HOW SECONDARY SCHOOL MATHEMATICS TEACHERS PERCEIVE THE EFFECTIVENESS OF MICROTEACHING AND TEACHING PRACTICE IN THEIR PRESERVICE EDUCATION

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ABSTRACT

Teacher education is an important pillar of every education system worldwide. Consequently, there is a need to determine the efficacy of teacher education programs in preparing good-quality teachers. The aim of this study is to investigate the impact of learned media and teaching skills on the teaching of mathematics in secondary schools. We therefore explore how secondary school mathematics teachers perceive the effect of "media practicals" and "microteaching" on teaching practice through a survey study. Seventy respondents provided usable data for the analysis, which indicated that media practicals are well organized and microteaching helps the majority of student teachers practice the various teaching skills they had learned. However, the majority of respondents (61.4%) stated they were not able to implement all the techniques they learned during their teacher training, while most respondents' (57.1%) teaching practice sessions were only assessed once by their supervisors. A major recommendation is that teaching practice assessment should be emphasized and undertaken at least twice.

Contribution/Originality: This study contributes to the existing literature and discourse on the effectiveness of teacher education programs, with a focus on the reform agenda. Media practicals and microteaching are two main components of teacher education that have a strong bearing on the quality of teachers in imparting knowledge, competence, and attitudes to the youth of any state or country.

1. INTRODUCTION

In current society, education plays a key role in inculcating the youth with the relevant knowledge, attitudes, efficacy, and competence to operate in the 21st century. Teacher education is one of the main pillars of any educational system: its overarching role is to prepare suitably qualified teachers required by that system.

Sifuna (1990) asserts that teacher education in Kenya dates back to the Phelps Stokes Commission Education Report of 1919, which recommended government grants for and the encouragement of every mission society to establish training centers for primary school teachers. Further, the Phelps Stokes Commission of 1924 stressed the serious need for trained teachers. Kagumo College opened later in 1944 to train primary school teachers. Teacher training at degree level in East Africa dates back to its introduction at Uganda's Makerere University in 1962. An education department was not set up in Kenya until 1966, which later became the Faculty of Education at Nairobi University in 1970, offering undergraduate programs for science and arts teachers. A three-year course had been available at Nairobi's Central Teachers Training College in 1963, however.

In 1966, Kenya Science Teachers College (KSTC) was established with Swedish funding to supplement the then meager number of science teachers. Nevertheless, since the 1970s, the curriculum for teacher education has remained inflexible and restricted in nature and scope, emphasizing the training rather than preparation of teachers (Kafu, 2006) and making little attempt to respond to the emerging trends of the information society and knowledge economy in the 21st century. Consequently, the system continues to produce conservative, traditional schoolteachers who resist change and lack creativity, and are thus unable to manage emerging, modern instructional and non-instructional situations. The current number of trained teachers is more than ample, but the major concern is how *qualified* they are in efficiently and effectively executing the curriculum (Nanjankululu, 2010).

Apart from the quantity, the quality of teachers inspires students' educational success; therefore, the main focus of teacher education is facilitating an efficient relationship between theory and practice (Von Bargen, 2014). In order to understand the concerns about *teacher quality*, this study explores two aspects of teacher preparation: (i) media practicals and microteaching, and (ii) teaching practice.

2. LITERATURE REVIEW

2.1. Media Practicals and Microteaching

Teachers are expected to use instructional materials and other teaching aids to facilitate a successful learner experience. In preparing student teachers to use instructional materials, and media in general, effectively, they receive a number of *media practicals* and *microteaching*. Student teachers must be able to design and develop/produce or construct their own teaching aids—to be less dependent on commercially produced ones—and media practicals teach skills in lettering and chalkboard use, graphics (e.g., charts, diagrams, cartoons, etc.), three-dimensional teaching aids (e.g., models, dioramas, puppets, etc.), audiovisual recordings, and so on (Patel and Mukwa, 1992). Student teachers are then given the opportunity to produce actual teaching aids, which are assessed to ensure they meet the minimum standards for teaching the identified concept(s).

According to Remesh (2013), the art of teaching is not simply the straightforward, effortless transfer of knowledge from teacher to learner; teaching must be understood as a complex *process*, not a *product*, involving a number of intervening steps, in an environment with inherent, latent distractions. The basic components of the teaching paradigm are: source (teacher), message (subject matter), media (means of communication), and receiver (learner), with the teacher's role being to *encode* the message in appropriate *linguistic*, *symbolic*, or *gestural forms* that the learner can *decode* (Mwei, 2017). Where teachers teach and learners interpret and "learn," the environment is of paramount importance to the quality of that teaching and learning. As teaching is a process that takes a considerable time to acquire and perfect, student teachers undergo microteaching during their preparation program (teacher education) to acquire the required skills.

