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*Original Paper*

## Variations in Science Mentors' Assessment of Student Teachers during Teaching Practice

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### Abstract

This study focuses on competencies of science mentors in assessing student teachers on Applied Science Education (ASE). A total of seventy-six (76) prospective science mentors drawn from one province where the student teachers are also based participated voluntarily during the capacity building mentoring workshops aimed at equipping experienced science teachers with skills on modern practices in science education as well as familiarising them with the training institution's expectations of students on ASE. The successful candidates were expected to assist university science educators in mentoring and assessment of student teachers. After theory presentations by science educators over two days, trainee mentors were shown two videos of student teachers teaching elementary science classes. They were asked to assess the student teachers using the ASE supervision and assessment instrument designed by the training institution. The plenary session followed where discussions on their assessment were done. The third video was shown to the trainee mentors and it is this video which was used to show any variations of the science mentors from the mean score obtained by the researchers (54%) during their own assessment of the student teacher from the same video. The results show significant inconsistencies of the mentors' scores ranging from 22% to 84%. The researchers recommend that, it is important to train mentors on the requirements and expectations of the training institution before engaging them and that it is important to have multiple assessments by both mentors and university tutors of students during teaching practice.

**Keywords:** Teaching practice, mentor, assessment, Supervision, Training

### 1. Introduction

Applied Science Education (ASE), also referred to as Teaching Practice (TP) forms an important component of any teacher training programme. The final product of a teacher training programme is judged by the ability of student teachers to effectively teach. This ability to teach is basically a by-product of the supervision that they receive from faculty members and mentors. A mentor is defined as an experienced teacher assigned the responsibility of helping a less experienced person adjust successfully to the work of teaching (Wood, 2000). Experienced teachers acting as mentors play an important role in the university-school partnership component of teacher education (Mudavanhu & Zezekwa, 2009). Student teachers in Zimbabwe are prepared to learn from experienced teachers as they valued their tacit and craft professional knowledge (Mudavanhu, 2006). As elsewhere, student teachers in Zimbabwe perceive experienced teachers as models of good instructional practice, guides, confidantes, counsellor and assessors (Williams & Soares, 2002). Whether the acclaimed mentors' abilities are realised in practice, or not, remains a subject for further research.

There are many models of mentoring with different ideological orientations. They all seem to concur on two goals of mentoring. The two goals are helping student teachers to develop an appropriate body of practical instructional knowledge and, secondly, encouraging student teachers to develop a deeper understanding of the assumptions that inform practical professional knowledge (Furlong & Maynard, 1995). Student teachers who are attached to mentors during TP are usually offered opportunities to integrate pedagogical theory and practice. The students are not alone in this endeavor - equally important are their mentors who are usually also eager to understand the theory that student teachers

bring to TP. The role of the mentor can be located at a continuum from “simply being there” (Feiman-Nemser & Parker, 1993) and at the other side of the continuum providing “active assistance” (Tomlinson, 1995, p. 16). More specifically, Portner (1998) and generally agreeing with other researchers (Stephens, 1996; Bova & Philips, 1981) identified four primary functions of mentors as relating, assessing, coaching, and guiding the student teacher into the art of teaching.

In the relating function, Portner (1998) argues that mentors are expected to build and maintain relationships with their mentees hinged on respect, mutual trust and professionalism. This enables the student teachers to confide in their mentors which in turn enhances mentor understanding of the ideas and needs of their mentees. Thus the mentor-mentee relationship can encourage the mentees to share and genuinely reflect upon their classroom experiences with their mentors. The mentoring function where mentor behaviours such as relating, assessing and facilitating are applied directly to improve the mentee’s performance is referred to as coaching (Portner, 1998; Hawkey, 1998; Tomlinson, 1995). Studies by Booth (1993) and Zanting, Verloop and Vermunt (2001) on students’ beliefs about mentoring have revealed that the coaching role is of great importance, notably in improving the mentees’ classroom behaviours, fine tuning problem solving and decision-making processes that take place before and after class.

Guiding, according to Portner (1998:55), “is the mentoring function that is directly concerned with the ongoing professional development of the mentee.” This entails steering the mentees through the process of reflecting on decisions and actions that may lead to constructing their own informed teaching and learning strategies with a view to groom them into effective teachers. Effective teachers, as viewed by Stephens (1996), are those that demonstrate secure knowledge of their subject, instructional strategies and have sound class management skills. Mentors themselves, from studies by Elliot and Calderhead (1994), Jones, Reid and Bevins (1997), view their role as effective when it incorporates such practical help as providing guidance, providing feedback, as well as observing students’ teaching and classroom management. Consequently, it is the mentors’ role to furnish relevant opportunities, supportive guidance and accurate assessments for student teachers to gain and fulfill these competencies.

