This paper is giving an information on the research study, which is still being done. The only data collected so far is through the pre-test questionnaire which was answered by 1843 learners from six sampled primary and secondary schools in one region of the Northern Province in South Africa. The research is on classroom learning environments. The main aim of the research is to seek information that will assist teachers to become reflective practitioners in their daily classroom mathematics teaching. The study involves a combination of quantitative and qualitative research methods. Quantitative data is collected using the Constructivist Learning Environment Survey (CLES), which is used to assess learners’ and teachers’ perceptions of the constructivist learning environment. And the qualitative data is gathered from classroom observations, interviews with learners and teachers, and checking on teachers’ records on their experiences through preparations and journal information. Thus the results of the pre-test on the CLES is to be discussed in this paper.

THE MAIN OBJECTIVE OF THE RESEARCH:

As mentioned earlier there are changes which came in the South African schools and the researcher felt it worth to seek information that will assist teachers to become reflective practitioners in their daily mathematics teaching in classes. There are curriculum advisers who assist teachers through in-service training courses. Through the results of this research it is felt that the findings will be used to organize those training courses for the inexperienced teachers in the use of constructivist methods.

The new curriculum being implemented in South Africa demands teachers to use constructivist methods of teaching and learning. Like in other countries the CLES (constructivist learning environment survey) had been tried as to find out the learners’ and teachers’ perceptions on constructivist environment. The researcher also wanted to compare South Africa with other countries and to check the validity of the CLES as well.

RESEARCH QUESTIONS:

The focus of this research is based on the following research questions:

1. Is it possible to modify and validate an actual and preferred version of the Constructivist Learning Environment Survey (CLES) for the use at the intermediate and senior phases of schooling in South Africa?
2. Is it possible to describe the learning environment of individual classrooms using the CLES in South Africa?

3. Are teachers able to make use of learners’ responses to the CLES to develop and implement action research strategies to improve learners perceptions of the constructivist learning environment?

4. How successful is the use of journals as a means of encouraging teachers to reflect on their teaching strategies and to improve their learning environments?

5. Do learners who have been exposed to Curriculum 2005 perceive a different learning environment from those who have not?

6. Do perceptions of the actual and preferred learning environments differ for:

   a. Teachers and learners?
   b. Male and female learners?
   c. Learners of different ethnic backgrounds?

1. Do associations exist between learners’ perceptions of the constructivist learning environment and their satisfaction with their mathematics classroom?

**SAMPLED POPULATION:**

The study includes a sample of 6 schools (three from the intermediate phase /grade 4 – 6 and the other three from senior phase /grade 7 – 9) selected from rural, semi-rural and urban areas of one region in the Northern Province in South Africa. From these schools 1843 learners from 42 mathematics classes of 29 teachers have administered the pre-test questionnaire of the CLES.

**BACKGROUND AND THEORETICAL FRAMEWORK:**

**The South African context**

The new government came into existence in 1994 under the education Minister, Professor Sibusiso Bengu. He then embarked on the changing of the education system. In 1998 it was decided that the old curriculum, under which Blacks, Indians, Coloureds and Whites studied different curricula, should be phased out and gradually is replaced by Curriculum 2005 (C2005). The Curriculum 2005 is based on the ideal of lifelong learning for all the South Africans, regardless of colour, race or sex. The curriculum focuses on fostering learning that encompasses a culture of human rights, multi-lingualism, multi-culturalism and a sensitivity to the values of reconciliation and nation-building. To ensure success, the curriculum aims to provide support in the form of in-service teacher training, assessment, guidelines and learners orientation.

C2005 encompasses an outcomes-based approach to education. The methods employed are learner-centered and emphasize skills that learners require becoming better citizens in the future. Teaching practices, adopted through C2005 require that learners participate in classroom activities, become more involved in the learning process and take responsibility for their own learning. It also requires that teachers give learners the opportunity to work at their own pace according to individual abilities and levels of development. Both teachers and learners are required to focus on predetermined results or outcomes that should be achieved during or at the end of each learning process. In practical terms, many teachers in South Africa do not have skills to implement classroom practices as demanded by the policy. One means by which teachers might be able to improve their classroom teaching practices could be through reflective practice. Thus this research aims to assist teachers in the development and implementation of their classroom practices through reflection on their learners’ perceptions of the learning environments.
The field of learning environments

Walberg and Moos initiated the field of learning environment in the 1960’s. Moos developed his first world-renowned social climate scales which were used in hospitals for improving the working environments and in the correctional institutions (Fraser, 1986). At around the same time, Walberg developed the Learning Environment Inventory (LEI) which was used for the research and evaluation activities of the Harvard Project Physics (Walberg & Anderson, 1968). Since that time, researchers have developed numerous questionnaires, designed to measure perceptions of a range of dimensions pertinent to the learning environment. Taylor, Fraser and Fisher (1997) emphasize that the use of learners’ perceptions of classroom environment as predictor variables has established consistent relationships between the nature of the classroom environment and the learners’ cognitive and affective outcomes. It is important, therefore that teachers consider the learning environments that they create. That’s why the researcher felt it worth to make a study of the learning environments for mathematics teaching in South Africa.

