

# **Efficacy of Agriculture Teaching Practice Projects in Secondary Schools: The Case of Egerton University Tracer Study**

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## **Abstract**

Project Based Learning (PBL) is a participatory approach that equips trainees with transferable competencies for utility. However, the potential of PBL training approach has not been scientifically documented. The efficacy of Agriculture Teaching Practice Projects (ATPPs) in secondary schools was evaluated through a tracer study of Agricultural Education and Extension Degree and Diploma graduates for the last 10 years (2011-2000). Three objectives guided this study. A questionnaire was developed and uploaded on Google forms and thereafter pilot tested for reliability using 36 graduates of 2005 to 2009 cohorts and its Cronbach's Alpha, reliability coefficient was 0.79. Out of the targeted 1,500 respondents, those accessed were 1,408 and 541 of them responded. The response rate was 37.2%. Data collection was done online. Statistical Package for the Social Sciences (SPSS) Version 25 was used to analyze and generate results. From the findings, majority of the respondents established rabbit projects (14.4%), vegetable projects (11.8%) and chicken rearing (10.2%). On transferability of Project Based Training (PBT), 97.4% indicated that they were still using the skills acquired. However, only 70% of respondents indicated that they had established projects in their current stations. Over 91% had established at least a project of whom, 32% had established three or more projects. Among the non-teachers, transferability was 100% as they indicated that they were applying the knowledge and skills learnt from ATPPs. Its worthy noting that only 13.4% of the established ATPPs could be used as a resource to teach across Forms 1-4 while 56.4% of the established ATPPs could only be used in teaching one class only. The study recommends that Egerton University through Department of AGED to deliberately phase out the projects that are short-lived for the benefit of host schools, and review their curriculum to infuse the concept of transferability of PBT.

**Key Words:** Agriculture Teaching Practice Projects; Graduates; Project Based Learning; Secondary schools

## **Introduction**

Education is considered as the nerve to development as it contributes to economic growth of every nation by nurturing competent graduates through accessible, relevant and quality education (Tindowen et al., 2019). One of the major targets of institutions of higher learning is to improve the efficiency and effectiveness of quality teacher training. To achieve quality teacher training student teachers are not only prepared to teach. In addition, they are prepared in major production

techniques, managerial skills and competencies necessary to function as agricultural trainers (Nataliia & Liubov, 2020).

The level of teacher training in Iceland is key when it comes to preparing teachers in agricultural education. For instance, for one to be certified as a teacher, there are two important levels of teacher training one must fulfill. The first level is a three-year Bachelor's degree then the second level is a two year master's degree training effective in 2013. The five-year programme majorly focuses on the following four key components; collaboration and cooperation which focuses on preparing student teachers to learn skills which will enable them work with their schools upon employment. Second aspect is inclusive education which is a policy that strengthens a teacher's professional skills. The third dimension is professionalism whose aim is to prepare a graduate teacher who will be able to work with his/her school in relation to problem solving and take part in research. The last aspect is diversity of teacher tasks which focuses on creativity in curriculum design (Sigurdardottir et al., 2018).

Teacher preparation in Wales is grounded in University of Wales Trinity Saint David (UWTSD) which is a leader in development of teacher education both in Wales and internationally. The teacher preparation is split into two aspects, teacher training and teacher assessment. Teacher assessment is formative, where student teachers develop projects and portfolios which enable self-evaluation upon time (Weicht & Jónsdóttir, 2021). Teacher training in Russia has an internship programme content is represented by subject-methodological and research training under supervision of experienced teachers (Bocharova, 2018).

A study conducted in Philippines on intern teachers revealed that graduate pre-service teacher who attended internship programmes had better competencies in their work. The interns are assessed in their teaching activities that is classwork and their projects (Tindowen et al., 2019).

In South Africa, internship programme is offered to undergraduate to their final year to offer student teachers smooth transition from class to world of work where they practice what they have been learning (Tonder & Fourie, 2018). Internship programme in South Africa is aimed at promoting acquisition of practical skills by student teachers.

In the East African Region, Tanzania's teacher preparation is done at two levels, Diploma and Bachelor's level which is considered as the highest-level qualification to teach secondary school. Institutions of higher learning have improved pedagogical methods by inculcating the 21<sup>st</sup> century knowledge and skills in teacher preparation (Ngao & Xiaohong, 2020).

