# Comparing Classroom Competence and Attitude between SESEMAT Trained and Non-SESEMAT Trained Teachers in Eastern Uganda

Aisha Mbeya

Gezira University, Sudan PhD Candidate, Department of Curriculum and Teaching Methodologies, Faculty of Education Hantoub Email: aishambeya18@gmail.com

# Abstract

This paper presents a comparison of professional competence and attitude between teachers trained in Secondary Science and Mathematics Teachers' (SESEMAT) Programme and those not trained in it in Eastern Uganda. The study was based on a realization that though the government provides facilitation to enable teachers undergo training through the SESEMAT programmes, teachers seem not to keenly use SESEMAT methodologies. The study was guided by two objectives: to establish whether there are differences in professional competences between SESEMAT- and non-SESEMAT- trained teachers in Uganda, and to determine whether there are differences in attitude towards teaching between SESEMAT-trained teachers and other teachers of science and mathematics. The study employed semi-experimental design. Ten secondary schools were sampled and 40 teachers were observed during lessons and also given questionnaires. Data analysis was done using the independent sample t-tests to compare the classroom professional competences and attitudes between SESEMAT-trained and non-SESEMAT-trained teachers. It was concluded that given enough time, teachers would implement SESEMAT competences / skills taught during the INSETS. The study recommended that more teachers should be encouraged to attend the SESEMAT INSETS to be able to understand the competences required during the delivery of lessons. This may help improve on the number of quality passes at Ordinary level in science subjects.

Keywords: in-service training, competences, SESEMAT, secondary schools

The study was designed to compare classroom competences and attitude between SESEMAT-trained and non-SESEMAT-trained teachers in Eastern Uganda. This was in relation to professional skills and attitudes of the teachers in the classroom. The specific areas tackled included; planning, objectives, introduction, content, communication, learning resources, learner participation, class management, evaluation, and attitudes of the teachers in the lesson. The Uganda National Council for Science and Technology identified that teachers needed to undergo Continuous Professional Development (CPD) to cope with contemporary practices such as team teaching that are required for effective teaching of science (Malunda, 2018). As a result, in 2005 the Ministry of Education and Sports (MoES) in conjunction with Japan International Cooperation Agency (JICA) introduced the Secondary Science and Mathematics Teachers' (SESEMAT) programme to re-tool teachers and enhance application of professional skills for quality lessons (JICA, 2017; Komakech, 2014). In the training, teachers are taught themes of teamwork, attitudes, assessment and evaluation.

The SESEMAT programme provides for analysis of the current teaching of science and mathematics in secondary schools, promotes formulation of teamwork strategies for effective teaching of science and mathematics, and encourages learner-centred teaching-learning process (Makaaru, Nick, Emma, & Oloya, 2019). However, observations have indicated variations in ways teachers handle the SESEMAT programme such as communication, classroom management, use of appropriate teaching and learning resources, and evaluation of lessons (Ssempala, 2017). An evaluation exercise in form of classroom observation conducted in March 2018 by the SESEMAT National Office in the pilot districts of Iganga, Butaleja and others highlights no evidence of teamwork as teachers had inadequate support from colleagues and administrators (Kamwine, 2018).

In addition, attitudes of science teachers are key to effective teaching of science. This study sought to establish whether there were differences in attitude between SESEMAT- and non-SESEMAT-trained teachers. Kariisa (2017) identified that generally, teachers perceive teaching mathematics and science subjects as an act done out of motivation. Yvonne's (2018) Newsland study indicates that positive teachers' attitudes towards teaching science reinforces participation of learners and consolidates their ideas of science and its importance to their lives. In training institutions, Young's (2016) study in South Africa indicated that student primary teachers whose main subject is science have a markedly more positive attitude towards science than those of any other subject group. On the other hand, mathematics students are relatively confident about the study of science.

The above analysis about classroom professional competences and attitudes of science teachers indicates that there is a need to really compare the ways in which teachers of science apply professional skills such as teamwork, communication, classroom management, evaluation mechanisms, lesson content, and how they use appropriate teaching resources. To increase validity of results, the attitude of teachers of science was identified to be key in the teaching of science.

