

ASSESSMENT OF CLASSROOM IMPLEMENTATION OF LEARNER-CENTERED INSTRUCTION AS IN SOUTH AFRICAN NATIONAL CURRICULUM STATEMENT

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Abstract

The introduction of South African National Curriculum Statement (NCS) was intended to, among others, impact on teacher-learner interaction for the betterment of teaching and learning. For instance, the NCS document prescribed a learner-centred approach to teaching and learning [Department of Education (DoE), 2002, 2005:7, 2008:10)]. This paper puts a spotlight on learner-centredness as an NCS requirement. It focuses on a typical high school mathematics classroom learning practice in the Gauteng province of South Africa. The idea is to establish the Gauteng teacher's interpretation of learner-centredness as an aspect that can impact on the success or failure of implementation of NCS curriculum. The investigation analyses the theoretical notion of learner-centredness, the learner-centredness as espoused by the NCS document, and establishes if the classroom learning practice in a Gauteng mathematics class complies with the NCS expected practice. To achieve this, the paper investigates learner experience in a typical Gauteng mathematics classroom. A teacher's questionnaire is used to establish the teacher's notion of learner-centredness, and a learner questionnaire is used to determine the learner's classroom experience, and then to check, using the responses to the questionnaire, if the respondents' notion of learner-centredness is compatible with that stated by the NCS document. The research question the paper asks is: "Is the teacher's notion of learner-centredness, or a learner experience in the Gauteng mathematics classroom practice in line with the NCS notion of learner-centredness?" To answer the question, the author used the questionnaires. The investigation has found that, in general, the classroom learning approach of Gauteng high school mathematics complies only partially with the NCS requirement of learner-centredness.

1.0 Introduction

The changes in South African curriculum have been influenced, among others, by the desire to see improvement in the teaching and learning in South African schools. Learner-centredness is one of the improvement requirements stated by the National Curriculum Statement (NCS). The focus of this paper is whether there is a common understanding of learner-centredness by the stakeholders. Before dwelling into this aspect, a brief background of curriculum changes is given.

1.1. Background: Curriculum changes in South Africa

Since South African adoption of democracy in 1994, there have been efforts by the government to transform education. The South African government began the process of developing a new curriculum for the school system in 1995. The growth and development of knowledge and technology and the demands of the 21st century required learners to be exposed to different and higher-level skills and knowledge than those required by the previous South African General Education curricula (South African Department of Education (DoE), 2008:2). Also, South Africa had changed and the curricula for schools therefore required revision to reflect new values and principles, especially those of the Constitution of South Africa.

The first version of the new curriculum for the General Education Band, known as Curriculum 2005 (C-2005), was introduced into the Foundation Phase in 1997. The concerns of educators led to a review of C-2005 in 2000. This led to the first curriculum revision in 2002: the *Revised National Curriculum Statement Grades R-9* and the *National Curriculum Statement Grades 10-12*. Ongoing implementation challenges resulted in another review in 2009 and *Revised National Curriculum Statement* was reviewed again. From 2012 the two 2002 curricula, for *Grades R-9* and *Grades 10-12* respectively were combined into a single document and were simply known as the *National Curriculum Statement (NCS) Grades R-12*. The *National Curriculum Statement Grades R-12*, builds on the previous curriculum but also updates it and aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis. A single comprehensive Curriculum and Assessment Policy (CAP) document was developed for each subject to replace Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12. [Curriculum and Assessment Policy statements (CAPs), 2011 foreword written by the Minister of Education].

1.2. Developments leading to the research question

Education and Training in South Africa has seven critical outcomes and five developmental outcomes, which derive from the Constitution (DoE, 2008:10). According to CAPs (2011:6), The NCS aims to produce learners that are able to fulfill the following seven Critical Outcomes:

- identify and solve problems and make decisions using critical and creative thinking;
- work effectively as individuals and with others as members of a team;
- organise and manage themselves and their activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, symbolic and/or language skills in various modes;
- use science and technology effectively and critically showing responsibility towards the environment and the health of others; and

□ demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

Each of the seven critical outcomes describes an essential characteristic of the type of South African citizen the education sector hopes to produce. The document (DoE, 2008:10) further states that these critical outcomes should be reflected in *the teaching approaches and methodologies that mathematics teachers’ use*. This is where the investigation comes in. The learner-centredness that is required by the policy must be consistent with the citizen to be produced by the critical outcomes.