Most of the teacher training programmes in the globe and the region resonate with that of Kenya and especially teacher training in higher learning institutions like Egerton University. Teacher training in Kenya for secondary school students takes four years for Bachelor's degree while three years for those undertaking Diploma courses. From the preceding literature, teacher internship takes place for at least 6 months but in Kenyan scenario for both Diploma and Bachelor Degree student teachers the duration is 3 Months (Katitia, 2015). Egerton University trains teachers of agriculture for both secondary schools as well as technical training institutions. The agriculture teacher training programme has a broad scope with students taking courses from different faculties to meet the training threshold. This study comes at a time when Egerton University is nearing her curriculum review period and also at a time when the Kenya government is implementing the

Competence Based Education system and teacher training institutions are expected to review their teacher training programmes to align to the Competence Based Teacher Framework (CBTF).

## **The Objectives of the Study**

The study aimed at documenting the efficacy of agriculture learning projects prepared by Egerton University Agricultural Education and Extension (AGED) students during teaching practice in host secondary schools.

### **Research Questions**

- i. What are the types of agriculture projects initiated by AGED teacher trainees from Egerton University?
- ii. What is the extent of transferability of Project Based Training among the AGED trainees after graduation?
- iii. To what extent do the AGED trainees' ATPPs address agricultural training in the host schools?

## **METHODOLOGY**

### **Scope of the Study**

This study focused on student teachers of Agricultural education who did teaching practice between 2011-2020 from 10 Teaching Practice Zones. Agriculture teacher training was limited to teacher trainee preparedness, types of agriculture projects initiated by agriculture teachers, extent of use of ATPPs in secondary school training and the extent to which graduates transfer the ATPP skills in the teaching of agriculture.

### **Sampling Procedure and Sample Size**

All the Egerton University AGED graduates between 2011-2020 were traced through snowball sampling and requested to join their cohort WhatsApp groups through which they participated in the baseline survey study. Regular requests to respond to the survey through the WhatsApp groups were made and individual calls to those who had not responded were made.

### **Data collection Methods**

The study employed use of baseline survey questionnaire for data collection while a checklist and an interview schedule were used for phase Two. These instruments were developed by the researchers. The questionnaire captured dependent and independent variables. The structured instruments contained both open ended and closed ended items. They were developed based on the objectives of the study. The questionnaire had three sections with section A sought the respondents' demographic data, section B sought to determine the types of teaching practice projects established by AGED students in their TP schools and Section C sought to determine the transferability of Project Based Training among the AGED graduates.

### **Data Analysis**

The survey link was deactivated after the expiry of the data collection period and data was exported from the Google forms platform to SPSS software (version 25) for validation and analysis. Data

was cleaned, checked for accuracy and completeness, and thereafter, analyzed. Descriptive statistics were generated as per the objectives of the survey. The findings were presented in figures (graphs and charts) and tables. Additionally, qualitative data was summarized and described using frequencies and percentages.

## Results and Discussion

### Year of Teaching Practice

Results in Table 1 indicate that the highest number of graduates conducted their TP in the year of 2016 (13.7%) and 2018 (12.3%). The year 2017 and 2020 accounted only for 2.3% of the population each.

*Table 1: Distribution of Teaching Practice graduates by year and programme of study (n=432)*

Year	BSc (AGED)	Diploma (AGED)	Grand Total	Grand Percent
2010	14	7	21	4.9%
2011	33	9	42	9.7%
2012	18	11	29	6.7%
2013	27	21	48	11.1%
2014	23	18	41	9.5%
2015	50	4	54	12.5%
2016	53	6	59	13.7%
2017	2	2	4	0.9%
2018	23	30	53	12.3%
2019	43	8	51	11.8%
2020	5	1	6	1.4%
2021	22	2	24	5.6%
<b>Grand Total</b>	<b>313</b>	<b>119</b>	<b>432</b>	<b>100.0%</b>

### 4.1.5 The Teaching Practice Zone

Table 2 shows that majority of graduates conducted their teaching practice in Eldoret-Kitale (17.4%); Kisumu-Busia-Siaya-Kakamega (17.1%) and Kisii-South Nyanza (16.9%). The zone that had the fewest students on TP was Thika-Kiambu (9%). This is summarized in Table 2.