According to Thawabieh (2017) assessment is concerned with the process of gathering, analyzing and interpreting information to make decisions. Assessment can focus on the individual learner, the learning community (class, workshop, or other organized group of learners), the institution, or the educational system as a whole. Assessment of student teachers on teaching practice thus requires that mentors gather and diagnose data about the mentees’ teaching and learning strategies (Wright & Bottery, 1997). Mentors are well positioned to determine their mentees’ competencies, skills, attitudes, knowledge and confidence to handle different classroom situations. Portner (1998) asserts that mentors’ assessment of student teacher behaviours enables identification of the mentees’ professional needs.

Classroom assessments are done through a variety of methods, including observation of teacher performance directly during teaching, observing a video recording, or the student teacher’s field journal (TP file) that includes schemes (unit plans), lesson plans and reflections/evaluations (Tilstone, 1998; Jackson, Burrus, Bassett & Roberts, 2010). The collection of student teacher observation data through videos has been used widely as reported by Wragg (1994), Cavendish, Galton, Hargreaves and Harlen (1990), Tobin (1995) and Jackson *et al.* (2010). One main advantage of using video recording in the collection of such assessment data is that they form a permanent record that enables action replays to be made whenever required (Tilstone, 1998). Video recordings also offer opportunities for groups of professionals and even pupils to make detailed analysis of certain episodes. One disadvantage though is that a video camera can only give a selective view of the actions and behaviours under review (Cavendish *et al.*, 1990) leading to less accurate and biased analysis of the recording. A further problem that is frequently underestimated, according to Tilstone (1998), is the presence of video equipment in the classroom which may cause reactions from some pupils and even the student teachers themselves. This may result in biased assessments.

Mentoring can be viewed as a specific example of clinical supervision which, as noted by Zanting *et al.* (2001), has always played an important role in teacher training. As defined by **Kilminster**, Cottrell, Grant and Jolly (2007), clinical supervision is the provision of guidance and feedback to trainees on

matters of personal, professional and educational development. It involves the teaching of specific skills and competencies, helping the learner to develop self-sufficiency in the ongoing acquirement of skills and knowledge and sometimes includes an element of assessment.

Mentoring can provide important benefits to all participants, namely the mentor, the student teacher and the school system (ERIC, 1986). Opportunities are provided for mentors to reexamine their own classroom practices as well as the effects of accepted instructional techniques on the teaching and learning process as a result of questions raised by mentees. The establishment of professional competence and introduction to teaching as a continually developing, life long career are some of the benefits to the mentee (ERIC, 1986).

The implementation of any mentoring program is susceptible to several challenges (ERIC, 1986; Feiman-Nemser & Parker, 1993; Ogonor & Badmus, 2006). ERIC (1986) identifies one problem common to all mentoring programs as finding the criteria and methods for choosing mentors, notwithstanding many such criteria and methods being available. Mentees become effective teachers by assimilating the desirable skills, attitudes, and professional outlook of their mentors. This may not be possible, as argued by ERIC (1986), unless the mentees are matched exactly with mentors who share the same professional interests, expressed educational philosophies and compatible personalities.

Student teachers are expected to conduct classroom teaching as part of learning to teach during school placement. They are expected to assess applicability of theory in real classroom situations and reflect their epistemological beliefs based on the practical contexts they see. Student teachers are expected to learn through observation of good teaching practices and develop into competent teachers. The content of teaching practice includes professionalism; scheming and lesson planning; introducing, developing and concluding lessons; questioning techniques; assessment and evaluation of student work; classroom management and writing and maintaining professional records. Using strategies such as reflective practice, peer observation and mentoring, student teachers are expected to learn from peers, mentors and supervisors, and to keep evidence for their learning.

