PRINT: ISSN 0975-1122 ONLINE: 2456-6322
Int J Edu Sci, 7(2): 375-384 (2014)
DOI: 10.31901/24566322.2014/07.02.15

Workshop Interventions to Facilitate Students' Access to Knowledge: A Dental Technology Case Study

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KEYWORDS Epistemological Access. Literacy Practices. Co-Constructivism. Higher Education

ABSTRACT The higher education landscape in South Africa has changed dramatically over the last two decades. The types, size and shape of tertiary institutions were reconfigured. Concomitantly the intake of students also changed, resulting in a large number of students coming from the previously disadvantaged communities who are deemed as being underprepared. Challenges were posed to educators and learners. First-year students in the Dental Technology programme at the Durban University of Technology struggle to cope with the transition from secondary school life into higher education. With this in mind, two workshops involving activities and tasks were designed to enable students to gain awareness of the academic and social practices of Dental Technology. An interpretive research design and an action research case study strategy were adopted. Data gathered by means of questionnaires, a focus group interview, and direct observations via video recordings were used. Further expansion and incorporation of using workshops to access knowledge in the curriculum is recommended by the authors.

INTRODUCTION

South African Universities of Technology (UoTs) provide vocational qualifications where the focus is essentially "on preparing students for lifelong learning and on education that will lead them into useful vocations" (Kilpert and Shay 2012: 2). The Dental Technology diploma programme is characterised as a vocational qualification, and the teaching is oriented towards preparing students to meet the demands of the workplace. Discussions around content, the processes of learning, and assessment of Dental Technology are generally achieved through consultative and collaborative processes between the professional bodies and the university. This collaborative relationship guides and structures the disciplinary base of the programme, and in the process ensures that the focus of the curriculum is geared towards expertise in the workplace. As the regulatory body of Dental Technology, the South African Dental Technicians Council (SADTC) also ensures that curriculum changes are about inclusion of technological advancements currently impacting on the professional practice (South African Dental Technicians Council 2011). Regardless of the efforts made in providing a curriculum that focuses on preparing students "for employability as well as for further study" (Gamble 2006: 94), changes in the higher education landscape have posed newer challenges to students. In particular, students continue to struggle to move through curricular content in the classroom and find it difficult to cope with the programme and university practices (Council on Higher Education 2013). This prompted the dental technology lecturer and Academic Development Practitioner to design two workshops, which will be described in the methodology section, to enable students' access to knowledge, or what Morrow (1993) terms as epistemological access.

Many studies (Morrow 2007; Scott et al. 2007; Thesen 2009; McKenna 2010) have acknowledged that university cultures, curricula and pedagogical practices continue to be unsympathetic and marginalise students, particularly those from poorer socio-economic communities. It has been reported that across qualification types African students[1] perform more weakly than other ethnic groups in South Africa (Scott et al. 2007). Several authors, such as Chisholm and Sujee (2006), Morrow (2007), van der Berg (2007) and Letseka and Maile (2008) have also indicated that there is an inadequate articulation between high school and university. There is general agreement between these authors that socio-economic disparities in students' home

and school backgrounds have an impact on student success in higher education. As argued by Thesen (1997: 491), students experience difficulties in adjusting to the university, as they are expected to enter new discourse practices that are shaped by "a remote culture that gave off contradictory messages about student participation".

Street (1995: 140) points out that "the social relationships of student to teacher are modes of socialization and acculturation". Yet, it is seldom made explicit to new students that higher education institutions consist of a variety of disciplinary groups or 'tribes' (the people within the knowledge areas), each with its own language, customs and culture (Becher and Trowler 2001). Students may struggle to move through curricular content in the classroom without induction into these norms and expectation, and thus find it difficult to cope with the programme and university practices. These students may then be unfairly considered to have poor language skills or cognitive abilities because they are unable to manipulate the different forms of literacy practices in the way academics expect (Haggis 2003; Boughey 2005). This situation is further exacerbated by the everyday misunderstanding that literacy practices are independent of the social context. Instead, and as argued by Street (2003: 78), literacy is a social act since "the ways in which academics and their students interact is already a social practice that affects the nature of the literacy being learned." Street (1995) characterises this as the ideological view of literacy, as it offers a more social and cultural awareness of the process of becoming literate.

