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An investigation into the Teaching and Learning Process Towards Enhancing Learning: A Case Study of Mechanical and Production Engineering Department, Kyambogo University

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Abstract: *This study was carried out to determine ways of improving the delivery of training in computing for mechanical engineers in the Department of Mechanical and Production Engineering, Kyambogo University, Uganda. The study employed the "Work Process Analysis tool to analyze the prevailing situation in the delivery of instruction, and the "Future Workshop procedures to identify the gaps in delivery of training and the most appropriate strategies to address the gaps. Evaluation of implemented strategies was carried out. The key stakeholders that participated in the study included students, the head of department, the department administrator, examinations coordinator, teaching staff and technicians. The Work Process Analysis was carried out by means of focused group discussion with the aim of identifying gaps in the teaching/learning process. It was found that more theory was being covered and less of practical work and inadequate relevance in relation to the real work environment. The most appropriate intervention strategies identified were; allocation of more time for practical work, relating instruction to the real work environment, group work, demonstrations, integration of information communication technology (ICT) in the teaching process, such as video tutorials for repetitive demonstrations. Implementation of the identified strategies was carried out. Evaluation of the implemented interventions was carried out. Additional practical time and group discussion were rated highest and ICT integration in the teaching/learning process was rated lowest. Group discussion has merits of occurring in a social context with free interaction, collaboration and feed back in the group which factors maximize the learners' ability to construct meaning. Demonstration and particularly ICT integration received the lowest ratings. It should be remembered that ICT integration in the teaching/learning process depends on available resources and efficient infrastructure.*

Key words: pedagogy, vocational, learning

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I. Introduction

According to the Uganda Bureau of Statistics Statistical Abstracts (2015), Uganda's total working population (15 – 64 years of age) in 2012/2013 was 13.9 million of which 56.8% were employed. In 2014 Uganda's overall population was 34.9 million of which the working population was 49.2% (Wikipedia, 2018). In 2012/2013 Uganda's Labor Force Participation Rate (LFPR) was 52.8% while Employment to Population Ratio (EPR) was 47.8% and the overall unemployment rate (UR) was 9.4% with females experiencing high unemployment rates of 11% than males with 8% (Uganda Bureau of Statistics (2015). The UR is the share of the labor force that is jobless expressed as a percentage of the working population (Investopedia, 2018). In general a high EPR is considered to be 70% of the working-age population, whereas a ratio below 50% is considered to be low.

Therefore, Uganda's EPR of 47.8% coupled with high UR of 8-11% indicate that Uganda's economy at the prevailing rate cannot create enough jobs for the population. However, job scarcity is not the bigger issue. The problem lies in the lack of employable skills relevant in the labor market as well as adequacy of skills required for business set-ups (Nabuzale, 2018). Hence, Uganda needs to adopt measures to adequately address the unemployment challenge facing the country. The Uganda Government has envisaged vocational secondary education that not only ceases to be terminal but provides students with diversified opportunities for further studies in their chosen vocational fields. Besides, each vocational secondary school imparting in addition to general skills, such skills which suit local conditions and needs of the community (Uganda Government, 1992).

Around the world, technical and vocational education and training (TVET) is being widely seen as having a key role in promoting both economic and socio-economic growth, increasing productivity, empowering citizens and alleviating poverty. However, the quality of TVET in terms of learner outcomes, teaching and teaching inputs is variable. In some countries this inconsistency is being addressed through increased professionalization and training of the TVET workforce and better engagement of employers in the process of curriculum development and on job training (UNESCO/UNEVOC, 2014). Apple Chief Executive Officer, Tim Cook in his remarks about China's vast supply of highly skilled vocational talent said; "The vocational expertise is very deep here, and I give the education system a lot of credit for continuing to push on that even when others were de-emphasizing vocational education. Many countries in the world have woken up to this reality" (Nabuzale, 2018).

According to CEDEFOP (2018), in European countries vocational education has mainly been promoted as a way of improving the transition from school to work. However, it also has an impact on subsequent education paths, as well as on the adaptability of workers to technological and structural change in the economy. Research has also indicated that vocational education can protect people against unemployment and unskilled work. VET enjoys higher esteem in countries in which it opens up access to well-paid jobs and career opportunities than it does in countries with a high share of low-skilled jobs. Also, VET in European countries faces a challenge of loosing- out on the longer term gains associated with further education in favor of the short-term benefits. Thus, it is argued vocational education should provide strong basic skills and competences along-side technical ones to ameliorate any later life disadvantages. Transition to further education need also to be facilitated to avoid negative perceptions of vocational education as a dead-end option. This would involve opening up of progress routes between different types and levels of education and training, flexible transitions between education and training and work and providing measures to support such transitions.

