



The Role of Learning Resource Project in Teacher Education in Kenya

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Abstract: The role of project work in STEM education cannot be overemphasized in Kenya and globally. A number of universities in Kenya have infused the Learning Resource Project (LRP) in the training programmes in Teacher Education. The Project based learning makes the school and learning more like a real-life situation promoting the 21st century skills meant for surviving in the present world, unlike the ancient model of passive learning. The study, guided by Yin's case study research design, using purposeful sampling, sought to find out the role of infusion of LRP in teacher training in Kenya. Three hundred and sixty (360) trainee teacher in the STEM subjects were studied over a period 2017-2020. The Learning Resource Project Assessment tool was used to get information concerning the choice of project, pedagogical justification, use of locally available materials, design and development procedures, involvement of learners, utilization in teaching and sustainability of the LRP. Data from observation was analyzed both qualitatively and quantitatively. The study established that the teacher trainees are made to learn on the job, create link their teaching with the learners' environment, understand how to apply Project-based learning (PBL) that is engaging, rigorous, teacher-facilitated, student-centered, and standards-based. It also assists the teacher trainees to connect to the economy, innovation, and technology. However, there is need to equip the lecturers teaching special subject methods and their cooperating teachers with the necessary knowledge, skills and attitudes with the recent trends of PBL.

Keywords: Learning Resource Project (LRP), Project-based learning (PBL), Trainee teacher, Teacher education, Efficacy, Competence-based learning.

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1. Introduction

The Project based learning makes the school and learning more like a real-life situation promoting the 21st century skills. In contrast, ancient model of passively regurgitating facts and reciting them out of context is no longer adequate to prepare learners to survive in today's world. Recent trends indicate that discussions are geared towards training teachers who are capable of using materials from their immediate environment in designing and developing

teaching and learning aids to assist them in their teaching (Knight et al., 2015). Further, the 21st century teacher is expected to be a critical thinker and a motivator of solving problems within the community where the School is located. This implies that more weight is given to improvisational skills in making teaching materials by the pre-service teacher trainees and even in-servicing the teachers who are practicing (Sawyer, 2011a). This study which took three years gives the opportunity to discuss how teacher trainees may be nurtured to become innovative right from the time they are in pre-service

training (Berk & Trieber, 2009; DeZutter, 2011; Sawyer, 2011b). Numerous literature indicate that learners in developing countries perform poorly in their studies because they are not involved in hands-on because schools lack of equipped laboratories or the teachers may be deficient in skills for utilizing practical work. (Ndirangu, Kathuri & Mungai, 2003).

Onyesolu (2009), sees constructivism in science as hindered by the inadequacy or lack of experimental materials and equipment in schools. In developing countries as in Africa, the training of technicians and engineers in technical training institutions is constrained by the lack of capability in presenting laboratory sessions (Kessy, Kabemba, & Gachoka, 2006). In Kenya, students have been found not being involved in practical work and the teachers are sometimes the 'main actors' and sometimes the 'only actors' in the classrooms, and the source of content is mainly from teachers' lecture notes. Akeyo & Achieng, (2012) observe that practicals are not carried in Kenya institutions because of the same reasons. However, with the new shift to Competence Based Curriculum (CBC) in the education system in Kenya since 2017 (Republic of Kenya, 2017), in which the utilization of improvised experimental materials is stressed not only in Science and Mathematics but in all the other subjects. Thus, a teacher will continuously be needed to be creative than being theoretical. Content delivery will be aligned to the theory and be related to the activities and problems within the School and community. The students then will get motivated and strive to understanding the content by themselves.

Competency is defined as that possession expertise in a given area. It is a situation in which a candidate has attained sufficient knowledge, practical skills and attitudes in performing a task or service to a degree and quality that is acceptable to the industry and the customer in a time within which a competent person at the level could reasonably be expected to perform the task (Momanyi & Rop, 2019). Improvisation is a concept that can be applied in many fields, education inclusive (Holdhus et al., 2016). Improvisation comes from the Latin word *improvisus* which literally means 'the unforeseen' or 'to provide the unexpected' (Dehlin, 2008). Therefore, improvisation means using a different object or material to do and achieve what a conventional one does almost the way it does (Dehlin, 2012). Lobman (2011) has observed that the teacher is required by syllabi and society to follow a rigid curriculum which complete without hands on activities (Imanda et.al 2020).