**Table 2: Summary of AGED Graduates' Teaching Practice Zones (n=432)**

S/No.	Teaching Practice Zone	Frequency	Grand Percent
1.	Eldoret-Kitale	75	17.4%
2.	Kisumu-Busia-Siaya-Kakamega	74	17.1%
3.	Kisii-South Nyanza	73	16.9%
4.	Kericho-Bomet	46	10.6%
5.	Nakuru West	36	8.3%
6.	Nakuru East	32	7.4%
7.	Nyandarua-Nyeri	31	7.2%
8.	Nairobi-Machakos-Makueni-Kitui	31	7.2%
9.	Baringo-Koibatek	25	5.8%
10.	Thika-Kiambu	9	2.1%
	<b>Grand Total</b>	<b>432</b>	<b>100.0%</b>

## Types of ATPPs among AGED Students

Respondents were asked to indicate the type of ATPP established and the area of focus of the projects. Their responses were as presented in Tables 3 and 4.

**Table 3:** Titles of the ATPP among AGED graduates

S/No.	Title of the Project	Frequency	Grand Percent
1.	Rabbitry	62	14.4%
2.	Vegetable Production	51	11.8%
3.	Chicken Rearing	44	10.2%
4.	Identification of Weeds	41	9.5%
5.	Soil Profile	39	9.0%
6.	Construction of Calf Pen	36	8.3%
7.	Bee Keeping	29	6.7%
8.	Agroforestry	23	5.3%
9.	Identification of Livestock Breeds	16	3.7%
10.	Construction of a Crush	9	2.1%
11.	Fish Farming	6	1.4%
12.	Identification of Farm Tools and Equipment	6	1.4%
13.	Livestock Feeding	6	1.4%
14.	Preparation of Organic Fertilizers	6	1.4%
15.	Other project titles	<6	13.4%

Majority of the respondents established rabbit projects (14.4%), vegetable projects (11.8%) and chicken rearing (10.2%). The projects that were least established included fish farming, livestock feeding, identification of farm tools and equipment and preparation of organic fertilizer at 1.4% each. The top three projects are short-seasoned in a manner that the interns were able to attain substantial results and write reports within the teaching practice period. The teaching practice duration in Egerton University is 12 weeks.

From the findings presented in Table 4, the focus of the ATPP indicated that livestock production had the highest preference among most of the students on teaching practice at 49.1%. This is in agreement with the earlier findings on Table 3 that most projects were on rabbitry, chicken rearing, calf pen construction and bee keeping which are sections under livestock production. This supports the fact that agriculture is a hands-on subject that focuses on establishment of projects meant for learning, earning income and solving agriculture related problems (Röling, 2019). Over, 70% of AGED students undertook their ATPP in the two broad areas of crop and livestock production, however, the over 23% of projects under instructional media.

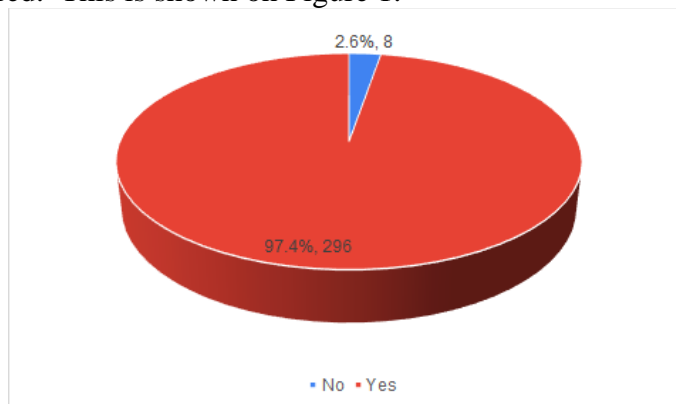
**Table 4:** Focus areas of Agriculture and Biology Teaching practice projects (n=432)

S/No.	Area of focus	Grand Total	Grand Percent
1.	Livestock Production	212	49.1%
2.	Crop Production	111	25.7%
3.	Instructional media like Models, chart, drawings	101	23.4%
4.	Engineering	5	1.2%
5.	Entrepreneurial agriculture	2	0.5%
6.	Trees and shrubs	1	0.2%
	Grand Total	432	100.0%

As the education system transits to Competency-Based Training the institutions of higher learning are expected to embrace problem solving which could be best practiced through the ATPP as sources of training resources in Kenya’s secondary schools.

