Chapter #14

ENHANCING LEARNERS' INTRINSIC MOTIVATION USING STUDENT TEAMS ACHIEVEMENT DIVISIONS (STAD) IN MULTICULTURAL CLASSROOMS OF SOUTH AFRICA

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ABSTRACT
This chapter is drawn from a PhD study that employed Student Team's Achievement Divisions as a learning technique to enhance learners' intrinsic motivation in Technology Education within a South African multicultural school. The authors over the years observed learners' actions, and interactions in Technology classes and realised that some of the learners find it difficult to engage in behaviour that arises within themselves - an aspect known as intrinsic motivation. Most learners in the Technology class, registered no concerns in obtaining low scores or failing the subject. However, a minority of the learner population obtained high achievement scores and maintained interest throughout lessons. This study explored the development of the ZPD in a cooperative learning context. The authors used STAD, as a cooperative learning technique, in motivating learners intrinsically to increase their participation in class activities. The study explored STAD in1) closing the gap between pedagogy and content knowledge, and 2) intrinsically motivating learners to develop high levels of achievement in the subject of Technology. This study employed the Bricolage design in gathering data from two Grade eight Technology classes over a six-month period. The findings indicated that the learning environment cultivated learners' development, curiosity, and positive attitude toward Technology.

Keywords: student teams achievement divisions, technology, intrinsic motivation and zone of proximal development.

1. INTRODUCTION

This chapter is a part of a broader doctoral study that employed Student Team's Achievement Divisions (STAD) as a learning technique to enhance learners' intrinsic motivation (IM) in Technology Education in a South African multicultural school. Classroom practices in most schools are driven by the traditions and policies uphold by those schools. Secondly, novice teachers could only follow examples of what is done by those who have been in a school for years, even if it doesn't reflect their worldview of teaching. Teaching methods not excluded from the above assertions, novice teacher could only teach in a way that experienced teachers do, and school management encourages. The lecture method where a teacher is a conveyor of subject content and all-knowing in the classroom tend to be mostly preferred by most seasoned educators, including those at the school where the research study was employed.

In this chapter, STAD as a cooperative learning technique was used to explore effects enhancing learners' development of intrinsic motivation and positive attitude in Technology as a school subject. Internal motivation is said to decrease from childhood to adolescent stage

in certain school subjects (McGeown, et al. 2014), which may hamper or negatively manipulate their life chances for the future.

Intrinsic motivation is mostly referred to as the zeal or drive that pushes the learners towards completing their tasks (Lee, McInerney, Liem, & Ortiga, 2010) and placing value of the work upfront. Therefore, intrinsically motivated learners set high goals for their academic performance basing their intentions on the importance and value of the task.

The choice of pedagogical methods was arrived at after consulting with literature on various methods of teaching, for addressing the concern on low or the absence of intrinsic motivation within numerous learners in Technology class.

As authors of this chapter, we believed that cooperative learning methods of teaching would best address the problem at hand as they use structured and well organised group learning activities, where learners learn to take responsibility for their learning (Johnson & Johnson, 2005). We are further convinced that this accountability for learning among learners could also be value laden, thus adapting to values of teammates that foster intrinsic motivation, especially in multicultural school contexts. Furthermore, we are of the belief that teaching should not only be based on the finished product but also on the development process for future references. I therefore opted for STAD since it has been explained to be the less complex of the cooperative learning methods for learners and the teachers to implement (Gaith, 2003; Slavin, 1990). STAD as a learning technique and a teaching method should create an interactive environment conducive for learners who are intrinsically motivated in Technology, to positively influence their peers in the groups. Furthermore, STAD creates a platform for extrinsically motivating learners by awarding groups with most points, a 'prize' (Slavin, 1990), which is expected to coerce internal motivation towards sustaining improved academic performance.

2. PROBLEM STATEMENT

The National Curriculum Statement (NCS) of South Africa classifies school subjects as essential and non-essential. The non-essential subjects in which Technology education falls under, could be failed or passed with very low requirements and as such it would not affect learners' progression to the next grade if failed. In most schools Technology ends at Senior Phase which represents, grades 7-9 (Junior Secondary) and not offered at the Further Education and Training Phase, which represents, grades 10-12, (Senior Secondary). This phenomenon causes amotivation to majority of learners in a Technology Class in a multicultural school. However, there are learners who would not settle for mediocrity in any subject whether they like it or not. There are also those few learners who excel and enjoy Technology as a subject. Then, there are those who would just do enough to pass and the ones who really do not have a problem in failing the subject. The question that the chapter seeks to answer is "***How could STAD be employed to enhance learners' intrinsic motivation towards Technology as a school subject*?"**

3. CONCEPTUAL FRAMEWORK

This section elaborates on the contextualisation of STAD as a teaching method and a learning technique in Technology classrooms in multicultural schools. As a teaching method, STAD would be a vehicle a teacher uses to deliver the content accurately to learners. As a learning technique would be a way for learners to implement and learn the content or material at hand, including skills and values that they need, to cultivate intrinsic motivation. The use

of STAD in the context of developing intrinsic motivation among the learners is underpinned by constructivism as a teaching paradigm with specific reference to the Zone of proximal development theory by Vygotsky as the main theoretical basis, whilst other theories relating to social interdependence and motivation, self-efficacy and self-determination serve as supporting notions.

De Kock, Sleegers and Voeten (2004) assert that social constructivism is founded on Piagetian theory that contests learning as an individual and internal process which is influenced by various developmental stages and experiences of learners. (Powell & Kalina, 2009; Palmer, 2005). Whereas in Vygotskian Zone of proximal development (ZPD), social interactions and debates within the STAD teams (Dagar & Yadav, 2016; Shabani, Khatib, & Ebadi, 2010) play a role towards individual construction of knowledge and making meaning of what is learnt. This forms the foundation of cultural enhancement towards self-motivation in team discussions during the STAD lesson in multicultural class settings. Therefore, constructivism advocates theories and teaching methods that sort to encourage construction of knowledge by individuals and the society (Sanchez & Loredo, 2009).