### **Statement of the Problem**

Ideally, CPD through SESEMAT training is expected to promote teaching competences and enhance positive attitude towards teaching and learning. Unfortunately, observations, especially in Eastern Uganda, indicate that non-SESEMAT trained teachers seem to demonstrate classroom teaching competences more effectively and efficiently than the SESEMAT trained teachers. In addition, the technical administrator of SESEMAT noted that one of the reasons for the introduction of the SESEMAT in-service training (INSET)

programme was government's realization of the need to change the attitudes of students towards doing sciences and to enhance teachers' skills in teaching. However, the minister of state for higher education while launching the SESEMAT handbook of lesson plan noted that they had realised that the teachers do not use the new methods of team teaching, co-teaching, and lesson study given to them during the SESEMAT trainings. The highlighted that instead, the teachers went back and used the same old approaches like lecture method, thus leading to continued failures seen up to date (Ssempala, 2017). This may result in negative impact on the country's workforce in science and technology if low attitude towards use of SESEMAT strategies during teaching of science and mathematics is not addressed (Vossen, 2019). This led to the need to evaluate and clarify whether differences do exist between SESEMAT-and non-SESEMAT-trained teachers.

## Purpose of the Study

To compare classroom competence between SESEMAT-trained and non-SESEMAT-trained teachers in Eastern Uganda.

#### **Objectives of the Study**

The specific objectives of the study were:

- 1. To establish whether there are differences in professional competences between science and mathematics teachers who are trained by SESEMAT programme and other teachers of mathematics and science.
- 2. The establish whether there are differences in attitude between teachers who are trained by SESEMAT programme and other teachers of mathematics and science.

#### **Hypothesis**

- $H_{01}$  There is no difference in professional competences between science teachers who are trained by SESEMAT programme and other teachers of science and mathematics.
- $H_{02}$  There is no difference in attitudes between teachers who are trained by SESEMAT programme and other teachers of mathematics and science.

## Methodology

# **Sampling Methods and Participants**

The researcher obtained a list of secondary schools in Eastern Uganda from Ministry of Education and Sports for the years 2010-2019 from which ten (10) secondary schools (five government and five private secondary schools) were selected by stratified random sampling. Non-probability purposive sampling technique was used to select teachers on the basis of attendance and non-attendance of SESEMAT training. Thus, a target sample of at least 4 science and mathematics teachers were selected from each school; where one was selected per subject that is to say Biology, Physics, Chemistry, and Mathematics, making 40 members of the sample size.

### **Research Instruments**

The study was informed by a self-administered questionnaire comprising of sections according to key components of the SESEMAT programme. Part A had statements on background information of the respondents, Part B had statements on professional competences such as objectives, introduction, content, communication, learning resources, learner participation, classroom management, evaluation, and Part C on attitudes of teachers regarding the SESEMAT objectives and training. The questionnaires were prepared for two categories of teachers – SESEMAT-trained and non-SESEMAT-trained. In addition, an observation checklist was used whose data was merged with that from the questionnaire to arrive at a composite value. This was made possible by using similar Likert scale for the questionnaire and observation checklist, that is, very good (4), good (3), fair (2), and poor (1).

# **Procedure of the Study**

In collaboration with the school authorities, O' level classes taught by teachers who had attended SESEMAT programme and those who had not attended the programme were observed using the observation tool during second term and each lesson took 80 minutes. All the ten schools were covered in three months from June to August 2019. The teachers were observed and given feedback in areas that needed improvement and in those that were performed well. Topics taught by the teachers were in line with the scheme of work at that particular time.

# **Data Analysis Techniques**

Independent sample t-tests were made which were determined with the help of Statistical Package for Social Scientists (SPSS version 17.0) programme. The independent sample t-tests were used to compare the average responses and observations of two groups that is the SESEMAT-trained teachers and non-SESEMAT-trained teachers on teacher competences in the classroom and their attitudes. According to Pallant (2013), this tool tests for group differences. Therefore, the independent sample t-test was chosen because it helped the researcher to determine the differences between trained and non-trained teachers (independent variable) in competences and attitudes (dependent variables).