According to UNESCO/UNEVOC (2014), in order to improve TVET in all of its many forms, there is need to understand the teaching and learning methods which make it work best. There is need for a robust model of vocational pedagogy, that is, the science, art and craft of teaching and learning vocational education. There is need to be able to describe with clarity and confidence the teaching and learning methods that are most effective for a range of different learners seeking to acquire skills , competences and dispositions in many different contexts. Pedagogy in VET takes place in two contexts, that is, work place and education space and it has to crucially involve both teachers and employers in the delivery of teaching and training in TVET.

Kyambogo University started a Masters program in Vocational Pedagogy in 2009 with the general objective of offering course content that covers pedagogical principles, practices and issues related to vocational education and training to enable graduates to demonstrate functional knowledge, skills and values for all types of work that are essential for development (Kyambogo University, 2009). The program as one of its activities organizes symposiums and breakfast meetings with participants from the world of work for actualization of collaboration between the world of work and the academia (Kyambogo University, 2017). In the 2nd of such breakfast meetings, the participant, Brian Longworth from Victoria Engineering Limited, Kampala gave his experience from taking over the company a year earlier. He had noted several training challenges that needed to be addressed. These were particularly, competence and standards of work. He further explained that lack of appropriate skills training coupled with "blue collar syndrome" or poor job attitude were some of the big challenges the country continued to grapple with. Yet, on the other hand, being an engineer for example, gives tremendous job satisfaction and pride where it combines creativity, innovation, technological enterprise and relevance to society, particularly in the technology driven societies today (University of Salford, 2018).

1.1 Purpose of the study

This study was an investigation into the teaching/learning processes towards enhancing the teaching/learning process in Computing for Mechanical Engineers course in the Department of Mechanical Engineering at Kyambogo University in Uganda. The course is concerned with giving students skills in the usage of engineering computer applications. The course components included solid-works designing, C++ programming and matrix laboratory (MAT-LAB) computer based applications. The course aims at equipping students with knowledge and skills to effectively diagnose and solve engineering problems using computers. The first author to this paper is a lecturer in the Computing for Mechanical Engineers course in the Department. He appreciates that change in learners depends a lot on how the teacher or instructor executes his/her teaching approach and process. Essentially, the purpose of teaching/learning is to bring about change in the learner (Mezirow, 2000) and more so when learning occurs by doing rather than passive learning (Dewey, 2001).

Therefore, what could have been the missing links or gaps in the teaching/learning process? and to which if remedies were found could enhance the teaching/learning process? Hence, this study investigated the existing teaching/learning process in the computing for mechanical engineers course to identify the missing links in the delivery of instruction and to determine, implement and evaluate strategies to enhance the teaching/learning process in the course. The empirical data will be discussed against published literature on learning and more so in the area of vocational pedagogy.

1.2 Vocational Pedagogy

Vocational pedagogy or instruction is described as a field of study oriented towards trades, occupations and professions, where learners acquire knowledge and skills in relation to work (Kyambogo University, 2009). Besides, it is seen as a science, art and craft of teaching and learning in vocational education or the sum total of the many decisions which vocational teachers make as they teach and adjusting their teaching approaches to meet the needs of the learners and to match the context in which they find themselves (UNESCO/UNEVOC, 2014). On the other hand, Lucas (2014) would rather view vocational pedagogy simply as a method of teaching.

Vocational pedagogy is a task oriented approach to teaching and learning in which the relation between the learner and the learning task/activity is at the core and the task/activity itself is the rotation point of learning. Nilsson (2000) as sited by Mjelde (2009) said that it is not the actual teaching, but learning which is at the center of vocational instruction or didactics. Emphasis is on the task itself as the site of learning. Teachers/instructors have to think in terms of tasks occurring as sites of learning and prepare their teaching and student learning processes accordingly.

