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Grade six students' and teachers' attitudes towards socio-constructivism in science education

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Abstract. The aim of this study was to investigate the attitudes of Grade 6 students and their science teachers towards a socio-constructivist way of learning and teaching science, compared to the usual way of learning and teaching science; as well as the science teaching practices. The data was collected during a period of eight weeks in two rural primary schools in the Limpopo Province, South Africa. A five-week intervention was conducted during which the researchers taught science in a socio-constructivist way. Observations were conducted as well as interviews with the teachers and 10 students (5 in each school) using the CLES observation guide, CLES interview guide, CLES Actual questionnaire and CLES Preferred questionnaire. The interviewed students also participated in a focus group. The results showed that some elements of socio-constructivism were appreciated by the students and teachers and other elements not. The students' attitudes were positive about scientific uncertainty and student negotiation and rather negative about critical voice and shared control. The attitudes of the teachers were more ambiguous. Implications are drawn for future research.

Keywords. socio-constructivism; primary education; STEM; South Africa; teacher attitudes; student attitudes.

Introduction

Science has a very important place in the world today and students' understanding of science is important if they are to become citizens making rational and informed decisions [9]. Furthermore, there is an increased demand for people qualified in science across the world. The development of science and technology skills is essential in order to face some major social and environmental problems [9]. Problems such as climate change, overpopulation, agricultural production and health amongst others require quality science education. Science can be a powerful way of understanding the basis of these problems [26].

However, according to Oppenheimer [16], science education across the world can be described as weak. There are many reasons causing this problem but three stands out. First of all, there is a lack of quality research training of teachers [16]. Secondly, students lack quality research experiences[2] and thirdly, university undergraduates lack quality research experiences

[16]. Although science education may be weak worldwide, there is a lot of difference between countries [18]. Several studies suggest that science, technology, engineering and mathematics (STEM) education receives a greater interest among children in developing countries as compared to developed, Western countries [22]. This interest is beneficial to these developing countries, as scientific knowledge has become a crucial factor in the production of wealth [26]. The exclusion from the creation and benefits of scientific knowledge is even said to be what distinguishes the poor from the rich [26].

South Africa is one such developing country, and could therefore benefit from STEM education of good quality, especially since the science results of the students in South Africa are low compared to the results from students in other countries [18]. South Africa has participated in the TIMSS (Trends in International Mathematics and Science Study) since 1995. This enables comparison of the results of South African students to the results of students from other countries for the last twenty years. In the most recent TIMSS report of 2011, Reddy et al [18] concluded that South Africa as a country has improved on science achievement. On the other hand, only one quarter of the students has a low understanding of the knowledge and basic skills of science, and three quarters of the South African students has not even acquired the minimum set of mathematical or science skills by Grade 9 [18].

The Limpopo Province is one of the lowest scoring provinces in science achievement performance in South Africa [18]. Despite these reports from TIMSS, little is known about the way science is being taught from Grade 4 up to Grade 9 in primary education [18]. Thus, the aim of the study was to investigate the best way of teaching science in the rural schools of the Limpopo Province. Two of the successful approaches to teaching science is constructivism and socio-constructivism. However, this approach seems to have received little attention in schools in non- western countries, such as South Africa [24].

1. Theoretical framework

Constructivism and socio-constructivism

This research will specifically focus on socio-constructivism. Watson [29] describes socio-constructivism as an approach to learning that embodies ideas of students building their understanding actively, helped by other more knowledgeable persons (e.g., their teachers), in their Zone of Proximal Development. A Zone of Proximal Development is a zone where a student learns with the help of others [17]. This help by others, also called scaffolding, typically phases out as the students become more aware of and able to regulate their own learning. In socio-constructivism, learning is regarded as being a shared social activity, embedded in classroom interactions [29].

Many previous studies have focused on the student outcomes caused by a socio-constructivist way of teaching [6][7][28]. Student attitudes, however, should not be forgotten in educational research. The attitudes of students are important for several reasons.