# **Ethical Considerations**

Responses to questions by respondents were treated with high levels of confidentiality. Names of teachers, students and schools were not recorded or mentioned anywhere in the findings of this research article. This therefore, indicated that observers were not allowed to write the names of a teacher on the observation tool. Permission was sought at all levels before classroom observations were carried out. This meant that no information was accessed without the consent of the concerned authorities or respondents as individuals.

#### **Summary of Findings**

The researcher used independent sample t-test on the different competences of teachers in terms of professional knowledge, skills and creative attitudes in the classroom. This was in relation to planning, objectives, introduction, content, communication, learning resources, learner participation, classroom management, evaluation, and attitude of the teachers during lesson delivery of teachers trained by the programme and those not trained by the programme. For effect size, Eta squared was calculated using the formula:

$$t^{2}$$
  $t^{2}$  + (N1 + N2 - 2)

## Lesson Planning, Objectives and Introduction

Table 1 represents the results of the independent-samples t-test comparing competences in planning, objectives and introduction for SESEMAT- and non-SESEMAT-trained teachers.

Table 1

Planning,	<i>Objectives</i>	and Introd	luction	of Lesson
· · · · · · · · · · · · · · · · · · ·	./			./

	Independent Samples Test										
		Leve	ene's	t-test for Equality of Means							
		Tes	t for								
		Equa	lity of								
		Varia	ances								
		F	Sig.	t	df	Sig.	Mean	S.	95% Coi	nfidence	
			0			(2-	Diff	Error	Interval	of the	
						tailed)		Dif	Differen	ce	
									Lower	Upper	
Planning	Equal variances assumed	2.369	.126	2.674	38	.008	.625	.234	.163	1.087	
of lesson	Equal variances not assumed			2.694	35.3	.007	.625	.233	.161	1.085	
Clarity of	Equal variances assumed	9.749	.002	3.879	38	.000	1.000	.260	.490	1.512	
lesson objectives	Equal variances not assumed			3.868	30.8	.000	1.000	.259	.489	1.511	
Appropria teness of	Equal variances assumed	6.584	.011	2.998	38	.004	.700	.243	.225	1.178	
lesson introducti on	Equal variances not assumed			2.898	32.9	.004	.700	.242	.223	1.177	

Source: Researcher 2019

### **Lesson Preparation and Planning**

The Levene's results on preparation and planning had an F-statistic of 2.369 with a significance value of 0.126. Since .126 > .05, the assumption of equal variances was not violated and therefore equal variances were assumed. There was a significant difference in lesson planning for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 2.674, p = .008, two-tailed). The

magnitude of the differences in the means (mean difference = .625, 95% *CI*: 0.163 to 1.087) was small (eta squared = .04).

This means that in all schools sampled for classroom observation and survey of the science and mathematics teachers, there was a difference in the way the teachers carried out their preparation and planning for the lessons. For teachers of SESEMAT programme, they had schemes of work and records of work as one of the key tools for lessons. However, majority of those in non-SESEMAT-trained lacked lesson plans, records of work and class registers which affected their lesson planning. Teachers are therefore encouraged to attend in-service SESEMAT training to learn more about how they plan and prepare lessons. This was in line with the findings of Iwuagwu and Aiwuyo (2017) that in-service training serves as a machinery to achieve the goal of education as related to learning and skill development. They recommended that regular and systematic in-service training courses be organized for teachers. This would update, motivate, and enhance teachers' teaching skills. The training should be in form of sandwich courses, seminars, conferences, workshops and even part-time training programmes to be able to prepare and plan for their lessons.