The recognition of the ideological nature of teaching and learning was a contributing factor in assessing the attributes of students that enter the Dental Technology programme at Durban University of Technology (DUT).

Bawa (2011: 1), Vice-Chancellor and Principal of DUT, acknowledged that DUT attracts a large number of students who come from poor socio-economic backgrounds. This suggests that they may come from families that do not have the educational capital or educational resources to support them in their academic studies and effectively enable a smooth transition to the practices of higher education. Bawa's (2011) acknowledgement of the realities of DUT students links to the South African Survey of Student Engagement (SASSE) institutional report (South African Survey of Student Engagment, 2010), which revealed that 75% of DUT students are first generation learners. This finding indicates that DUT students, particularly the 80% Black African students who participated in the survey (South African Survey of Student Engagment 2010: 15), have not been exposed to the experiences, discourses and expectations associated with higher education. Consistent with this report, Mckenna and Sutherland (2006) noted that such students have not been exposed to the experiences, discourses and expectations associated with higher education. While secondary schools generally do not directly prepare students for higher education (Slonimsky and Shalem 2006), it is highly probable that students coming from marginalised communities and under-resourced schools have been exposed to a teaching and learning environment which is different from that of higher education institutions (Thesen 2001). Smith (2012) therefore proposed that a change of thinking is needed that will "research the full texture of the student experience and to value the pre-higher education context of students".

It needs to be borne in mind that students are enculturated by their social and cultural histories, which are often entrenched in the South African histories of apartheid. Consequently, students bring other understandings of teaching and learning that are different from those expected for the acquisition of higher educational knowledge (Boughey 2010). Morrow (2007) asserts that students only manage the challenges of higher education by acquiring epistemological access or access to the ways of constructing knowledge that is valued by the discipline. In view of Morrow's assertion, the dental technology lecturer[2] and Academic Development Practitioner[3] recognised the need to improve their teaching and learning practice, particularly in making the academic and social practices of Dental Technology explicit to first-year students. This need also resonates with the notions of learning expressed by Dall'Alba and Barnacle (2007: 687), who assert that in order for students to become skillful practitioners who can enact ways of being, "teachers in higher education need to reflexively examine the what and how of university teaching."

Other studies (Haggis 2009; Kreber 2009; Council on Higher Education 2010; McKenna 2010; Council on Higher Education 2013b) have

further acknowledged the growing debate around universities needing to make the rules, norms and culture accessible to students in order for them to enjoy and benefit from what the university has to offer. Emmitt et al. (2002) asserted that students who feel "welcomed and connected to the university will flourish and develop academically and socially". In an effort to increase students' access to knowledge, higher education lecturers need to use pedagogical practices that will engage, empower and support students in the learning of the discipline-specific subjects, and into the university overall. In order to facilitate access to discipline-specific knowledge for first-year Dental Technology students, the teaching framework proposed by Carnell (2007) is useful in navigating this area of enquiry.

Carnell's model on teaching and learning (2007) illustrates the Individual to Collective continuum on teaching approaches along the x-axis, and the Objective to Subjective continuum on knowledge along the y-axis. She describes the Individual-Collective continuum in relation to the process or dynamics of teaching and learning, while the Objective-Subjective continuum relates to how knowledge is given or constructed. Consequently, a teaching and learning approach is identified in each quadrant of the model, namely the didactic, empowering, co-operative and community. The teaching purpose of the didactic quadrant is to increase information through transmission by the teacher as expert with the student as passive learner. The empowering quadrant develops individual understanding through the provision of experiences with the teacher being the facilitator and the student an active learner. The teaching purpose of the co-operative quadrant is to examine existing knowledge through group work. The teacher decides on the tasks, which have set parameters, while the students participate in the group. Joint responsibility for learning between the facilitator and student typifies the community quadrant, where co-constructive dialogue leads to collective construction of knowledge. Haggis (2009), resonating with Carnell (2007), asserts that the theory and research of learning needs to shift from an individual to a social approach. She advises that the shift requires doing "everything we can to get out of our own comfortable, cultural milieu... and to know not only more but differently, and to keep on extending the range of our different ways of knowing" (Haggis 2009: 389).