Teachers play important roles in determining the success or failure of any curriculum change and they have their own views about classroom dynamics, which are influenced by their training. “All teachers hold beliefs . . . about their work, their students, their subject matter, and their roles and responsibilities and these beliefs have a strong link with teachers’ planning, instructional decisions, and classroom practices”(Pajares,1992:326). “The view of mathematics held by the teacher has a strong impact on the way in which mathematics is approached in the classroom” (Dossey, 1992). “Research confirms that mathematics teaching is deeply rooted in the views of mathematics held by the educators and that they do not discard these views easily” (Nieuwoudt 1998).

This paper assumes that the teacher’s view of learner-centredness has a strong bearing on success or failure of implementation of NCS. This is because the teacher’s notion of learner-centredness directly influences the learner’s classroom experience. For instance, the expectation that the learners *identify and solve problems and make decisions using critical and creative thinking* can be fulfilled if the teacher’s focus is on providing the learner with the opportunity to make decisions, to think critically and creatively. Such a teacher will know that any lesson characterised by learner passiveness contradicts the policy.

The challenge is that the successful implementation of NCS requires the teacher’s view of learner-centredness to be aligned to the policy expectation. After exposure to the NCS expectation of learner-centredness (through, for instance, DoE-run workshops), the investigation wants to establish the extent of such a desired alignment. Table 1 gives some examples of what could be considered to be the teacher’s role in an NCS compliant classroom (Mahlobo, 2010):

Table 1: NCS teacher’s compliance checklist"

Critical Outcome	The teacher’s suitable approach:
1. Identify and solve problems and make decisions using critical and creative thinking.	1. Creates a learning environment in which it is possible for learners to have opportunities to make comprehensive use of <i>their creative</i>

	<i>thinking.</i>
2. Work effectively with others as members of a team, group, organisation and community	2. Encourages an active small-group learner participation in lessons and allow the learners to express <i>their</i> ideas frequently.
3. Organise and manage themselves and their activities responsibly and effectively.	3. a) Provides every learner with an opportunity for reasoning experience b) Positions the teacher as the facilitator, and not the source, of learning.
4. Communicate effectively using visual, symbolic, and/or language skills in various modes.	4. Makes it possible for every learner to respond to the problem in some significant ways of his/her own.

If the teacher views a learner as an empty vessel to be filled with knowledge, the teacher will possibly depict himself/herself as the source of information to be transmitted to attentive learners. The inevitable result is that of learners being passive recipients of such knowledge – trying to absorb what is in the teacher’s head. If the teacher looks at a learner as central to the learning process, then such a teacher’s approach will be different. The teacher will position him-/her-self to be the facilitator in the learning process, rather than purely the source of knowledge. What does literature say about learner-centredness?

1.2. Literature survey

1.2.1 Description of learner-centredness

According to Morrison (2009), the literature on learner-centredness has described it variously as an approach (Tudor, 1996), a model (McCombs & Miller, 2007), an orientation (Anton, 1999), a system, philosophy, and curriculum (Nunan, 1988), a concept and process (Nunan & Lamb, 2001), a pedagogy (Kumaravadivelu, 2006), and most recently an attitude (Nunan, 2008). Proponents have studiously avoided the term “method”, claiming that learner-centredness rejects prepackaged solutions in favour of local solutions to local problems in recognition of human complexity and diversity (Tudor, 1996). They claim learner-centredness does not subscribe to any one method of teaching.