Firstly, student attitudes can influence student outcomes. According to the self-determination theory (SDT), not only the quantity, but also the quality of the motivation of students helps determine student outcomes [14]. The SDT makes a distinction between autonomous motivation and controlling motivation [14]. Autonomous motivation refers to the student doing something for inherent reasons like pleasure and satisfaction or because he feels a sense of choice and realizes the importance of the activity [14]. Controlling motivational styles, however, involve internal or external pressure that moves the student to do something. Autonomous motivation is highly desirable as it has been shown to result in higher academic achievement and other positive educational outcomes such as enhanced engagement [14].

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From the previously mentioned definition of attitudes by Tok [27], we can derive that it is so that the attitudes of a person can influence their reaction in certain situations. Accordingly, the attitude of one person can indirectly influence other people [27]. More specifically the attitude of the teacher towards a subject influences the attitudes of the students toward this subject [19]. Consequently, it can be concluded that the attitudes of a teacher towards a subject such as socio-constructivism can influence the attitudes of the students towards socio-constructivism. In many previous studies, researchers have confirmed the importance of the role of the teacher and the importance of his educational believes [21]. There is also a large body of research that suggests that teacher believes affect teaching practices [20][21].

2. Research methodology

2.1.1. Research design

This research was done by means of a field study. The data was collected between September and November 2016. The participants who took part in this study were students of two primary schools in rural South Africa and their Natural Science and Technology (NS and Tech) teachers. These schools will be called school M and school D. This study solely focused on Grade six students because South African education uses English as the language of instruction starting from Grade four. To the estimation of the researchers, the students of Grade four and five are not yet skilled enough to be taught solely in English. In these grades, teachers often use code-switching between English and Sepedi, their home language, to communicate clearly. As the purpose was to focus on primary education, Grade 6 was selected as an appropriate target group.

There were 103 Grade six students participating in this research: 45 students in school D and 58 students in school M. The mean age of the participants was 12, with 37.5 percent (%) of the students being male and 62.5 percent (%) female.

The intervention in both schools consisted of teaching NS and Tech in Grade six based on the CAPS curriculum document, term 4. CAPS stands for Curriculum and Assessment Policy Statements. This document provides the teachers with guidelines in teaching and assessing students per subject. The purpose of this document is to reduce the administrative workload for teachers and to ensure more consistency between teachers (Department of Basic Education, 2013). The research questions were investigated before and during the intervention.

2.1.2. Context of the schools

2.1.3. Context school D

School D is a small local rural South African school with a total of 487 students from Grade R up to Grade seven. This school is funded by the government and parents do not have to pay school fees since this school is categorized as a quintile one school and is therefore a no-fee school. The only expense for parents is gas, which is used for cooking, and at the beginning of the year they have to purchase a box of printing paper.

The NS and Tech teacher of Grade six in school D, participating in this research, has 28 years of teaching experience. Before he started teaching, he obtained a teacher diploma and a diploma in sports management. Besides the course NS and Tech, he also teaches Mathematics and Sepedi for several grades.

2.1.4. Context school M

School M is also a local rural South African school. This school consists of 519 students, also from Grade R up to seven. Just as school D, school M is categorized as a quintile one school, which means that it is also a no-fee school. School M is a school that holds the rules

and policies instructed by the government very high. They seriously try to comply. The teacher suggested that this was the reason that school M scores rather highly in comparison to other schools. Each quarter the scores of the students in different schools are compared and school M scores the highest most of the time.

The Grade six NS and Tech teacher of school M has 13 years of teaching experience. During her education, she obtained a biodiversity degree, a technology degree and other qualifications necessary to teach. She is still studying for her master's degree. At school M, this teacher teaches the courses NS and Tech, Life Skills, Life Orientation and Sepedi in several grades.