This case study focuses on workshop interventions that were developed to enable students to understand the social practices of learning Dental Technology, and in the process to overtly introduce them to the customs, culture and position of Dental Technology in DUT. It was anticipated that this initiative would reduce the distance of the social, cultural and intellectual elements for students to become skilful. The workshops were therefore conceived as an innovative platform for students to work together, and to extract from the activities an improved understanding of the Dental Technology programme. Drawing from the work of Carnell (2007) a co-constructivist, learning-centred approach was used. She defines co-constructivism as an expanded version of the constructivist model as "facilitating a community of learners, learning through dialogue and sharing responsibility for teaching and learning" (Carnell 2007: 30). In view of this approach, the dental technology lecturer and Academic Development Practitioner created opportunities for students to experience conceptual dilemmas, solve problems, and to reflect and engage in exploratory dialogue.

The Purpose and Aim of the study

The purpose of the workshop interventions was to facilitate access to knowledge of Dental Technology and related social practices. The aim was to determine how workshop interventions using a variety of teaching practices can assist students of Dental Technology in accessing knowledge. It is envisaged that the findings of this study could contribute to the expansion and development of similar workshops in the Dental Technology programme, as well as in other programmes within Faculties of Health Sciences across different universities.

METHODOLOGY

A review of the 2008 and 2009 first-year student results indicated that there was a decline in student performance. Observations of students during theory and practical sessions also revealed that they struggled to connect their theory lectures to laboratory practice, which is critical within Dental Technology. In addition, students lacked computer skills needed for produc-

ing written work, as well as the necessary skills to make oral presentations. Through the departmental mentorship programme, it emerged that students experienced difficulty in making the academic and social transitions to university life, and in particular being able to effectively communicate and collaborate with their peers and lecturers. In addition, and on various occasions in 2009, the Academic Development Practitioner observed first-year students working in the Dental Technology training laboratories. She observed that students were unable to effectively communicate in the laboratory, struggled to work in teams, or failed to listen to instructions given by the lecturer during the practical sessions.

Inductive reasoning revealed that workshop interventions that are underpinned by an effective pedagogy could facilitate the transition of first-year students into the university. Such interventions can also improve, as well as enhance, students' academic and social experiences (Peat et al. 2001). As this research endeavoured to provide students access to knowledge of Dental Technology, an interpretative research design and an action research case study strategy were adopted. A qualitative framework enables a "form of interpretative inquiry in which researchers make an interpretation of what they see, hear and understand…collect data in the field at the site where participants experience the issue or problem under study" (Creswell 2009: 175, 176). The action research case study strategy attempted "to engage with and report the complexity of social and educational activity, in order to represent the meanings that individual social actors bring to those settings." (Chadderton and Torrance 2011: 53).

Description of the Workshop Interventions

Planning for the workshops occurred from November 2009 to May 2010. In consideration of Carnell's (2007) teaching and learning model, elements such as dialogue, listening skills, teamwork, creativity and self-expression, critical and lateral thinking, and problem-solving were identified as contributing factors to the concept of co-constructivism. In view of the first-year students struggling to connect their theory lectures to laboratory practice, some of the tasks and activities used in the workshops emanated from the practices of the Academic Development Practitioner. The activities and tasks devised by the Academic Development Practitioner were underpinned by her own practice and research as discussed in her Master's dissertation work.

The first three-day workshop titled 'Reflecting Discoveries' occurred in April 2010. In August of the same year, the second one-day workshop titled 'Reflecting on your Discoveries' took place. A description of the activities used in these workshops follows.