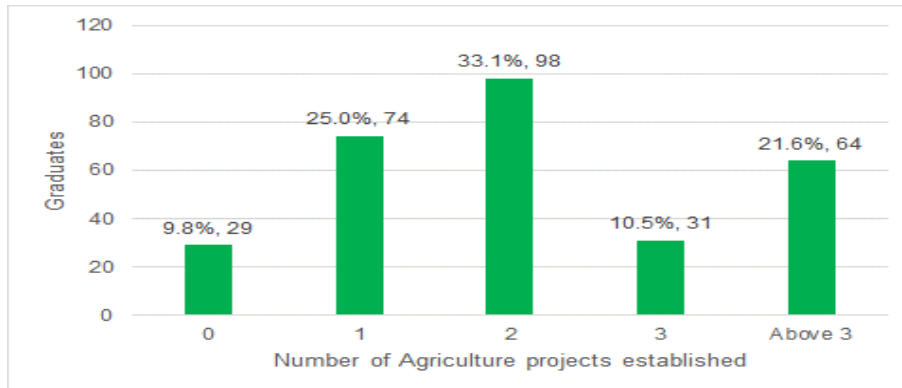
#### 4.3 Transferability of Project Based Training among AGED

The extent of transferability of PBT among AGED graduates was measured depending on whether they were still using the skills acquired from ATPP they had established during TP. Out of the 432 graduates who had established projects in agriculture, 97.4% indicated that they were still using the skills acquired. This is shown on Figure 1.



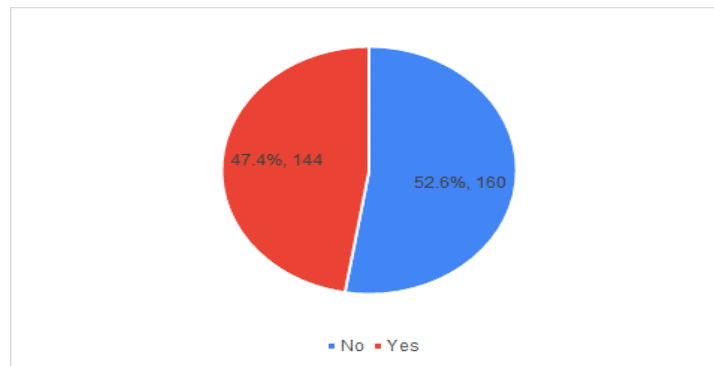
**Figure 1:** Continued use of skills acquired from teaching practice project training (n=304)

To measure transferability respondents were asked to indicate the number of agriculture projects they had established in their current stations. In Figure 2, 296 respondents indicated that they established projects in their current stations. Over 91% had established at least a project while only 32% had established three or more projects.



**Figure 2: Agriculture projects established in current station (n=296)**

Transferability was also measured on the usability of the existing ATPPs as presented in Figure 3. Over 45% of the respondents had existing projects in their current stations. However, over 52% indicated that there were no existing agriculture projects in their schools.



**Figure 3: Already Existence of ATPPs (n=304)**

Those who had existing projects in their stations were asked to show if they made use of them. The results presented in Figure 4 indicate that 45% of the respondents used existing projects in their schools but at different time spans. Majority at 52.8% had used them in the last one month while 6.9% had used them in the last one year. Those who had used them in the last two weeks and one month were 15.3% and 25% respectively.