3.1. Zone of proximal development

The Zone of proximal development (ZPD) as a social constructivism concept suggests that learners interacting with others that are more knowledgeable in a well organised round-table group work could bear positive effects in enhancing the expected culture within a group (Shabani et al., 2010). In this study the authors of this chapter, assigned learners into STAD groups for effecting positive change on learners with low motivation towards improving their performance in Technology. The significance of ZPD concept to this study is zooming into specific potentialities individual learners in Technology class are seemingly lacking maturity and could possibly achieve at higher levels through cooperation with others such as STAD teams (Li & Lam, 2013; Gade, 2010). We are of the belief that learners' aptitude in simulating behaviours and practices of well performing peers would result in majority of learners improving their academic performance. Therefore, enhancing their internal motivation to keep up the academic standards recently achieved. In the context of this chapter, ***Zone*** could be defined in terms of an area in a learner that is awaiting to be triggered through interaction with more capable team members whereas ***proximal*** may denote those behaviours and actions that eventually coax learners to adapt and reach whilst the ***development*** that could be regarded as intellectual maturation of learners to implement the learnt behaviours and actions from more able peers (Gade, 2010). ZPD is mostly explained as the contrast between what a learner can do individually and what he/she may achieve with some assistance from a more knowledgeable peer (Least, 2014; Rezaee & Azizi, 2012), implying that STAD as a teaching method and a learning strategy is a suitable vehicle in enhancing intrinsic motivation of learners that are underperforming academically. Chaiklin (2003), further argues that the theory of ZPD considers the holistic development of a learner within a time interval from lack of particular psychological abilities to the attainment of such capabilities resulting from the support of more able peers or the teacher.

3.2. Social interdependence

Social interdependence theory provides a foundation on which cooperative learning is built. It is said to occur when individuals' actions affect others' achievement of the expected outcomes including their own (Smith, 2010; Johnson & Johnson, 2009). Thus, intrinsically motivated learners in Technology in multicultural school settings would be encouraged to improve the situation of the demotivated others, in STAD communities to effect positive interdependence through ZPD. Therefore, learners need to understand that each member has

to put an effort for the team to succeed – the less capable learner should be willing to put more effort to learn from others and more knowledgeable ones give their full support to others (Johnson, Johnson & Smith, 2014). In this study, social interdependence was promoted by ensuring that learners work effectively with group members to achieve group goals.

3.3. Motivation theories

Various motivation theories such as Maslow's needs theory, mentions basic hierarchical needs including, physiological, safety, love (social), esteem and self-actualisation needs. the study focused on levels of safety, love, and esteem that learners could receive and appreciate from their respective groups towards self-actualisation in their academics (Martin & Joomis, 2007; Maslow, 1943) Alderfer's Erg model has three levels, existence, relatedness and growth. therefore, STAD groups assist with the nurturing of sustainable interpersonal relationship (relatedness), which will boost the strive for personal growth (intrinsic motivation) among members of the STAD teams. Mcclelland's achievement motivation theory asserts that needs are acquired through life experiences, namely, need for achievement, need for power and need for affiliation. when employing STAD in a technology classroom, we are of the view that each learner has a need to excel or achieve praiseworthy results in all their school subjects (Ball, 2012; Redmond & Cramer, 2012; Moore, Grabsch & Rotter, 2010). secondly, learners in stad learn to take control over their studies and appreciate a sense of belonging by affiliating to a stad group (Ball, 2012; Borkowski, 2005). These motivation theories were studied to find out the factors that may influence the development of intrinsic motivation among the learners in technology classroom. motivation can be defined as the internal or external drive that directs and informs people's behaviour towards doing something (Lai, 2011; Pew, 2007). Moreover, motivational theories have indicated to direct focus on dynamizing and redirecting learners' demeanour to trigger internalisation of expected behaviours (Pintrich, 2003). therefore, highly motivated individuals willingly put more effort, vigour and time into the journey leading to the achievement of intended outcomes.

For this chapter, more emphasis is on process motivation theories such as self-efficacy and self-determination theories.

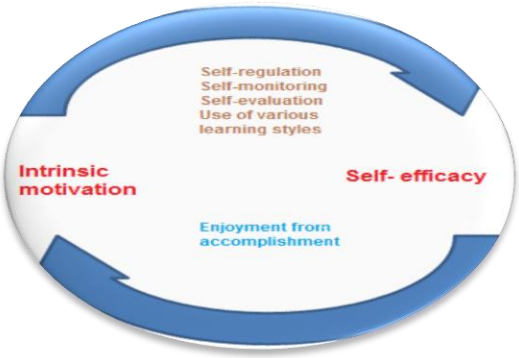
3.4. Self-determination theory

The self-determination theory classifies motivation into intrinsic (autonomous) and extrinsic (controlled) motivations. Intrinsic motivation is regarded as the highest level of self-determined regulation and it involves doing an activity, because it is interesting and enjoyable. Self-determination theory further addresses the energising and directing of behaviour of learners through the satisfaction of three essential psychological needs natural to human life, namely competence, relatedness and autonomy (Bachman & Steward, 2011; Gillard, 2007). A STAD classroom environment would be conducive to nurture these inherent tendencies by meeting the abovementioned needs. Competence, relatedness as well as autonomy learner traits could be improved as they discuss and debate facts within their groups and among different groups in the multicultural classroom. Learners sharpen one another improving internal motivation to do well in the task (Mario, 2019; Bachman & Stewart, 2011; Stone, Deci, & Ryan, 2008).

3.5. Self-efficacy theory

Self-efficacy by Bandura is classified as a process motivational theory due to particular processes individuals should experience as a mechanism to enhance motivation within themselves. Academic self-efficacy could be defined as beliefs that students have about their abilities (Scherer, 2013) to perform well in their academic tasks. The higher academic self-efficacy learners have, the higher they set own academic goals and earn higher grades and this correlates with intrinsic motivation (Niehaus, Rudasill, & Andelson, 2012; Usher, 2009; Bandura, 2001).

Figure 1.
Self-efficacy vs IM.