Workshop One: 'Reflecting Discoveries' (n = 52)

The dental technology lecturer identified tasks that would enable students to acquire a deeper understanding and knowledge of Dental Technology. The table puzzles task entailed grouping various types of dental appliances, dental materials and models in terms of first and second year Dental Technology subjects, as well as clinical dentistry. Students were expected to identify the different subjects and explain its importance in the context of Dental Technology. It was anticipated that the table puzzles task would allow students to develop a holistic understanding of first-year subjects, and how they relate to their senior levels of study, as well as to industry. From a pedagogical perspective, it was expected that this task would promote dialogue among students. An introductory hands-on PowerPoint course was also included, to train students on how to use the necessary computer programme that would assist them in preparing for presentations.

The dental technology lecturer sought a fun, yet effective activity to help students make the connection between theory and practice. The first author together with the Fine Arts lecturer provided students with a hands-on workshop in designing, creating and firing of ceramic tiles. Apart from the envisaged benefit of providing a fun activity for students to express themselves, the ceramic tile activity was to make students aware of the transferability of their practical skills. To foster communication and collaboration amongst students, appropriate activities such as Pathfinder, Abstract Art, and Character Type were identified for inclusion in the workshops. A brief description of each of these activities follows.

The Pathfinder activity was conducted outdoors and began with the students standing in a large circle with paper sheets placed in a me-

andering pathway from one part of the circle, through the centre and to the other side of the circle. The objective was for the students to guide the blindfolded walker from start to finish along the paper pathway. In doing so, students were advised to work together to facilitate the communication process required for this activity.

For the Abstract Art activity, students were paired together and sat back-to-back. One student from each pair (the scribe) was given a pen and piece of paper while their partner (the describer) was given an abstract drawing. The drawing included straight lines, circles, dots, triangles and similar shapes, linked together to form an abstract pattern. The instruction given was for the describer to explain the drawing to the scribe, who had to replicate it on the paper from the description s/he heard.

The Character Type role-play worked with groups of students where each group was given an envelope with different characters written on pieces of paper. Each person within the group took a piece of paper and secretly read the character they would portray. The groups were then given a problem to solve through discussion, thereby promoting dialogue. Each group member had to participate in the discussion in the role of their 'character', while assisting the group to find a solution to the stated problem.

To enable students to gain a holistic understanding of the Dental Sciences academic terrain, they visited the dental clinic where dental assistants are trained. The purpose of this visit was to differentiate between the Dental Technology and Dental Assisting programmes. Two groups were formed, and on a rotational basis one group, escorted by the Academic Development Practitioner, visited the dental clinics. Concurrently, the second group participated in the PowerPoint training session with the dental technology lecturer. As part of the exercise, students were asked questions in a quiz format on the various aspects observed at the dental clinics. The pedagogical purpose was for the dental technology lecturer and Academic Development Practitioner to assess if this exercise enabled students to increase their knowledge on the dental profession.

Workshop Two: 'Reflecting on your Discoveries' (n = 37)

Two weeks prior to the workshop, students were placed in groups of four and were advised of the criteria for the PowerPoint presentation. From a student perspective, the purpose of the presentation was for them to reflect and report on their developmental progress since attending workshop one. Pedagogically, the dental technology lecturer and Academic Development Practitioner wanted to assess if students were able to use the knowledge of PowerPoint, as well as to determine the efficacy of the various tasks and activities offered in workshop one.

Students had the opportunity to paint the ceramic tile that they created in workshop one. The dental technology lecturer together with the Fine Arts lecturer facilitated the ceramic tile painting activity. Two groups were formed, and on a rotational basis one group performed the ceramic tile painting while the other did the Cat Tangram activity. The Cat Tangram activity used thin board pieces in shapes of triangles, oblongs and squares. These board shapes were randomly piled for each group who then had to rearrange the pieces to form a picture of a cat sitting up on its haunches with one paw extended. Students also participated in the Dots-on-the-Page activity, which used nine-dots on a page in the shape of a square. They were required to draw a line through all the dots only using four lines, without lifting the pen or going back along a line.