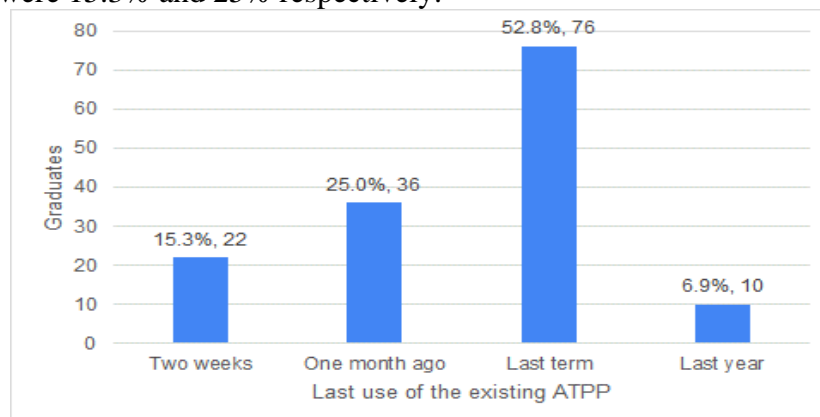


Figure 4: Last used the existing ATPP (n=144)

The same data was analyzed per programme of study as presented in Figure 5 and it was clear that most of the graduates had used the projects in the last one month with 50% and 61.7% both Degree and Diploma graduates respectively.

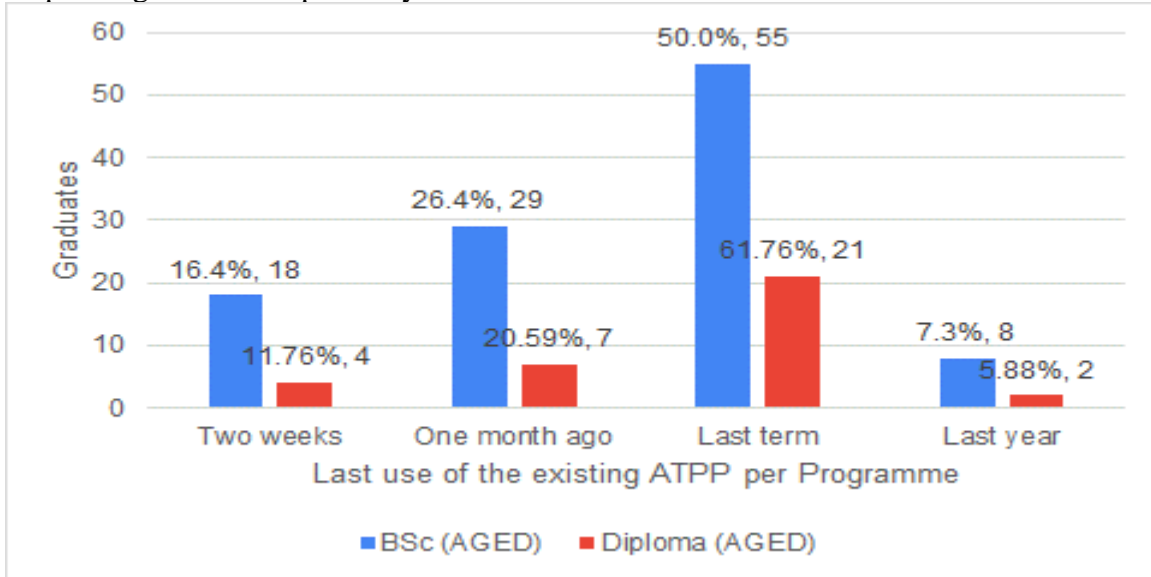


Figure 5: Last use of the existing ATPP by Programme. (n=144)

Transferability was also tested among the non-teachers and 100% indicated that they were applying the knowledge and skills learnt from ATPPs. The non-teachers were also asked about the number of projects they had established in their current stations and majority of them (37.5%) had established over three projects while 12.5% had not established any project. Hence the extent of transferability was low among the non-teachers compared to the teachers.

#### 4.4 Extent of Use of ATPPs by AGED Graduates

Usability of the ATPP was also measured. Respondents were asked to indicate the classes that would be taught using the ATPP established and the results were as presented in Table 5.