In Kenya, Egerton University and the universities that came out of it, namely; Kisii, Laikipia Chuka and Tharaka University Colleges, have embraced the idea of a Learning Resource normally reduces his or her opportunity to improvise which leaves him or her as simply a transmitter of knowledge from one generation to another. She further argues that it is high time teachers became facilitators of

learning by organizing meaningful learning activities for the learners. Therefore, the teachers should practice constructivism. The skills of improvising teaching/learning materials are a necessity in education (Lobman, 2011; Sawyer, 2011b). Holdhus et al. (2016) posit that improvisation is a professional skill which influences educational theory and practice. Improvisation can be learned and rehearsed (Berk & Trieber, 2009) as a teacher continues teaching and using it. The teacher then can deliberately apply the 4C's, namely collaboration, communication, critical thinking and creativity. The teacher trainees are guided on how to develop the LRP that are guided by the Scientific method which comprises of Science process skills. In their work, they focus on the following seven steps, project description, materials, budget, design and procedure, utilization and sustainability of their LRP. Science learning is not Project (LRP) in which the teacher trainees design, develop, implement and evaluate a low-cost, LRP utilizing locally available materials. University of Nairobi, The Kenya Science Teachers University College also implements the LRP, though theirs is slightly modified. LRP is one form of improvisation that is aimed to make the learners to construct knowledge cheaply and by getting involved in constructivism. The type of LRP that the student teachers are required to develop during their teaching practice (practicum) is one which that can be used to either teach either at least two topics or two different forms (grades) in the subject of one's choice. There is little research literature of the influence of the LRP on the improvisational skills in the teacher trainees. Therefore, this research set out to establish the influence of the LRP on the improvisational capabilities of the teacher trainees who have just cleared their teaching practicum.

1.2 Statement of the problem

Learners in developing countries perform poorly in their studies because they are not involved in hands-on experiences. Factors such as not every school having equipped laboratories or the teachers are deficient as far as the utilization of practical work is concerned. Constructivism in education is hindered by the inadequacy or lack of experimental materials and equipment in schools. Teachers are sometimes the 'main actors' and sometimes the 'only actors' in the classrooms, and the source of content is mainly from teachers' talk or lecture notes. With the new shift to Competence Based Curriculum (CBC) in the education system in Kenya since 2017 (Republic of Kenya, 2017), in which the utilization of a variety of improvised LRP materials is stressed not only in science and mathematics but in all the other subjects. The type of LRP is a type of improvisation. The reviewed literature reveals that most of the studies established an increase in the self-efficacy of the university students. Consequently, the studies conducted with secondary school learners being insufficient and the results of the studies not agreeing with each other means more studies should be conducted regarding this subject.

Additionally, the review did not establish any study dealing with PBL with pre-service teacher training yet from all these outlined studies, it has been established that the learning process, student motivation and academic self-efficacy are important aspects and should be developed. Therefore, there is little research literature of the influence of the LRP on the improvisational skills in the teacher trainees. Therefore, this research set out to establish the influence of the LRP on the improvisational capabilities of the teacher trainees who have just cleared their teaching practicum.

1.3 Objectives of the study

The study was guided by the following objectives;

1. To investigate the preparedness of the teacher trainees in conducting a learning resource project
2. To evaluate the process of the design, development and implementation of the learning resource project.

2. Literature Review

Project-based learning (PBL) among the methods of active learning methods through which real life problems encountered and results from the investigations are presented orally or given in terms of the actual project and in form of written reports (Thomas, 2000). The PBL dates back to the times of John Dewey Experiential Learning, Kilpatrick's Project Method, and Bruner's Learning Approach Through Invention (Korkmaz and Kaptan, 2001). The aim of utilizing PBL is to make learners to not only better their conception of ideas but acquire science process skills (Ayaz and Söylemez, 2015). According to Demirhan and Demiral (2003), PBL develops and enriches the students' learning skills, avail opportunities for life-long learning, connects them to their environment. enable them to construct their knowledge through meaningful learning activities, makes them to exploit the different dimensions of intelligence, provides valuable data to parents, teachers, educational officers about the learners learning, develops in the learner skills for solving real-life problems and providing problem-based learning skills. Such skills include but not limited to skills for sustaining life, using appropriate technology, skills for learning, skills for self-control, appropriate attitudes, tendencies, and beliefs (Demirhan & Demirel, 2003); Bayraktar, 2015). Further, PBL presents the learner with motivation, enhances student's interest and attracts them into action (Solomon, 2003).