Among many other duties, mentors are expected to supervise and assess student teachers during TP. There ought to be alignment between the capabilities of mentees and the grades they obtain during assessment since the mentor spends more time with the teacher learner. In light of this observation, it is the expectation of any teacher training institution that mentors are consistent in their supervision and assessment of mentees in accordance with the requirements of the training institution. Consistent and reflective assessment of student teachers on TP has however remained an issue of contestation as variations are often evident from one assessor to the other. The reasons for such variations are subject to further research as the purpose of this research is to show these as revealed during several workshops mounted to train mentors on supervision and assessment of student teachers guided by the requirements of a teacher training institution. Whilst it was not the purpose of the workshops to show these variations the revelation of the discrepancies of mark/scores awarded by mentors during the workshops was alarming. The research was guided by the research question below:

- What is the degree of consistency of mentors' and university tutors' assessments of student teachers on TP?

### **Context of the study**

In response to brain drain of mainly science teachers in Zimbabwe to regional and international destinations, Bindura University of Science Education introduced the Virtual and Open Distance Learning (VODL) programme aimed at training science teachers at their door step, to fill in the gap as a result of the mass exodus of qualified personnel. The university realized the need to target remote areas where the few remaining science teachers shun. Three centers in Mashonaland central namely Mushumbi, St Albert's and Mt Darwin were identified. A total of about 1500 student teachers mainly relief teachers were enrolled at these three centers to pursue studies in one of the following programmes: Bachelor of Science Education Degree (BScEd -3 years), Bachelor of Science Education Honours (BScEdH-3 years) specializing in one of the following subjects: Biology, Geography, Physics, Chemistry, Computer Science, Mathematics and Agriculture. The third programme, the Diploma in Science Education (DipScEd-3 years) comprises of three subject clusters (Physics, chemistry, Biology;

Physics, Mathematics, Computer Science, and Biology, Agriculture, Geography). Both degree and diploma programmes are done during the school holidays for a total of six semesters where a semester consists of two school holidays.

As a result of these overwhelming numbers, the science education department realized the need to engage mentors to assist in the supervision and assessment of student teachers during preparatory courses for TP. Before going for the final TP, student teachers pursuing a degree programme do a course called AS203 (Secondary school experience F1-6) and those pursuing a diploma programme do a course called PC007 (Pre-practicum). The courses give student teachers classroom practice where the teacher learners are expected to assess their theoretical content and pedagogical knowledge in light of the epistemological conceptions they hold and their applicability in real classroom situations. The totality of courses in the foundations of education, curriculum studies and pedagogics are linked to form a holistic science enterprise.

With the guiding principle of the training institution of being a beacon of excellence in teaching, research and extension services and to contribute towards the development of Zimbabwe through science education, the training of quality science teachers could not be left to chance. It became obvious that the department of education couldn't efficiently and effectively supervise and assess student teachers during the preparatory courses because of the large numbers against limited lecturers, hence the need to engage mentors. It was however important to train the mentors on the expectations of the college on student teacher supervision and assessment. Three training centers were identified and a total of seventy-six mentors were trained at these centers.

## 2. Methodology

A total of seventy six (76) qualified teachers, who volunteered to be trained as mentors for the VODL programme, each with a minimum of five (5) years of continuous teaching experience participated during the study. The teachers were drawn from different schools in Mashonaland Central Province in Zimbabwe. The teachers were either diploma or degree holders in Science education. The majority of them (82%) had some mentorship experience. Three secondary schools with boarding facilities were identified as centres for the workshops. The teachers were free to choose any of these centres to train from and most of them based their choices on proximity of a training centre to their working stations. Training of these teachers was conducted during the April-May vacation when there were little disruptions to their day to day teaching obligations. The distribution of mentors according to centre and qualifications in science education is shown in Table 1.

Table 1. Distribution of Science Mentors by Centre

District Centre	Degree holders	Diploma holders	Total
Mushumbi	7	9	16
St Alberts	13	15	28
Chindunduma	18	14	32
<b>Total</b>	38	38	76

Each mentor training workshop was conducted over a three- day period, lasting a total of 24 hours. The researchers, who are experienced science educators at the university, presented lectures to the trainee mentor teachers. A programme of the workshop was availed to the trainee teacher mentors on first day. Presentations were delivered in the following areas: The concept of TP; professionalism in teaching; student preparation for TP; essentials of classroom teaching; measurement, assessment and evaluation; item writing and classroom test construction; the TP file (field journal); the role of the mentor in TP; the university's scheme of work format; lesson plan format; and supervision and assessment instruments. Two activities were devoted to the final day and these were a practical session and a plenary session.