Table 5: Major Class(es) where Agriculture subject Teaching Practice Project (ATPP) (n=432)

Class(es)	BSc (AGED)	Diploma (AGED)	Total	Grand Percent
Form 3	80 (25.6%)	23 (19.2%)	<b>103</b>	23.8%
Form 1	50 (16%)	21 (17.5%)	<b>71</b>	16.4%
Form 1, Form 2, Form 3, Form 4	41 (13.1%)	17 (14.2%)	<b>58</b>	13.4%
Form 2	32 (10.3%)	18 (15%)	<b>50</b>	11.6%
Form 1, Form 2	30 (9.6%)	12 (10%)	<b>42</b>	9.7%
Form 4	13 (4.2%)	7 (5.8%)	<b>20</b>	4.6%
Form 1, Form 3	16 (5.1%)	2 (1.7%)	<b>18</b>	4.2%
Form 3, Form 4	16 (5.1%)	4 (3.3%)	<b>20</b>	4.6%
Form 1, Form 2, Form 3	9 (2.9%)	3 (2.5%)	<b>12</b>	2.8%
Form 2, Form 3, Form 4	7 (2.2%)	6 (5%)	<b>13</b>	3.0%

Form 2, Form 4	4 (1.3%)	0 (0%)	<b>4</b>	0.9%
Form 2, Form 3	6 (1.9%)	2 (1.7%)	<b>8</b>	1.9%
Form 1, Form 3, Form 4	3 (1%)	4 (3.3%)	<b>7</b>	1.6%
Form 1, Form 4	3 (1%)	1 (0.8%)	<b>4</b>	0.9%
Form 1, Form 2, Form 4	2 (0.6%)	0 (0%)	<b>2</b>	0.5%
<b>Grand Total</b>	312 (100%)	120 (100%)	<b>432</b>	100.0%

Majority of the teacher trainees established projects which could be used in teaching form three despite being expected to mostly teach forms 1 and 2. These findings are in agreement with the findings on the title of the TP projects in which most trainees established projects in rabbitry, identification of weeds and chicken rearing all of which are topics taught in form three.

Regarding breadth and scope of the established ATPPs, only 13.4% could be used as a resource to teach across all the four classes while 56.4% of the established ATPPs could only be used in teaching one class either form 1, 2, 3 or 4. Additionally, 6.9% and 23.3% of the ATPPs could be used in teaching three and two classes respectively. Hence the need for AGED trainees to be sensitized on the breadth and scope that enhances the diversity of use of the ATPPs.

Usability was also measured in terms of the number of other subjects that would be taught using the ATPP established. The findings presented in Figure 6 showed that majority of graduates (81.0%) used ATPPs in teaching other subjects.

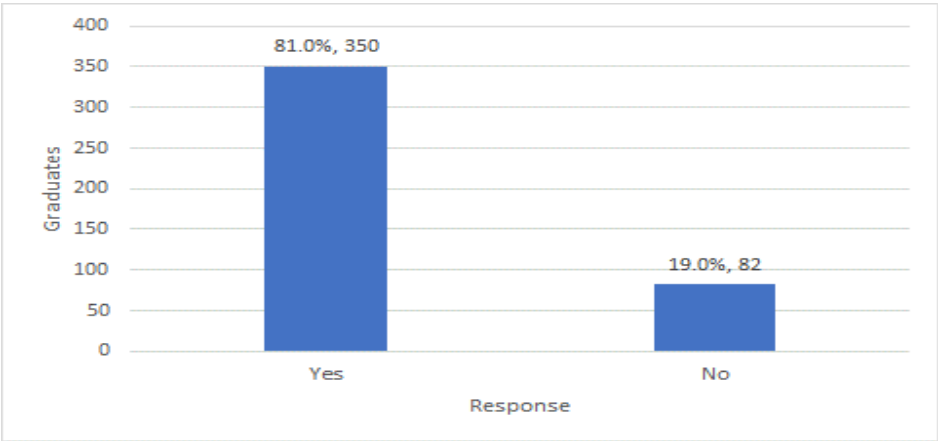


Figure 6: Use of ATPPs in teaching other subjects (n=432)

Of those graduates whose ATPPs were used to teach other subjects, 80.1% and 83.3% were Degree and Diploma holders respectively as opposed to 19.9% and 16.7% of Degree and Diploma graduates respectively who did not use the ATPPs to teach other subjects.