To understand learner-centred teaching, it is necessary to begin with the teacher-centred approach, which is closely related to the behaviourist tradition. It assumes that learners are passive and that they become active by reacting to stimuli in the environment. Therefore, the

teacher's role is to create an environment which stimulates the desired behaviour and discourages those that are believed to be undesirable. This role makes the teacher the focus of attention. By contrast, the learner-centred approach assumes that learners are active and have unlimited potential for individual development. The individual learner rather than the body of information is the focus of teaching (Liu and Liu, 2010:78). Learner-centred approach emphasises a variety of different types of methods that shifts the role of the instructors from givers of information to facilitating student learning. Learning-centered teaching focuses on the process of learning (Morrison, 2009).

Nunan and Lamb (2001:27) note that “. . . learner-centred classrooms are those in which learners are actively involved in their own learning processes”. Roles and relationships in the classroom must undergo a radical change from those in traditional teacher-fronted classrooms. Teachers become facilitators. This necessitates a more participatory role for learners than they have probably experienced before. This role is complex and demanding. In addition to their active participation in class activities, they must cooperatively negotiate other aspects of their study. In this capacity, they must question, contribute, and critique (Morrison, 2009). Learners assume a more active role in their own learning and are involved in decision-making (Tudor, 1996). The above-stated literature gives a theoretical view of learner-centredness. The following discussion focuses on learner-centredness as described by the NCS document.

1.2.2. Learner-centredness as propagated by the NCS

One of the items mentioned in the NCS policy document is that “You produce learners who can *develop themselves mathematically* (DoE, 2005:8)”. The policy document also describes the role of the teacher to include being “the mediator of learning” (DoE, 2003:5). In terms of classroom practice, the National Curriculum Statement Grades R-12 is based, among others, on the principle of encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths (CAPs, 2011:4). Clearly, the NCS envisaged learner-centredness is compatible with the above-stated literature descriptions of learner-centredness.

1.2.3. Theoretical Framework and limitations

According to Liu and Liu (2010), learner-centredness derives from the socio-constructivist view of learning. A constructivist approach to teaching encourages educators to look for patterns in learners' thinking (Killen, 2000: xxi). With inquiry strategies the teacher engages learners in activities in which they interact with information, make observations, and formulate and articulate ideas that lead them toward discovery, conceptual construction, or invention (Cangelosi, 2003:10). The following are some of the reasons learner-centredness is considered important in the teaching-learning situation:

- When the focus becomes student learning, colleges attain higher rates of student retention and have better prepared graduates than those students who were more traditionally trained (Matlin, 2002; Sternberg & Grigorenko, 2002).
- A task force of the American Psychological Association integrated this research into fourteen Learner-Centred Psychological Principles which can be summarised through the following five domains.
 - *The knowledge base.* The conclusive result of decades of research on knowledge base is that what a person already knows largely determines what new information he attends to, how he organises and represents new information, and how he filters new experiences, and even what he determines to be important or relevant. (Alexander & Murphy, 2000)
 - *Strategic processing and executive control.* The ability to reflect on and regulate one's thoughts and behaviours is an essential aspect of learning. Successful students are actively involved in their own learning, monitor their thinking, think about their learning, and assume responsibility for their own learning (Lambert & McCombs, 2000)
 - *Motivation and affect.* The benefits of learner-centred education include increased motivation for learning and greater satisfaction with school; both of these outcomes lead to greater achievement (Johnson, 1991; Maxwell, 1998; Slavin, 1990). Research shows that personal involvement, intrinsic motivation, personal commitment, confidence in one's abilities to succeed, and a perception of control over learning lead to more learning and higher achievement in school. (Alexander & Murphy, 2000)
 - *Development and individual differences.* Individuals progress through various common stages of development, influenced by both inherited and environmental factors. Depending on the context or task, changes in how people think, believe, or behave are dependent on a combination of one's inherited abilities, stages of development, individual differences, capabilities, experiences, and environmental conditions. (Alexander & Murphy, 2000).
 - *Situation or context.* Theories of learning that highlight the roles of active engagement and social interaction in the students' own construction of knowledge (Bruner, 1966; Kafai & Resnick, 1996; Piaget, 1963; Vygotsky, 1978) strongly support this learner-centered paradigm. Learning is a social process. Many environmental factors including how the instructor teaches, and how actively engaged the student is in the learning process positively or negatively influence how much and what students learn (Lambert & McCombs, 2000). In comparison studies between

students in lecture and active learning courses, there are significantly more learning gains in the active learning courses (Springer, Stanne, & Donovan, 1999).