According to Bandura (1986) as cited in (Ritchie & Williamon, 2011), self-efficacy is influenced in four main domains, namely: through accomplishing a task, observing the completion of a task, verbal encouragement or physical signals. STAD groups could be a reliable platform for the enhancement of individual members' self-efficacy. Furthermore, self-efficacy of learners is regarded to have positive effect (McGeown, et al. 2014) in enhancing intrinsic motivation towards their academic performance.

3.6. Technology as a school subject

Technology evolved from the era of industrial arts through technical education period where various technical subjects such as technical drawing, woodwork, metalwork, electricity and electronics were taught independently from early school ages in South Africa. Technological knowledge emanates from human activity to solve societal problems and meet the needs of the community using various available materials, skills, values and knowledge – taking into consideration the environmental and social factors (DBE, 2012; Stein, Ginns, & McDonald, 2007). Moreover, Technology in nature is a broad concept that cannot be limited to engineering, sciences, handcraft or industrial arts, but almost every human activity that strives to meet the needs and wants of the society by providing practical solutions, including the use of high-tech computing (DBE, 2012; Järvinen, 2001; Wonacott, 2001). It could therefore be deduced that Technology lays the foundation for most technical and vocational education and training (TVET) subjects especially in the engineering department.

Therefore, the authors further add that Technology, Technology Education or Design and Technology continued to show its holistic nature from its inception and now it incorporates information and communication, electrical and electronics, mechanical and civil, food and material, environmental and medical technologies (Householder, 2012).

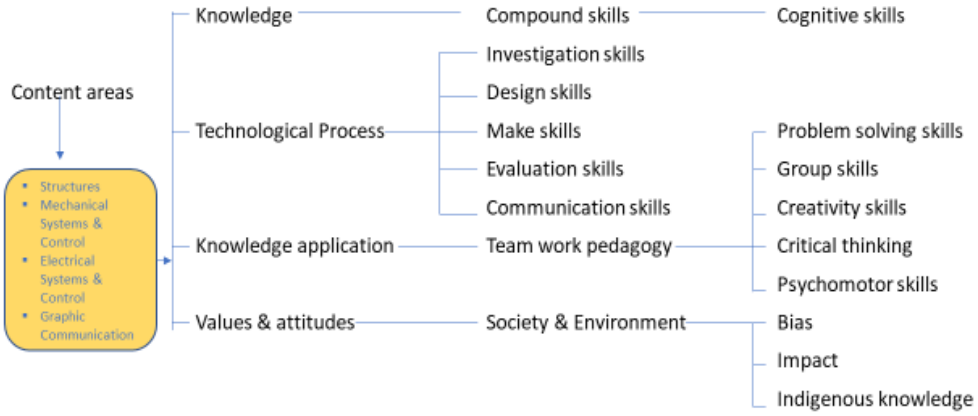
Whereas the listed subjects within the TVET (Technical, Vocational, Education & Technical) sector are taught as specialised fields of study. Due to its holistic nature, Technology education includes conceptual knowledge in the explanation of various topics, procedural knowledge in the design process, physical nature knowledge in natural structures and material, functional knowledge in the mechanical and electrical systems, and action knowledge in the practical exercises of developing solutions.

Apart from the core content of Technology, the design process outlines the process skills that form a backbone for Technology. Therefore, the design process is employed as a framework around which the teaching of Technology is encompassed. The outlined design process could be versatile to TVET students within the engineering division also. The design process stages include investigation, design, make, communicate and evaluate. However, these stages may not be chronologically followed, the designer needs to go back and forth between the stages. It is therefore advisable that TVET engineering studies need to include the design process to stimulate creativity and innovativeness among the students. In the model below the researcher extracted the problem and the design brief from the design stage to indicate their significance during the process. High school learners tend to focus more on initial design sketches without following their design briefs' requirements for the problem identified.

Figure 2.
The Technology Design Process (Masoabi, 2015).

The Technology structure below shows the holistic nature of knowledge and skills, values and outcomes.

Figure 3.
The Technology Education Structure (Masoabi, 2015).



3.7. Research methodology

Scholars in the constructivists' paradigm seek to develop theory through inductive methods of collecting and analysing data striving to understand, explain and disseminate knowledge about a social context, such as the Technology STAD multicultural classroom environment through the interpretation of research objects or participants (McGregor & Murnane, 2011). Moreover, the ontological understanding of the world view or the epistemology that guides this study states that knowledge is constructed by people on how they interpret their interaction with their environment and others. Therefore, it is not practical to detach factual knowledge from values, attitudes, beliefs, intentions and assumptions that govern people in a specific phenomenon (Arthur, 2012; Nieuwenhuis, 2010a).

Furthermore, the epistemological perspective of interpretivism holds that the researcher and the participants cannot be totally detached and therefore the investigator is interactively connected to the proceedings of the inquiry. Therefore, as authors we were able to interpret and understand the observed phenomenon and also through the perspective of the researched (Krauss, 2005). Axiological stand of the constructivist researchers is to abstain from pre-conceptualising the understanding of the phenomena, as knowledge in this paradigm unfolds inductively from data (Allen-Collinson, 2012; Mertens, 2010). Adopting the methodological bricoleur approach, the scholar is perceived as someone who combines multiple research tools to accomplish a meaning-making task. A methodological bricoleur is flexible regarding research approaches and tools (Masoabi, 2015; Denzin & Lincoln, 1999).

This study was guided by the interpretive and methodological bricolage designs during the fieldwork for collection of data and data analysis. We observed groups' interactions, processes and how learners communicate with each other amongst their groups. We further gathered the quotes of groups' conversations in their own words to determine time on task and conflict management strategies (McMillan & Schumacher, 2010). This study employed a case study design as guided by the constructivist paradigm. The inquiry tried to holistically understand the in-depth effects of STAD on learners' intrinsic motivation levels in order to assist those with lower motivation levels or unmotivated to develop intrinsic motivation for Technology as a school subject in a multicultural learning environment.

This study was conducted in a public school situated in an urban opulent residential area in the city of Bloemfontein, South Africa. Furthermore, the school has a long history of existence with over hundred and fifty years practicing and embracing the English culture, tradition and ethos (historically White school).

STAD was implemented in two Grade eight classes that consisted of thirty learners in each class. According to the South African admission to school, learners begin Grade one when they are seven years old, which brings the majority age group in Grade eight to be fourteen years (adolescent stage).