#### **Clarity or Feasibility of Lesson Objectives**

The Levene's results on clarity of lesson objectives had an F-statistic of 9.749 with a significance value of .002 and because .002< .05, the 2 variables had statistically different variance distributions and equal variances were not assumed. There was a significant difference in clarity of lesson objectives for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 3.868, p = .000, two-tailed). The magnitude of the differences in the means (mean difference = 1.000, 95% *CI*: 0.489 to 1.511) was moderate (eta squared = .08).

This meant that for SESEMAT teachers their objectives were stated in clear specific language. The objectives indicated level of achievement and were stated in assessable terms. However, for the non-SESEMAT teachers since most of them had no lesson plans, their objectives were verbal and this affected their intended lesson objectives.

# **Appropriateness of Lesson Introduction**

The Levene's results on appropriateness of lesson introduction had an F-statistic of 6.584 with a significance value of .011 and because .011< .05, the 2 variables had statistically different variance distributions and so equal variances were not assumed. There was a significant difference in appropriateness of introduction for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 2.898 p = .004, two-tailed). The magnitude of the differences in the means (mean difference = .700, 95% *CI*: 0.223 to 1.177) was small (eta squared = .05).

During the lessons, SESEMAT teachers made reference to the previous lessons or every day experiences. They helped to focus on content of the lesson which stimulated the attention of the class unlike the Non SESEMAT teachers.

	Independent Samples Test									
		Levene's t-test for Equality of Means								
		Test f	or							
		Equal	ity of							
		Varia	nces							
		F	Sig.	t	df	Sig.	Mean	Std.	95% C.	I
						(2-	Diff.	Error	Difference	
						tailed)		Diff	Lower	Upper
Lesson	Equal variances assumed	.290	.591	1.580	38	.116	.475	.301	119	1.069
content	Equal variances not assumed			1.580	37.9	.117	.475	.300	119	1.068
	Equal variances assumed	.634	.427	3.001	38	.003	1.213	.404	.415	2.010
commu										
nication	Equal variances not assumed			3.001	37.2	.002	1.211	.402	.414	2.011
Learner	Equal variances	.676	.412	.726	38	.469	.138	.189	237	.512
resourc es	Equal variances not assumed			.726	37.5	.465	.137	.187	237	.511

### Table 2

Teacher Communication and Learner Resources

# Source: Researcher 2019

# **Teacher Communication and Learner Resources**

Table 2 represents the results of the independent-samples t-test comparing competences in lesson content, communication and use of appropriate teaching-learning resources for SESEMAT- and non-ESEMAT-trained teachers.

# **Lesson Content and Learning Points**

The Levene's results on lesson content and learning points had an Fstatistic of 0.290 with a significance value of .591. Because .591 >0.05, the 2 variables had no statistically different variance distributions, that is, equal variances were assumed. There was no significant difference in lesson content for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 1.58, p = .116, two-tailed). The magnitude of the differences in the means (mean difference = .475, 95% *CI*: -0.119 to 1.069) was small (eta squared = .02).

This indicated that all teachers observed during their lessons showed no difference in as far as lesson content and learning points were concerned. All content was connected to the learners' previous knowledge and experience and was logically and systematically structured. This was observed in the learners' books. All content was within the learners' level, adequate for all the classes of ordinary level. The content was found to be adequate as all secondary schools follow the same syllabi of National Curriculum Development Centre in the whole country. The topics would be confirmed in the scheme of work, lesson plan and record of work. This therefore indicated that teachers' competences were uniform.

# Communication by Teacher in the Lesson

The Levene's results on communication by the teacher had an F-statistic of 0.634 with a significance value of 0.427. Because 0.427 >0.05, the 2 variables had no statistically different variance distributions, hence equal variances assumed. There was a significant difference in communication for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 3.001, p = .003, two-tailed). The magnitude of the differences in the means (mean difference = 1.213, 95% *CI*: 0.414 to 2.011) was small (eta squared = .05).