However, the following are some of the factors that can limit implementation of learner-centredness in a mathematics classroom situation.

1.2.4. Limitations of implementing learner-centredness

Nunan and Lamb (2001) acknowledge that institutional forces outside the classroom and other contextual influences will impact on classroom curriculum decision-making and management of the learning process (Morrison, 2010:15). For instance, the type of questions that are asked in examinations and tests may influence the approach to teaching and learning. Also, teachers sometimes find themselves in a dilemma with learners who subscribe to ‘traditional’ attitudes and beliefs about what are appropriate classroom activities (Nunan, 1988).

1.3. Research Question.

There is a need to establish the teacher’s current notion of LC. This will help in establishing the extent to which the teachers are ready to successfully implement NCS.

The research question the paper asks is two-fold:

- 1.3.1. To what extent is learner experience of learner-centredness in a Gauteng high school mathematics classroom practice in line with the NCS notion of learner-centredness?
- 1.3.2. To what extent is the grade 11 teacher’s notion of learner-centredness in a Gauteng high school mathematics classroom practice in line with the NCS notion of learner-centredness?”

2. Significance of the study

Studies have been conducted to question the quality of the NCS products in terms of predicting academic mathematics performance at university level. For instance, Schoer *et al.* (2010) noted that a high number of the 2009 first-year student intake – the 2008 first cohort of NCS group – failed their first-year mathematics, among other core courses across faculties. In attempting to seek reasons for the poor performance, this study isolated learner-centredness as an aspect of the NCS that requires attention. The study is significant in that by establishing the teacher’s notion of learner-centredness, which is linked to the learner’s classroom experience, it can be established if the NCS product performance can be attributed to NCS itself or its faulty

implementation. In the former case, NCS would need to be overhauled. In the latter case, aspects of NCS that are faultily implemented would need to be corrected.

3.0. Research methodology

3.1. Research design

The design is a descriptive design, with descriptive statistics (means and percentages) used to analyse the data.

3.2. Samples.

Samples were taken from township high schools in Gauteng Province in South Africa. The motivation behind the choice of Gauteng province was because the majority of educational developments in South Africa schools are initiated from Gauteng – most of the mathematics NGOs are based in Gauteng and render services in Gauteng and then spread their services to other provinces. Township schools were chosen because they are the targets of many department of education or NGO intervention programmes. It should be noted that the research questions are directed at learners and teachers who had exposure to NCS training.

Probability sampling was used. Focus of the paper was on *stratified sampling* – while the research questions were directed at high schools, only grade 12 learners were chosen to respond to the questionnaires. Also, only grade 11 mathematics teachers were the targets of the questionnaire. The choice of grade 12 learners was prompted by the pilot study that indicated that lower grade learners may have problems in understanding some of the questionnaire statements. On the other hand, the choice of grade 11 teachers was prompted by the desire to avoid a situation in which a sample would consist of teachers and *their* learners. The fear was that the learners could be intimidated into giving answers favourable to their teachers, or the teachers could try to influence learner responses. This was intended to minimise bias and simplify analysis of results.

Table 2 below summarises the sample.

Region	District	Number of returned questionnaires
Learner questionnaire		
Gauteng South	Vanderbijlpark	33
Gauteng central	Johannesburg	15
Gauteng North	Alexandra	41
Gauteng North	Tembisa	41

Teacher questionnaire		
Gauteng South	Vanderbijlpark	15
Gauteng North	Alexandra	15
Gauteng West	Randfontein	9

3.3. Data collection instrument.

A teacher questionnaire on Principles of Adult Learning Scale (PALS), taken from Adult Learning Methods 2nd edition, edited by Galbraith (1998), was used. It consisted of 44 statements made by a teacher teaching in an adult school, to which the teachers responding to the questionnaire agreed or disagreed on a scale adapted from 1 to 5.