Data collection

2.2. Qualitative data

Observations were conducted using the CLES observation form [24]. These observations were coupled with interviews conducted with the teachers using the CLES interview guide [24]. In each school, five grade six students were interviewed at the beginning of the intervention, using questions based on the CLES actual questionnaire and the CLES preferred questionnaire. At the end of the intervention, the same students were interviewed again based on the CLES Preferred questionnaire. The 10 students were selected based on the following criteria:

- If the students indicated in the (no longer used) pre-test that they liked NS, or if they indicated that they don't like NS.
- If the students used visual patterns in their answers on the CLES Actual or if they didn't.
- If the students scored high on the pre-test and didn't guess often, if the students scored low on the pre-test and didn't guess often or if the students scored low on the pre-test and did guess often.

These criteria were selected to differentiate students based on their general attitudes towards science, in order to clarify why patterns have been found in the CLES actual questionnaire [24], in order to know when mistakes were due to guessing or misconceptions and in order to test the knowledge of the students. This last reason, however, later proved to be unnecessary, as the students weren't questioned about their knowledge and understanding during the interviews.

By the end of the intervention the selected five students from each school participated in a focus group. The students were questioned about the intervention and their attitudes towards it. Part of the conversation was anonymous. The interviewer asked a question, and the students wrote down their answers on a piece of paper. At the end, the interviewer gathered the notes, read them out loud, and then discussed the answers in group.

2.3. Quantitative data

During the intervention, unstructured and unplanned data were collected. To determine the attitudes of the students towards group exercises, a scale from 0–5 were used to test their preferences.

2.4. Ethics

In order to make sure the necessary ethical rules were followed; an informed consent form was presented to both the teachers and the parents of the students. The teachers received an information letter about the project, its purpose and its methods. Both teachers signed the informed consent form. The parents of the students involved in the study, received all the

necessary information about the project in the form of a passive informed consent form. The parents were asked to send the form back signed if they did not want their child to be interviewed directly. No declined informed consent forms were received. The school boards of the schools received an information letter, describing the purpose and methods of the project.

3. Results

3.1. Interviews students: CLES Preferred

After analysing the interviews conducted with the students based on the CLES Preferred, the following results were found:

3.1.1. Personal relevance

The first finding is that all students preferred to learn about the world outside of school. They all preferred learning about this, but no clear explanation was found why they preferred to learn about that. Only one student gave a somewhat elaborate answer to this question, which was:

M231—"*because we should know our world and how it is"*.

3.1.2. Scientific uncertainty

Besides learning about the world outside of school, most students also preferred to learn about science, how it has changed over time, how it has been influenced by people and cultures. When asked why they preferred to learn about that, the students said they wanted to understand (science) better.

D102—"*Because I want to know. I want to know when things are false and not true*."

M472—"*Because it will help us understand*."

3.1.3. Critical voice

The critical voice, learning to speak out, was perceived differently in both schools. In school D students were rather negative towards this. The students mostly did not want to express their opinion or complained if they thought something was confusing.

D252—"No. Because we can't make our own decisions without the teacher's explanation" (About expressing his/her own opinion)

However, the students from school D did not have a problem with knowledge questions. They asked questions. This mostly comes from the urge to score well. The students indicated that if they don't understand something, they ask the teacher because otherwise they would score badly.

D132— "*Because in class if I don't understand I don't say I understand because than if we have a test, I will get a zero*."

In school M on the other hand students were mostly positive about speaking their minds. They indicated that if they don't speak their minds, they won't understand or won't be able to share their ideas. However, some students indicated that they feared the teacher.

M231— "In our class, the other learners are scared to ask her. Because I understand her, I don't always ask*."*

3.1.4. Shared control

Most students indicated that they do not shared control in NS and Tech. Students felt that teachers know best. Students thought that they could not contribute to lessons.

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D132—*"… because he will teach them things that they don't know yet. If they would help the teacher to plan the lessons, they would only say things that they already learned about."*

Furthermore, most students thought it would be disrespectful towards teachers to remark on their way of teaching. Students did not want to 'upset' the teacher.

D102— "*I must respect him and he must teach me in the way that he would like to teach me. … I must support the things he wants to teach me; I want to know the things that he will teach me*."