SESEMAT teachers were found to be different in the way they communicated to learners in classroom. They clearly and evenly distributed questions, well phrased the questions, their language was appropriate to the level of the class taught. They used friendly language and gestures and their voice tone and pitch were utilized to catch the attention and emphasized points to the learners. They gave opportunity to listen to all learners handled in the lesson. This was due to the fact that they apply SESEMAT methodologies. However, the non SESEMAT teachers were not clear in the way they phrased their questions to the learners, and they communicated to only learners at the front. For some teachers, their language was not friendly, failing to capture the attention of the learners, always complaining that the classes are of big size. This affected their voice projections, in the end learners failed to understand what the teachers were teaching. This was evident in mathematics lessons. The findings are in line with those of Maclean's (2018) study who concluded that inservice training had positive impact on teacher job performance in public senior secondary schools. Based on his findings opportunities for in-service training programme should be made available to all categories of teachers, all stakeholders should revitalize the organization of regular seminars, workshops, and conferences for old and newly employed practicing teachers. This would enable them learn communication skills to be used in lessons.

# Use of Appropriate Teaching / Learning Resources in the Lesson

In Table 2, the Levene's results on appropriate teaching/learning resources had an F-statistic of 0.676 with a significance value of .412. Because .412 >.05, the 2 variables had no statistically different variance distributions, that is equal variances were assumed. There was no significant difference in appropriate teaching-learning resources for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = .726, p = 0.469, two-tailed). The magnitude of the differences in the means (mean difference = 0.189, 95% *CI:* - 0.237 to 0.512) was very small (eta squared = .003).

This revealed that majority teachers observed had no adequate and appropriate teaching and learning resources. This was evident between both the science teachers of government and private schools. There was less evidence of improvisation and economy in the use of learning materials. Though SESEMAT teachers during their insets are taught the ALEI approach which refers to activity, learner centred and improvisation. This implies that effective teaching involves a teacher giving an activity which is learner-centred with improvisation of learning materials. They were not creative to use local teaching aids. Ketevan and Garakanidze's (2010) study confirms that with the demands of many educational reforms, a teacher should not only be a provider of knowledge and skills, but also have a positive attitude towards innovations, feel the necessity for self-education, and adopt a student-centred teaching approach.

#### Table 3

	1	,	- 1 1	Indepe	ndent San	ples Tes	t			
		Levene's	5	t-test f	or Equalit	y of Mea	ns			
		Test	for							
		Equality	v of							
		Variance	es							
		F	Sig.	t	Df	Sig.	Mean	Std.	95% Con	fidence
						(2-	Differe	Error	Interval c	of the
						tailed)	nce	Diff	Differenc	e
									Lower	Upper
participati on	Equal variances	3.800	.053	2.147	38	.033	.763	.355	.061	1.464
	Equal variances			2.147	35.400	.029	.764	.357	.063	1.465
	not assumed Equal	1.669	.198	.950	38	.344	.300	.316	324	.924
Learner support	variances assumed Equal variances			.950	34.802	.340	.300	.317	325	.925
	assumed Equal	2.823	.095	1.082	38	.281	.363	.335	299	1.024
Classroo m organizati on	variances assumed Equal variances			1.082	35.732	.278	.365	.337	300	1.025
	not assumed									

Learner Participation, Support, and Classroom Organisation

### Source: Researcher 2019

# Learner Participation, Support, and Classroom Organisation

Table 3 represents the results of the independent-samples t-test comparing competences in participation, learner support and classroom management for SESEMAT- and non-SESEMAT-trained teachers.

## Learner Involvement or Participation in the Lesson

The Levene's results on learner involvement in a lesson had an F-statistic of 3.800 with a significance value of .053. Because .053 > .05, the 2

variables had no statistically different variance distributions hence equal variances assumed. There was a significant difference in learner involvement and participation for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 2.147, p = 0.033, two-tailed). The magnitude of the differences in the means (mean difference = .763, 95% *CI*: 0.061 to 1.464) was small (eta squared = .03).