While the rationale of the Cat Tangram and Dots-on-the-Page activities was to promote lateral thinking, critical thinking, and problem solving through collaboration among peers, these activities also provided a specific purpose within the context of Dental Technology. It was anticipated that these activities would alert students to as to whether or not they needed to develop their fine motor skills, which are generally required to produce accurate and clinically acceptable intra-oral dental appliances.

Research Participants

Purposive sampling was used, where all first-year Dental Technology students registered in 2010 (n=52) participated in this study. In addition, and for reasons beyond the control of the dental technology lecturer and Academic Development Practitioner, attendance by students in Workshop Two was smaller (n=37) when compared to attendance at Workshop One (n=52).

Data Collection and Analysis

Permission to collect data was obtained from the academic head of Dental Sciences. Written

consent was obtained from all first-year Dental Technology students who participated in the workshops. Students were made aware that the anonymity and confidentiality of information would be maintained. Consequently, student names were not required on their feedback forms. Students were also aware that the workshops were part of a larger research project.

For each workshop, written feedback was collected at the end of each workshop day, except for the last day of Workshop One. As the dental technology lecturer and Academic Development Practitioner intended to use training workshops to enable students to acquire epistemological access to Dental Technology and to the university overall, the following three broad questions were asked:

1. What did you like?
2. What didn't you like?
3. What benefits did you see in what we have been doing today?

Direct observation of students through video recordings, digital images, and a focus group interview supplemented the feedback. The video recordings also captured important aspects of the activities that were being conducted concurrently by the dental technology lecturer and Academic Development Practitioner in the workshops, and were analysed in terms of the research question.

With reference to Workshop One, on the final day an independent academic conducted a focus group interview with the participating students. The focus group questions, which were designed by the authors, centred on the efficacy of tasks and activities, acquiring access to Dental Technology, learning to read the culture of the university, the kinds of skills that were fostered, and areas of improvement. This focus group discussion was recorded and transcribed by another departmental lecturer, who was not part of the design and development of the workshop. This further assisted in validating the study.

Validity (or "Trustworthiness")

Prior to the workshops, the academic staff in the Dental Technology programme validated the activities and tasks to be used in the workshops. As this research intends to give a factually accurate report on the workshop interventions, descriptive validity as described by Johnson and Christensen (2012: 265) was used. They state that descriptive validity refers to the "accuracy in reporting descriptive information (description of events, objects, behaviors, people, settings and so forth)". This form of validity is important because description is a major objective in nearly all qualitative research.

In terms of reliability, intercoder agreement between the dental technology lecturer and Academic Development Practitioner was used to determine whether each had assigned the same or different themes to the students' feedback (Creswell 2011). Examination of the students' statements revealed two categories namely, access to knowledge and workshop design. Statements within each category were then organised into three themes (Figs. 2 & 3). The dental technology lecturer and Academic Development Practitioner agreed on each theme within each category through frequency counts of the students' statements. The themes were then analysed in terms of Carnell's (2007) teaching and learning model.

RESULTS

For each workshop, six themes emerged from the students' written feedback. Figure 1 illustrates the category of 'epistemological access' and the themes that emerged namely, professional development, personal development and teamwork. Similarly, Figure 2 illustrates the category of 'workshop design' and the themes that emerged namely, instructional design of the workshop, peer interaction and structural set-up of the workshops. Figures 1 and 2 also show the common phrases underpinning each theme.

The focus group interview together with video recordings and digital images confirmed the students' written feedback. Video recordings revealed that that the tasks and activities conducted enabled students to acquire knowledge of the Dental Technology profession. This is supported by the student responses, given verbatim, below:

"What I did like about the workshop is giving us what we can expect to this profession of Dental Technology".

"What we did today really gives or opens one's eyes on what to expect in varsity life and when you working as a technician or technologist".