3.1.5. Student negotiation

Lastly all students preferred to discuss content with other students. The most stated reason for this was that the students wanted to help each other or be helped by one another.

D272—"*Because then I can help other people and they can help me."*

M262—"*I don't know the answer to a question I can just ask the other learners*."

3.2. Focus groups

The purpose of the focus group was to gather information about the learners and their attitudes towards socio-constructivism. Three major themes emerged during this conversation. First, the learners were asked whether they preferred to find information themselves or preferred the teacher tells them the answers. Next, they were asked whether they would rather work in a group or alone. Lastly, they were asked whether they preferred to ask questions to their school teacher or whether they preferred to ask the question to the intervention teachers.

During the focus group it became clear that most students preferred to find information by themselves or in groups. They were convinced that they would learn better and understand better if they would find information for themselves instead of the teacher just giving the answers.

M232—*"Yes because when I look for it myself, I will understand it better."*

Furthermore, almost all the learners preferred working in group instead of working alone. The learners also indicated that they get the chance to work in groups during their classes.

M542—*"All of us we just want to teach each other. "*

When the students were asked whether they preferred to ask a question to the normal teacher or to the intervention teacher, most of them didn't have a preference. When a learner did express to rather ask the normal teacher it was because he could speak Sepedi, which is easier to understand for the students since it is their mother tongue. On the other hand, some students did say that they would prefer to ask the new teacher. When they were asked why, one student said it was because he was scared of the (normal) teacher.

M232—"Because (the teacher) scares me."

3.3. Likert scale - jigsaw exercise

This Likert scale was conducted as an addition to the first research question. The students were asked to score the jigsaw exercise on a scale of 0–5. They had to write their answer on paper so that it would be anonymous. In school M, 46 learners scored the exercise a five, one student gave the exercise a four, 13 students gave the exercise a three, and two students gave the exercise a zero. In school D, 36 students gave a score of five, two gave a score of four, 11 gave a score of three and one student gave a score of zero.

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3.4. Teachers' attitudes and practices

3.4.1. Personal relevance

The teacher from school D indicated that he also teaches about the world outside of school. This corresponds with the findings of the observations. The results from the CLES actual questionnaire were ambiguous. Some students indicated a positive response and some a negative. Personal relevance was also considered important by the teacher of school M. The teacher indicated to use these classes, but no example was given. Also, during the observations, no mention of this were made. The students claimed that the teacher uses personal relevant example sin her class. However, they could not provide examples.

3.4.2. Scientific uncertainty

Scientific uncertainties were rarely used by both teachers. Both teachers did indicate that raising questions about this is very important. Looking at the results from the CLES actual questionnaire, the students of school D confirmed that the teacher never teaches about scientific uncertainty. The results from the students at school M on the other hand were ambiguous.

3.4.3. Critical voice

As with scientific uncertainty, teachers indicated that a critical voice is important but that they rarely use it.. The teacher from school D indicated that language is the problem. Since the classes are taught in English, which is not the mother language of the students, the teacher considered this the reason why students don't ask questions.

Teacher school D— "… *there are very few learners that really raise questions. … I think the problem is the language … I think sometimes they cannot put out the words to ask a question."*

The teacher from school M indicated that the students were simply not advanced enough to ask these questions. Furthermore, the teacher indicated that students might be scared of their peers and therefore not asking questions.

Teacher school M— "*I think it is because they are still lacking knowledge of those kinds of things. So yeah, that is why they don't have such questions. It is too difficult for them."*

Teacher school M—"*They will think that they (the other students) will laugh at them."* During the observations, no questions were asked. The results from the CLES actual questionnaire were ambiguous, although some students indicated fear as motivation not to ask questions.

3.4.4. Shared control

In the observations only a few examples of shared control were seen during the lessons in school D and none in school M. The only time students helped plan the lessons in school D was when they asked for more time to complete an assignment. The teacher of school D himself said not to use it because, according to him, the students are not at a level to help him plan.