Project-based learning affects the learner's perception of competence (Aydın & Yel, 2013; Mills, 2009). PBL has been observed to provide a deeper learning, higher reading level, a better conceptualization of ideas and boosts interest in reading. By increasing the learner's participation in the process of knowledge acquisition, Thomas (2000) opines that PBL creates and maintains

attention, hence motivation to learn more. In the eight-month study conducted by Toci (2000) on 5th and 6th grades, it was established that technology-supported PBL environment positively influenced on the intrinsic motivation of the learners. In addition, in Mills (2009) study on self-efficacy; it was observed that self-efficacy significantly increased in the students after PBL was applied on 46 undergraduate students taking French course. Similarly, Aydın's (2012) study based on 40 undergraduate Cytology Laboratory course students, he concludes that there was an increase in the biology self-efficacy levels following the curriculum based on PBL. Chen, Hernandez and Dong (2015) in their impact of collaborative project studies on undergraduate students. The study concluded that the Spanish students developed a higher self-efficacy in comparison with non-Spanish students. In studying teachers in PBL for several months, Choi, Kim, Lee and Park (2016) determined that PBL was positively and strongly correlated with the self-efficacy of the teachers. Weber (2010) in his study on the self-efficacy levels of high school students confirms that PBL increased their self-efficacy. Amanda, Subagia and Tika (2012) on conducting a study on 8th-grade students, they found no relationship between PBL and self-efficacy of students towards science.

The reviewed literature shows that project-based learning in many different school and grade levels on self-efficacy were examined, more so those that focus on undergraduate students and finding the studies conducted with secondary school students insufficient. Most of the studies established an increase in the self-efficacy of the students (Dunlap, 2005; Hatipoğlu & Rambo-Hernandez, 2016; Mills, 2009; Schaffer, Chen, Zhu and Oakes, 2012), some of them did not determine a significant effect (Amanda, Subagia & Tika, 2014). Consequently, the studies conducted with secondary school learners being insufficient and the results of the studies not agreeing with each other mean more studies should be conducted regarding this subject. Additionally, the review did not establish any study dealing PBL with pre-service teacher training yet from all these outlined studies, it has been established that the learning process, student motivation and academic self-efficacy is an important aspect and should be developed. At this stage, it is necessary to contribute to the knowledge on the role that PBL on competence and self-efficacy of the teachers who would be applying the tenets of PBL in their teaching and therefore those students they will be teaching (Gerlach, 2008; Mills, 2009; Wang, 2010). Additionally, the study contributes to the literature in establishing the role of PBL on student academic self-efficacy, competence and motivation. Projects can be done in all areas of study and not just Science, Technology and Mathematics (STEM) (Aydın, Demir, Atalay & Göksu, 2017).

3. Methodology

3.1 Research Design

The study was guided by Yin's case study research design, on how findings from the field are related to the preliminary theory (Yin, 1994), with a focus on actors' descriptions, interpretations and meaning-making (Yin, 1994).

3.2 Target Population and Sampling

The target population was all the 2500 teacher trainees at Kisii University for the period 2017 -2020. Out of these 360 teacher trainees who had just cleared their teaching training practicum were purposely sampled for inclusion as the respondents in the study. These teacher trainees represented the main teaching subjects that are offered in the secondary school segment in Kenya. They included; English, Kiswahili, Mathematics, Biology, Physics, Chemistry, History and Government, Geography, Christian Religious Education, Business Studies, Agriculture and Computer Studies.

3.3 Research Instruments

A researcher-made questionnaire was used to collect data about the LRP design, development, implementation and evaluation. Additionally, a co-operating teacher's questionnaire and an observation schedule (assessment tool) for the LRP was used to get to observe data about the LRP at its natural school setting and processes that went on from design to completion and induction of the regular teacher(s). These instruments were used so that triangulation could be easily attained, so that should there be information that one tool could not give fully, it could be given by the other. Validity of the instruments was achieved by having senior lecturers in the Department of Curriculum, Instruction and Media Studies at Kisii University validating them. Reliability was checked by subjecting the instruments to test and retest with the first and second tests being separated by two weeks. The research instruments were piloted on the group of teacher trainees who were not involved in the actual study. These were students of Egerton University who had just cleared their teaching Practicum, but were of the same cohort and therefore considered to be having similar characteristics to the sampled teacher trainees, given that are also involved in LRP. The reliability of the Teacher trainee's

questionnaire was calculated to be 0.81; that of the co-operating teachers' questionnaire was 0.79 and that of the LRP assessment tool was calculated as 0.84; since they met the threshold of 0.7 reliability coefficient, they were considered suitable for use in the study.