II. Research design used

The study adopted a participatory action research approach which emphasizes participation of stakeholders and action (Buckles, 2013). The methods were largely qualitative. The key stakeholders were students(31) in the department, the head of department(1), the department administrator(1), examinations coordinator(1), teaching staff(4) and the computer technicians(3). In focused group discussions students would provide information on how they were being taught and what they felt about their learning. The head of department, the administrator and the examinations coordinator would give information on provisions and regulations for the running of academic programs in the department. The teaching staff and the computer technicians would give information on the actual teaching and what they felt about their teaching and students' learning. The researcher ensured the organization and direction of the research and recording data being yielded by the research process. The researcher had key questions that guided the discussions and also acted as the moderator of the discussions besides taking notes and recordings. The second and third authors of this paper were the supervisors of the research and provided guidance and supervision of the research.

2.1 Situation Analysis

The prevailing situation in the delivery of instruction was analyzed. A Work Process Analysis - WPA (Sannerud, 2013; Gessler and Howe, 2015), was carried out by means of a focused group discussion (FGD) or focus group interview or group interview (Punch, 1998) with the identified stake holders. The WPA was aimed at identifying gaps in the delivery of instruction in computing for mechanical engineers course.

2.2 Identifying Intervention Strategies

The Future Workshop (FW) procedure (Jungk, 1987; Sannerud, 2012) was used to further determine the gaps in the teaching/learning process in computing for mechanical engineers course and the most appropriate intervention strategies for the gaps identified. The FW is a democratic technique that enables a group of people to develop new ideas or solutions to social or educational problems (Jungk, 1987; Sannerud, 2012). This study was an action research study and the Future Workshop provided opportunity to the stake holders including the students in the department, the head of department, the department administrator, examinations coordinator, teaching staff and the computer technicians for democratic and participative discussions.

2.3 Implementation of Identified Strategies

The most felt gaps identified in the teaching/learning process were; were; a lot more theory was being covered and less of practical work, and inadequate relevance of instruction in relation to the requirements in the world of work. The most appropriate intervention strategies identified were; allocation of more time for practical work, relating instruction to the real work environment, group work, demonstrations, integration of information communication technology (ICT) in the teaching/learning process such as video tutorials for repetitive demonstrations.

Allocation of more time for practicals

With the approval of the head of department and administration, practical work was allocated more time, that is; three hours for practical work and one hour for lecture per week, instead of the previous two practical hours and two lecture hours per week (Table 2). Table 2 shows Department time allocation as two lecture hours per week; that is 30 hours for the 15 weeks of the semester and similarly two hours for practical. For this study one hour per week was allocated for lecture; that is 15 hours for the 15 weeks of the semester and three hours for practical; that is 45 hours for the 15 weeks of the semester.

Group discussion

Student learning groups were formed consisting of seven students per group. Three groups were formed. Groups were aimed at providing opportunity for learning to occur in a social context through interaction and communication with others. Discussion, collaboration and feedback maximize the learners' ability to construct meaning (Johnson, 2008). In this study group discussion tasks were given by the researcher and guided by lecturers and technicians. Students were free to interact with each other over the assigned learning tasks.

Demonstration

Three demonstrations were conducted on assembly modeling in solid works designing by the researcher. The demonstrations followed the essential steps, ie introduction, development and integration.

Integration of ICT in the teaching/learning process

Integration of Information Communication Technology (ICT) in the teaching/learning process involved improving access to internet and its use, such as browsing and reading assigned work, and recorded lecture videos. The computer laboratory technicians would then distribute the recorded lectures through the computers for the students to attend conveniently with opportunity for repeat of the lectures.

2.4 Evaluation

Evaluation of the implemented interventions was carried out by means of questionnaires with a "Likert Scale" or "Summed Ratings" (Punch, 1998; Mills, 2011) on given statements on whether the implemented interventions enhanced students' learning. The Likert scale developed had; 5 for "strongly agree", 4 for "agree", 3 for "disagree", 2 for "strongly disagree" and 1 for "I don't know". A response questionnaire for each implemented strategy was constructed as shown in Table 1 below. Respondents indicated their responses by ticking in the appropriate box corresponding to their felt response score. The weighted scores were determined for each implemented strategy. The weighted scores were obtained as response score multiplied by the number of respondents ticking the scale score. The average weighted scores were obtained by dividing the total weighted scores by the total number of respondents. The number of respondents at each rating and the average weighted scores would give the respondents' felt response rating (Punch, 1998; Mills, 2011).

Table 1: Respondents' Scores on Implemented Strategy (Extended Practical Time).