The findings of the study revealed that in the lessons of some SESEMAT teachers, learners were grouped in different groups. This enhanced participation of the learners in various discussions. This was observed in physics, chemistry and biology classes. The learners were involved in meaningful hands-on activities and experiments and tasks, and teachers solicited and used learners' ideas. Among the non SESEMAT observed, teachers only remained in front of the classes, did not form groups, and less tasks were given to the learners, an indication that they need to improve on the way they conduct their lessons. This was in line with finding on the SESEMAT teachers who always worked as a team of teachers during their lessons. Meister's (2010) study also revealed that teachers need a community of friends to do everything together. Further, she asserts that collegiality includes training teachers in the use of group skills, providing the time and place for on-going collaboration. Since teachers view students' success both academically and socially as the most important part of their work, administrators need to create ways to engage teachers in professional development.

# Learner Support and Encouragement in the Lesson

The Levene's results on learner support and encouragement had an Fstatistic of 1.669 with a significance value of .198. Because .198 >0.05, the 2 variables had no statistically different variance distributions hence equal variances assumed. There was no significant difference in learner support and encouragement for SESEMAT-trained and non-SESEMAT-trained teachers; t(40) = 0.950, p = .344, two-tailed). The magnitude of the differences in the means (mean difference = .300, 95% *CI:* -0.324 to 0.924) was very small (eta squared = .006).

It was revealed from the majority of teachers observed that there was student discussion in groups where the teacher corrected learners' misconceptions. There existed prompt feedback to learners' responses. Teachers tried to relate learners' ideas to content taught. It was observed that weak learners were encouraged to participate whereas first learners were challenged with more tasks. The teachers exercised flexibility and patience with all learners' ideas. This revealed that they could attend to all the needs of the learners during the lessons. The findings on the side of all teachers are in line with the findings of Gacohi, Sang and Ngesa's (2005) study which revealed that teachers implemented the principles, skills and knowledge they learnt in the course of their teaching and that individual teacher's characteristics do not influence the adoption of INSET (in-service training). The study of Gacohi et al. recommended that head teachers should put in place mechanisms in their schools to ensure that teachers implement all the principles, skills and knowledge learnt from INSET. There was also need for schools to take advantage of the high level of adoption of the INSET to encourage more students to enrol and improve their academic performance in these subjects.

# **Classroom Management and Organization**

The Levene's results on class management and organisation had an Fstatistic of 2.823 with a significance value of .198 because 0.198 > .05, the 2 variables had no statistically different variance distributions, that is, equal variances assumed. There was no significant difference in classroom management and organization for SESEMAT-trained and non-SESEMATtrained teachers; t (40) = 1.082, p = .363, two-tailed). The magnitude of the differences in the means (mean difference = 0.363, 95% *CI:* -0.299 to 1.024) was very small (eta squared = .007).

It was an outcome of the study that the classroom management and organization was not statistically significantly different for teachers who underwent SESEMAT training and those who did not, probably due to the fact that in all classes handled by the teachers, a majority showed care for the discipline of all learners in the class even when the numbers of student were very big. The teachers could supervise individual learners as well as groups. The teachers also showed care for the orderliness of furniture, materials and charts. During delivery of content they tried to vary their methodology. However, concerning time management, the teachers lamented that they cannot practice all the SESEMAT methodologies because they are always given little time on the time table. Hence it was revealed that the reason why they failed to conduct lessons the way SESEMAT entails it was due to time factor. This makes them to return to lecture method in lessons so as to complete the syllabi in time as required by the school administrators.

# **Evaluation and Attitude of the Teacher**

Table 4 represents the results of the independent-samples t-test comparing lesson evaluation and attitudes for SESEMAT- and non-SESEMAT- trained teachers.

### **Consolidation and Evaluation of the Lesson**

The Levene's results on consolidation and evaluation of the lesson had an F-statistic of 1.220 with a significance value of 0.271 because 0.271 >0.05, the 2 variables had no statistically different variance distributions, that is, equal variances assumed. There was no significant difference in lesson evaluation for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = 1.236, p = 0.218, two-tailed). The magnitude of the differences in the means (mean difference = .300, 95% *CI*: -0.179 to 0.779) was small (eta squared = .01).