Microteaching originated in 1963 at Stanford University in the USA during an experiment to identify *teaching skills* (Shah and Masrur, 2011; Bilen, 2015; Sa'ad *et al.*, 2015). The technique has since been implemented in almost all college and university teacher education and training programs, emphasizing the development of teaching skills among student teachers: "A teaching skill is a set of teaching behaviors of the teacher which is especially effective in bringing about desired changes in pupils' behavior" (Shah and Masrur, 2011, p. 22). Microteaching is thus a teacher training technique or system that helps the student teacher to master most basic teaching skills: set induction and closure, classroom management, reinforcement, stimulus variation, explaining, questioning, illustrating with examples, and so on.

Sen (2010) posits that microteaching is an environment in which student teachers teach a scaled-down (i.e., a reduced number of learners and limited time period) and somewhat "artificial" class. As such, it offers both inexperienced and experienced teachers the opportunity to acquire new or refine existing teaching skills, respectively. Microteaching aims to simplify the complex teaching process (Aggrawal, 2006) by video recording a

student teacher's class for later evaluation; indeed, Aggrawal (2002) observed that microteaching is the process of subjecting samples of human behavior to the 5Rs: video recording, reviewing, responding, refining, and redoing.

2.2. Microteaching Cycle

There are generally six main steps involved in microteaching: (1) plan, (2) teach, (3) feedback (observe or criticize), (4) replan, (5) reteach, and (6) re-feedback (reobserve or recriticize) (Shah and Masrur, 2011; Remesh, 2013; Saban and Çoklar, 2013). Briefly, each step involves the following:

1. *Plan*: This involves selecting the topic and related content with which a specific skill can be easily and conveniently practiced. The topic is divided into different activities for the teacher and students, in such a way that the maximum application of the skill is possible.

2. *Teach*: This is when the student teacher attempts to practice the skill when suitable situations arise in the process of teaching–learning, in accordance with the plan of activities.

3. *Feedback*: This is when the student teacher is given pointers on the strengths and weaknesses of their performance, helping to improve performance in the desired direction.

4. *Replan*: The student teacher then replans the lesson, incorporating their strong points and removing those points that were not skillfully handled; either the same or a different topic more suited to an improvement can be used.

5. *Reteach*: This is when the student teacher teaches a class once more, with renewed confidence and determination to perform better. To avoid any monotony, either the same students can be taught a different topic or different students the same topic.

6. *Re-feedback*: Further advice is offered to the student teacher on modifications in the desired direction following every practice session.

Despite detractors arguing that microteaching is an inadequate and inefficient teacher training technique because the real classroom is so different (Sen, 2010), it does have potential value in ensuring student teachers acquire a minimum level of proficiency in the required teaching skills before entering a real classroom. Moreover, microteaching raises an awareness of classroom dynamics, enhances observation skills, and provides experience of a classroom environment (Sonmez, 2012). Bento-Kupper (2001) highlights the value of microteaching as an instructional tool in teacher education and how, when the necessary resources and ambience are provided, is more effective than traditional teaching. According to Subramaniam (2006), microteaching benefits student teachers in the following ways:

1. It exposes them to the realities of teaching.
2. It introduces them to their roles as teachers.
3. It helps them understand the importance of planning, decision-making, and implementation in teaching.
4. It enables them to develop and improve their teaching skills.
5. It helps them to build their self-confidence.

Microteaching may be small-scale, but its effect is substantial: it improves teaching skills by revealing and correcting any problems before student teachers enter the real classroom, and equips them with an empirical *toolkit* of a range of skills, knowledge, and attitudes from which they can develop further in both their teaching practice and long-term professional career. Participation in well-planned, implemented, and monitored microteaching experiences will ensure student teachers are able to respond appropriately to many (if not most) real classroom scenarios.

2.3. Teaching Practice

Teaching practice provides student teachers with the opportunity to experience real, complex classroom situations in which they can demonstrate their teaching and media skills under a host teacher's supervision and be

regularly assessed by their home institution. These skills must be observable not only during but also pre- and post-lesson. Endeley (2014) posits that teaching practice, or practicum, is a key component in teacher education programs, since, as well as developing competence, it focuses on helping student teachers to bridge the gap between theory and practice.

