

Science student teacher's perceptions of good teaching

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Abstract

The purpose of this study was to explore the science student teachers' perceptions of good teaching at a university of technology. A descriptive survey research design was employed to derive responses from a convenience sample size of 50 senior students enrolled in the Bachelor of Education (Further Education and Training band): Natural Sciences programme. Data were collected by means of a semi structured questionnaire. Descriptive statistics and themes were used to establish student's perceptions. Results revealed that, amongst others, the nature of the subject and teaching strategies employed are perceived to influence what students perceived as good teaching. Results showed that good teaching was synonymous with good lesson delivery. There is a need for provision of a supportive learning environment in which lecturers conceptualise their role as subject specialist-cum-teachers and scaffold learning effectively to promote effective interaction with the students.

Keywords: teacher education, good teaching

Introduction

This study provides a rich narrative on a university of technology's science students' perceptions of effective teaching. Teaching is becoming equally important as research goals of higher education institutions. Good teaching is that which promotes student learning, it is not just about getting learners to commit facts to memory but to teach them to participate in the process that makes the establishment of knowledge possible (Baysal, Arkan & Yildirim, 2010; Nieman, 2004; Biggs, 2003). Learning is an active, not a passive process. Learning happens when students read, talk, write, explain, make connections between ideas, try things out and observe the results, analyse, evaluate and organise their knowledge in meaningful ways (Nieman, 2004; Gravette & Geyser, 2004; Biggs, 2003). Good instruction engages students in processing and using new ideas rather than just listening to or watching their teachers. Teaching is simply the means of promoting student learning, not an end in itself.

Theoretical framework

A 21st century academic has to be creative and innovative in curriculum design and pedagogy, engage with blended learning and integrate emerging academic and digital literacies in the curriculum. Teaching is therefore a social transaction between the learner and educator, with the educator mediating the learning experiences (Feurenstein, 1980). This mediation process involves structuring activities to enable a learner to gradually gain control over real life activities as well as problems that are set and need to be solved.

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Studies on teaching effectiveness reveal that there is no one definition for effective or good teaching. Also, that evidence gleaned from students is highly reliable (Muijs, 2008; Biggs, 2003). Parajes (1992) states that beliefs about teaching are formulated through many years of formal schooling and that they may be difficult to alter. Biggs (2003: 27) refers to good teaching as “alignment between what we want, how we teach and how we assess” in a system. Furthermore, Fenstermacher & Richardson (2005: 687) assert that “the primary level of effective teaching is located at the level of the student rather than the teacher”, while Berliner, (2005: 207) states that “effective teaching is about students learning what they are supposed to in a particular context, grade or subject, studies on student engagement correlate academic achievement and persistence with creating engaging experiences”. Using preferred learning styles, psychosocial values, collaborative meaningful tasks, peer involvement, and integrating curricula with world issues, increases student performance (Kuh, Cruce, Shoup & Kingie, 2008). This implies that students are intrinsically motivated when they participate in contributing to a public or civic identity. This type of engagement creates a sense of connectedness and belonging and improves both student and society. The call is for creating democratic classrooms and preparing students for success in class, in the workplace and in a globalised world (Hatcher, 2011; Larcombe & Mslkin, 2011).

In the teaching of Science, constructivism appears to emphasise the active role of learners in constructing, considering and applying logic to information. Learning is adaptive as it integrates new knowledge with existing knowledge and this allows for generation of innovative ideas or work because constructivism involves more of exploration and discovery. Teaching that is constructivist is learner centered; this is where learners are actively involved in the construction of knowledge rather than being mere passive listeners (Kalpana, 2014). Students’ thinking drives the lesson and dialogue, inquiry and puzzlement are valued. This enables a teacher/ lecturer to draw on new ideas and make decisions about which teaching techniques are most appropriate for all students to learn.

Institutions of higher learning also have to do introspection of the way they prepare and train teachers for the schooling sector. It therefore also becomes important that lecturers at university level are grounded in pedagogical content knowledge.

Research objective

The study sought to establish the science student teachers’ perceive to be good teaching. It was guided by the following research questions

- What do science student teachers at a university of technology perceive as learning environments, teaching strategies and tools that constitute good and effective teaching and promote learning?

Method

Participants and setting

The participants in this study were a convenience sample comprising fifty (50) senior students enrolled for a Bachelor of Education Further Education and Training: Natural Sciences programme at a university of technology. The sample comprised of 23 (46 %) females and 27 (54) males, a proportion commensurate with the gender ratio in the Natural Sciences programme involved in this study (see Table 1).