In the classes observed, all the teachers of science and mathematics tried to summarise the main learning points. This was majorly by written exercise especially in mathematics. Learners were prompted and given tasks, seek clarification. The learners could neatly write down the lesson notes and the

Evaluation and Attitude of the Teacher													
		Lever	ne's	t-test for Equality of Means									
		Test f Equal	or ity of										
		Varia	nces										
		F	Sig.	t	df	Sig. (2-	Mean	Std.	95% Co	nfidence			
						tailed)	Differ ence	Error Differ	Interval Differen	of the			
								ence	Lower	Upper			
	Equal variances assumed	1.22	.271	1.236	38	.218	.300	.243	179	.779			
evaluation	Equal variances not assumed			1.236	35.2	.214	.300	.241	178	.777			
Attitude	Equal variances assumed	1.37	.242	084	38	.933	025	.297	612	.562			
and behaviour	Equal variances not assumed			084	35.3	.928	023	.295	610	.512			

Table 4	
Evaluation and Attitude of the	Teacher

## Source: Researcher 2019

observer could check a section of books for the learners' notes during the lesson to confirm. Across the seven competence areas teachers showed low level of competence with minor differences. Teachers in the non-governmental schools had a significantly higher level of competence than teachers who taught at governmental schools. This is different from the findings of the present study.

# Attitude and Behaviour of the Teacher

The Levene's results on attitude and behaviour of the teacher had an Fstatistic of 1.379 with a significance value of .242. Because .242 >0.05, the 2 variables had no statistically different variance distributions. There was no significant difference in lesson planning for SESEMAT-trained and non-SESEMAT-trained teachers; t (40) = -0.084, p = .933, two-tailed). The magnitude of the differences in the means (mean difference = -0.025, 95% *CI*: -0.612 to 0.562) was very small (eta squared = .0004).

The study revealed that teachers showed concern for the learners and enjoyed their lessons with their learners. The teachers had a sense of humour to keep classes jolly. This was because these teachers had been taught how to create a positive learning environment and attitude change in their lessons. The findings on the side of the teachers of mathematics was in agreement with the findings of Azhari and Zaleha's (2015) study that revealed that the professional knowledge, functionality skills and creative attitudes were identified as the critical elements of teachers' competence for creative teaching in mathematics.

#### Conclusions

The study was carried out to compare professional competences and attitude between SESEMAT- and non-SESEMAT-trained teachers in Eastern Uganda and the conclusions were based on the findings of the study and the above discussion. Out of the eleven components compared, that is, Lesson Planning, Clarity of Objectives, Appropriateness of Introduction, Lesson Content, Communication, Learners' Resources, Learner Participation, Learner Support, Classroom Management, Evaluation, and Attitude and Behaviour, teaching competences of SESEMAT and non SESEMAT teachers were statistically significantly different in five of them as observed during the lessons of science and mathematics. These include Lesson Planning, Clarity of Objectives, Appropriateness of Introduction, Communication, and Learner Participation. Generally, SESEMAT-trained teachers delivered well the lessons regarding the SESEMAT competences observed than the teachers not under the SESEMAT programme. It is therefore a conclusion of this study that provided with enough time on the timetable to the science and mathematics subjects, the teachers would be able to implement SESEMAT methodologies taught during the INSETS. For the non-SESEMAT teachers it was concluded that they largely lacked competences to deliver lessons of science and mathematics.

# Recommendations

In light of the findings of this study, discussions and conclusions, the following recommendations are made for teachers' implementation of SESEMAT teacher competences in Uganda. The study recommends that teachers both in private and government schools should be encouraged to attend the SESEMAT INSETS to be able to understand the competences required during delivery of lessons. The teachers should also be given adequate inservice training programmes with attention and support from Ministry of Education and Sports. For private schools the directors should be sensitized about the benefits of teachers attending the SESEMAT programme. This may help improve on the number of quality passes at Ordinary level.