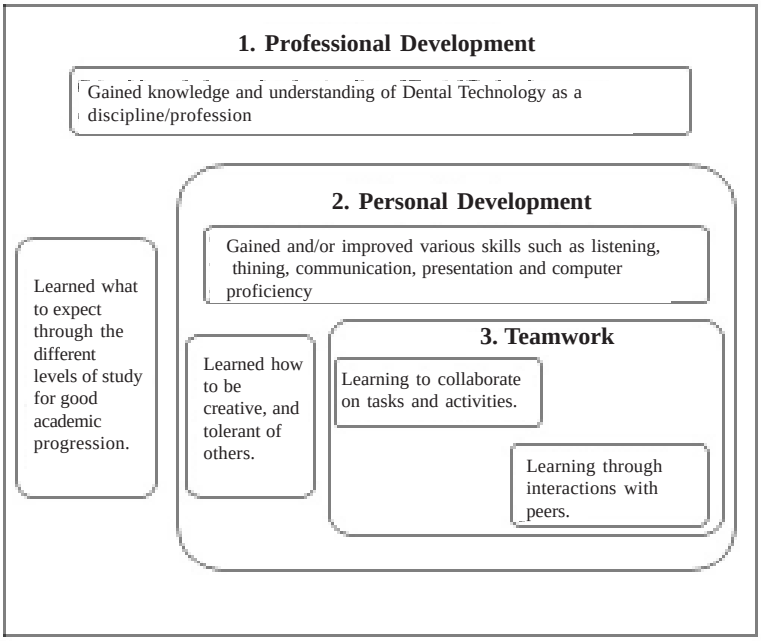

Fig. 1. Themes related to the category of access to knowledge through teaching and learning practices.

"I liked the activity that improved my listening skills which are essential in this dental industry".

In addition, the response rate of 70% revealed that the workshop tasks, games and activities enabled students' to make links between their first-year theoretical subjects and the practical aspects of Dental Technology. Some of them emphasised how these links extended through to the senior levels of study: *"I saw the work done in 2nd year – Btech which made me love and want to continue with the coarse* (sic)*"*. Video recordings further showed that the tasks and activities conducted in the workshops promoted dialogue and shared understanding among students, and between staff and students.

With reference to workshop one, 75% of student responses recorded that there was "nothing that I did not like", while the remaining students documented their dislikes. These included their peers making noise or shouting inappropriately, that working groups were too big, there were disagreements during group work, and some students were not always able to voice their opinions as their peers were too dominant. This finding is supported by comments made by students in the interview.

While most of the students felt that the duration of the workshop was appropriate, there were a few who thought that the workshop was too short, or too long, or interfered with the formal academic programmes. They expressed their concern that time invested in the workshop would have long term consequences on their dental laboratory practical classes.

DISCUSSION

The findings of this study are consistent with studies that focus on facilitating first-year students' transition into the university. In particular, the results of this study mirror the work of Wilcox et al. (2005: 719), who expressed that apart from new students having to deal with the "academic culture shock of adapting to the higher education environment" they also need to cope with "the emotional shock of moving from the familiar home environment to a very different life at university.", which was a key focus of this study.

McKenna and Sutherland (2006: 16) state that, "Lecturers and students at University of Technologies value the curricular link with industry and this is often expressed as a defining

factor in constructing the learning practices of the institution." This study supports McKenna and Sutherland's assertion, particularly with reference to Figure 1 and in relation to the 'empowering' quadrant of Carnell's model. The students stated that the table puzzle task and the visit to the Dental Assisting clinic empowered them to make the links between the formal academic programme and professional practice. Particularly, students indicated that they *"gained in knowledge and understanding of Dental Technology."*, and that they *"learned more about Dental Assisting and the links with Dental Technology"*. In the process, and as illustrated in Figure 1, the environment provided them with the opportunity for personal development and to engage with soft-skills such as teamwork.