Teacher school M—*"I have never tried that. But I think I will have to try it one day. I think that they are not at the level where they can help me."*

The teacher at school M on the other hand did say to use this but once again she could not give examples of how she had used it. Looking at the results of the CLES actual questionnaire, most students did state that it happens in class but none of them could give any examples either.

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3.4.5. Student negotiation

The teacher in school D clearly used student negotiation, as seen during the observations and as indicated by the students. The teacher also indicated that he used this in his lessons and he stressed the importance of it.

Teacher school D— "*For a baby to walk he needs other babies to help him. He will walk faster with other babies. I always say you need other students to help you learn. They will learn better in groups if they help each other, I always tell them."*

The teacher from school M also claimed to use this during her classes but it was not observed. The students did say that they can work in groups during their normal classes but less than during the intervention. The reason that the teacher at school M gave for not using group work that much is because it is time-consuming.

Teacher school M— "*Yeah, sometimes, but not that often because working in groups is time-consuming. So, if you want them to work in groups you must make sure that they know what to do and that they don't have to start a new lesson. Because if you need to explain it to each group it will take a lot more time. But if it is an activity that they have already done than it can work, and it is timesaving*."

Discussion

This study sought to investigate the grade six students and their teachers attitudes on a socio-constructivist way of learning and teaching science as compared to the usual way of learning and teaching science which is text book oriented. Also, the usual practices of the teachers were investigated. In order to determine this, a 'socio-constructivist' intervention was conducted in both schools: school M and school D. This intervention, however, lasted for only 4.5 weeks, which is a very short period of time to accomplish big changes. The purpose was to let the students get used to the new way of teaching, so that they could evaluate it more objectively. Due to time restrictions, this goal could hardly be met.

Furthermore, this intervention could sometimes not be as 'socio-constructivist' as it was intended to be. There were some practical and other restrictions, such as the availability of enough and good infrastructure and materials. Constructivism requires active knowledge building, which can be promoted by the use of touchable materials (Watson, 2001). This was very hard to accomplish as such materials or funds to buy them was scarce. Also, the class size was very big and the size of the room was very small in comparison. This was therefore not an ideal setting for successful implementation, as it was difficult for students and teachers to interact and move around.

Thirdly, there were other practical issues limiting the intervention. For example, field trips to a South African telescope would have been highly educational and very socio-constructivist as the school topic can be related to the outside world [24]. Financial and time issues, however, made such field trips impossible.

Lastly, the CAPS curriculum document offered restrictions to the intervention. As the goals for education must be met as much as possible, with all the students, lessons needed to be adjusted. This is closely linked to the teachers' expectations towards the researchers, who were responsible for the education of the students. These expectations sometimes did not correspond with the researchers plans. This limited the ability of the students to share control in the classroom.

Furthermore, language barriers were prevalent. As was mentioned, the mother tongue of most students is Sepedi, even though most speak and understand English quite well. Because the English was often flawed, this offered an obstruction for the conducted interviews, but also for asking (critical) questions. In other words, the students were not only limited by the

classroom climate to ask questions or make remarks, but also faced a lingual restriction to speak (out) in class. This could have caused results to be unreliable. During the conducted interviews, translators were needed to help clarify the questions and answers between interviewer and interviewee. The first six interviews were conducted without a translator, as these language problems were unforeseen.

Students' attitudes

It was found that in some way's students preferred to learn in a more socio-constructivist way. The students appeared to believe that learning about scientific uncertainty would help them in learning more and understanding the materials better. Throughout the interviews and the intervention, the students showed high motivation levels to learn about science. This finding shows congruence with the statements of Shukla [22] and Thomas and Watters [26] that students in developing countries are more motivated to learn about STEM than children in developed countries.

When it comes to student negotiation, the students indicated that they prefer to learn through social interaction. Most students said that they wanted to help each other, so that everyone could pass the exams. Some also said that they like questioning others in small groups, because they are shyer to ask them in front of the whole class or to the teacher. As Watson [29] suggested, the students seemed to feel stronger and had more fun working together than working alone.