Table 1 Biographic details of participants

		N	%
Gender	Males	27	54
	Females	23	46
Age		21-28 years	

Data collection

Data were collected by means of a semi structured questionnaire with four scales of imperatives of good teaching, comprising a total of 31 items wherein students had to identify characteristics of what they perceive an effective teacher/ lecturer does in the classroom drawing from their own experiences in school and university.

The student's responses were measured on a five-point Likert type scale with response alternatives ranging from Never (1) to Always (5) based on the key imperatives of good teaching in a constructivist classroom, namely, creation of a supportive learning environment, teaching strategies, respects student opinions and is approachable and creates collaborative learning opportunities and provides feedback

The likert-scale items were used to allow science student teachers to reflect on what they feel should be happening in the classroom and how effective are teachers implementing the strategies. The approach proved successful because the participants were able to provide rich descriptions based on their own experiences as students.

Data analysis

Quantitative data were analysed through descriptive statistics to establish student's perceptions of good teaching. Descriptive statistics provide statistical summaries of data. The purpose of these summaries is to provide an overall, coherent and straightforward picture of large amounts of information. In this study typical statistics such as means scores and standard deviation distributions were presented in tables to show the findings.

Ethical considerations

All participants concerned were assured that data collected will be treated with utmost confidentiality and anonymity. The aims and objectives of the study were explained verbally to the students involved in the study by the researcher prior to their participation. Participants individually consented. Assurance was given that no person would be identified.

Results and Discussion

The following were the findings as presented in Table 2 on imperatives of good teaching in a constructivist classroom, namely, creation of a supportive learning environment, teaching strategies, respects student opinions and is approachable and creates collaborative learning opportunities and provides feedback.

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Table 2 Mean scores and standard deviation of students' ratings of imperatives of good teaching that an effective teacher/lecturer should demonstrate in a constructivist classroom

<i>No</i>	<i>Statement: Good teachers / lecturers</i>	Means	SD
<i>Creation of a supportive learning environment</i>			
1	Demonstrate excellent knowledge of their subject	4.519	0.513
2	Demonstrate the research they undertake in their subject area	4.025	0.698
3	Relate their research directly to module sessions	3.563	1.135
4	Relate theory to the students everyday life experiences	3.538	1.147
5	Enable students to understand the content of each session	3.696	0.822
6	Create a safe climate for all students to participate in discussion	3.838	0.818
	Average	3.863	0.856
<i>Teaching strategies</i>			
7	Convey Knowledge in a way that is accessible to students	3.700	0.736
8	Ensure the relevance of information within sessions	4.013	0.515
10	Are patient	4.013	0.490
11	Recognise that students learn at different rates	3.275	1.113
12	Are prepared to explain	4.150	0.618
13	Encourage students to ask questions	4.063	0.700
14	Are enthusiastic about learning	3.888	0.779
15	Explain any new language or concepts clearly	3.575	0.991
16	Acknowledge previous learning/work experiences of students	3.380	1.066
17	Keep students on task	4.088	0.640
18	Allow adequate time for discussion	3.613	0.684
	Average	3.780	0.769
<i>Respect students' opinions and is approachable</i>			
19	Are approachable	4.313	0.805
20	have respect students opinions	3.924	0.747
21	They give clear guidance when asked for help	3.888	0.795
22	Value students contributions	4.063	0.700
23	Give examples drawn from their owns experiences	3.863	0.882
24	Does not put students on the spot when asking questions	4.088	0.640
	Average	4.023	0.762
<i>Creates collaborative learning opportunities & provides feedback</i>			
25	Allow adequate time for discussion	3.613	0.684
26	Give full citation for any references given	3.788	0.669
27	Customises information for their students	3.316	0.968
28	Explain inconsistencies clearly	3.494	0.696
29	Provide clear assessment briefs	3.863	0.689
30	Include group activities during sessions	4.038	0.625
31	Recap at end of sessions	3.55	0.884
	Average	3.666	0.745

Creation of a supportive learning environment

As reflected in table 2, majority of the students think it is important for a teacher to have excellent knowledge of their subject matter and also to demonstration of research to be undertaken in the subject and these items had the highest mean scores (M: 4.519 & 4.025). Relating the learners' prior learning and everyday life experiences to new knowledge was also found to be essential and crucial. From the Piagetian point of view, the learner has to work from the known to the unknown (Piaget, 1985). Prior knowledge has to be integrated in the learning of new content and sufficiently transformed, organised a reorganised, to enable the student to master the subsequent contents and skills. Learning is adaptive as it integrates new knowledge with existing knowledge and also allows for generation of innovative ideas (Kalpana, 2014; Ausubel, 1968).