For the purpose of answering the research questions, two questionnaires, adapted from PALS, were used, one titled “Learner” and the other “Teacher”. The learner questionnaire consisted of the statements made from the learner’s perspective (e.g. my teacher allows students...), with the learners expected to agree or disagree with the statements. The teacher questionnaire consisted of same statements but from the teacher’s perspective (e.g. I allow students...). The teachers responding to the questionnaire were also expected to agree or disagree with the statements . The data was analysed using statistical methods.

3.3.1. Validity/ Reliability of the instrument

Validity in the questionnaire was enhanced by basing it on a validated PALS questionnaire by Galbraith (1998). It was read, used and approved by research experts.

3. 4. Data Analysis

Quantitative analyses involving descriptive, as well as inferential statistical analysis were used. T-tests were used to establish significance of differences between the means and standard deviations of participating groups’ performance. A statistical significance test was used to analyse the data.

The statements in the questionnaire are classified in terms of whether they are positive or negative from learner-centredness perspective. Negative statements are those that are teacher centred, while positive statements are those leaning towards LC as described in the policy document. In other words, a questionnaire statement was looked at from the perspectives of the aspects of LC described in the policy document. If the statement was not compatible with the LC aspect, then it was considered teacher centred.

Positive Items i.e. Statements that are consistent with LC

Items number 1, 3, 5, 8, 10, 14, 15, 17, 18, 20, 22, 23, 24, 25, 28, 31, 32, 34, 35, 36, 39, 42, 43, and 44 are positive items. For positive items, assign the following values: Always=5, Almost Always=4, Often=3, Seldom=2, Never=1.

Negative Items i.e. Statements that are consistent with TC

Items number 2, 4, 6, 7, 9, 11, 12, 13, 16, 19, 21, 26, 27, 29, 30, 33, 37, 38, 40, and 41 are negative items. For negative items, assign the following values: Always=1, Often=2, Seldom=3, Almost Never=4, and Never=5.

For example, item 9 on the questionnaire – I use lecturing as the best method for presenting – is teacher centred. The scoring principle of the PALS, the value assigned to “never” for this item (item 9) is 5. In other words, opposition to a teacher-centred statement is viewed as leaning towards LC. On the other hand item 18 – I encourage dialogue among my students – leans towards LC. Following the scoring principle of the PALS, the value assigned to “never” for this positive item (number 18) is 1. By assigning values to these statements according to the PALS principles, we end up with data with differing degrees of learner-centredness, ranging from lower level 1 of learner-centredness to a higher level 5 of learner centredness. All teacher-centred items are accommodated at the lower end of LC scale.

Some problems associated with analysis by compiling means and standard deviations across a number of items in the questionnaire are acknowledged. For example, one needs to acknowledge that if there are 40 respondents, with 20 of those marking “always” and 20 marking “never”, then the mean will be 3 which, according to the PALS instrument, means “seldom”, instead of indicating a neutral position. The use of the means and standard deviations is further compounded when issues like whether the response options are equidistant from each other are also taken into consideration. For instance, is the distance from, for instance, “always” to “often” the same as the distance from “almost never” to “never”?

Despite the abovementioned concerns, analysis by compiling means and standard deviations across a number of items in the questionnaire seems the available viable option. The analysis has attempted to limit the above-stated potential problems. The analysis in this paper has been described in terms of the “degree of agreement to LC”, with 1 representing “ $\frac{1}{5}$ or 20% agreement to LC”, 2 representing “ $\frac{2}{5}$ or 40% agreement to LC”, 3 representing “ $\frac{3}{5}$ or 60% agreement to LC”, 4 representing “ $\frac{4}{5}$ or 80% agreement to LC” and 5 representing “ $\frac{5}{5}$ or 100% agreement to LC”.

agreement to LC”. In the analysis, a number 2,5 has been assigned to an unanswered question. Using the mentioned analysis, it means people who did not respond to a question demonstrate a 50% agreement to LC. Does it make sense? The author thinks there are conditions under which it does. The reader will probably agree that any percentage agreement to LC that is less than 50% amounts to disagreement of more than 50%. For instance, a 20% agreement to LC” can be interpreted an “80% disagreement to LC”. In that case 50% agreement to LC can be interpreted to be a neutral position, since 50% represents a point of coincidence of agreement and disagreement. This explanation fits a respondent whose reason for not answering the question is being indecisive about whether to agree or disagree with the statement. For a respondent whose reason for not responding to a question is because the respondent finds the statement not to apply to him / her or the respondent does not understand the statement, assigning 2,5 to the unanswered statement will, in the author’s mind, not have a big impact on the final score, because of the significantly small number of questions not responded to as compared to those responded to.