The case study design was also employed to allow the researchers (authors of this chapter) to become an active participant with the learners, but still upholding expected research ethics (Andrade, 2009). The findings thereof were not generalisable as the inquiry was bound and therefore, thorough and contributing knowledge pertaining to the social context had to be developed (Brown, 2008).

3.8. The STAD procedure and process

Since the study was employed in a boys-only school, we used the mid-year results of learners to group them. The teams of four to five members were formed using academic heterogeneity, each team sat around a table. Therefore, groups consisted of various races and or ethnic groups, high achiever 80%-100%, average achievers 50%-79% and under achiever 49% and below (Tarim & Akdeniz, 2007). The learners were informed about the purpose of the groupings and use of STAD in Technology classroom- they had to work with peers to improve academic achievement. The researcher introduced the STAD for the first three weeks of the third term to teach the teams about STAD's principles and values and how they need to work before data was collected.

On the commencement of data collection, we introduced a new topic in a lecture method allowing probes from the class (Berry, 2008; Tiantong & Teemuangsai, 2013). Throughout this semester contents on electrical and mechanical systems were taught to learners- these contents focused on the relationship between theory and calculations. Every new topic or advancement in a topic was introduced in a lecture, including question and answer methods of teaching (Slavin, 2010). Then the groups would be issued with worksheets with calculations ranging from easy to complex; to work as teams and ascertain that all members participate and eventually comprehend the exercises (Masoabi, 2015; Van Wyk, 2010). After the teams have completed their tasks, the teachers (authors) would then appoint a member from a group to do one of the sums on the board with the support of his team members. Then the rest of the class would be asked if they approve the calculation or if they have done it differently to show their method to the class. At the end of a specific topic, the learners were assigned a test which they had to do individually. The team members test results would be added together divided by a total number of team members to get a group score in percentages. The group with highest percentage was awarded a certificate of highest achiever (Tarim & Akdeniz, 2007).

After all the STAD processes were completed, we would assess, in conjunction, with the teams their improvements made, advantages and benefits of the activity and the challenges within individual groups. We also discuss with the STAD teams, the individual improvement, contribution to the team and the challenges that each member faces within the team. If there are any challenges indicated, we would then resolve them before proceeding to the next topic.

These exercises assisted learners to take responsibility of their individual and corporate actions for the betterment of group functionality.

Learners that improved their scores were then promoted to compete at a higher level (Slavin, 1977). This formula motivated learners to strive for improvement in order to compete at a higher level in the next class test.

3.9. Data collecting tools

As teacher-researchers (authors of this chapter), we employed two types of observations, namely the unobtrusive or non-reactive which were done by external observers, such as our colleagues (members of school teaching staff) distancing themselves from being involved. Secondly, we practised, reactive observation by because we (as teachers and researchers) wouldn't be part of learners' groups, but from time to time we needed to do some interventions amongst the STAD groups, as to help and guide learners toward reaching their group goals (Arthur, 2012). A learner classroom observation schedule was used as a tool for collecting data during STAD group discussions. About ten of our teacher colleagues were invited to observe procedures and processes in Technology STAD classes. We did not have specific criteria for choosing the observers.

Secondly, we attempted at giving each group an opportunity to be interviewed in order to gather more insight about how they experienced and interpreted the phenomenon. The interviews used semi-structured questions, though the interviewees were allowed full expression of their experiences during this period of STAD as compared to their traditional classroom set-up and teaching methods (Turner, 2010; DiCicco-Bloom & Crabtree, 2006).

Thirdly, we used video recordings which are classified under visual methodologies or techniques. We understood audio-visual methodology as using digital technology that is able to capture pictures that show movement, actions, nonverbal communication or behaviour including verbatim conversations from participants. The recordings assisted us as the teacher-researcher to develop accurate description of the phenomena and analysis of data.

3.10. Discussion and analysis of data

According to Nieuwenhuis (2010b), qualitative data analysis is established on an interpretivist epistemology that targets construction of knowledge by understanding the phenomenon through analysing participants' perspectives regarding the phenomenon. Furthermore, the purpose of analysing qualitative data is to interpret the words spoken in conversations and interviews, also behaviours that could not be represented by numbers or statistical calculations.

For the purpose of this study, inductive content analysis for qualitative data analysis was used guided by ethnographic and phenomenological ways of analysing data (Elo & Kyngäs, 2007). The phenomenological analysis of data took significant utterances to generate knowledge and understanding. We transcribed all the raw data from video recordings word for word including non-verbal behaviours. After all the data was transcribed, it was typed and coded and categorised into themes (Elo & Kyngäs, 2007).

3.10.1. Video recorded data

Under this data category, the following subthemes were identified during team study and presentation phases as more relevant to the learners' levels of motivation in Technology classes in a multicultural school. During team study, aspects confined to communication, group interactions, facilitator intervention; disruptive behaviours and positive interdependence were observed. During group presentations aspects confined to teamwork, sharing responsibility, confidence and excitement and self-determination were observed.

Communication level in Group 1Y (labelling of groups) was minimal, only to find out the leader, who was the high achiever did all the work and the rest of the group members, copied from his workbook. Therefore, we intervened to explain that they are doing the wrong thing that would demotivate other members from taking part in future discussions. We reiterated the crucial role of each member to be part of the process towards obtaining the final answer. As social interdependence theory suggests that each member's actions should be directed at accomplishing team goals (Johnson & Johnson, 2009). From then onwards, the situation improved- all were engaging in discussions demonstrating improved motivation to achieve and understand the work. Regarding group interactions, the majority of groups in Class 8Y showed acceptable levels of engaging each other on the work at hand and each member in the group was given an opportunity to contribute. Group members asked for further clarity from the beginning of fieldwork. On the contrary, we had to intervene in Grade 8X to clarify the purpose of using STAD in Technology as to assist one another to improve their academic achievement as well as the motivation to comprehend the subject. Social interdependence theory also indicates various psychological processes such as substitutability, infusibility and cathexis that need to take place within an individual before positive interdependence could be achieved in STAD groups (Johnson, Johnson & Smith, 2007; Johnson & Johnson, 2005). The process took several days for this class to fully interact within their groups showing enjoyment of the work due to some learners that thought working in groups allows them to disrupt others. Eventually all groups jelled well and displayed high levels of communication and focus on the tasks to be completed.