Tick your Response in the Appropriate Box					
Respondents' Responses	**Strongly Agree (5)**	**Agree (4)**	**Disagree (3)**	**Strongly Disagree (2)**	**Don't know (1)**
Students: Benefited my learning					
Lecturers: Benefited students' learning					
Technicians: Benefited students' learning					

III. Findings and Discussion

Much of the results were qualitative response statements to which Likert values were obtained and are presented in tables. The results are interpreted to obtain findings which are discussed to obtain conclusions on the situation as analyzed and the strategies as evaluated.

3.1 Situation Analysis and Identified Strategies

The University operates a Semester System with 15 weeks of teaching and 2 weeks of examinations. Computing for Mechanical Engineers course was a service course to four Engineering programs in the Department of Mechanical and Production Engineering. The researcher analyzed the programs regulations. The programs regulations showed that one lecture or contact hour was equivalent to two tutorial or practical hours. One credit unit (CU) was equivalent to 15 contact hours, which is one contact hour per week for 15 weeks of the semester.

The results of the situation analysis on time allocation for Computing for Mechanical Engineers course as analyzed by the researcher from the program documents and the department time allocation on the time table are shown in Table 2. The results show that the course should have had 30 lecture or contact hours and 60 practical hours. The 60 practical hours would be an equivalent of 30 contact hours. Therefore, the course should have had a total of 60 contact hours, an equivalent of 4 credit units (CU), where one CU was equivalent to 15 contact hours or one contact hour per week for 15 weeks of the semester.

Table 2: Time allocation for Computing for Mechanical Engineers Course (CME)

Structure	Lecture hours (L)	Practical hours (P)	Contact hours (C)	Credit Units (CU)
Program Document	30	60	60	4
Department Time Table	30	30	45	3
Time Table for this study	15	45	37.5	2.5

The analysis results in Table 2 further show that the Department time table fell short by 30 practical hours, an equivalent of 15 contact hours or one CU. For this study, compared to the Department time table, the lecture time or contact hours were reduced from 2 to 1 lecture or contact hour per week, or from 2 CUs to 1 CU and the practical time was increased from 2 to 3 practical hours per week, or from 1 CU to 1.5CU. However, the total CU for the course, Computing for Mechanical Engineers dropped from 4 at program level, to 3 at Department level, and 2.5 for this study. However, the study time was a temporary arrangement for six weeks of the study and approved by the Department management.

The discrepancies between the Department time table weighting and the program document weighting could have arisen as a result of enormous number of students. The Department has four Engineering degree programs to which Computing for Mechanical Engineers is a service course. Besides, Computing for Mechanical Engineers is a wide course having components of solid-works designing, C++ programming and matrix laboratory (MAT-LAB) computer based applications, all of which are practical components of the course.

Hence, a combination of choices an instructor has to make proposed by Lucas (2014), though may appear simplistic, they are far reaching. For example; whether teaching/learning activities are authentic or imagined, means of knowing is by practice or theory, organization of time is extended or not flexible, to mention but a few. Therefore, the designing of the Computing for Mechanical Engineers course needed to have given more attention to the time factor for the course.

3.2 Additional Practical Time Intervention Strategy

A combination of the Future Workshop (Junk, 1987; Sannerud, 2012) procedure and focused group discussion (Punch, 1998) were used in the identification and discussion of gaps and challenges in the teaching and learning activities in Computing for Mechanical Engineers course. Besides, intervention strategies were also identified. Inadequate time allocation for the course, yet whose content was wide, was identified as one of the gaps. However, the most constraining gap identified was lack of relevance to the world of work in the delivery of the course.

In the third phase, the reality phase of the Future Workshop, the most feasible intervention strategies were identified as; allocating enough time for practical work, relating the teaching to the real world of work, emphasis on group learning, demonstrations, and integration of information communication technology (ICT) in the teaching learning process. The number of respondents and Likert scale weighted scores on additional practical time benefiting learning are given in Table 3 below.

Table 3: Respondents (38) and Likert Scale Weighted Scores on Extended Practical Time Benefiting Learning.