3.4 Data Collection

The Teaching Practice Supervisors were required to assess the LRP for every teacher trainee at various stages starting with the proposal done by the teacher trainee through the completed project to the utilization of the LRP in teaching subject content to the evaluation of the LRP. The teacher trainees who were sampled for the study were required to complete the questionnaire at the tail end of the Teaching Practice. Additionally, co-operating teacher (the teacher who was meant to mentor the trainee teacher) had a questionnaire to fill at the end of the teaching practice period for his/her mentee teacher (trainee). To ensure high rate of return of the data collection instruments, the researchers gave the instruments on the day they visited the schools and requested the respondents to complete the instruments and hand in on the same day. The instruments sought information on the understanding what an LRP is, the design, development, implementation, evaluation, durability and sustainability of the LRP even after the teacher trainee had long left the teaching practice school.

3.5 Data Analysis and Presentation

Data collected was cleaned, coded and input into the SPSS Version 23 and analyzed both descriptively and quantitatively and presented in tables. Interpretation was done and the results were discussed thematically.

4. Results and Discussion

There were 265 male teacher trainees and 95 female teacher trainees who were involved in the study. In terms of age 78 % of the trainees were between age 22 and 24 years.

Preparation of the teacher trainee for LRP

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 1 presents the responses from the questionnaire.

Table 1: Preparation or the teacher trainee for LRP

	Minimum	Maximum	Mean	Std. Deviation
I am sufficiently aware of what kind of learning resource projects to make during the teaching practice	1	4	1.53	.722
I did not understand the difference between teaching aid and LRP	1	4	3.72	.808
I understood the format of writing LRP Proposal	1	4	1.78	2.775
I understood the format of writing LRP Report	1	4	1.54	.655
The budget I presented was high and it had to be adjusted before being funded by the school	1	4	3.37	1.078

The score of 1.53 with a large standard deviation means that most teacher trainees are sufficiently aware of what kind of learning resource projects to make during the teaching practice. But again, there is an appreciable number who may not be well aware of what it is they are supposed to design, develop and implement. The score of 3.72 to the negative statement that the teacher trainee did not understand the difference between teaching aid and LRP means that the teacher trainees understand the difference between a teaching aid and a learning resource project. The teacher trainee understood the format of writing LRP Proposal. The teacher trainee understood the format of writing LRP Report. This is based on the low score of 1.54 that tends to agree. The high value of 3.37 to

the negative statement that the teacher trainees presented a high budget that needed to adjusted downwards before being funded by the school means that the budgets presented by the trainees were within the recommended range as guided by the LRP guideline.

4.2 Usefulness of LRP

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 2 presents the responses from the questionnaire.

Table 2: Usefulness of LRP

Statement	Minimum	Maximum	Mean	Std. Deviation
In general, the project component helps the school with teaching materials even after the teaching practice	1	4	1.49	.868
Learning resource project assisted the teacher to deliver content at low cost	1	4	1.38	.545
LRP made students to use their intellectual ability	1	4	1.35	.510
LRP Connected learners to their immediate Environment	1	4	1.30	.494
LRP Makes content easily understood by the student	1	4	1.36	.593
LRP enhanced the learners' adventure and curiosity	1	4	1.54	.632
LRP promotes learners' self-reliance and creativity	1	4	1.51	.559

The respondents agreed that the LRP assists the school to have teaching and learning resources out of the LRP for use even after the teaching practice. This is evident from the 1.49 mean score (SD = 0.868) to that statement that the LRP leaves behind a teaching/learning resource in the TP school. The mean score of 1.38 (SD = 0.545) for that the LRP aids the teacher to deliver content at a low cost is in agreement with the earlier findings by Demirhan and Demiral (2003) that PBL develops and enriches the students' learning skills, avail opportunities for life-long learning, connects them to their environment. The low mean score of 1.35 with a standard deviation of 0.510 to the statement that LRP made students to use their intellectual ability means that the PBL (or the LRP) triggered the intellectual ability of the learners. By utilizing the PBL, the LRP Connected learners to their

