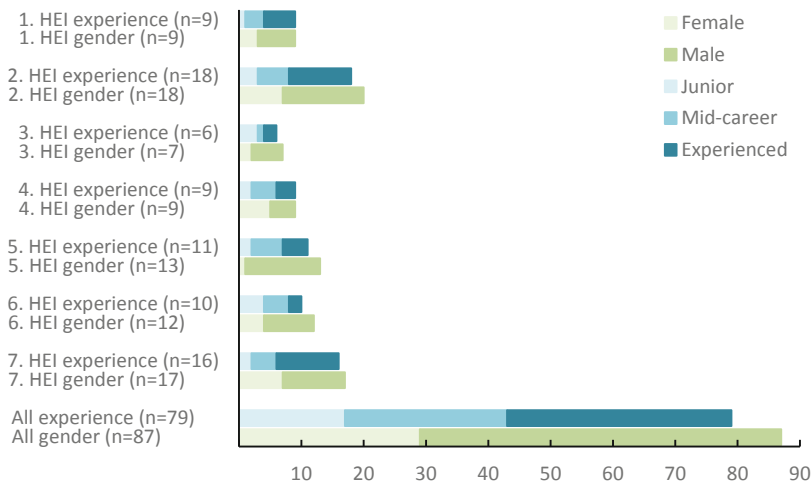


Fig. 1. Amount and distribution of survey responses by home university, teaching experience (junior: 1–5 y, mid-career: 6–10 y, and experienced > 10 y) and gender. Note that the difference between response numbers in relation to experience and gender is due to some respondents not stating their teaching experience, yet all indicated their gender.

3.2 Perception of Knowledge and Interest

Pedagogical theories and PBL approach are generally perceived to be rather poorly known among the teaching staff (Fig. 2). Modes for the perceived knowledge were in

almost all of the cases either 3 (to some extent) or lower (to small extent, not at all). On contrary to expected, the main differences among perceived knowledge were among the different universities and not among junior, mid-career and experienced teachers. Few universities stand out with majority of the respondents knowing constructivist, behaviorism/cognitivism and PBL to only small extent or not at all.

The perceived knowledge of pedagogical theories and PBL as a teaching approach in general is smallest in the junior teachers. This suggest that the pedagogical prerequisites for teaching staff are rather low, or at least do not cover pedagogical theories, leading to low theoretical understanding. This finding is supported by the notion that the study universities do not require pedagogical pre-training from their teaching staff (university representatives, personal communication, October 1st, 2020). Surprisingly, compared to other experience groups, larger share of the most experienced teachers perceive not to know pedagogical theories or PBL at all. Generally, the largest perceived knowledge is among the mid-career teachers. This finding holds even when the few universities stating the lowest knowledge are removed from the analysis. This trend may be caused by the Dunning-Kruger effect: the experienced teachers know enough to understand what they do not know, as the middle-experienced may overestimate their abilities. However, there may also be other factors influencing the perceived knowledge. Pedagogical training methods and topics may have changed during time, leading to different type of competences among the teaching staff, or middle-experienced may have more time or enthusiasm to develop their theoretical understanding.

Constructivist and socio-constructivist learning theories were perceived less know than behaviorism and cognitivism. This perception is in line with the notion that education in most African universities base in so-called "traditional", teacher-centered methods [7], founded on behavioristic and cognitivist learning theories.

PBL approach is perceived to be better known than the theory behind it in each respondent group. This may be due to pedagogy basing more on practices than theories; a practice may be used or studied about without getting acquainted with the theory behind it. The respondents may also have heard about PBL and its basic principles, yet not thoroughly understand the theory behind it.

Interest towards PBL is high among the whole teaching staff, with three fourth or more of the respondents, despite descriptive variable, stated to be interested in PBL to moderate or great extent. The interest towards PBL seem to grow with teaching experience, as well as with perceived knowledge of the approach. The higher the perceived knowledge of PBL, the higher share of respondent were interested on PBL to moderate and great extent. Teaching staff interested on PBL will most probably take opportunities to learn about the practice, or conversely, exposure to the practice, through e.g. training, may arouse the interest towards it.