The statements in the questionnaire are classified in terms of whether they are positive or negative in relation to the concept of learner-centredness.

4. Results:

4.1. Introduction

The items on the PALS questionnaire are either pro- or anti- learner – centred. For instance, item 9 on the questionnaire – I use lecturing as the best method for presenting – is anti-learner-centred. Table 2 describes the other items in the questionnaire.

Table 3: Questionnaire items.

Leaner centred statement	Abbreviation used in the analysis	Teacher centred statement	Abbreviation used in the analysis
Help students participate in developing criteria for evaluating performance	Participate	Use disciplinary action.	Discipline
Allow older students more time to complete assignments	Oldstudent	Encourage students to adopt middle class values.	Adoptmiddle
Help students diagnose gaps between their goals and present performance	Diagnosegap	Provide knowledge rather than serve as a resource	Provideknow

		person.	
Participate in informal counseling of students.	Counsel	Stick to the instructional objectives that I write at the beginning.	Objectives
Arrange the classroom so that it is easy for students to interact.	Interact	Use lecturing as the best method for presenting subject material.	Lecture
Plan learning episodes to take into account students' prior experiences.	Priorex	Determine educational objectives for each student.	Dermtobj
Allow students to participate in making decisions about topics covered in class.	Decmake	Plan units which differ widely as possible from students' socioeconomic background.	Myplan
Use different techniques depending on students taught.	Difftech	Get a student to motivate himself by confronting him in the presence of classmates during group discussion.	Confront
Encourage dialogue among my students.	Dialogue	I use one basis teaching method.	Onemeth
Utilize the many competencies that students already possess to achieve educational objectives.	Competenc	Use written tests to assess degree of academic growth rather than to indicate new directions for learning.	Writtest
Accept errors as natural part of learning process.	Accepterr	Use what history has proven that adults need to learn as chief criteria for planning learning episodes.	History
Have individual conferences to help students identify their educational needs.	Indconf	Maintain a well disciplined classroom to reduce interference to learning.	Maintdisc

Let each student work at his own rate regardless of time taken to learn new concepts.	Ownpace	Avoid discussion of controversial subjects that involve vague judgments.	Avoidcontr
Help students to develop short-/long- range objectives.	Ownobj	Use methods that foster quiet, productive desk work	Quietwork
Allow students to take periodic breaks during class.	Breaks	Use tests as chief method of evaluation of students.	Tests
Plan activities that encourage each student's growth from dependence on others to greater independence	Independ	Avoid issues that relate to student's self concept.	Noselfconc
Gear instructional objectives to match individual abilities and needs of students.	Indivabilt	Give all students the same assignment on a given topic.	Sameasgn
Encourage students to ask questions about nature of their society.	Askquest	Use materials that were originally designed for students in elementary and secondary schools.	Usedmtrl
Allow a student's motives for participating in continuing education to be a major determinant in the planning of the learning objectives.	Partiptmtv	Measure a student's long term educational growth by comparing his total achievement in class to his expected performance as measured by national norms from standardised tests.	Normmeas
Have students identify their own problems that need to be solved.	Ownprbl	Encourage competition among students.	Competit
Organise adult learning episodes according to the problems that students encounter in everyday life.	Reallife		
Use different material with	Diffmterl		

different students.			
Help students relate new learning to prior experience.	Priorex		
Teach units about problems of everyday living.	Everydalive		

The first Critical Outcome (CO-1) - *to produce learners that are able to identify and solve problems and make decisions using critical and creative thinking* – is an important indicator of learner-centredness. Other COs cannot be realised unless CO-1 is satisfied. Consequently the focus of the discussion of the results in this paper will be CO-1. Some of the questionnaire statements would be directly compatible with the CO-1 while others' compatibility would not be so obvious.