# References

- Azhari, S., & Zaleha, I. (2015). The elements of teachers' competency for creative teaching in mathematics. International Education Studies Vol. 8, No. 13; 2015 ISSN 1913-9020
- Gacohi. K. M., Sang, K. A & Ngesa, U. F. (2005). Effects of SMASSE programme in-service education and training on the teaching of mathematics and science in secondary schools in Koibatek district, Kenya.
- Iwuagwu. B. O., & Aiwuyo, M. O. (2017). Effect of in-service training on effective classroom control and student's relationship in secondary schools in Edo central senatorial district. *African Educational Research Journal*, 5(2), 152-155.

- Japan International Cooperation Agency (JICA). (2017). Secondary science and mathematics teachers' programme. Retrieved from: https://www.jica.go.jp
- Kamwine, E. (2018). An assessment of the implementation of subsidiary mathematics and subsidiary information communication technology curricula at advanced level. Kampala: National Curriculum Development Centre.
- Kariisa, H. (2017). Perceptions of secondary school mathematics teachers towards secondary science and mathematics teachers (SESEMAT) programme in Mbarara District, Uganda. *International Journal of Recent Advances in Multidisciplinary Research*.
- Ketevan, K., & Garakanidze, E. (2010). *The professional competencies of the* 21stcentury school teacher. Problems of education in the 21st century Volume 20, Ilia state university, Georgia.
- Kisangi, A., & Ateng, O. (2013). Enhancing teachers' capacity through inservice education & training: A reflection on projects for Strengthening Mathematics, Science and Technology Education in Africa: Slideshare.
- Komakech, R. A. (2014). Uganda SESEMAT programme: Impact and challenges in its implementation. Washington DC: Researchgate.net.
- Maclean, I.F. (2018). In-service training and job performance in public secondary schools in River State, Nigeria: *International Journal of Scientific Research in Education*, 11(3B), 493-520.
- Makaaru, J. A., Nick, T., Emma, B., & Oloya, C. (2019). Secondary education in Sub-Saharan Africa teacher preparation and support: A case of Uganda. Johannesberg: Mastercard Foundation.
- Malunda, P. (2018). *Teacher professional development and quality of pedagogical practices in public secondary schools in Uganda.* Retrieved from: https://www.researchgate.net.
- Meister, D. G. (2010). Experienced secondary teachers' perception of engagement and effectiveness: A guide for professional development. Pennsylvania USA.The Qualitative Report vol.15.NO 4,880-898, (2010).
- Ministry of education and Sports, (2006). *Teaching guidelines for science and mathematics teachers (SESEMAT) programme*. Kampala Uganda.
- Muyingo, J. C. (2017). *Minister for higher education in Uganda blames teachers for poor performance in science:* Africa News, Retrieved from www.africanews.com
- Pallant, J. (2013). SPSS survival manual: A step by step guide to data analysis using IBM SPSS. Berkshire, England: McGrow Hill Education.
- Ssempala, F. (2017). Science teachers' understanding and practice of inquirybased instruction in Uganda. NewYork: Syracuse University.
- SESEMAT programme, (2008). Pilot expansion cycle two national training. Teamwork in the teaching and learning of science and mathematics. Kampala Uganda.

- Tynan.H and Greenes.S. (2012). Using SPSS for data analysis: support document for SPSS output tables, office of planning, assessment, research and quality. University of Wisconsin.
- UNESCO. (2012). Report on UN decade of education of tomorrow for sustainable development. DESD monitoring & evaluation. : Arjen, E. J.
- UNESCO. (2017). cracking the code: Girls and Women's education in science and technology, engineering and mathematics (STEM).7 Place de Fontenoy, 75352 Paris 07 sp, France.
- Vossen, T. E. (2019). Attitudes of Secondary School STEM Teachers towards Supervising Research and Design Activities. Washington DC: Research in Science Education.
- Young, T. (2016). *Student Teachers' Attitudes Towards Science (STATS)*. London: https://www.tandfonline.com.
- Yvonne, U. (2018). *Teachers' A eachers' Attitudes T ttitudes Toward Teaching Science in a New Z eaching Science in a New Zealand*. Gillan: University of Auckland.