When groups were presenting their solutions to the whole class, there was a commendable oneness (teamwork) of teams as they defend their work to the class. They came to the black board sharing responsibilities by appointing the scribe and the spokesperson while other members were responsible for responding to questions from the floor. The observing groups were also cooperative, paying attention during the presentations and asking clarity seeking questions once a presenting group was done. Self-determination increased among the groups showing enthusiasm to come to the board and correct work that other groups could not get right (Bachman & Stewart, 2011; Barkoukis, Tsorbatzoudis, Grouios, & Sideridis, 2008). This exercise rose the confidence and excitement among the groups to be vigilant, and as such, other individuals in the STAD groups also able to come up with and demonstrate alternative methods of solving the calculations. For us as teacher-researchers, this development showed improved interest and determination to master the taught material.

3.10.2. Class observation data

Ten of our peer teacher colleagues volunteered to do the class visits and complete the observation schedules for learners' group work processes. Our extension of invite to external observers was to minimise our bias as teacher-researchers, as much as possible.

Themes from the class observation data included behaviour in groups, communication in groups, respect for team members, and adherence to time frames, ensuring mastery of the content, ensuring individual accountability, and ensuring positive interdependence. Below are the assertions by the peer observers under the theme of behaviour in groups.

> Mr Barnard: *Learners behaved excellently and were disciplined with appropriate interactions.*
> Ms Logan: *No disruptions experienced – boys were focussed on task at hand*.
> Mrs Blitz: *They were mostly co-operative and getting on with their work*.

The above contentions are a sample from the peer observers. The majority of them indicated that learners were generally motivated to work together in their groups. Moreover, more observers indicated that monitored group work encourages learners to focus on their task and are motivated to engage one another in their discussions (Johnson & Johnson, 1995; Johnson, Johnson, & Smith, 2004). This type of constructive engagement could result in better comprehension of the work increasing self-efficacy and self-determination in individual learners, especially when the process bears expected fruits (outcomes).

> Mrs Blitz: *The teacher was continually moving amongst the groups, but they were self-motivated.*
>
> Mr de Venter: *They are absorbed in the task at hand.*
>
> Mrs Gomez: *My walking amongst the groups observing and asking questions promoted some focuses as well as the presence of the teacher as facilitator*.

Moreover, the respectful atmosphere that reigned with the STAD groups further motivated learners to engage freely in their group discussions knowing they are protected and supported by their peers.

> Ms Robinson said: *They respond very well. Good behaviour from the learners suggests that the educator commands his classroom with authority. Learners respect the class and quickly quieten down once the educator talks to them.*
>
> Mr De Venter: *They treat one another with respect and consider each other's opinion.*

Learners were able share ideas and develop each other's knowledge using constructive arguments that made groups to be productive on their work (Smith, Sherpard, Johnson, & Johnson, 2005).

> Ms Matthews: *They did very well some even encouraged others to do better and waited for all to finish before moving on.*

Furthermore, teachers stated that learners motivated one another to do better and gave each other a chance to finish before moving on to the next activity. Moreover, teammates helped each other to comprehend the work and complete the given tasks. This was evident when learners shared their resources and knowledge to better one another. As the teacher-researchers, we believe that once an individual receives trust from the significant ones, his self-efficacy and confidence increases, motivating the individual to work harder to maintain that trust. Secondly, when a group member is held accountable for his input, it boosts self-esteem seeing that the team expects constructive contributions from him. These kinds of actions in STAD groups could be regarded as playing a significant role in developing learners' internal (intrinsic) motivation (Bachman & Stewart, 2011; Deci & Ryan, 2008) in multicultural class settings and to do better and enjoy their work because they perceive themselves as valuable members.

3.10.3. Groups interviews

There were fourteen STAD groups in total from both classes with each class having seven teams of four and five members. We managed to have group interviews with twelve of the groups, due to tight extra-curricular program.

The analysis of group interviews was done using constant comparison data analysis. Thus, the research question was How would STAD effect the intrinsic motivation of learners in Technology subject? The group interview sub-questions were: How did working in STAD teams effect your personality and academics? How do you perceive Technology as a subject? What is it that you saw or heard from the group that motivated you to be at your best?

Themes such as relationships, experiences, task completion, sharing, increased effort, lessons learnt, and challenges encountered, emanated from the learners' responses.

It could be revealed from leaners responses that, though they were in the same class, they were strangers to each other's world view and perceptions about schoolwork. In the groups interviews we asked questions that made the groups look back from the beginning of working in STAD groups to the end.

> Learner 2AX; '*Firstly we did not know each other well, we started growing to know each other and began to work well together as friends*.'

> Learner 6BX; '*Attitude to each other was not good at the start of our group work*.'

Therefore, using STAD teams to develop intrinsic motivation towards Technology as a school subject was not a smooth ride, since learners had to first reconcile their perceptions and attitudes among themselves. They first had to be encouraged and be motivated to work as a unit.

Trust developed among the groups after oiling the friction caused by their personality differences. Every member felt welcome and valuable assert of the team. They began to embrace free spirit within their respective groups as their viewpoints were also constructively criticised. Thus, learners managed to develop positive interdependence as one of the cooperative learning essential elements (Laing, 2002).

> Learner 8AY; '*We are efficient in our work and contributed equally*'.

Learners further alluded that, working in STAD teams boosted their self-confidence. Therefore, this internal contentment could be viewed as a step into developing intrinsic motivation towards the subject. The learners showed that in order for the team to succeed every member should be valued equally and support each other through the work.

It is not foreign when another learner explained the importance of focussing and putting extra effort, other if said by the teacher who is all matured having no idea of teenage challenges. However, when uttered at peer level, the learners might find it to be a possible exercise that is achievable as other learners could do it. Therefore, in this case a learner judges his actions by comparing himself to the actions of other learners.

> Learner 3CY; '*It was fun and interesting*'.