		Response						
Respondents		**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Don't know**	**Respon-dents**	**Average weighted score**
Students	Number	14	15	1	0	1	31	4.32
	Likert weighted score	70	60	3	0	1		
Lecturers	Number	3	1	0	0	0	4	4.75
	Likert weighted score	15	4	0	0	0		
Technicians	Number	3	0	0	0	0	3	5.0
	Likert weighted score	15	0	0	0	0		
Total number of respondents							38	

The results show that 14 students out of 31 strongly agreed, while 15 agreed that the extended time for practical benefitted their learning, while 1 disagreed and 1 did not know whether the extended time for practical benefitted his learning. Three lecturers out of four strongly agreed, while 1 agreed that the extended time for practical work benefitted students' learning. All the three technicians strongly agreed that the extended time for practical work benefitted students' learning. It is possible that the extended time for practical work improved students' engagement in the learning process where theory concepts could have been adequately aligned to real learning tasks and therefore ultimately benefitted students' learning. This would be in line with the vocational didactic concept of a learning task being the rotation point of learning (Mjelde, 2009).

3.3 Adoption of Group Discussions Intervention Strategy

The number of respondents and Likert scale weighted scores on adoption of group discussions benefiting learning are given in Table 4 below.

Table 4: Respondents (38) and Likert Weighted Scores on Group Discussions Benefiting Learning

		Response						
Respondents		**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Don't know**	**Respon-dents**	**Average weight score**
Students	Number	12	15	3	0	1	31	
	Likert weighted score	60	60	9	0	1		4.19
Lecturers	Number	3	1	0	0	0	4	
	Likert weighted score	15	4	0	0	0		4.75
Technicians	Number	3	0	0	0	0	3	
	Likert weighted score	15	0	0	0	0		5.00
Total number of respondents							38	

The results show that 12 students out of 31 strongly agreed, 15 agreed, while 3 disagreed and 1 did not know whether the group discussions benefited his learning. Three of the 4 lecturers strongly agreed, while 1 agreed that group discussions benefited students' learning. All the three technicians strongly agreed that the group discussions benefited students' learning. It is possible that the group discussions benefitted students' learning. All the average Likert scores showed that the group discussions benefitted students' learning. In group discussions, collaboration and feedback, maximizes the learners' ability to construct meaning (Johnson, et. al., 2008).

3.5 Adoption of Demonstration Intervention Strategy

The number of respondents and Likert scale weighted scores on adoption of demonstration benefiting learning are given in Table 5 below.

Table 5: Respondents (38) and Likert Weighted Scores on the Demonstrations Benefiting Learning

		Response						
Respondents		**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Don't know**	**Respon-dents**	**Average weight score**
Students	Number	9	15	3	2	2	31	
	Likert weighted score	45	60	9	4	2		3.87
Lecturers	Number	2	2	0	0	0	4	
	Likert weighted score	10	8	0	0	0		4.50
Technicians	Number	3	0	0	0	0	3	
	Likert weighted score	15	0	0	0	0		5.00
Total number of respondents							38	

The results show that 9 students out of 31 strongly agreed, 15 agreed, 3 disagreed and 2 strongly disagreed, while 2 did not know whether the demonstrations benefited their learning. The average Likert weighted score was below 4, the "agreed" score and 2 of the students strongly disagreed that the demonstrations benefited their learning. Demonstration is showing, though clearly, how to carry out or act a technique or how something works. However, demonstration would not be a student learning activity or learning task upon which learning would rotate. It would require a task or activity in which a student is actively involved (Mjelde, 2009). Hence, the average weighted Likert score by the students that was below "agreed" and 2 students strongly disagreeing that demonstrations benefited their learning could have been pertinent. Two of the lecturers strongly agreed while 2 agreed. All the three technicians gave a score of 5, "strongly agree". Considering these results, a teacher is faced by a number of variables in choosing the best blend of methods to use in instruction, such as means of learning being by practice or theory (Lucas, 2014). Besides, there could be a miss match between the method chosen and the students' preference and the students' learning would be variously affected.

3.6 Integrating ICT in the Teaching/Learning Process

The number of respondents and Likert scale weighted scores on integration of ICT in the teaching/learning process benefiting learning are given in Table 6 below.