Teamwork developed through dialogue between students from diverse backgrounds. This was evident in the video recordings that captured students working co-operatively and collaboratively. As a consequence, teamwork emerged as a positive theme and straddles the 'co-operative' and 'community' quadrants of Carnell's model. From a higher education perspective, teamwork is recognised as an important hallmark within vocational programmes in training students for industry. Garraway (2011: 232) asserted that there is a responsibility to assist students in skills transfer to the work place. In particular, he emphasised that "working productively in groups…can then be transferred from university to work situations". Whilst teamwork is a valuable soft skill within teaching and learning, this study cautions that the effectiveness of teamwork is reduced when the groups are too large (Fig. 2).

Northedge (2003) posits that in order for students to access knowledge they need to participate in knowledge (discourse) communities, and that such participation must be both intellectually and socially challenging. Video recordings of the students participating in the Pathfinder and Character Type activities revealed that they were engaging collectively, and in the process were attempting to socialise as a 'community' in the new academic terrain of Dental Technology. Regardless of this community-like engagement, and as illustrated in Figure 2, some students reported negative peer interactions. It could be argued that the inadequate time allocated to these activities (Fig. 2) contributed to the adverse behaviour of some students. Interestingly, and characteristic of the student dynamics within a class, there was contradictory reporting by stu-

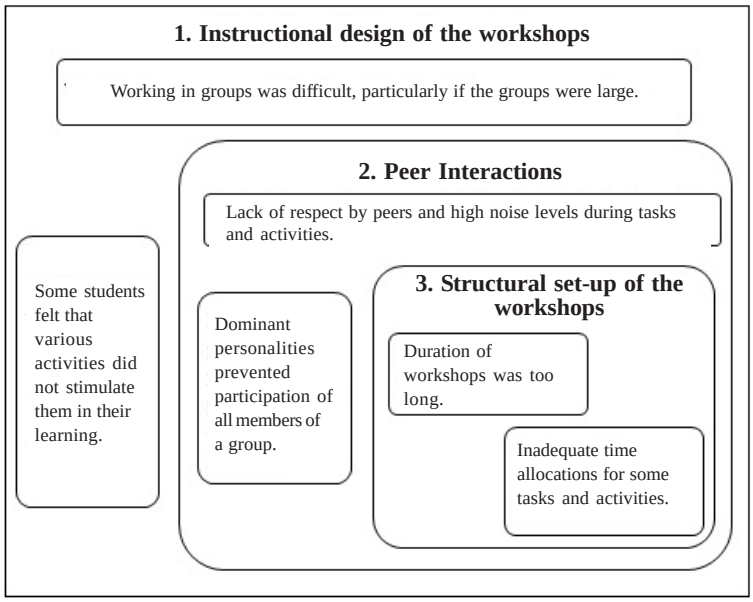

Fig. 2. Themes related to the category of workshop design

dents whereby some complained about the overall length of the workshops, while others felt that the time allocation for task and activities was inadequate. The issue of time has been carefully considered when developing other workshops in the Dental Sciences department.

Although this study indicates that workshop interventions assist higher education lecturers to facilitate students' access to knowledge of Dental Technology, there is a potential limitation. The sample included first-year Dental Technology students only, hence the results cannot be generalised to other health sciences programmes. Nevertheless, the relation between students' accounts of the workshops and their access to knowledge of Dental Technology offers some support for the validity of the categories constituted, as Carnell's model has been found to be reliable in a number of contexts (Arnold and Thompson 2009; Johnson 2009).

CONCLUSION

The salient feature of this study is that workshop interventions that engender co-operative, empowering, and community-like practices enable students to acquire epistemological access to their discipline, and to the university overall. As outlined in this study, workshop interventions can capacitate first-year students in learning how to negotiate and survive in a diverse and often challenging higher education environment. It is envisaged that the pedagogical approach taken in this study will help to develop a framework to assist other programmes within Faculties of Health Sciences across different universities. This study suggests that it is possible for lecturers to be more responsive to nurturing student adjustment to an alien university milieu, both academically and socially.

NOTES

1. This study uses the 'race' or 'population group' categories of Statistics South Africa, namely: Black African, Coloured, Indian or Asian, and White (Statistics South Africa, 2003).
2. The first author of this paper.
3. The second author of this paper.

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