In Kenya, teaching practice is one of the most influential practical components of preservice teacher education programs, which are supposedly bound to content delivery. Lasting between six and twelve weeks, student teachers are provided with an in-depth experience of, and, primarily, enabled to exercise all the skills they have learned in, a real classroom situation.

Arends (2004) emphasizes that the main purpose of preservice teaching practice is to create a diverse expertise among student teachers so that they can face challenges in the future. Their professional competence and development includes creating instructional tools, maintaining teaching quality, ensuring efficient content delivery, and disseminating core knowledge gained through the preservice training. Teaching practice aims to improve student behavior, test their knowledge of subject matter, provide constructive criticism, discover students' teaching strengths and weaknesses, and develop a core set of values by which a professionally competent teacher abides.

However, Sabar (2004) and Korthagen *et al*. (2006) state that teaching practice is just as likely to induce negative as positive attributes among student teachers. Likewise, Tang (2003) and Tickle (2000) posited that teaching practice often fails to achieve the desired outcomes despite the excessive amount of time spent: it appears to be an ineffectual scholastic activity.

Nevertheless, Beck and Kosnik (2002) maintain that to produce satisfied and effective teaching professionals, teaching practice must be based on a sound knowledge about its practical application in real classrooms. In addition, student teachers gain experience in lesson planning and how to competently put that lesson plan into effect in a natural classroom setting (Bilger, 2017). Andabai (2013) also argues that teaching practice offers student teachers the opportunity to enhance their professional competence and confidence in lesson preparation and teaching (p. 113). As part of educational reform, this can help improve the teachers' behavior during a lesson, leading to the conclusion that the main aim of teaching practice is to build their core competence not only in the classroom but also following the lesson.

Teaching practice brings together three key players, university supervisor, host teacher, and student teacher, to determine the level of experience and confidence the student teacher will gain (Aglazor, 2017). Supervision during teaching practice is a very important aspect: supervisors visit the host schools to observe the student teachers and advise on their teaching. Anderson (2001) states that supervision can take the form of either an apprenticeship or laboratory experience. Researchers further suggest that, during the teaching practice cycle, student teachers should observe some of the host teachers delivering their lessons and discern the atmosphere of different classes and the school in general.

2.4. Conceptual Framework

According to Sa'ad *et al*. (2015), student teachers' performance in microteaching can be used to predict that in teaching practice. Therefore, this study defines success in teaching practice as a function of those skills acquired in the media practicals and microteaching. Equipped with these skills, a teacher can enter into any school environment that has its own complex relations, as indicated in Figure 1.

The skills acquired in media practicals are a basic step in designing and developing instructional media, which in Figure 1 are believed to influence success in both microteaching and teaching practice. Instructional media, which are used in both microteaching and real classrooms during teaching practice, can be viewed as the *spices that sweeten the teaching–learning situation* but play a pivotal role as the *means* by which subject matter is encoded and transmitted to the learner. Microteaching itself is also considered to influence success in teaching practice, which is seen as the *arena* or *playground* in which student teachers use the teaching skills acquired in microteaching to play

their game. However, in the final analysis, there are other factors (e.g., school environment, teacher personality, etc.) that interact with the skills acquired to affect teaching practice. These factors act as moderators, which either enhance or diminish the effect of the skills acquired in media practicals and microteaching, on student teachers' success in teaching practice.
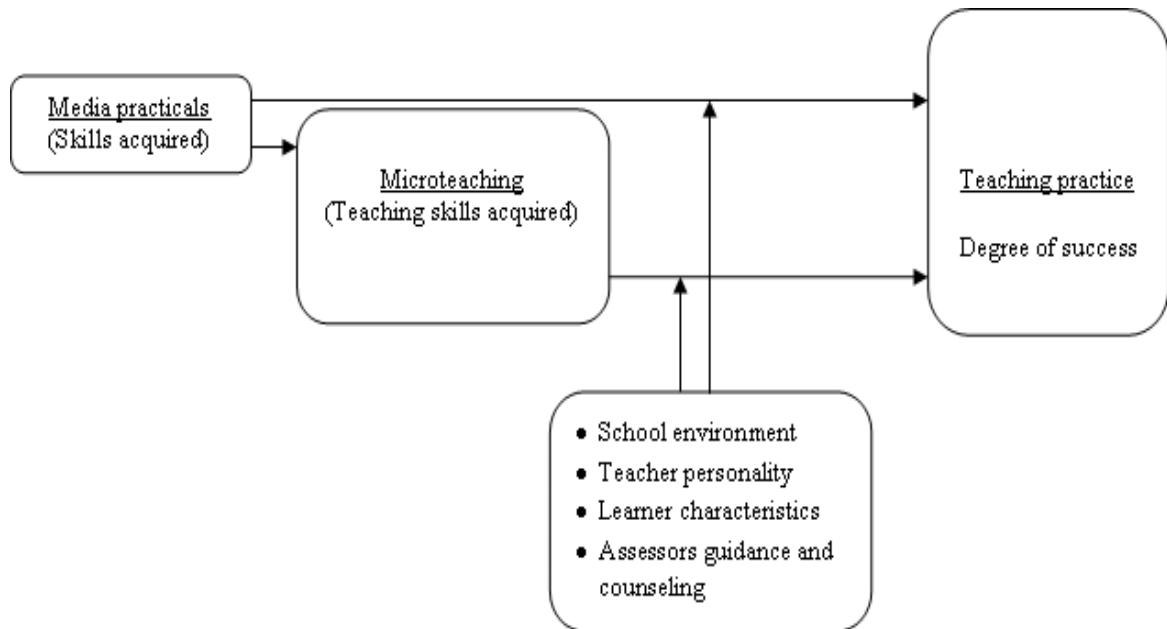