Table 6: Respondents (38) and Likert Weighted Scores on Integration of ICT in Teaching Learning Process Benefiting Learning

		Response						
Respondents		**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Don't know**	**Respon-dents**	**Average weight score**
Students	Number	9	17	4	0	1	31	4.06
	Likert weighted score	45	68	12	0	1		
Lecturers	Number	3	1	0	0	0	4	4.75
	Likert weighted score	15	4	0	0	0		
Technicians	Number	1	2	0	0	0	3	4.33
	Likert weighted score	5	8	0	0	0		
Total number of respondents							38	

The results show that 9 students out of 31 strongly agreed, 17 agreed, 4 disagreed and 1 did not whether that integration of ICT in the teaching benefited his learning. Three of the four lecturers strongly agreed and 1 agreed that ICT integration benefited the students' learning. One technician out of the three technicians strongly agreed and 2 agreed that ICT integration benefited students' learning. The average weighted scores show that students rated ICT integration in the teaching learning process lowest. This raises questions on the set up of the ICT facilities for the Computing for Mechanical Engineers course. The work of Adongo (2012) and Ediedu (2012) indicate the importance of ICT in the contemporary world of work and the need for well resourced and efficient ICT training to enable graduates to be relevant and functional in the contemporary world of work. Similarly, UNESCO – UNEVOC publication, Transforming TVET from Idea to Action (UNESCO, 2012) points out that while ICT opens up new potential for learning, it needs to be harnessed to provide more wide spread access to skills. Weak infrastructures are barriers to integration of ICT in TVET.

3.7 Overall Indicative Likert Scale Weighted Scores on Implemented Interventions Benefiting Learning.

The overall Likert scale weighted average scores on implemented interventions benefiting learning are shown in Table 7.

Table 7: Overall Indicative Likert Weighted Scores on Implemented Strategies Benefiting Students' Learning.

	Strategies			
Respondents	**Additional Practice Time**	**Group Discussion**	**Demonstration**	**ICT Integration**

Students	4.32	4.19	3.90	4.10
Lecturers	4.75	4.75	4.50	4.75
Technicians	5.00	5.00	5.00	4.33
Overall	4.69	4.65	4.47	4.39

The results show that giving additional time for practical benefited learning. This was more so in the case of lecturers and technicians. Group discussion received similar rating. Demonstration and ICT integration also received "agree" rating, but at a lower level. These findings indicate the fundamental question of the variables the teacher or instructor has to consider in choosing the best blend of approaches and methods to use in teaching or instruction. For example, the students' ratings were consistently lower than those by the lecturers and technicians. This was more so in the case of the demonstration strategy where the students' rating was below 'agree'.

According to Bill and Ellen (2012), improving outcomes from vocational education lie in understanding the many decisions teachers take as they interact with students, ie, how best to engage particular kinds of learners to undertake a particular kind of training they have decided to take. Similarly, according to Brown (2008), in learner centered instruction, the planning, teaching and assessment revolve around the needs and abilities of the learner. The students influence the content, activities, materials and place of learning. The instructor provides students opportunities to learn independently and from one another. According to Susan, et al., (2010), teaching is an interactive process involving classroom dialogue which takes place between the teacher or instructor and the learner and occurs during a definable activity. In this study the students' overall ratings of the strategies investigated were consistently lower than by lecturers and technicians (Table 7). Thus, while the lecturers and technicians rated high the implemented strategies, the students did not rate their felt learning as high. Hence, there is a challenge for lecturers and instructors in choosing the best blend of approaches and methods to use in their teaching or instruction. A further research would be necessary to determine conditions that would bring closer the learners' and lecturers' or instructors' appreciation of leaching and learning closer.

IV. Conclusion

This study investigated the teaching/learning process towards enhancing learning in computing for mechanical engineers course. The findings bring out the said fundamental question of the teacher having to choose the best blend of approaches/methods to use. The interventions evaluated, all received an "agree" Likert Scale weighted score of 4, except the students' score of 3.90 which was less than 'agree' in the case of the demonstration strategy. It needs to be noted that demonstration by itself is not a learning activity around which learning can revolve. It would perhaps require post demonstration tasks that would reinforce learning of the elements and aspects demonstrated.

V. Further Research

The findings indicate that giving more time for practical work and group discussion would be the preferred methods of teaching and learning. However, often teachers and lecturers fall back to the lecture method or teaching theory, usually in a bid to cover the given course. For example, many teachers are reported to claim that practical work is essential, but many learners report that, months may pass between the hands-on experiments they do (Anon, 2008). Therefore, in-depth research is necessary as to why teachers or lecturers, who have believed that practical work and discussion is the way to go for enhancing teaching and learning, fall back to the lecture method and teaching theory extensively.

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