The overall mean score for this category is 3.863 which imply that generally all science students teachers involved in this study believe that a good teacher should create a supportive learning environment.

Teaching strategies

In this category (as reflected o table 2) science student teachers are of an opinion that good teachers will employ teaching strategies such that students' curiosity about a lesson topic is aroused. Also that good teachers are prepared to explain, will engage students in learning, develop critical thinking skills, keep students on task, engender sustained and useful classroom interaction, and, in general, enable and enhance the learning of course content. Good teachers were also said to be capable of keeping students on task, this item also had a high mean score (4.088). The average mean score for this category is 3.780. The implication is that good teachers actively involve learners in class and also provide opportunities for learners to construct their own knowledge and meaning from their experiences (Vygotsky, 1978).

Respect student opinions and are approachable

In this category as reflected on table 2, scale assessment is on an extent to which a social climate has been established in which students feel that it is legitimate and beneficial to question the teacher's pedagogical plans and methods, and to express concerns about any impediments to their learning. The findings suggest that science student teachers believe that an atmosphere where they are free to voice their opinions is characteristic of a good teaching and learning environment necessary in the constructivist science class. A good teacher creates a teaching and learning environment where students will feel that their opinions and their perceptions are taken into consideration. An environment where opportunities for peer and teacher-directed scaffolding are created, a process allowing interaction which stimulates knowledge building bridging the differences of knowledge levels within a classroom (Roosevelt, 2011; Lunenberg, 1998). This category had the highest average mean score (4.023).

Creates collaborative learning opportunities and provides feedback

Collaboration is a viable method of creating individual meaning of acquiring information from someone else. This action as referred to social negotiation (Vygotsky, 1978) has proven beneficial and essential for acquiring specific knowledge. Also, Baysal, Arkan & Yildirim (2010) assert that co-operative learning promotes higher achievement than competitive and individualistic learning does. Students begin to value one another and see each other as sources of information and not sources of ridicule. Learners are enabled to elaborate on their own ideas

as well as those of their peers (Lunenberg, 1998). As reflected on table 2 in this category, the average mean score is 3.666 meaning that the students perceive sharing of information amongst themselves, through group discussions, informal study groups and engagement in common homework as supportive to their learning.

This is a typical environment necessary in the constructivist science class, an environment where opportunities for peer and teacher-directed scaffolding are created, a process allowing interaction which stimulates knowledge building bridging the differences of knowledge levels within a classroom. According to Bennett (2007), the teachers' attitudes influence learner achievement.

The results of this study are relevant to teaching and learning environments. While teachers and lecturers should engage with their students holistically and consider contexts and personal values; choosing the kind of educator a student teacher wants to be is also significant as highlighted by Roosevelt (2011). This study also supports the view that students and institutions must accept a dual responsibility for promoting a creative constructivist learning environment as suggested by Kalpana (2014) and Barefoot (2000).

Implications and limitations

The use of a quantitative closed-response questionnaire where participants had to respond only to the set of items included in the questionnaire. More rich information could have been sought from participants if the questionnaire had open-ended questions and some qualitative data.

Lecturers and teachers are not supposed to assume that students will accurately perceive how or how often certain techniques or strategies are employed.

Conclusion

From the findings it is very evident that good teaching plays a pivotal role in making learning effective. Students highlighted the provision of a supportive learning environment where learning is scaffolded by the teachers as a requirement of effective teaching. For effective teaching and learning, performance, student satisfaction and developing positive academic and social attitudes, students must interact, engage and shape their self-identity through experiencing the identity of others (Gingham & Rodgers, 2010). Approaching instruction from a constructivist continuum reaches a wide range of students and increases comprehension and self-confidence in all students, also teaching them to think for themselves.

The study hopes to influence and persuade educators, especially academics in further and higher institutions to reflect on their epistemological assumptions and reshape their practice, enhance on their teaching skills and embrace the scholarship of teaching and learning to the benefit of institutions, society and communities.

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