Figure-1. A Model of the Effects of Media Practicals and Microteaching on Teaching Practice.

3. MATERIALS AND METHODS

3.1. Research Questions

The following two research questions were addressed in this study:

1. What are the perceptions of mathematics teachers of the effectiveness of microteaching in preparing for teaching practice?
2. What are teachers' perceptions of the role of teaching practice in preparing for secondary school teaching?

3.2. Research Design and Methodology

An ex post facto survey was undertaken by means of a questionnaire. We obtained responses from 70 secondary school mathematics teachers, all of which were usable.

4. RESULTS AND DISCUSSIONS

4.1. Research Question 1: What are the Perceptions of Mathematics Teachers of the Effectiveness of Microteaching in Preparing for Teaching Practice?

This section addresses the first research question, for which the respondents were asked three questions.

4.1.1. Organization of Media Practicals before Microteaching

Teachers were asked to rate the organization of media practicals undertaken before microteaching as either *excellent, good, fair, poor*, or *very poor*. Their responses are shown in Table 1. The majority (44; 62.9%) were satisfied with the organization, giving either a good or excellent rating, while twenty-three (32.9%) rated it as average, and 3 (4.3%) as either poor or very poor. This finding indicates that most respondents appreciated how the media practicals would prepare them for microteaching.

Table-1. Teachers' Perceptions of the Organization of the Media Practicals Component.

How would you rate the organization of media practicals that you undertook before peer or microteaching?	Frequency	Percentage
Excellent	13	18.5
Good	31	44.3
Fair	23	32.9
Poor	2	2.9
Very poor	1	1.4
Total	70	100.0

4.1.2. The Extent to which Microteaching Helps Student Teachers Practice Various Skills

They respondents were then asked to rate the extent to which microteaching had helped them to practice what they had learned in their lectures. Table 2 shows their responses: 55 (78.6%) of respondents agreed that microteaching helped them to a large extent, while 7 (10%) felt that they were only helped to a small extent, but 8 (or 11.4%) were undecided. This implies that the teachers appreciated microteaching as a very important component of preservice teacher training, providing a good opportunity to practice the skills learned. This also supports Subramaniam's (2006) view that microteaching helps student teachers develop and improve their teaching skills and build their self-confidence. Furthermore, microteaching is shown to have the potential to ensure student teachers achieve a certain level of proficiency in the required skills before entering a real classroom.

Table-2. Extent to which Microteaching Helps Student Teachers Practice Various Skills.

How would you rate the extent to which microteaching helped you practice the various teaching skills you learned in your lectures?	Frequency	Percentage
Large extent	55	78.6
Undecided	8	11.4
Small extent	7	10.0
Total	70	100.0

4.1.3. General Conduct and Evaluation (Feedback) Process of Peer Teaching as a Teacher Training Method

The respondents' ratings on the feedback process are given in Table 3. Of the three options, 8 (11.4%) teachers did not consider the process very helpful, 25 (35.7%) moderately helpful, and 37 (52.9%) very helpful; the majority, therefore, believed their feedback helped them improve their teaching skills. This finding supports the aforementioned argument that microteaching helps student teachers not only prepare lessons and practice their teaching skills but evaluate their performance through feedback. They can then modify and improve their lesson plan and reteach the lesson (Shah and Masrur, 2011; Remesh, 2013), which is followed by re-feedback to enable them to achieve mastery of the teaching skill.

