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A quantitative examination of two different teaching paradigms in a Germiston based pre-school: A pilot study

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Abstract

Purpose – The purpose of this paper is to determine if there is value in performing studies comparing a cybernetic approach over a traditional teaching approach in regards to improved pre-school tuition.
Design/methodology/approach – A two independent groups design was implemented with each group receiving a different treatment. The first group had their lesson presented in the traditional teaching approach while the second group were part of a cybernetic approach. After each group had their lesson, each child was assessed and asked a series of ten questions. The total correct answers for the traditional group was compared to the total correct answers of the cybernetic group. The results were statistically examined using a *t*-test and Pearson *r* correlation.
Findings – The group who took part in the cybernetic lesson had a 46 per cent increase in the total number of correct answers. The cybernetic approach to the pre-school lesson was an improvement in terms of memory retention. This initial study justifies a series of further experimental designs.
Research limitations/implications – This study provides a basis for further studies of comparative educational approaches to pre-school education and learner memory performance. A cybernetic approach to pre-school instruction has a lot to offer and is especially beneficial for children who are learning language, whether first or second language. This is a model to develop further, for use in the teaching-learning environment.
Practical implications – The use of Teachback within a pre-school context may have additional benefits such as improved language acquisition through additional practice of verbal expression. A practical method of addressing the challenge of cybernetics training was also presented in this study.
Social implications – When the Teachback is performed, the person creates a verbal expression based on their language and background. As the Teachback occurs in a social context amongst peers, an opportunity for an exploration into the diverse backgrounds of the individual pre-school children can take place, especially beneficial when in a multi-cultural setting.
Originality/value – There are few cybernetics studies conducted on pre-school aged children. This is the first study whereby cybernetic tools such as Teachback have been used in pre-school education.

Keywords Cybernetics, Language, Multicultural, Pre-school, Teachback, Teacher
Paper type Research paper

1. Introduction

Learning is lifelong. However, many people (specifically parents) are especially concerned with the educational years preceding employment. Employers who are seeking new employees are interested in the applicant's final year report – they do not

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ask for an applicant's pre- or primary school report. Thus, for many people there is a perception that one educational stage is more important than another. This I do not believe to be true. Working both in a university as a post-graduate lecturer and also being a co-owner of a pre-school, it is my experience that pre-school experiences and learning are very important for children in their formative years. It is not uncommon for adults to recall lifelong lessons they learned at an early age. It is also not surprising that a book titled *All I really need to know I learned in Kindergarten* is a no. 1 New York Times bestseller (authored by Fulghum, 2003). In this best seller, Fulghum recounts how the lessons and experiences he had gained in kindergarten are relevant to life, love and other aspects of living. Glanville (2012) also accounts how his Froebelian pre-school time was an important foundation for his later development.

Whichever model of psychology one reads, there are well known thinkers who have made sweeping observations about early childhood. Freud (2005) and his controversial psychosexual stages of development, but more importantly his view that personality is being formed and personality traits solidify near age seven – as well as the works undertaken by his daughter Anna in her focus on child development and therapy. Erickson (1995) and his psychosocial model, and his belief in a child's need to master certain tasks in their life for successful development, such as gaining a sense of autonomy, purpose and competence. Piaget (1969) and his four developmental stages, specifically his pre-operational stage and how he describes a child's thinking in this stage, which are all related to young children and their development and learning. Vygotsky's (1978) Sociocultural Theory, like Piaget's theory of cognitive development, stresses children's active engagement in their environment, albeit Vygotsky focusing more on a collaborative learning process, while Piaget more solo based (Papalia *et al.*, 2004). From a biological epistemology, Luria (1970) noted that there is a sensitive time frame for language development in the brain, and that children need to be exposed to auditory linguistic sounds early on for them to have a strong foundation in language. Luria's early studies on neuro processes and brain functioning are still valid today. The early childhood age is no lessor important than any other developmental step, and it is clear that something very special is happening in this pre-school age.

Being a university lecturer, I notice that many adult students have still not learned efficient ways of managing their own learning. They have not found efficient ways to understand and verbalise their coursework, remain focused in class and integrate their understandings of different subjects. Having recently incorporated a cybernetic approach to my lecturing style, I have seen improvements in my pass rates, as well as improved evaluations that the students provide after completing the courses. The projects and work standards have improved. But, most importantly, the ideas surrounding what it means to be a lecturer and what my role is in the class have also changed (discussed in more detail in the Teaching Strategies section). Being a co-owner of a pre-school, I wandered if similar improvements could be achieved with younger people, as learning to observe and making sense of the world are important tools that should be learnt as part of a pre-school experience. Glasersfeld (1992) says that children need to be allowed to make sense for themselves of their experiences, which the teacher needs to allow before attempting to modify or correct. An atmosphere needs to be created of conversation and mutual co-creation; whereby, students are allowed to be part of, rather than receivers of. He says that a traditional teaching epistemology does not readily provide this. Cybernetics is a good fit for Glaserfeld's recommendation, especially if Pask (and colleagues') Conversation Theory is considered. Thus, would using a cybernetic approach rather than a traditional approach to pre-school instruction

improve the skill level and achievement index of a group of pre-school children? To answer this question, a pilot experiment was set up, but first an explanation of the two strategies will be presented next.

2. Teaching strategies

There are many teaching strategies, but some are more effective than others. The point of departure is that the student is only one part of the system, as Gardner (2006, p. 198) states:

> It is our claim that the capacity of individuals to acquire and advance knowledge in a cultural domain and apply it in some purposeful fashion toward a goal has equally to do with the competencies inside a person's head and with the values and opportunities afforded by society to engage these competencies.