immediate Environment. This is evidenced by the mean of 1.30 mean score and the 0.494 standard deviation response that came up for the statement that LRP connect the learner with his /her environment. LRP Makes content easily understood by the student (mean = 1.36, SD 0.593). This is so because the learner is actively and meaningfully involved in constructing his/her knowledge. It has been seen in the past studies that PBL enhances the learner's adventure and curiosity. This is in agreement with Weber (2016) who opines that PBL creates and maintains attention, hence motivation to learn more. This type of PBL, the LRP enhanced the learners' adventure, creativity and curiosity (mean =1.54, SD = 0.632). Additionally, the LRP was found to promote self-reliance and creativity in learners (mean = 1.51, SD = 0.559).

4.3 Sourcing Materials for the LRP

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 3 presents the responses from the questionnaire.

Table 3: Sourcing materials for the LRP

Statement	Minimum	Maximum	Mean	Std. Deviation
LRP enabled me rethink and research on cheaper processes easier for students	1	4	1.46	.558
Sourced materials were available within the environment	1	4	1.54	.609
Materials sourced made the LRP durable	1	4	1.47	.584
I sourced for materials that will make the LRP attractive	1	4	1.49	.560
I obtained materials that pose minimal or no danger to the users	1	4	1.41	.525
I organized the project report/ write ups that user can get it easy to understand	1	4	1.38	.517
I used conventions for the common parts such as switches	1	4	1.52	.587
I made a careful study of conventional apparatus or experiments before design and developing the LRP	1	4	1.61	.579

The research revealed that the utilization LRP in pre-service teacher training enables the trainee teacher to rethink and research on cheaper processes easier for students (Mean = 1.46, SD = 0.558). The teachers on teaching practicum were made to source materials were available within the environment (Mean = 1.54, SD = 0.609) for the development of the teaching learning resources that they came up with. They used materials that could make the LRP durable (Mean = 1.47, SD = 0.584). Again, the sourced materials were such that the final LRP artifact were attractive (Mean = 1.49, SD = 0.560). Materials that could pose possible dangers were avoided and those that could pose minimal or no danger to the users (Mean = 1.41, SD = 0.525) were applied in the molding of the LRPs. The teachers organized the project report/ write ups that user can get it easy to understand (Mean = 1.38, SD = 0.517) while going through them. Usual conventions for the common parts such as switches

(Mean = 1.52, SD = 0.587) on the project item so that their operations were easy. The teacher trainees carefully studied conventional apparatus or experiments before design and developing the LRP (Mean = 1.61, SD = 0.579) before design and development of the LRPs. The low mean score with small standard deviation means that teacher trainees modeled their LRPs on the existing teaching/learning aids, therefore the LRPs could meet the pedagogical effectiveness.

4.4 Curriculum and the LRP

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 4 presents the responses from the questionnaire.

Table 4: Curriculum and the LRP

Statement	Minimum	Maximum	Mean	Std. Deviation
I designed the LRP based on learning objectives	1	4	1.45	.585
I put the LRP or Experiments to test	1	4	1.43	.529
I made further improvements on LRP	1	3	1.49	.561
I made use of LRP for demonstration or practical work	1	4	1.39	.491
I chose instructional strategy for use with LRP	1	4	1.46	.532
I chose the best medium of presentation of the LRP	1	4	1.45	.501
I first reviewed the existing LRPs	1	4	1.45	.501

Most teacher trainees used the learning objectives as spelt out in the Kenya Certificate of Secondary Education (KCSE) syllabus to design the LRP (Mean = 1.45, SD =

0.585). In the process of making the LRP or Experiments they tested the working of the LRP at preliminary stages (Mean = 1.45, SD = 0.585). Based on the way the

LRP workability was evaluated, further improvements on LRP were made (Mean = 1.45, SD = 0.585). The LRP was utilized by the teacher trainees either for demonstration or practical work (Mean = 1.45, SD = 0.585). The instructional strategy for use with LRP was selected (Mean = 1.45, SD = 0.585) for use with the LRP. The teachers chose the best medium of presentation of the LRP (Mean = 1.45, SD = 0.585). In coming up with the LRP that a teacher designed and implemented, they had first to review the LRPs existing in the schools (Mean = 1.45, SD = 0.585). The low mean score with small standard deviation means that teacher trainees established the LRPs

already existing in the teaching practice school, so as not to replicate what may have been done. This implies that the teacher trainees were to come up with original or modified ideas of LRP.