Table-3. General Conduct and Evaluation (Feedback) Process for Peer Teaching as a Teacher Training Method.

How would you rate the general conduct and evaluation of peer teaching as a way of training teachers in your institution?	Frequency	Percentage
Very helpful	37	52.9
Moderately helpful	25	35.7
Not very helpful	8	11.4
Total	70	100.0

4.2. Research Question 2: What are Teachers' Perceptions of the Role of Teaching Practice in Preparing for Secondary School Teaching?

This section addresses the second research question, for which the respondents were asked four questions.

4.2.1. Awareness of the Purpose of Teaching Practice

The teachers' responses about their awareness before teaching in real classrooms are shown in Table 4. Over half of the teachers 58 (82.9%) were, while 11 (15.7%) were not, aware of the purpose of teaching practice beforehand. This implies that it is well understood that teaching practice is designed to prepare mathematics teachers for working in secondary schools, which supports Arends' (2004) assertion that the main purpose of preservice teaching practice is to create a diverse expertise among student teachers and enable them to face future challenges.

Table-4. Awareness of the Purpose of Teaching Practice.

The purpose of teaching practice was well known to me before I went into the field.	Frequency	Percentage
Strongly Agree	13	18.6
Agree	45	64.3
Undecided	1	1.4
Disagree	8	11.4
Strongly disagree	3	4.3
Total	70	100.0

4.2.2. Ability of Student Teachers to implement all Learned Techniques

Responses on implementing teaching techniques are recorded in Table 5 and reveal that 43 (61.4%) of the respondents were not able to use all the techniques they learned and only 25 (35.7%) had done so. This finding supports the conclusion of Tang (2003), Tickle (2000), and Wilson *et al.* (2001) that teaching practice often failed to achieve the desired outcomes despite the amount of time taken. In this study, the majority of respondents did suggest that host schools nearer teacher training colleges should be selected so that student teachers could regularly visit and observe experienced teachers practicing the different skills they had been taught before starting their own teaching practice.

Table-5. Ability of Student Teachers to Implement all Learned Techniques.

I was able implement all the techniques I learned as a student teacher.	Frequency	Percentage
Strongly Agree	1	1.4
Agree	24	34.3
Undecided	2	2.9
Disagree	33	47.1
Strongly disagree	10	14.3
Total	70	100.0

4.2.3. Number of Times Trainees were Supervised

The respondents were asked whether they were supervised once, twice, or more than twice. The findings indicated that 40 (57.1%) were supervised once, 25 (35.7%) twice, and 5 (7.1%) more than twice. It is evident that the majority of teachers were only supervised once or twice, which according to Msangya *et al.* (2016) is insufficient. Khalid (2014) on the other hand suggests at least three assessments are required during teaching practice period.

4.2.4. Input and Feedback Discussion with Supervisor

Finally, the respondents rated the feedback sessions with their supervisors and Table 6 shows how 7 (10%), or 1 in 10, thought the input and discussion of feedback as above average, 43 (61.4%) average, and 20 (28.6%) below average. Finding that the discussion between student teacher and supervisor about "lesson observation and assessment" is considered mainly average or below, which was also discovered by Basturk (2016), is unsatisfactory for teacher preparation.

Moreover, the respondents stated that they were offered little opportunity to have such discussions. Consequently, although teaching practice is a well-designed method by which to prepare teachers for working in secondary schools, the lack of feedback discussion may render the whole process unproductive: microteaching is supposed to enable student teachers to "see" their mistakes and correct them (Ünlü, 2018).

Table-6. Input and Discussion of Feedback with the Supervisor.

The input and feedback discussion with my supervisor was productive.	Frequency	Percentage
Above average	7	10.0
Average	43	61.4
Below average	20	28.6
Total	70	100.0

5. CONCLUSIONS

The following conclusions are deduced from the findings of this study:

1. Media practicals are well organized and can properly prepare student teachers for the microteaching sessions and teaching practice.

2. Microteaching is a very important component of preservice training and provides trainees with a good opportunity to practice what they have learned.

3. The majority of the student teachers only undergo supervision once, which is insufficient to improve their behavior, test their knowledge of the subject matter, provide constructive criticism, discover their teaching strengths and weaknesses, and develop a core set of values by which to abide as professionally component teachers. These missed opportunities may render the whole process unproductive.

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