As teacher-researchers, we therefore attest that, when a learner has the necessary support in the classroom, it is easy for him to enjoy the work, develop confidence, boost self-esteem and be free to contribute to whole class discussions (Deci & Ryan, 2008; Johnson, Johnson & Smith, 2007). Furthermore, learners were able to exercise their creativity and

critical thinking, as well as learning how to ask good questions when taking part in team discussions. In addition, sharing information was highlighted as a source for more insight into the subject as indicated below.

> Learner 2DX *"Working in a group improves our thinking patterns"*.

Furthermore, learners stated that their motivation levels are increasing by being aware that it is necessary to be to update with the one might have missed due to absenteeism.

> Learner 4CX; '*We help each other catch up in case of absenteeism*'.

Moreover, self-efficacy of individual learners was also increased, and they had determination to work efficiently (Vansteenkiste, Lens, & Deci, 2006), even on their own, as they have learned from others that work must be done with diligence. They also learned that the more time spent on learning the better and easier it became to understand the material taught in class.

> Learner 7CX *"Individual homework became easier because of the group discussions"*.

> Learner 4CY; '*I learned that even the smallest mark can have improvement on your total*'.

Learners further took home the notion that each mark is important to improve one's academic achievement. On this basis learners deemed it fit to internalise motivation to strive for excellence (improved self-efficacy), other than doing work for the sake of doing it. Moreover, emulating good practices and behaviours from others (Veenman, Denessen, Van den Akker, & Van der Tijtl, 2005), that strive enhance one's performance and comprehension of the work became a significant factor as well.

> Learner 1AX; '*I saw one of our group members was getting high marks – that motivated me to put more effort to improve my marks with the assistance of group members.*'

Therefore, as teammates learners learn good quality ethos from each other that improve group's effectiveness towards motivating members to aim for the sky.

> Learner 2AY; '*My group leader's work ethic was of a high standard where each mark or point matters – I decided to be more involved in group activities and promote excellency at all costs*'.

> Learner 2AX; '*When my contributions were wrong – my group members encouraged to keep trying. That boosted my confidence*.'

Moreover, in STAD groups learners acquire good questioning skills to receive appropriate and developmental assistance (Murdoch & Wilson, 2008) from his or her countenance. Empathy from other members of the team facilitates the zeal to learn effectively towards becoming a confident and internally motivated (Slavin, 1990) member with constructive contributions for group success.

> Learner 5DY; '*As a group leader, it was encouraging to me when I saw one of our members who was struggling – obtaining grades far above his usual performance*.'
>
> Learner 2DY; '*Group work made me work harder and improve my attitude towards schoolwork*.'
>
> Learner 3DY; '*we learnt each other's work habits and styles – were able to use each other's abilities to the maximum*.'

Teachers should use collaboration teaching methods to improve learners dialogue in multicultural schools; to question the knowledge from textbooks and argue based on how they view the world (Gillies & Boyle, 2009)- this assist learners to see the bigger "picture" of things, beyond normal analytical stage.

4. CONCLUSION AND RECOMMENDATIONS

Learners in the STAD teams, in the context of this multicultural school, managed to fulfil the second to the fourth level of Maslow's needs theory. In the process individuals' self-esteem was boosted leading to self-actualization and individuals tend to recognize their unearthed potential. Process based, motivational theories are based on particular evolution or course that individuals have to pass through towards enhancing motivation within themselves, self-efficacy and self-determination.

It is evident from the research results that learners with high self-efficacy set their own academic goals to earn high scores. These kinds of learners make it their business to diligently complete their task. Therefore, when employing STAD in Technology class, the efficacious learners supported the other learners to value every piece of work given in class and to observe the importance of timeframe for the completion of given task. When the other learners realised that, with dedicated focus, tasks can be completed efficiently, they appear to become motivated to finish their next task well. As they further receive encouragement and affirmation, they begin to volitionally want to do more to the best of their abilities. Within this environment, learners develop inquiry skills by probing thought patterns of others, including the teacher to construct his/her knowledge on the content.

Similarly, according to self-determination theory, STAD teams build learners' competence through support and adapting efficacious norm and values from their peers within a secure professional relationship. In the process, learners improve their work ethics to receive approval from their teammates and self-fulfilment – then they begin to enjoy what they are doing from within.

Furthermore, in some situations, rewards (extrinsic motivation) were issued to STAD teams that performed well in their first test. However, as time went on, it was no longer about receiving a reward for achieving higher that other groups. But the teams engaged in their tasks due to internalised motivation to improve and enjoy the subject.

Finally, we as authors of this chapter recommend that Technology teachers be trained STAD and other cooperative learning methods in order to enhance learners' motivation in the subject. The more teachers learn to facilitate groups professionally, learners will also begin to enjoy working in groups until they are able to monitor their own group processes. This method of teaching brings respect among the learners as well as between the learners and the teacher. Most importantly, learners learn not to just accept what comes from the teacher or textbook without constructively engaging in dialogue to probe the world view and application of knowledge. This study also recommends the training of school-based teachers

and the lecturer staff attached to TVET college. STAD should be construed as a vehicle for enhancing intrinsic motivation among the students. The reason being majority of these students leave mainstream education hoping TVET route would be easier because of the prevailing social perception as compared to high school route. Hence, low throughput rate in the TVET sector due to the perceived low morale of students when facing difficult content.

REFERENCES

Allen-Collinson, J. (2012). *Interpretivist research paradigm.* Lincoln: University of Lincoln.

Andrade, A. D. (2009). Interpretive research aiming at theory building: adopting and adapting the case study design. *The Qualitative Report, 14*(1), 42-60.

Arthur, J. (2012). *Research methods and methodologies in education.* London: SAGE.

Bachman, C. M. & Stewart, C. (2011). Self-Determination Theory and Web-Enhanced Course Template Development. *Teaching of Psychology Journal*, *38*(3), 180-188.

Ball, B. (2012). *A summary of motivation theories.* Retrieved from http://www.uorcoach.be/en/employee-motivation-ebook/.

Bandura A. (2001). Social Cognitive Theory: An agentic perspective. *Annual Reviews*, *52*(1), 1-26.