Agreements to:

students diagnosing gaps between their goals and performance, students' growth from dependence on others to greater independence, etc., and

disagreements to:

the teacher providing knowledge rather than serve as a resource person, the teacher maintaining a well disciplined classroom *to reduce interference to learning*, the teacher using what history has proven that adults need to learn as chief criteria for planning learning episodes, the teacher using lecturing as the best method for presenting subject material etc,

are aspects that are compatible with *production of learners that are able to identify and solve problems and make decisions using critical and creative thinking* (CO-1).

Not that other items of the questionnaire are not compatible with CO-1. Some items are not relevant to the responding learners. For example allowing *older* students more time to complete assignments does not apply in the typical classroom as learners there are of similar age group. Having students *identify their own problems that need to be solved*, while perfectly learner centred, may not apply directly in a typical classroom where the syllabus prescribes what needs to be done. It is not obvious how encouraging students to adopt middle class values can assist them *to identify and solve problems and make decisions using critical and creative thinking* (CO-1). It is not obvious how encouraging competition among students will enhance their problem solving skills. Consequently Table 4 is considered by the author to consist of the statements that are compatible to CO-1.

4.3. Findings

Recall that the research questions were about the extent of compliance with policy expectation of learner-centredness. To address the questions, all responses in the above table – those compatible with CO-1, were considered. The results of this paper focused on 22 questionnaire statements that were responded to by the 130 learners and 39 teachers, respectively totaling 2860 learner responses and 858 teacher responses. The responses have been arranged according to ‘degree of learner-centredness’, ranging from the weak 1 to the strong 5.

t-Test: Two-Sample Assuming Unequal Variances

	<i>Learners</i>	<i>Teachers</i>
Mean	2.472902	2.04021
Variance	1.78914	1.387821
Observations	2860	858
Hypothesized Mean Difference	0	
df	1577	
t Stat	9.136014	
P(T<=t) one-tail	9.66E-20	
t Critical one-tail	1.64582	
P(T<=t) two-tail	1.93E-19	
t Critical two-tail	1.961469	

4.4. Discussion and conclusion

The two questions addressed by the paper are:

- 4.4.1. To what extent is learner experience of learner-centredness in a Gauteng high school mathematics classroom practice in line with the NCS notion of learner-centredness?
- 4.4.2. To what extent is the grade 11 teacher’s notion of learner-centredness in a Gauteng high school mathematics classroom practice in line with the NCS notion of learner-centredness?”

There are two contexts under which these questions are addressed. Firstly, how does the mathematics grade 12 learner experience of LC compare with the grade 11 teacher’s notion of LC? According to the above results, there is a statistically significant difference between the means of the two groups ($p = 1,93 \times 10^{-19} < 0,005$). The percentage agreement to ‘degree of LC’ for the learners is about 50% (2,473). For the teachers it is about 40% .

Secondly, the extent of learner experience of LC as espoused by the policy seems to be about 50%, meaning that efforts must be doubled to ensure complete compliance. What is a bit of concern is the fact that the teacher's notion of LC is only about 40% of where it should be.

4.5.Recommendation

There is no doubt about the value of LC in the success of mathematics teaching and learning. The fact that mathematics pass rate is of general concern to the South African education authorities means that, among other factors, the role the teacher plays in the classroom needs to be more clearly spelt out if the benefits of LC are to be accomplished. The fact the Gauteng high school mathematics teacher's notion of LC is only about 40% of the desired notion means education authorities must make an effort to explain the policy more clearly to the teachers, and the subject advisors must conduct more workshops to spell out the department position regarding the role the teacher must play in class. A brief explanation of what learner-centredness entails is necessary. This needs to be cleared up with the teachers in order to ensure a coordinated implementation.

Furthermore, the case of learners claiming through their responses to experience LC while the teachers indicate a below-average creation of LC-compliant environment needs to be explored.

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