In some ways, however, students did not prefer a socio-constructivist way of learning and teaching. Critical voice is one of the elements of socio-constructivism towards which students held mostly negative attitudes. Also, shared control was not preferred by most students. This might be related to the relationship between teachers and students, or between adults and children. As discussed, the relationship between adults and children in South-Africa is very hierarchical culturally. As students said to respect their teachers, they did not want to ask critical questions. Some students also said that the teacher knows what is best for them. With most students, it's hard to know if the relationship with the teacher consists mostly out of respect, out of fear or out of both. As these are concepts that can motivate students in different ways—respect can cause autonomous motivation and fear can cause controlled motivation—this would be an interesting topic for further investigation. It should be also noted that, it was very clear that corporal punishment was still in use in both schools.

Cetin-Dindar [3], also found a negative motivation for science in a constructivist learning environment. Socio-constructivism is a highly praised educational theory, but one should consider the attitudes of the students towards this way of teaching. Negative motivation can lead to degrading academic performance [11][14][23].

The last element of socio-constructivism, as described by Thao-Do et al. [24], is personal relevance. As the students could never give examples of their attitudes towards personal relevance, these results are believed to be unreliable. The questions in the interviews were very open and abstract, and were most likely too difficult for the students to understand. That is why these results will not be used in the discussion or conclusion.

Teachers' attitudes and practices

The purpose of this research was to investigate the difference between the usual way of teaching and the socio-constructivist way of teaching. This means there was an assumption that the teachers did not usually teach in a socio-constructivist manner. To investigate this, the second research question focused on the attitudes of teachers towards education and science

education specifically, and how this is translated into their practice. It was investigated what their attitudes are towards different elements of socio-constructivism.

The findings show that, before the intervention, the teachers already taught socio-constructively in some ways. The teacher of NS and Tech in Grade six of school D used both personal relevance and student negotiation multiple times during observations and explained that he thought it to be very important. In school M, the teacher of NS and Tech of Grade six said to value shared control. Though this was not represented during the observations and the students couldn't give examples during the interviews of when the teacher used shared control, the students did say they could sometimes share control in the classroom.

Of the importance of other aspects, the teachers did not seem to be convinced. This is the case for scientific uncertainty in school M. As the teacher did not really believe in scientific uncertainty—she said there are no questions without answers—it would be logical that she does not teach the students otherwise. This focus on science as facts can possibly be linked to the lack of teacher training accompanying the implementation of OBE and the consequential focus on memorization of facts.

In school D, the teacher was not convinced of the importance of shared control. This might also be linked to the relationship between children and adults in South Africa. The teacher said that the students were not yet capable or skilled enough to help him make decisions about their lessons. According to this teacher, the students were too young for shared control to work.

In both schools, students' experience often didn't match their teacher's intentions. This was the case for critical voice in school D, for example. Though the teacher believed it to be important that students would be critical towards learning contents and even the way they are being taught, most students thought it to be disrespectful towards their teacher to criticize him. This respect, or fear, towards the teacher is a frequently recurring theme in what limits the students to be supportive of all the elements of socio-constructivism.

Implications of the study

Some implications for further research can be mentioned. First, future research might take the academic achievement of the participating students into account. Due to practical restrictions, this was not possible, but a comparison of outcomes and attitudes could provide a broader perspective on what works in science education.

Furthermore, future research might benefit from a longer intervention, in order for the novelty effect to be reduced. This way, the students might get used to the different way of learning and the different teachers, so that their attitudes might change.

Also, further research could be improved by the comparison between an experimental and a control group. This way there could be a comparison between two ways of teaching without the impact of topic or teacher's personality. These elements might have played an important role in the attitudes of the students in this study.

Secondly, there are some implications for educational practice. In this study, the researchers found that the students were gradually warming up to the different way of learning and the possibility for them to be more critical and active in class. As it is up to teachers to create this kind of socio-constructivist environment, teacher trainings should prepare them for this role. In this regard, it would be beneficial to conduct further research about how teachers' practices are influenced by broader cultural values, such as the hierarchy between child and adult, and how teacher trainings can be of influence in this matter. This would be interesting, as Alexander [1] found that teacher beliefs are influenced by broader values within a culture and because deeply grounded teacher beliefs are hard to influence [20].