As the interest towards learning methods in general were not asked, it can't be deduced whether teachers' interest is high specifically towards PBL, or in learning and teaching methods in general. However, the perceived low knowledge on learning theories and PBL, combined with high interest towards PBL indicate clearly that there is a need and demand for learning and thus pedagogical trainings among the whole teaching staff.

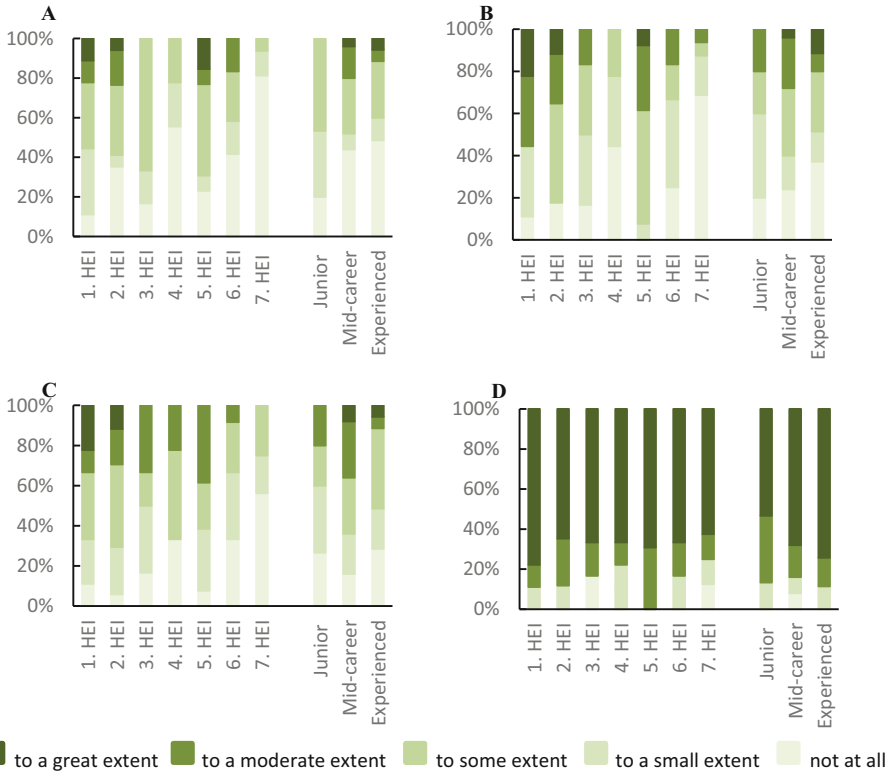


Fig. 2. Perception of knowledge of and interests towards pedagogical theories and approaches among university teaching staff, in relation to different universities (HEI) and to teaching experience (junior, mid-career, experienced). A. Do you know constructivist or socio-constructivist learning theories? B. Do you know any other learning theories such as behaviorism or cognitivism? C. Do you know problem-based-learning pedagogical approach? D. Are you interested in problem-based-learning? Number of responses: 1.HEI, n = 9, 2. HEI, n = 17, 3.HEI, n = 6, 4.HEI, n = 9, 5.HEI, n = 13, 6.HEI, n = 12, 7.HEI, n = 16, junior, n = 15, mid-career n = 25, experienced, n = 35.

3.3 Pedagogical Trainings

Of all respondents, clear majority (76.8%) had participated to pedagogical trainings during their careers. However, there are major differences on pedagogical trainings between different universities, with all respondents from given universities had participated to trainings, and in one university (HEI no 7) 75.0% of respondents have not participated in any pedagogical trainings (Fig. 3). It seems, that the share of teachers participating to trainings are rather equal between the different experience categories. However, when HEI no 7 is removed from the analysis, there is a clear trend showing, that the participation to training as well as the length of trainings grow together with teaching experience. The longer one has been recruited as a teacher, the more opportunities there has been for pedagogical trainings. All in all, most of the trainings participated have been rather

short, lasting for one working week or less. Of all training participants, only 25.8% have participated to pedagogical trainings lasting more than one working week.