Constructivist learning environment and Curriculum 2005

The constructivist theory acknowledges that the teacher is not a transmitter of knowledge but rather a facilitator and provider of experiences from which learners will learn. Similarly, pupils are not absorbers of knowledge but rather active participants in constructing their own meaning based on strongly held preconceptions. According to constructivist theory, then, knowledge is a social construct that is gained through interacting with other people.

Curriculum 2005 advocates the use of constructivist teaching methods to ensure a more learner-centered classroom. This study examines how mathematics teachers in South Africa transform their classrooms from ones which may be more traditional and teacher-centered, towards ones that include teaching methods which reflect a more constructivist notion (learner-centered) of teaching. To do this, the present study engages the Costructivist Learning Environment Survey (CLES; Taylor & Fraser, 1991; Taylor, Dawson & Fraser, 1995; Taylor, Fraser & Fisher, 1997), which has the potential to address the improvement and development of the social constructivist classroom learning environments in the present new South Africa.

Using the CLES to monitor transformation in South Africa

The Constructivist Learning Environment Survey (CLES) was developed to provide a plausible perspective of teachers’ attempts to transform their classroom learning environments in accordance with the critical constructivist epistemology (Taylor, Dawson & Fraser, 1995). The CLES was developed in 1991 (Taylor & Fraser, 1991) to enable teachers to monitor the transformation from a more teacher-centered approach to a more constructivist teaching approaches and to address key restraints to the development of constructivist classroom climates in school science and mathematics (Taylor, Fraser & Fisher, 1997).

The CLES assesses learners’and teachers’ perceptions of five dimensions pertinent to the notion of constructivist, namely: Personal Relevance (the extent to which teachers relate science and mathematics to learners’ out-of-school experiences), Uncertainty (the extent to which opportunities are provided for the learners to experience mathematics and science knowledge as arising from theory dependent inquiry, involving human experience and values, evolving and non-foundational, and culturally and socially determined), Shared Control (the extent to which learners are invited to share with the teacher’s control of the learning environment, including the articulation of their own learning goals, design and management of their learning activities with the determination and application of assessment
criteria), **Student Negotiation** (the extent to which opportunities exist for learners to explain and justify to other learners their newly developing ideas and to listen and reflect on the viability of other learners’ ideas) and **Critical Voice** (the extent to which a social climate has been established in which learners feel that it is legitimate and beneficial to question the teacher’s pedagogical plans and methods and to express concerns about any implements to their learning – this dimension was not used in this study).

The CLES is available in an actual and preferred form (Kim, Fisher & Fraser, 1999). As with the development of preferred forms related to other learning environment instruments (Fraser, 1994, 1998), the CLES preferred form is concerned with goal and value orientation and measures the learners perceptions of the learning environment that learners would ideally like. Past studies that have made use of the CLES have found the instrument’s to be robust and consistently reports high reliability. The CLES has been validated in studies across several countries, including Korea (Kim, Fisher & Fraser, 1999, in press), the United States (Dryden & Fraser, 1998); Poth & Fraser, 1999), Australia and Taiwan (Aldridge, Fraser, Taylor & Chen, 2000) and in several subject areas, such as internet (Fisher & Churach, 1998) and science classrooms (Kim, Fisher & Fraser, 1999). Aldridge, Fraser, Taylor and Chen (2000) used the CLES in a cross-cultural study in Taiwan and Australia. They administered their research with 1081 learners from 50 classes in Australia and 1879 learners from 50 classes in Taiwan. Their research revealed that both the English and Mandarin versions of the CLES were valid and reliable and proved useful for providing insights into the key characteristics of the teaching epistemologies in science.

Taylor, Dawson and Fraser’s (1995) study of Australia 494 learners’ perceptions of the constructivist environments indicated that the CLES was useful as heuristic device to enrich teacher-researcher’s understanding of the impact on learners of his/her teaching innovations and to alert him/her to the possible counter productive impact of his/her reform endeavour.

The CLES has again been used to evaluate systematic reform in the United States (Dryden & Fraser, 1998). In a longitudinal study involving 440 learners in a pretest and 351 learners in a posttest (administered three years after the initial test), Dryden and Fraser (1998) used the CLES to assess the impact of systemic reform in promoting constructivist approaches in high school science classes.

Kim, Fisher & Fraser (1999) also used the CLES in a study designed to assess the new curriculum in Korea. The Korean version of the CLES was found to be reliable and the results of their research indicated that Grade 10 learners, who were exposed to the new curriculum, perceived a more constructivist learning environment than Grade 11 learners who were not. The research indicated that learners’ attitudes were likely to be enhanced if learners perceived more of the **Personal relevance, Shared control, Uncertainty** and **Student negotiation** scales.

In the present study, the researcher is having a belief that the CLES has the potential to provide valuable information regarding learners' perceptions of the constructivist nature of the classroom environment. As the notion of constructivism is one of the main thrusts of the Curriculum 2005, the information will provide teachers with useful feedback regarding their teaching styles and efforts to transform the classroom. Also, the data collected using the CLES will provide valuable information by which the impact of Curriculum 2005 in promoting a more constructivist learning environments can be assessed from the view of the learners.