Barkoukis, V. Tsorbatzoudis, H., Grouios, G. & Sideridis, G. (2008). The assessment of intrinsic and extrinsic motivation and amotivation: Validity and reliability of the Greek version of the Academic Motivation Scale. *Assessment in Education: Principles, Policy and Practice, 15*(1), 39-55.

Berry, W. (2008). Surviving Lecture: A Pedagogical Alternative. *College Teaching, 56*(3), 149-153.

Borkowski, N. (2005). Content Theories of Motivation. In N. Borkowski (Ed.), *Understanding Individual Behaviours* (pp. 113- 138). DBA, CPA, FACHE.

Brown, A. P. (2008). Review of the literature on case study research. *Canadian Journal for New Scholars in Education, 1*(1), 1-13.

Chaiklin, S. (2003). The zone of proximal development in Vygotsky's analysis of learning and instruction. In A. Kozulin, B. Gindis, V. Ageyev, & S. Miller, (Eds.), *Vygotsky's educational theory and practice in cultural context.* Cambridge, Cambridge University Press.

Dagar, V. & Yadav, A. (2016). Constructivism: A Paradigm for Teaching and Learning. *Arts and Social Sciences Journal, 7*(4), 1-4. doi: 10.4172/2151-2600.1000200

DBE (Department of Basic Education) (2012). *Curriculum and Assessment Policy Statement (CAPS) Technology Senior Phase. Final draft*. Pretoria: Government Printer.

De Kock A.Sleegers P. & Voeten M. J. M. (2004). New Learning and the Classification of Learning Environment in secondary Education. *Review of Educational Research, 74*(2), 141-170. Retrieved from http://www.jstor.org/stable/3516054.

Deci, E. L. & Ryan, R. M. (2008). Self-Determination Theory: A Macro-theory of human motivation development, and health. *Canadian Psychology, 49*(3), 182-185.

Denzin, N. K., & Lincoln, Y. S. (1999). *The SAGE handbook of qualitative research* (3rd ed.). Thousand Oaks, California: SAGE.

DiCicco-Bloom B. & Crabtree B. (2006). The qualitative research interviews. *Blackwell Publishing Ltd. Medical Education*, *40*(4), 314-321.

Elo, S. & Kyngäs, H. (2007). The qualitative content analysis. *Journal of Advanced Nursing*, *62*(1), 107-115.

Gade, S. (2010). Cooperation and Collaboration as zones of proximal development within the mathematics classroom. *Nordic Studies in Mathematics Education, 15*(2), 49-68.

Gaith, G. (2003). Effects of the Learning Together Model of Cooperative Learning on English as a Foreign Language Reading Achievement, Academic Self-esteem, and Feelings of School Alienation. *Bilingual Journal, 27*(3), 451-474.

Gillard, A. (2007). *Self-Determination Theory*. American Camp Association, Texas: Texas A&M University.

Gillies, R. M. & Boyle, M. (2009). Teachers' reflections on cooperative learning: Issues of implementation. *Teacher and Teacher Education,* 26 (1), 933-940.

Householder, D. L. (2012). International handbook of research and development in technology education: Book review. *International Journal of Technology and Design Education, 22*(1), 115-122.

Järvinen, E-M. (2001). *Education about and through Technology. Oulu:* Faculty of Education, University of Oulu.

Johnson D. W. & Johnson R. T. (1995). Cooperative learning and non-academic outcomes of schooling: The other side of the Report *Card.* In JE Pedersen & AD Digby (Eds), *Secondary schools and cooperative learning theories, models and strategies* (pp. 79-149). USA: Garland Publishing INC.

Johnson D. W., Johnson R. T. & Smith K. A. (2004). *Cooperative learning*. Minnesota: University of Minnesota.

Johnson, D. W. & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher, 38*(5), 365-379.

Johnson, D. W. & Johnson, R. T. (2005). New Developments in Social interdependence Theory. *General Psychology Monograph*, *131*(4), 285-358.

Johnson, D. W., Johnson, R. T. & Smith, K. A. (2007). The state of cooperative learning in postsecondary and professional settings. *Educational Psychology Review*, *19*(1), 15-29.

Johnson, D. W., Johnson, R. T. & Smith, K. A. (2014). Cooperative Learning: Improving University Instruction by Basing Practice on Validated Theory. *Journal on Excellence in University Teaching*, *25*(3&4), 85-118.

Krauss S.E. 2005. Research paradigms and meaning making: A Primer. *The Qualitative Report*, *10*(4), 758-770.

Lai, E.R. (2011). *Motivation: A Literature Review.* Pearson Research Report.

Laing, T. (2002). *Implementing Cooperative Learning in EFL Teaching: Process and Effects.* (Unpublished Doctoral thesis). National Taiwan Normal University.

Least, S.K. (2014). Differentiated Instruction: Its effect on proximal development (Education and Human Development Master's thesis, 532, SUNY Brockport University). Retrieved from http://digitalcommons.brockport.edu/ehd_theses/532

Lee, J. Q., McInerney, M., Liem, G. A. D. & Ortiga, Y. P. (2010). The relationship between future goals and achievement goal orientations: An intrinsic-extrinsic motivation perspective. *Contemporary Educational Psychology, 35*(4), 264-279.

Li, M. P. & Lam, B. H. (2013). *The Active English. The Hong Kong Institute of Education*. Retrieved from www.ied.edu.hk/aclass/

Mario, C. (2019). Theories of Self-determination. In A. Farazmand (Ed.), *Global Encyclopaedia of Public Administration, Public Policy, and Governance* (pp. 1-7). Springer Nature Switzerland.

Martin, D. & Joomis, K. (2009). *Building Teachers: A Constructivist Approach to Introducing Education*. Wadsworth.

Maslow, A.H. (1943). A Theory of human motivation. *Psychological Review*, *50*(4), 370-396.

Masoabi, C.S. (2015). *Designing a framework for the implementation of Student Teams Achievement Divisions (STAD) for Technology in a cultural-diverse school setting* (Unpublished doctoral dissertation). University of the Free State.