4.5 Student involvement in the LRP

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 5 presents the responses from the questionnaire.

Table 5: Student involvement in the LRP

Statement	Minimum	Maximum	Mean	Std. Deviation
I involved learners in the design and development of the LRP	1	4	1.52	.636
I involved the regular teachers in the design and development of the LRP	1	4	1.61	.738
I involved the learners in the assembly of the LRP	1	4	1.49	.587
I taught the learners using the LRP	1	4	1.42	.581
I made the regular staff aware of the effectiveness of the LRP	1	4	1.45	.502
I Made comparison between the experimental results and the conventional teaching	1	4	1.61	.551
I Conducted formative evaluation on LRP	1	4	1.58	.556
I assessed the effects of LRP on teaching the subject	1	4	1.63	.671

Most teacher trainees involved learners in the design (Mean = 1.52, SD = 0.636) and development (assembly) of the LRP (Mean = 1.49, SD = 0.587). This was arrived at based on the mean of 1.52 which is very close to agreeing with the statement suggesting that the learners were involved in coming up with and making the LRP. Regular teachers were also involved in the design and development of the LRP (Mean = 1.61, SD = 0.738). The learners were taught using the LRP (Mean = 1.42, SD = 0.581). The TP teachers made the regular staff aware of the effectiveness of the LRP (Mean = 1.45, SD = 0.502) in teaching topics within the subject of concern. Most teachers evaluated the effectiveness of the LRPs by comparing experimental results given by the LRP to and the conventional teaching (Mean = 1.61, SD = 0.551). They also conducted formative evaluation on LRP (Mean = 1.58, SD = 0.556) at various stages of the LRP and

finally they assessed the effects of LRP on teaching the subject (Mean = 1.63, SD = 0.671). These statements agree that PBL enhance the competence and self-efficacy of the teachers who would be applying the tenets of PBL in their teaching and therefore those students they will be teaching (Gerlach, 2008; Mills, 2009; Wang, 2010; Weber, 2016). Additionally, the study contributes to the literature in establishing the role of PBL on student academic self-efficacy, competence and motivation

4.6 Sustainability of the LRP (Project)

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 6 presents the responses from the questionnaire.

Table 6: Sustainability of the LRP

Statement	Minimum	Maximum	Mean	Std. Deviation
I described how the project is used to the regular teachers within the school	1	4	1.36	.483
I gave a copy of LRP report to the Head of Department in the TP school	1	4	1.52	.533
I made a write up/manual for use of the LRP	1	4	1.51	.587
I left a manual/explanation on how to use the LRP with the school	1	4	1.58	.655
I inducted some regular staff at the school on repair and maintenance of the LRP	1	4	1.66	.735

From Table 7, the mean for describing the LRP to the regular teachers is 1.36 with a standard deviation of 0.483, therefore it can be deduced that the teacher trainees described how the project is used to the regular teachers within the school. The score of 1.52 implies that the trainee teacher gave a copy of LRP report to the Head of Department in the TP school. Most teacher trainees made write ups/manuals for use of the LRP. This is because the mean score of 1.51 is within the agree region. Further, that the trainee teacher left a manual/explanation on how to use the LRP with the school (mean = 1.58, SD = 0.655). The score of 1.66 with a standard deviation of 0.735 to whether some regular teachers were inducted on repair and

maintenance of the LRP, means that they were actually inducted. All these statements point to preparation for sustainability of the utilization of the LRP even after the trainee teacher leaves the schools of their teaching practice

4.7 Hindrances to Use of LRP

The teacher trainee was asked to rate statements on a scale of 1 = agree, 2 = seem to agree, 3 = Tend to Disagree and 4 = Disagree. Table 7 presents the responses from the questionnaire.