**Action research**

Action research provides teachers with an opportunity to apply the findings of traditional research to their own situations and to adapt theory to practice. It also involves teachers as
participants in their own educational process, and helps them to develop a critical and reflective eye for their own instructional practices along with those of their peers (Lederman & Niess, 1997). The systematic collection of classroom data presents teachers with a view that could "catalyze" a change and facilitate informed decision making with regard to curricula and the instructional issues.

Action research offers participants flexible approach to classroom improvement through actions and reflections. Lederman & Niess (1997) emphasizes that action research is the most direct route to facilitating teachers’ development into reflective practitioners, and that it helps them to become lifelong learners of pedagogy.

A study by Yarrow, Millwater and Fraser (1997) explored the impact of action research and the use of reflective practices to improve the learning environments of primary school classes during their in-service training. In this study 117 in-service primary teachers assessed their learners’ actual and preferred perceptions of the classroom environment using the My Class Inventory (MCL). The teachers were required to produce a ‘case writing’ to heighten the importance of their ‘voice’ and were guided by their daily experiences. According to Yarrow, Millwater & Fraser (1997) action research is collaborative and is achieved through critically examining actions made by the participants themselves, providing a link between theory and practice.

Action research is a focus of this present study. Using learners’ responses to an actual and preferred version of the CLES, teachers identify aspects of the constructivist learning environment that they would like to improve. Using spiraling cycles of questioning, planning, implementing, collecting data and reflecting through journal writing as suggested by Yarrow, Millwater & Fraser (1997), teachers developed strategies aimed at improving their learning environment, which they will implement in their classrooms and document in a daily journal. The CLES will provide a framework, that will serve as a point of departure for the pursuit of the research for the developing teachers as reflective practitioners through the use of journals (Wiersma, 1991). Learners responses to the CLES will assist teachers to reflect on their epistemological assumptions and attempts to reshape their classroom mathematics teaching practices (Fraser, 1998)

RESEARCH METHODS:

At the beginning of the study the pre-test questionnaire of the CLES was given to the six schools for all their learners. The responses to the questionnaire were analyzed and statistics for each teacher and class were captured like in Table 1. Graphs were also drawn for the teachers so that they can be able to understand how they are performing in their class. The results of the questionnaire on graphs (see Figure 1) were given to each teacher, the idea being for them to plan and devise strategies to employ in order to improve their teaching. Teachers, then, develop and implement these strategies aimed at improving their learning environment that they record in a daily journal.

Teacher No. 2: Paired Samples Statistics

<table>
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<th>N</th>
<th>Std Deviation</th>
<th>Std Error Mean</th>
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<td>93</td>
<td>0.7613</td>
</tr>
<tr>
<td>1 PRP</td>
<td>3.7993</td>
<td>93</td>
<td>0.4640</td>
</tr>
<tr>
<td>Pair</td>
<td>Correlation</td>
<td>Sig.</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>UNA &amp; UNP</td>
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<td>0.5720 5.932E-02</td>
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<td>0.4395 4.558E-02</td>
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<tr>
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<tr>
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Teacher No. 2: Paired Samples Correlations

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<tr>
<td>4 SNA &amp; SNP</td>
<td>93</td>
<td>0.346 0.001</td>
</tr>
</tbody>
</table>

Table 1

The intervention phase was to be carried for a duration of 12 weeks. During this 12 weeks, data was collected using both quantitative and qualitative research methods. In the first place teachers had to attend workshops designed to assist them to learn how to keep and use a teaching journal. These teachers were encouraged to keep and use the journal by means of reflection throughout the 12-week intervention. These journals were used by both the teacher and the researcher as a source of data concerning problems, successes and issues faced by the teachers during the intervention period.

The reflection on the journals was carried out weekly during a meeting with the researcher and other teachers involved in the research. And in this way support and discussions were provided by peers, and the researcher in a position to assist teachers and if necessary, guide their reflections. The discussions with teachers regarding their use of the journal was aimed at assisting teachers to devise and implement strategies aimed at improving their learning environment.
During the intervention phase, teachers were observed and interviewed in order to determine whether they were using their reflections in their classroom practice and also to provide encouragement and feedback to them during the process. Interviews were also carried with the learners selected from each class. A post-test of the CLES questionnaire is to be given at the end of the intervention to the learners and this is still to be analyzed and compared with the pre-test, and a more in-depth information regarding their perceptions of the learning environment and the teacher-learner interactions will be provided.

**CONCLUSION:**

Up to this extend my assumption is that at the end this research will assist me in writing a report that will help other teachers about how to improve their teaching strategies in order to be able to teach Curriculum 2005. There is also no difference between the learners not doing Curriculum 2005 and those implementing the old curriculum. Teachers all struggle to understand what constructivist is all about. Differences between learners’ and teachers’ perceptions in both cases are not seen significantly.
REFERENCES:


