Exploring large group dynamics

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Abstract. Due to high intake, teaching large groups of students has become an inevitable feature of the learning process at institutions of higher learning. This article explores large group dynamics in a teaching-learning activity involving first year students (National Diploma Programme) at the University of Johannesburg. This exploration is premised fundamentally on the essential tenets such as the teaching approach employed during the teaching-learning activity, the impact of audio-visual media, the nature of support provided by the qualification offering department, the limitations of the online learning tool (Edulink), availability and suitability of lecture venues, as well as student-instructor interaction. Insights gained from this exploration are largely based on the notion that the teaching-learning activity is by its very nature a dynamic process. In addition, these insights provide interesting pedagogical dimensions to the teaching-learning activity described in this article.

Introduction

Providing tuition to large groups of students coupled with its concomitant challenges has become an inevitable reality for the academic personnel at institutions of higher learning. This article explores the dynamics associated with the teaching-learning activity involving large group of students at the University of Johannesburg, South Africa. The exploration is largely based on the essential tenets that served to characterise the activity under consideration in this regard.

Teaching-learning activity as a dynamic process

It is a known fact that the teaching-learning process is characterised by significant ramifications which cannot be wished away. These ramifications point in most instances to reinforcement learning as a remedial intervention. Reinforcement learning is defined as the problem faced by an agent that must learn behaviour through trial and error interactions in a dynamic environment [1]. In addition, it is appropriate to point out that reinforcement learning is premised on the notion that an individual uses his previously gathered experience to improve the decision-making process [2]. Reinforcement learning as an essential pedagogic tool is underpinned by some basic theoretical concepts [3], namely: *agent, state, action set, reward.*

Agent refers to the decision-making unit under consideration which is the Physics student within the context of this inquiry. A finite set of *states* constitutes a system which in the light of this article specifically refers to the classroom environment populated by the students. The system is defined by a number of dimensions which in the context of this inquiry are: the activity being performed, the location at which the activity occurs, activity schedule and the people involved in the activity itself. The *action set* refers to all possible decisions which can be made. In the context of this article, these are viewed as decisions made by the students to frame their sequence of activities. *Reward* refers to the feedback provided. In this particular context, reward is viewed as the feedback provided by the instructor as an outcome of assessment.

The teaching-learning activity in this particular setting was characterised by a tutorial-based teaching approach which made provision for intensive tutorial sessions. The instructors were actively involved during the tutorial sessions assisted by peer tutors. Audio-visual media were also used as additional tools in the process and were largely in fairly good working condition. Media can be used as instructional aids exclusively to enhance or enrich the instructor's presentation and as instructional systems to promote individualization of instruction in both conventional and non-conventional settings [4]. Moreover, the function of technological media is to supplement the instructor through enhancing his effectiveness in the classroom [5]. In addition, educational media can be viewed as both tools for teaching and avenues for learning, and their function is to serve these processes by enhancing clarity in communication, diversity in method, and forcefulness in appeal [6]. Technological media used in the teaching-learning activity described in this article included Edulink. Edulink is an online learning tool used by students to access critical information related to academic activities pertaining to various specific disciplines.

Theoretical framework

This article is positioned within the broad theoretical framework of interpretivism which fits coherently with the adoption of third generation version of the Cultural Historical Activity Theory (CHAT) [7] as a theoretical framework. The Cultural Historical Activity Theory is a socio-cultural and historical lens through which human activity systems can be holistically analyzed [8]. The basic elements of an activity system include subject, object, tools, community, rules, and division of labor [7] as depicted in Figure 1 below.

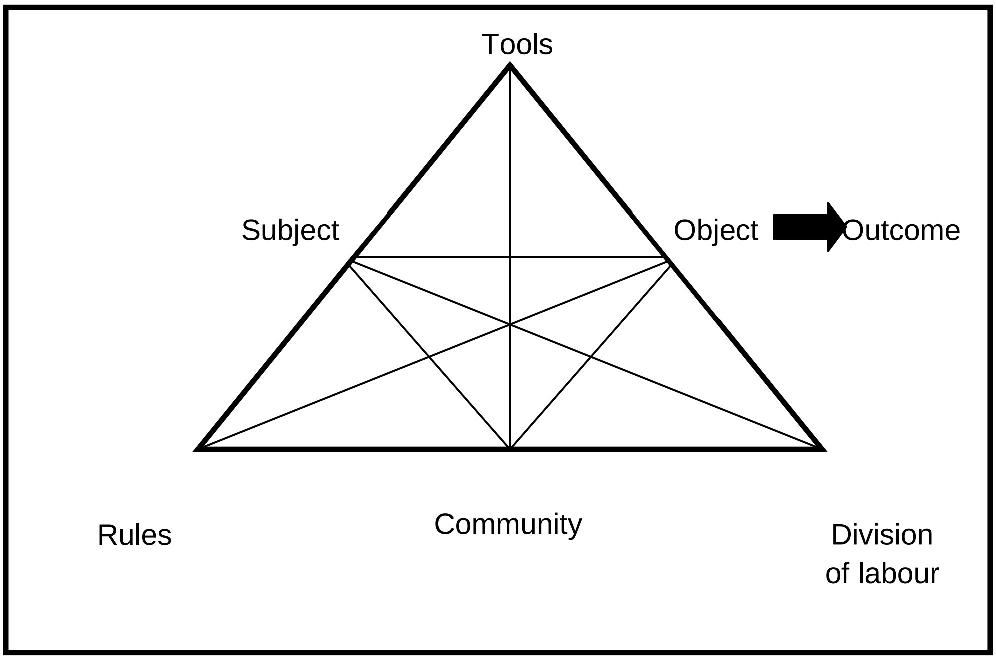

Figure 1: An activity system (Engeström, 1987)

The adapted version of the activity system relevant for this inquiry is provided in Figure 2 below.

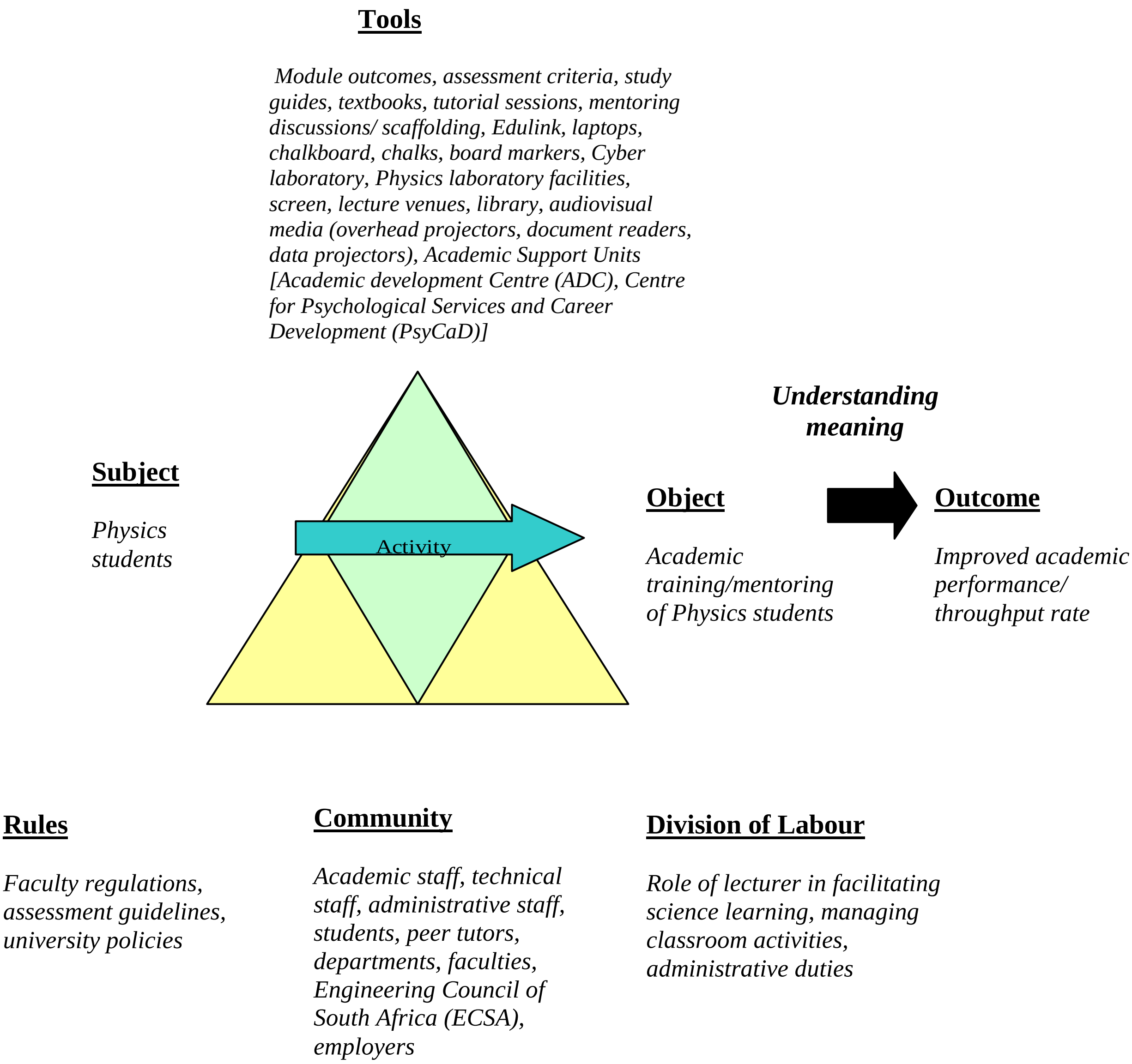

Figure 2: An activity system adapted for this inquiry

It is important to point out that the unit of analysis (object) in this article is the academic training (mentoring) of Physics students. In terms of the structure of the activity system adapted for this article, the tools comprise the following: module outcomes, assessment criteria, study guides, textbooks, tutorial sessions, mentoring discussions/ scaffolding, Edulink, laptops, chalkboard, chalks, board markers, Cyber laboratory, Physics laboratory facilities, screen, lecture venues, library, audio-visual media (overhead projectors, document readers, data projectors), Academic Support Units [Academic Development Centre (ADC), Centre for Psychological Services and Career Development (PsyCaD)]. The subject is the Physics students receiving tuition in a classroom environment. The rules in the context of this article refer to aspects such as faculty regulations, assessment guidelines and various university policies. The community is constituted by human personnel in the form of academic staff, technical staff, administrative staff, students, peer tutors, departments, faculties, employers and the Engineering Council of South Africa (ECSA).Division of labour specifically refers to the role of lecturer in facilitating science learning, management of classroom activities and related administrative duties. The outcome is the improved academic performance of students in Physics as a discipline forming an integral part of the academic offering at the University of Johannesburg. The outcome also has a significant bearing on the nature of the throughput rate achieved.

Sample

The sample comprised first year Electrical Engineering students (National Diploma Programme) and Batchelor of Technology (Analytic Chemistry) students at the University of Johannesburg. Figure 3 below reflects student intake in relation to first year Electrical Engineering (National Diploma Programme) for 2011 and 2012. The intake for 2011 was higher as compared to 2012.

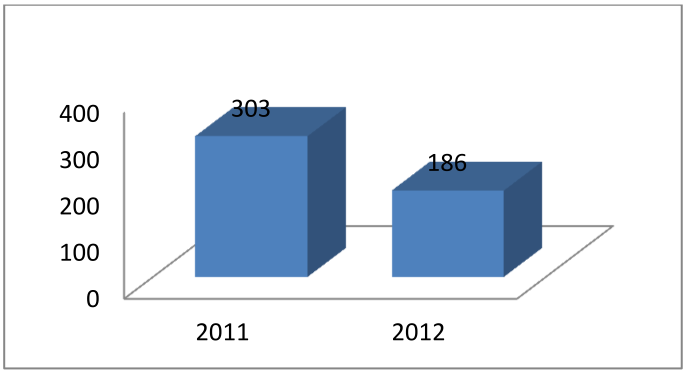

Figure 3: Student intake for 2011 and 2012 (Electrical Engineering)

The throughput rate in 2012 (66%) was higher than 2011 (55%) as depicted in Figure 4 below. This translates into an increase of 11% in terms of the throughput rate. There was no significant difference in the pass rate for 2011 (71%) and 2012 (72%).

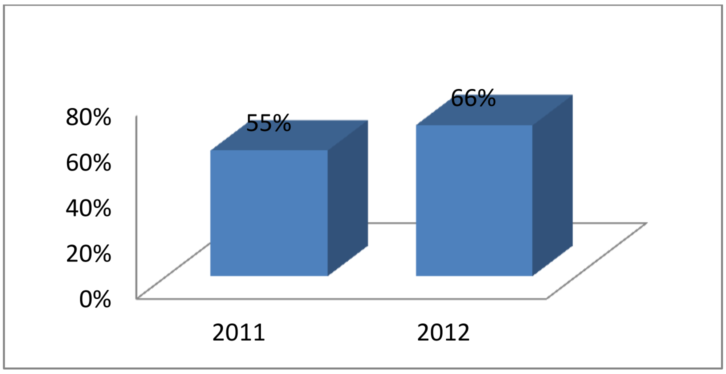

Figure 4: Throughput rate for 2011 and 2012 (Electrical Engineering)

Figure 5 below provides details about the student intake in respect of Batchelor of Technology (Analytic Chemistry) for 2011 and 2012. This cohort represents a smaller group which was used for comparative purposes in this inquiry.

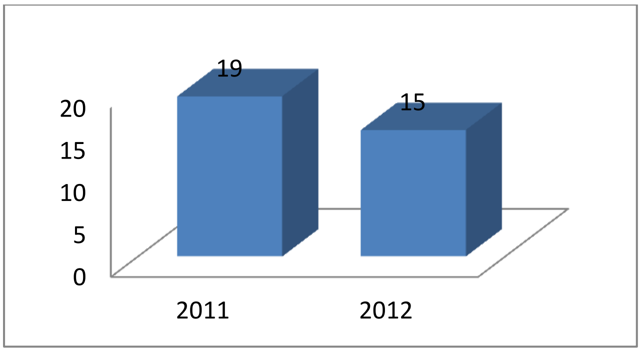

Figure 5: Student intake for 2011 and 2012 (B.Tech: Analytic Chemistry)

However, the throughput rate for this smaller group remained consistently higher although there was a decrease in 2012 (see Figure 6 below). Does this imply that the group was smaller and consequently manageable for the instructor?

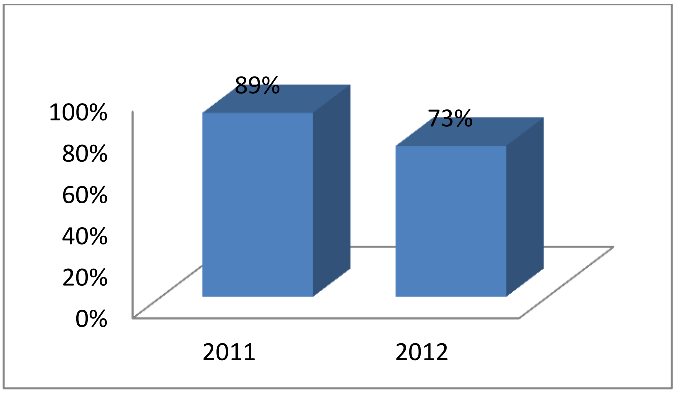

Figure 6: Throughput rate for 2011 and 2012 (B.Tech: Analytic Chemistry)

Implications

Higher intake resulted in lower throughput rate while lower intake yielded a relatively higher throughput rate in the case of the larger group comprising first year Electrical Engineering students (National Diploma Programme). Consideration has to be given to the fact that tuition was provided by the same instructors under the same operating conditions. Teaching a large group appears to be a challenging task as evidenced by the difference in the throughput rates. Within the context of this inquiry, the throughput rate seems to be a function of group size. It may also very well be a function of the complexity of the dynamics characteristic of the environment in which tuition is provided such as the facilities conducive for meaningful interactive learning to take place which include the appropriateness of the seating arrangement, lighting, audio-video systems and the projection facilities. If the same instructors employ the same teaching approach and use the same venue for the large and small groups, then the difference in throughput rate may be attributed to the group-size provided that the input characteristics of the two groups are of comparable scales.

Tensions emanating from the activity system

While the use of technology as an educational resource is of paramount importance, some concerns have been expressed by some researchers. For instance, there appears to be a level of unpreparedness to integrate technology into the classroom [9] and technology training opportunities do not seem to provide adequate preparation for effective incorporation of technology into the classroom [10]. While Edulink training is regularly provided at the University of Johannesburg, its utilization is characterised by inherent limitations. Edulink as an educational resource is powerful when it comes to dissemination of critical information, but cannot serve to develop students' understanding of key principles in Mathematics and Physics in particular. In essence, it cannot be used to describe or explain the sequence of steps in the derivation of complex mathematical constructs. As a matter of fact, it cannot supersede the instructor in the classroom. However, it is recommended that a good program that can be used to facilitate the transition should include peer-to-peer training on available technology, modelling of successful classroom techniques by more experienced instructors within the discipline, support, accessibility and feedback from a trusted mentor, and established forums and mechanisms that enable end-users to share ideas and continue development [11]. Moreover, one of the advantages of using technology in the classroom is a decrease in the instructor's workload to an increase in student learning, motivation, knowledge of tools and skills necessary to become life-long learners in the age of technology [11].

In terms of university policies and faculty regulations, examination entrance requirements do in most instances create friction between students and the academic staff in the sense that students sometimes feel that they have to be allowed to sit for the examination even if they do not qualify to do so. First semester modules serve as prerequisites for subsequent modules and poor academic performance in the first semester results in academic exclusion as an unpalatable reality for some students. Tutorial sessions are a critical component of the teaching-learning activity and peer tutors are involved in these sessions. While every effort is made to appoint academically competent peer tutors as far as possible using rigorous and stringent screening criteria, the lack of graduate peer tutors has always been a prevalent predicament. The reality is that academic staff members responsible for specific modules are called upon to be actively engaged in tutorial sessions in order to maximize the benefits of the academic experience. This is a crucial and logical step in terms of circumventing what is potentially a significant pitfall in the teaching-learning activity under consideration in this regard.

By the same token, the size of the lecture venues was also a concern as some of the venues used could not provide adequate space to comfortably accommodate all the students. Classroom management proved to be an immense challenge in view of the large size of the group. In addition, support from the qualification offering department was inadequate and the classroom environment provided minimal opportunities for individualized attention for weaker students. It is appropriate to indicate that the throughput rates in this regard were achieved against all odds. In the interest of providing quality tuition to students, these factors should not hamper the role of instructors in realising the set pedagogic objectives. Quality is a core ingredient of any programme offered by institutions of higher learning. Given this imperative, appropriate conditions are essential for the provision of tuition that is in line with the programme accreditation criteria set by quality assurance bodies.

Conclusion

Teaching large group of students is a daunting task as it is an extremely difficult and complex undertaking. It may indeed seem to be considerably difficult but it is certainly not impossible provided appropriate systems are put in place in advance. Instructors have to harness the potential of effective and innovative teaching approaches in order to overcome the critical challenges associated with the provision of tuition to large groups of students. Increased tutorials, consultations, and monitoring have to be provided for the larger group for purposes of achieving the same success level as the smaller group. Constant rational reflection on the dynamics involved is required to ensure that substantial progress can be made in such undertakings even under very challenging operating conditions without compromising quality.

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