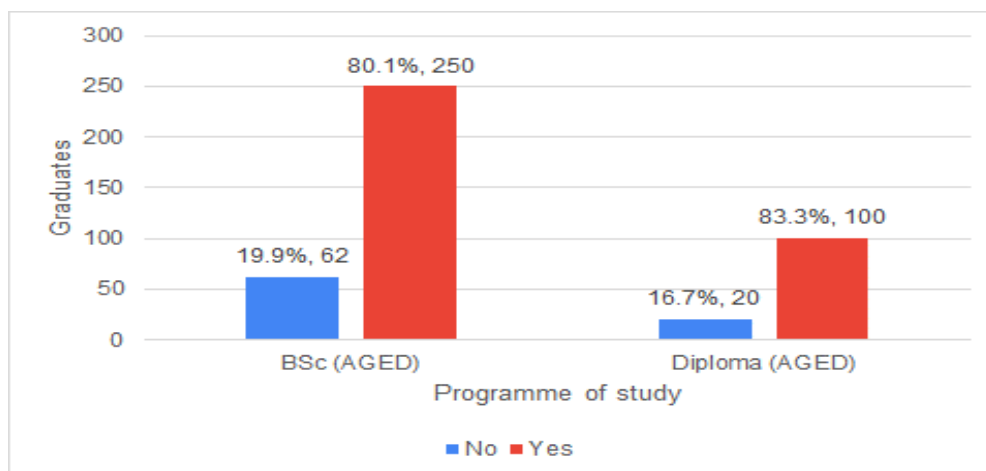


Figure 7: Use of ATPPs in teaching other subjects (n=432)

Transferability was also measured in terms of the other teaching subjects taught using the ATPP. The findings were as presented in table 6.

Table 6: Other subjects taught by ATPP (n=350)

S/N o.	Other Subject Taught	BSc (AGED)	Diploma (AGED)	Grand Total	Grand Percent
1.	Biology	97	41	138	39.4%
2.	Geography	47	21	68	19.4%
3.	Geography, Biology	28	8	36	10.3%
4.	Biology, Home science	18	7	25	7.1%
5.	Geography, Biology, Home science	12	5	17	4.9%
6.	Home science	5	3	8	2.3%
7.	Other subjects			<8	16.6%

Most of the ATPPs were used in teaching biology, which is attributed to the interrelatedness between agriculture and biology subjects. Other subjects that were often taught using the ATPP were geography and home science among others.

## Conclusions

Majority of the respondents established livestock projects specifically rabbitry while least projects were fish farming, livestock feeding, identification of farm tools and equipment and preparation of organic fertilizer.

Over 91% indicated to have had established at least a project of whom 32% had established three or more projects. On the use of the projects already existing in schools, 45% of the respondents were already using existing projects in their schools but at different times within the year. The majority 52.8% had used them in the last one month while only 6.9% had used them in the last one year. All those who were not in the teaching profession were found to be applying the knowledge

and skills acquired in the establishment of ATPP and 37.5% had established more than three projects in their work stations.

Most graduates comprising 80.1% and 83.3% for BSc and Diploma AGED respectfully used the ATPP in teaching other subjects. Most of the projects established were meant to teach Form three class with over 60% of the projects being used to teach across most of the classes.

## Recommendations

Egerton University through Department of AGED should take a deliberate move to phase out the projects that are short-lived for the benefit of host schools, review their curriculum to infuse the concept of transferability of PBT among the trainees for better acquisition of competencies and promote divergent use of the ATPP developed in schools as teaching resources in different subject areas.