During the practical session, two different thirty five (35) minute videos of a full junior general science lesson, each delivered by two of the college's student teachers, were shown to the trainee mentors. The student teacher's TP files were also availed to the mentors. Each video simulated a live lesson and the teachers used the university's supervision and assessment template (which they had been trained to use) to observe and individually rate the various competencies of each of the student teachers (see Appendix 1 for a copy of the template).

At the end of each video session, focus group discussions, led by the researchers, were held with the group of mentor teachers on each score they had awarded for each of the competencies in the instrument. Where there were wide discrepancies, a replay of the video followed by further discussion was done until general consensus was reached.

A plenary session was then held where the mentors were free to ask questions and seek clarity on all aspects of the training workshop and the nature of their roles in mentoring the student teachers on the college's VODL programme. After this session, the researchers felt that the mentor teachers were adequately trained to use the college's instrument to supervise and assess the student teachers attached to them.

The final stage of the training workshop, involved showing a third video of another Science lesson at the same level as the other two video sessions. The graduate mentors had been informed that their final rating on this video would be compared to the two researchers' mean mark (which was not initially disclosed to them). The scores awarded by researchers on the third video during their own assessments were 52% and 56%, giving a mean mark of 54%. It was the expectation of the researchers that the trainee mentors were going to obtain scores at least within this range with, of course, minimal deviations on either side of the mean score of the experienced university lecturers' marks.

### 3. Results

The third video which was shown to the graduate mentors where the mentors were using the institution's assessment instrument (Appendix 1) to rate the student teacher on the shown video, produced the following range of scores.

Table 2. Scores as Observed by Science Mentors

Score (%)	Number of mentors with scores in that range
<30	4
31-35	5
36-40	4
41-45	5
46-50	9
51-55	8
56-60	13
61-65	12
66-70	7
71-75	3
>75	6

At each centre, after scoring the marks as shown in Table 2, the researchers decided to have a discussion with the mentors and agreed on a particular score for each competency in the assessment instrument and the variation is shown in Table 3 below.

Table 3. Group Score per Centre after Focus Group Discussions

Centre	Group mean score (%) per centre after group reflections
Mushumbi	53
St Alberts	52
Chindunduma	54

An analysis of the scores for the three centres is shown in Table 4 below:

Table 4. An Analysis of Scores from the Centres

Lowest score	22%
Highest score	84%
Deviation from mean(lower quartile)	32 marks
Deviation from mean(upper quartile)	30 marks

#### 4. Discussion

The present study explored the degree of consistency of mentors in awarding assessment scores to a video-taped student teacher's classroom lesson delivery. The results clearly and alarmingly show very significant inconsistencies of the mentors' scores. Whilst it is the norm that assessors vary slightly on their evaluation of students on TP, this research has shown otherwise. From the variations shown in Table 2 on the scores by mentors, it is clear that there was a lack of consistency in the assessment of the student teacher by mentors. Of interest is the fact that the highest score was 84% with a lowest score of 22%, giving the wide difference of 62 marks. It may be noted that 6 (8%) of the mentors rated the student teacher's lesson delivery as excellent (above a score of 75%) while the same lesson was regarded as very poor (scores below 30%) by 5% (4) of the seventy six mentors who participated in the study (Table 2).

Those who awarded high marks felt that the student teacher used different teaching methods grounded in the constructivist philosophy. However the majority of the science teachers who awarded low marks argued that though some constructivist approaches were employed to some extent, they were not effective as the student teacher ended up dominating the discussion during the lesson and in some cases exhibiting some misconceptions on certain concepts.

It is against this background that it becomes worrying whether the final product from the teacher training programme is a reflection of his/her capabilities or the student teacher may graduate merely as a result of the generosity of an assessor or fail to graduate as a result of staunchness and lack of competency on the part of an assessor. The final product from the teacher training program ought to exhibit qualities and competences as expected from the training programme. It seems however that the TP experience is not always done as hoped or expected to be (Mudavanhu, 2006). Mentors are expected to help student teachers to develop a greater understanding of their practical theories and tacit knowledge through their own reflection (Keogh, *et al*, 2006 & Chikunda, 2008). While Megginson and Clutterbuck (1995, p. 13) view mentoring as "offline help by one person to another in making transition in knowledge, work or thinking," the wide discrepancies in the scores by mentors in this research cast doubt as to the ability of such mentors to offer meaningful professional assistance.