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Also, in-service training and support for teachers might be a huge advantage for science education. This might help the teachers in focusing on a deeper understanding of the students and some socio-constructivist aspects of learning instead of the common focus on memorisation of facts in South-African education.

Conclusion

The aim of this study was to investigate the attitudes of grade six students and their science teachers towards a socio-constructivist way of teaching, compared to the usual way of teaching; as well as the science teaching practices of the teachers. It was found that this is not a black and white story in which attitudes are either all negative or all positive. Students' attitudes seemed to be positive towards most aspects of socio-constructivism, but not towards critical voice and shared control. Teacher practices and attitudes seemed to support personal relevance and student negotiation in one of the schools and shared control in the other. Towards the other aspects, there were mostly positive attitudes or indifference, but the positive attitudes were not reflected in their practice. Throughout the results, there appears to be a clear reflection of the South African culture, namely in the hierarchy between child and adult. This hierarchy is an impediment for (the attitudes towards) a socio-constructivist practice in science education. If this is to be changed, the teachers may be responsible for creating a more open class environment for the students to participate and criticize. Also, the all-too-common focus on memorisation and outcomes, due to an ineffective implementation of recent curriculum reforms in South Africa, seems to be an impediment for the successful implementation of socio-constructivism in science education.

Limitations

While conducting this study, some limitations were observed. Some of these limitations occurred during the data collection with the students. First, the results of the CLES actual questionnaire, conducted with the whole class, showed obvious visual patterns. Therefore, it is highly doubtful that these data truly represent the opinions of the students. When conducting the interviews with the five selected students per school, it became obvious that these questions were too hard. We believe the level of abstractness and the used language might have caused the lack of understanding or the misunderstandings. The interviews with the students, however, could clarify most of these answers, as more concrete examples were used. Also, for some of the interviews a translator was present to help. The results of the CLES actual conducted with the whole class were not used in this study, as they are not believed to be reliable.

Secondly, in some of the interviews conducted with the students, there was no translator present. Even though the level of English communication skills appeared to be quite well with some of the students, the presence of a translator was believed to have a positive influence on the communication between researcher and student.

The intervention was intended to be a socio-constructivist one, but it wasn't totally so, as was stated in the discussion. As Watson [29] states, there are many different roles and tasks a socio-constructivist teacher must implement in their teaching. Looking back, some of these tasks were not conducted sufficiently in order for the intervention to be as socio-constructivist as possible. However, the researchers believe that the general ideal of socio-constructivism was incorporated in their classes and in the relationship, they held with the students.

In order to support the intervention, a workbook was made for the students. Due to practical issues, this workbook was not finished in time for the intervention. This caused the workbook to be of no use for the intervention or the students.

Furthermore, the intervention did not go as planned. Due to exams and other unforeseen events, the intervention was shorter than planned and lasted for only five weeks.

Also, the questionnaires, tests and guides used during the study were not tested during the pilot research. There was no time, nor were there teachers or students available to conduct this. The CLES actual, CLES preferred, the observation guide and interview guide, however, have been pilot tested in the study of Thao-Do et al. [24] in a Vietnamese context. Another limitation is one that already indicated in his study. Kabapinar [10] claimed that results of questionnaires like the CLES questionnaire are influenced by the tendency of respondents to agree with the given statements. In this study, we noticed indeed that the interviewed teachers often answered positively on the questions, whereas this constructivist point of view was not reflected in the observed lessons or other data.

Finally, the students and teachers may have had troubles adjusting to the presence of the researchers in the schools. As the attitudes of the students were measured, these may have been influenced by the fact that the researchers were the only white people in the school, that the language of the researchers was not the mother tongue of the students or the teachers and that the intervention consisted of a very new way of learning. This may have caused a novelty effect with the students and the teachers involved in this study.

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