McGeown, S. P., Putwain, D., Simpson, E. G., Boffey, E., Markham, J. & Vince, A. (2014). Predictors of adolescents' academic motivation: Personality, Self-efficacy, and adolescents' characteristics. *Learning and Individual Differences, 32*(1), 278-286.

McGregor, S. L. T. & Murnane, J.A. (2010). Paradigm, methodology and method: Intellectual integrity in consumer scholarship. *International Journal of Consumer Studies, 34*(4), 419-427.

McMillan, J. H. & Schumacher, S. (2010). *Research in education: evidence-based Inquiry* (7th Ed.). USA: Pearson Education Inc..

Mertens, D.M. (2010). An introduction to research. In *Research and Evaluation in Education and Psychology*. Retrieved from http://www.sagepub.com/upm_data/29985_chapter 1.pdf

Moore, L. L., Grabsch, D. K., & Rotter, C. (2010). Using Achievement Motivation Theory to Explain Student Participation in a Residential Leadership Learning Community. *Journal of Leadership Education, 9(2),* 22-34.

Murdoch K. & Wilson J. (2008). *Helping your pupils to work cooperatively*. USA: Routledge.

Niehaus K. Rudasill K. M. & Andelson J. L. (2012). Self-efficacy, intrinsic motivation and academic outcomes among Latino middle school students participating in an after-school program. Hispanic *Journal of Behavioural Sciences*, *34*(1), 118-136.

Nieuwenhuis J. (2010a). Qualitative research designs and data gathering techniques. In K. Maree (Ed.), *First Steps in Research* (pp. 47-66) Pretoria: Van Schaik Publishers.

Nieuwenhuis J. (2010b). Analysing qualitative data. In K. Maree (Ed.), *First Steps in Research* (pp. 70-92). Pretoria: Van Schaik Publishers.

Palmer D. (2005). *A* motivational view of constructivist informed teaching. *International Journal of Science Education,* 27(15), 1853-1881.

Pew, S. (2007). Andragogy and pedagogy as foundational theory for student motivation in higher education. *InSight: A Journal of Scholarly Teaching, 2,* 14-25.

Pintrich, P. R. (2003). A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts. *Journal of Educational Psychology, 95*(4), 667-686.

Powell K. C., & Kalina C. J. (2009). Cognitive and social constructivism: developing tools for an effective classroom. *Education, 130*(2), 241-250.

Redmond, B.F. & Cramer, C. (2012). *Needs theories overview.* Retrieved from https://wikispaces.psu.edu.display/PSYCH484/2.+Need+Theories.

Rezaee, A.A. & Azizi, Z. (2012). The Role of Zone of Proximal Development in the Students' Learning of English Adverbs. *Journal of Language Teaching and Research, 3*(1), 51-57.

Ritchie, L. & Williamon, A. (2011). Primary school children's self-efficacy for music learning. *Journal of Research in Music Education, 59*(2), 146-161.

Sanchez, J. C. & Loredo, J. C. (2009). Constructivisms from a genetic point of view: A critical classification of current tendencies. *Integrative Psychological and Behavioral Science, 43*(1), 332-349.

Scherer, R. (2013). Further evidence on the structural relationship between academic self-concept and self-efficacy: On the effects of domain specificity. *Learning and Individual Differences, 28,* 9-19.

Shabani, K., Khatib, M. & Ebadi, S. (2010). Vygotsky's Zone of Proximal Development: Instructional Implications and Teachers' Professional Development. *English Language Teaching, 3*(4), 237-248.

Slavin, R. E. (1990). *Cooperative Learning: Theory, Research and Practice.* Allyn and Bacon, USA.

Slavin, R. E. (2010). *Cooperative learning: What makes group-work work?* New York*:* University of York and John Hopkins University.

Slavin, R. E. (1977). *Student Teams and Achievement Divisions: Effects on Academic Performance, Mutual attraction, and Attitudes.* Maryland: The Hopkins University.

Smith, K. A. (2010). *Preparing Students for an Interdependent World: Role of Cooperation and Social Interdependence Theory*. Minnesota: University of Minnesota. Retrieved from https://karlsmithmn.org/wp-content/uploads/2017/08/Smith-Interdependence-Small_Group_Learning_in_Higher_Education-2011.pdf

Smith K. A., Sheppard, S. D., Johnson, D. W. & Johnson, R.T. (2005). Pedagogies of engagement: classroom-based practices. *Journal of Engineering Education, 94*(1), 87-101.

Stein, S. J., Ginns, T. S., & McDonald, C.V. (2007). Teachers learning about Technology and Technology Education: Insights from a professional development experience. *International Journal of Technology and Design Education,* 17 (1), 179-195.

Stone, D. N., Deci, E. L., & Ryan, R. M. (2008). *Beyond Talk: Creating Autonomous Motivation through Self-Determination Theory*. Kentucky: University of Kentucky.

Tarim, K. & Akdeniz, F. (2007). The effects of cooperative learning on Turkish Elementary Students' Mathematics achievement and attitude towards Mathematics using TAI and STAD Methods. *Educational Studies in Mathematics, 67*(1), 77-91.

Tiantong, C. & Teemuangsai, K. (2013): Student team achievement divisions (STAD) technique through the moodle to enhance learning achievement. *International Educational Studies*, *6*(4), 85-92.

Turner, D. W. III (2010). Qualitative interview design: A practical guide for novice investigators. *The Qualitative Report*, *15*(3), 754-760.

Usher E. L. (2009). Sources of middle school students' self-efficacy in Mathematics: A qualitative investigation. *American Educational Research Journal, 46*(1), 275-314.

Van Wyk M.M. (2010). Do student teams' achievement divisions enhance economic literacy? A Quazi-experimental design. *Journal of Technology*, *23*(2), 83-89.

Vansteenkiste, M. Lens, W. & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: another look, at the quality of academic motivation. *Educational Psychologist*, *41*(1), 19-31.

Veenman, S. Denessen, E., Van den Akker, A., & Van der Rijt, J. (2005). Effects of a cooperative learning program on the elaborations of students during help seeking and help giving. *American Educational Research Journal*, *42*(1), 115-151.

Wonacott, M. E. 2001. *Technological Literacy*. USA: Eric Digest.

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