Trusted with these crucial roles, large deviations of mentors in their assessment of student teachers become worrying. It is however encouraging to note that the majority of the assessors (39/76) had a range of 9 marks on either side of the mean. The outliers on either side of the mean can be viewed as either generally generous or too strict though lack of competency cannot be ruled out. Basing on the results shown in Table 2, the researchers recommended to the university's science education

departmental board not to consider the outliers for the part-time job of mentoring student teachers during the preparatory courses before the final TP for summative assessment. Thus, whilst mentors are expected to assist in the professional development of the mentees and guide them into becoming effective teachers, the wide variations in their assessment scores in this research raises questions concerning their own teaching and learning strategies. One hopes that the workshops went a long way to expose to the mentors the intricacies of student assessment which, perhaps, was effective as a standardising tool. The opportunities intended to be offered to student teachers who participate in the mentoring process in integrating theory and practice therefore becomes suspect if the mentors themselves have such divergent views in the teaching and learning process.

The results shown in Table 3, reached after intensive focus group discussions between the mentors and the two researchers, show insignificant differences within the three centres. The fact that there was an agreement on the rating of the videotaped student teacher's lesson delivery may reflect the inexperience of the mentor teachers in student teacher assessment in general and, in particular, the use of the university's TP supervision and assessment template. Such experience in mentoring and acting as instructors responsible for using assessment to guide teaching and learning, may be insufficient (Brown, 2011).

While this study does not explicitly examine the underlying causes of the wide variations in the prospective mentors' scores on the same lesson they observed, it does help to expose a major assessment dilemma faced by this institution in its attempt to incorporate school-based experienced teachers in its teacher training programmes. The wide deviations in the mentors' assessment scores of the lesson observed poses serious implications about the quality of supervision and assessment they may render to their mentees (Zanting et al., 2001). With such discrepant evaluations as revealed in this study, the advice that the majority of the prospective mentors will render to their mentees would obviously be questionable. Such variations also pose student teacher certification problems to the institution.

It is the hope of the present researchers that the standardising process will reduce such large variations and that fewer discrepancies will be observed during live assessments of student teachers on TP as the use of a video may have contributed to such discrepancies. Despite this noted fact, mentors' assessment of student teachers has remained subjective because of different conceptions and philosophies of science educators. One way of reducing such a problem may be the adoption of ERIC's (1986) idea that there is need for careful and appropriate selection, matching and pairing of mentor/mentee partners. The ideal partners may share the same professional interests, expressed educational philosophies and compatible personalities.

## 5. Conclusion

Quite a number of lessons were drawn from the research findings with subsequent conclusions that:

- It is important to workshop/train mentors on the requirements and expectations of the training institution before engaging them.
- Student teachers need not to be assigned to one mentor only but at least two as this variation is an important ingredient in the baking of the final product. This complimentary mentorship can help both the mentors and the mentee in their professional development.
- It is important to have multiple assessments by both mentors and university education tutors for students during the ASE preparatory courses before the final teaching practice.

More similar workshops are necessary to iron out mentors' competencies so that they can develop the similar insight that can enable them to reduce the deviations on summative assessments that they make on student teachers' TP competencies.

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#### Appendix 1: ASE SUPERVISION AND ASSESSMENT INSTRUMENT

Name of Student: \_\_\_\_\_ Reg. Number: \_\_\_\_\_

School: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Topic: \_\_\_\_\_ Subject: \_\_\_\_\_

Mark Awarded: \_\_\_\_\_ %

Key to Rating: 0 – no competence at all, 1-Poor, 2- Average, 3-Good, 4- Excellent

Competencies and Criteria	Rating					Comments
	0	1	2	3	4	
<b>Introduction</b>						
Link to pupils' knowledge						
Appropriateness						
<b>Lesson Development</b>						
Questioning technique						
Communication						
Sequencing of content						
Mastery of content						
<b>Student learning</b>						
Differentiation						
Level of participation						

Classroom interaction						
Teaching strategies						
<b>Media</b>						
Suitability						
Effectiveness						
Learner explorations						
<b>Classroom management</b>						
Responsiveness						
Organisation						
Lesson closure						
Feedback						
Exploration						
<b>Assessment of written work</b>						
Frequency and effectiveness						
Test dossier						
Record of pupils' work						
<b>Documents</b>						
File appearance						
Lesson planning						
Clarity of objectives						
Lesson evaluation						
Schemes of work						
<b>Total marks per column</b>						

**Overall Comments:**

**Name of assessor:** \_\_\_\_\_ **Signature:** \_\_\_\_\_