Table 7: Hindrances to the use of LRP

Statement	Minimum	Maximum	Mean	Std. Deviation
The curriculum is loaded and does not easily allow for use of project method instead examination pressure is too much	1	4	2.43	1.185
It was not possible to improvise everything needed for the project	1	4	2.50	1.268
I received little or no support from the school's stakeholders	1	4	3.28	1.070
The time for developing LRP was limited	1	4	3.48	.846
The idea of LRP is not well understood by the school administration	1	4	1.94	.877
Most regular teachers are not well versed with LRP	1	4	1.74	.615
There is an equipped room with workbench for development of LRP	1	4	3.30	1.030

That if the mean of 2.43 with a standard deviation of 1.185 implying that there are teacher trainees who do not see that the curriculum is loaded with the examination pressure while others see otherwise. The curriculum is loaded and does not easily allow for use of project method instead examination pressure is too much. This is agreement with Lobman (2011) who observed that the teacher is required by syllabi and society to follow a rigid curriculum which normally reduces his or her opportunity to improvise which leaves him or her as simply a transmitter of knowledge from a generation to another. It was not possible to improvise everything needed, most the 2.50 mean score with 1.268 standard deviation implies that there are items that are needed for the project cannot be improvised. The mean score of 3.28 with a standard deviation of 1.070 that the respondents gave for the teachers received little or no support from the stakeholders meant that the schools gave the teacher trainees were given support. The mean of 3.48 with a standard deviation of 0.846 for the negative statement that the teacher trainees are not provided with enough time for developing LRP means that the trainees see the time as sufficient for the developing and evaluation of the LRP. The concept of LRP is not well understood by the school administration attracted a mean score of 1.94 with a standard deviation of 0.877 which means that some school administrators could be well versed with the meaning of LRP and a majority do not fully understand it. The regular teacher too does not well understand fully what LRP entails. This is evidenced

by the mean score of 1.74 (SD = 0.615). The score of 3.30 with a standard deviation of 1.030 means that most schools do not have workspaces including workbenches that are equipped for use in developing the LRPs. These are some of the main challenges that the teacher trainees face in coming up with and utilizing the LRP in teaching during their teaching practice.

4.8 The relationship between the teacher's involvement of the learners in use of LRP and the understanding of the difference between teaching aid and LRP.

A correlation was employed to describe the strength and direction of the linear relationship between the two variables, the involvement of learners in LRP during teaching and learning and the teacher trainee's sufficiency in understanding the difference between a teaching aid and a LRP, a moderate positive relationship was found ($r(360/240)=0.99 < 0.01$ indicating a significant proportional linear relationship in the understanding of the difference between teaching aid and LRP and the LRP utilization in teaching and learning. The findings indicate that a teacher trainee who has an understanding of the difference between a teaching aid and LRP involved the learners more in the use of LRP in the learning. Therefore, he had

a high tendency of applying PBL in teaching the learners within their environments.

4.9 The relationship between the teacher's design and provision of LRP manual and the understanding of the difference between teaching aid and LRP

A correlation was employed to describe the strength and direction of the linear relationship between the two variables, the design and provision of the LRP manual by the teacher trainee and the teacher trainee's sufficiency in understanding the difference between a teaching aid and a LRP, a moderate positive relationship was found ($r_{360/240} = 0.99 < 0.01$) indicating a significant proportional linear relationship in the design and provision of the LRP manual and the LRP utilization in teaching and learning. The findings indicate that a teacher trainee who had designed and provided the LRP manual involved the learners more in the use of LRP in the learning. Therefore, he had a high tendency of applying PBL in teaching the learners within the learning environments

5. Conclusion and Recommendations

5.1 Conclusion

In this study the learning resource projects (LRPs), were conducted so as to identify their contribution to pre-

References

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service training on CBC of secondary school would-be teachers. The study which came up with the same results for university students showed that PBL increased student self-efficacy (Aydın and Yel, 2013; Brennan, Hugo and Gu, 2013; Chen, Hernandez and Dong, 2015; Mills, 2009). However, there could be several hindrances to the use of LRP in training those who would be the teachers to implement CBC and do the actual teaching of the STEAM subjects to secondary school students. These hindrances include but not limited to an overloaded curriculum, lack of understanding of the meaning and need for the LRP, lack of sufficient funding and lack of proper working spaces in schools.

5.2 Recommendations

Based on the findings, discussions and conclusion from this study, it is recommended that the concept of LRP is introduced and structured to universities and teacher training colleges not only within Kenya, but world-wide so that the teachers to be are trained on becoming proficient in the design, development, implementation and evaluation of LRPs so that they can be able to create in themselves ability to impart the CBC at minimal cost and also connect their learners to their daily environment. For the already practicing teachers, the Ministry of education should introduce the component of improvisation in the In-service trainings, more particularly on the use of PBL (LRPs) to teach.

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