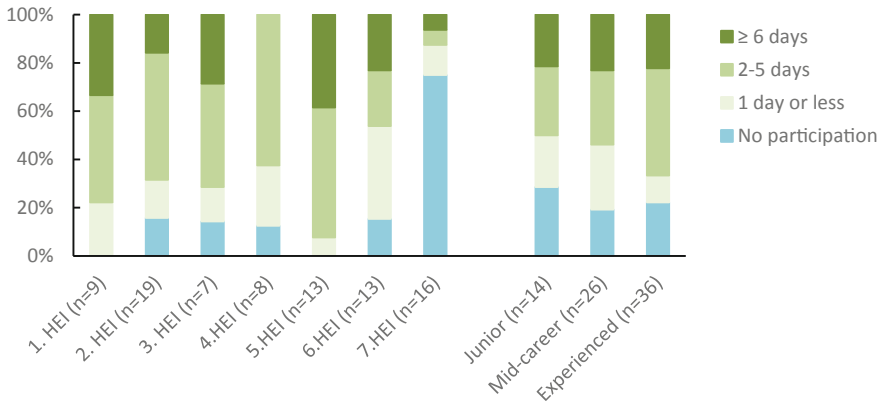


Fig. 3. Participation to training and training lengths, in relation to university and teaching experience.

The length of training participated clearly affect to the teaching approaches (Fig. 4). The longer the training, the bigger share of participants perceived it to change their teaching approaches to moderate or great extent. This indicates that for trainings to have a practical effect on the teaching, longer trainings should be preferred. The trainings also intrinsically affect to the perceived knowledge of pedagogical theories. Respondents from universities with largest share of respondents not participated to trainings and/or generally shortest training lengths also stated the least perceived knowledge on pedagogical theories.

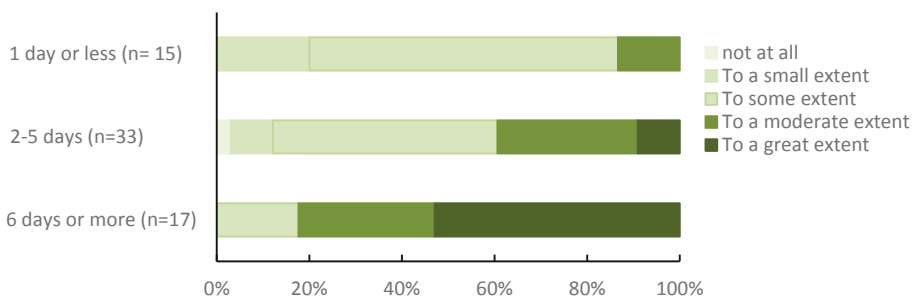


Fig. 4. Length of pedagogical training respondents have participated (y-axis) and the effect training had on changing teaching approach (x-axis), measured as share of responses.

3.4 Perception of PBL

When asked specifically of PBL, 87.2% of all respondents stated to value teaching through real life cases to moderate or great extent, with variation of 75.0–100.0% between teachers of different universities (Fig. 5). The valuation of real-life cases in teaching seem to grow together with teaching experience. However, relatively smaller share of teachers from different universities and teaching experience have used real-life cases in teaching of student groups to moderate or great extent. This repeats the same pattern, as with interest and knowledge about PBL: PBL is more valued than it's actually practiced and the interest towards PBL is higher than the actual knowledge about it. Yet, the notion that almost half of the respondents have used real-life cases in their teaching to moderate or great extent, may suggest that change towards more practical and real-life relevant teaching is under way. However, as the valuation towards other teaching methods is unknown, we cannot conclude whether PBL is valued higher or lower than the traditional, lecture-based teaching methods.