## REFERENCES

- Alahmad, A., Stamenkovska, T., & Gyori, J. (2021). Preparing Pre-service Teachers for 21st Century Skills Education: A Teacher Education Model. *GiLE Journal of Skills Development*, 1(1), 67–86. <https://doi.org/10.52398/gjsd.2021.v1.i1.pp67-86>
- Bedir, H. (2019). Pre-service ELT Teachers' Beliefs and Perceptions on 21st Century Learning and Innovation Skills (4Cs). *Dil ve Dilbilimi Çalışmaları Dergisi*, 15(1), 231–246. <https://doi.org/10.17263/jlls.547718>
- Bocharova, J. Yu. (2018). Expected outcomes of teacher internship, or a pedagogical university graduate trapped in standards. *Журнал Сибирского федерального университета. Гуманитарные науки*, 11(2). *Journal of Siberian Federal University. Humanities & Social Sciences*, 11(2), 174–184. <https://doi.org/10.17516/1997-1370-0178>
- Isaac, A., Hudu, D., & Mohammed, A. A. (2018). *Effectiveness of Project Method of Teaching on Agricultural Knowledge and Skills Acquisition among Agricultural Science Students of Awe Senior High School in the Upper East Region, Ghana*. 4(1), 62–75.
- Karani, A., Miriam, K., & Mironga, J. (2021). *Teaching competence-based agriculture subject in primary schools in Kenya; A review of institutional preparedness. International Journal of Education, Technology and Science*, 1(1), 14-30.
- Katitia, D. M. O. (2015). Teacher Education Preparation program for the 21 st Century. Which way forward for Kenya? *Journal of Education and Practice*, 8.
- Khalidi, K. (2017). Quantitative, Qualitative or Mixed Research: Which Research Paradigm to Use? *Journal of Educational and Social Research*, 7(2), 15–24. <https://doi.org/10.5901/jesr.2017.v7n2p15>
- Li, J., & Pilz, M. (2021). International transfer of vocational education and training: A literature review. *Journal of Vocational Education & Training*, 1–34. <https://doi.org/10.1080/13636820.2020.1847566>
- Mosotho, J. G., Mamontsi, K., & Eunice, K. M. (2018). Exploring the Mathematics and Science subject matter content in the Primary School Level in Lesotho teachers. *International Journal of Science and Technology Education Research*, 9(2), 9–17. <https://doi.org/10.5897/IJSTER2017.0442>
- Mupa, P., & Chinooneka, T. I. (2015). Factors contributing to ineffective teaching and learning in primary schools: Why are schools in decadence? *Journal of Education and Practice*, 9.

- Nataliia, O., & Liubov, S. Z. (2020). Professional training of agricultural industry assistants as pedagogical problem. *Middle European Scientific Bulletin*, 1, 13–19. <https://doi.org/10.47494/mesb.2020.1.4>
- Ngao, A. I., & Xiaohong, T. (2020). Teacher Education in Tanzania: Pre-Service Teachers Preparation for the 21st Century. *Journal of Education and Practice*, 9.
- Njura, H. J., Kaberia, I. K., & Taaliu, S. T. (2020a). *Effect of agricultural teaching approaches on skills development for food security: A case of secondary schools in Embu County, Kenya. The Journal of Agricultural Education and Extension*, 26(3), 239-252.
- Njura, H. J., Kaberia, I. K., & Taaliu, S. T. (2020b). Effect of agricultural teaching approaches on skills development for food security: A case of secondary schools in Embu County, Kenya. *The Journal of Agricultural Education and Extension*, 26(3), 239–252. <https://doi.org/10.1080/1389224X.2019.1680401>
- Röling, N. (2019). *The agricultural research-technology transfer interface: A knowledge systems perspective. In Making the link (pp. 1-42). CRC Press.*
- Sigurdardottir, A. K., Johannesson, I. A., & Oskarsdottir, G. (2018). *Challenges, contradictions and continuity in creating a five-year teacher education programme in Iceland*. 21.
- Silva, H., Lopes, J., Cruz, G., Dominguez, C., & Morais, E. (2022). Does university attendance affect students’ critical and creative thinking skills? A longitudinal research with pre-service teaching and psychology undergraduates. *Higher Education Research & Development*, 1–11. <https://doi.org/10.1080/07294360.2022.2057448>
- Tindowen, D. J., Bangi, J., & Parallag, C. Jr. (2019). Pre-Service Teachers’ Evaluation on their Student Internship Program. *International Journal of Learning, Teaching and Educational Research*, 18(10), 279–291. <https://doi.org/10.26803/ijlter.18.10.18>
- Tonder, G. P., & Fourie, E. (2018). *Internship as a criterion for South African educators’ registration. International Journal of Educational Management.*
- Weicht, R., & Jónsdóttir, S. R. (2021). Education for Social Change: The Case of Teacher Education in Wales. *Sustainability*, 13(15), 8574. <https://doi.org/10.3390/su13158574>
- Wepukhulu, R., & Simiyu, I. (2018). *Teaching-Practice-as-Internship in Kenya.*