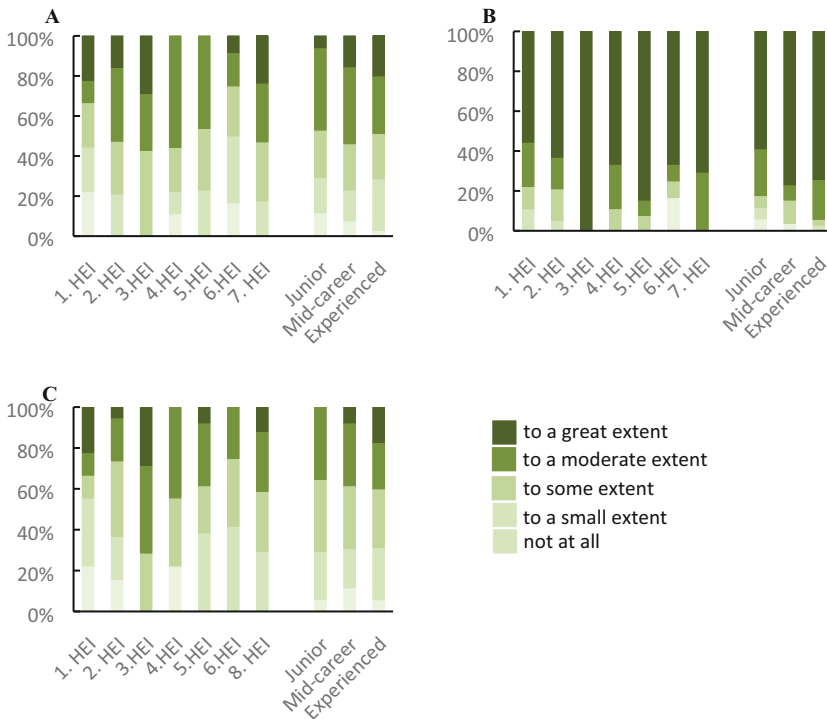


Fig. 5. Shares of university teaching staff’s responses to questions: A. have you used real-life cases as topics of student group works? B. Do you see value in teaching through real-life cases? C. Do you have contacts to external partners (such as industry or societal actors) to cooperate in teaching. Number of responses: 1.HEI, n = 9, 2.HEI, n = 19, 3.HEI, n = 7, 4.HEI, n = 9, 5.HEI, n = 13, 6.HEI, n = 3, 7.HEI, n = 17, junior, n = 17, mid-career, n = 26, experienced, n = 35.

External partners are core element of PBL. 37.2% of teachers responded to have external contacts to cooperate in teaching to moderate or great extent. A bit smaller share responded not to have contacts at all or only to small extent. There was some variation between the extent of perceived contacts among teachers from different universities, while the differences between junior, mid-career and experienced teachers are smaller. The answers indicate, that if and when, PBL will be incorporated into the universities' curricula, there already are utilizable contacts to be used in all of the universities, so the whole process would not need to be started from scratch. However, there still is place for further improvement on contacts with external partners.

4 Conclusions

To keep up with the changing world, contribute to societal development and provide employment opportunities to graduating youth, there is a widely acknowledged need to improve the quality of higher education in SSA. Teachers play a major role in this quality shift and thus, it is important to understand how teachers themselves perceive teaching and their own capacities.

Despite majority of teaching staff from the study universities have participated to pedagogical trainings, they recognize lack of pedagogical understanding among themselves, perceiving their theoretical pedagogical knowledge rather weak. Low knowledge rating among the junior teaching staff indicates that the pedagogical pre-requisites for entry level teaching staff are low or non-existent. Perception of knowledge varied between different universities, with respondents from universities with least participation to pedagogical trainings and/or lowest trainings lengths perceived also lowest knowledge. The bulk of pedagogical trainings participated have been short, lasting no more than a working week. These short trainings do not seem to have substantial effect to teaching approaches used, and probably short trainings are also the cause of the low pedagogical knowledge.

Interest and valuation towards PBL are much higher than the actual usage and knowledge of the practice and theory behind it, suggesting that there is a demand to both learn more about the practice and willingness to implement it. This combined with the perceived low knowledge of pedagogy clearly indicates that there is need for more theoretical and practical training for teaching staff. As training length seem to positively impact to changes on teaching approaches, we recommend structured and longer, in-dept trainings to all teaching staff, but especially to the junior staff. To be able to bring PBL to the real-life settings, university teachers should be supported to establish contacts and partnerships to external actors, that can provide workable cases for PBL.

To provide equal opportunities to graduates from different universities, as well as staff members, we suggest especial emphasis on the universities with lowest perceived knowledge and lowest participation to pedagogical trainings. These universities should be supported in developing competent staff and graduates.

For future research, we suggest studies comparing university staff's perceptions on PBL compared to traditional, lecture-based approaches, and inclusion of not only teaching staff but the whole academia including management. There is also need for a study investigating how interest and valuation of PBL can be turned into adoption and implementation, what kind of support would be needed to enable the use of the practice.

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