This experimental pilot study set out to compare the results of two groups of participants with one group having a traditional teaching approach, while the other group was engaged in a cybernetic approach. For explanation purposes it is necessary to provide at least some account of what steps were needed to differentiate the traditional group from the cybernetic group.

2.1 Traditional approach

The first teaching style adheres to the traditional teaching methods; whereby, the teacher presents the theme work relying on books (or other media[1]) and verbal instructions to the children. The children are passive participants in this system. The teacher presents the work to the children from the theme books, while the children listen and may ask questions at any time. The teacher "teaches" the children. There is a hierarchy in the system with teacher separate to the children taking the position of the leader in the class. The children are generally seen as a group, which is separate to the teacher. The teacher may speak individually to the learners, but ultimately the learners are seen as a group from the eye of the teacher. The teacher "teaches", and has the main responsibility of what learning should take place. During the lesson, the children may tell of their own stories relating to what the teacher has spoken about, following which the teacher moves on with her lesson usually according to the set lesson plan or course file. If another teacher offered to take the lesson in place of the original teacher – from the same course file – the next teacher would offer a similar structure and epistemological stance based on the traditional teacher and student model.

There was no training provided for the teacher for group 1 as she continued using the traditional approach; rather, she was just instructed to teach the children the work as she normally would.

2.2 Cybernetic approach (and additional training)

The second approach relying on a cybernetic epistemology incorporates the children into the tuition system. The teacher is not solely responsible for the learning, as learning is an activity that the children and teacher do within each other's presence mutually cooperating with each participant in the group, but not necessarily under the rules of the teacher. The teacher presents her knowledge. The idea of the teacher "teaching" is challenged. The teacher imparts her knowledge but as von Foerster reminds us: "It's the listener, not the speaker, who determines the meaning of an utterance" (Glasersfeld, 2007). Meaning is determined by the listener, as it is the listener that places this message into context in their own neurology based on their past lived experience. Glasersfeld

(2007) expands on von Foerster's position where he provides four indispensable points of how the listener may determine what meaning to attach to the communication; namely:

(1) sounds must be recognized as sound-images of words that suggest correlations;

(2) these correlations are re-presentations of components of earlier experience;

(3) our past experiences form the basis of the remembered components for possible meanings of the utterance; and

(4) the choice of meanings that the listener attaches to the utterance is dependent on the context including the listener's familiarity with the actor.

If the listener determines the meaning and their past-lived experience is a major contributor to this meaning, then the listener's context and background is also of interest in a lesson and should be incorporated into the learning system. The teacher is part of the children's environment and thus has to take responsibility for presenting the necessary information that forms part of the lesson plan. This is in keeping with Vygotsky's central focus: social, cultural, and historical, which form a complex system that the child is part of. For Vygotsky (1978), understanding cognitive growth, one must also look to the social processes from which a child's thinking is derived, while acknowledging the cognitive growth as a collaborative process as the child learns through social interactions. In the cybernetic group, the children are allowed and encouraged to dynamically adjust the trajectory of the lesson plan. The children generate sub themes of the lesson plan to incorporate their own contextual background into the lesson. The teacher still has learning outcomes to achieve; however, her view is changed to one of mutual cooperation realising that the children can equally be presenters. The lesson changes dynamically by incorporating the responses of each child. The child and teacher are now both leaders in the tuition system, with the teacher moderating the learning outcomes.

There is a challenge in describing the second group's teaching/learning style owing to the self-negating nature of the un-modelled cybernetic approach. Modelling cybernetics is troublesome. Baron (2014) in his study of South African university students' difficulty in learning cybernetic psychology, found that attempting to model cybernetic psychology like the common psychology models – the psychodynamic model, the cognitive model, person-centred model and so forth – created obstacles to acting and understanding cybernetics. Moving away from a model to a way of thinking and a way of being, proved to be more fruitful. As in Baron's study, explaining principles of cybernetic thinking is a first step and these principles can then be used within the models that they already know. In dealing with this same dilemma in the pre-school, I needed to make it clear that we are not dealing with two models, that is, traditional vs cybernetic. Rather, traditional (group 1) and then an approach whereby the person now has a cybernetic way of thinking, observing and acting within the lesson (group 2) – not excluding all the traditional methods, but rather a change in the interpretation of these methods. This person would need to understand and live the principles of cybernetic thinking. This was the challenging part. There is no user manual or course file on how to be cybernetic. In the pre-school, it was easier to discuss tools and methods through acting out modelled behaviour, as Mead (1968) and then later Glanville (2015) who both would agree – to live cybernetics. Glanville (2014, p. 1293) has expressed "Acting to understand and understanding to act", which is better than just defining what it means to be cybernetic. Extensive discussions, role playing and challenging conversations were undertaken with the teacher involved, to

move from a traditional teaching approach relying on a linear perspective to one of mutual causality of a co-created multiverse. One does not become a cyberneticist overnight and hence it was easier to start by discussing roles, responsibilities and observations in the class room followed by an introduction to common cybernetics principles. After the teacher showed understanding of the new approach, we discussed individual cases and possible scenarios and how these could be described from a cybernetic perspective. The limit is that I the initiator of the study cannot claim to hold the position of some all-seeing cybernetic specialist either.

To follow is a short description of how the training was undertaken for the teacher who was part of the cybernetic group: The first theme discussed was the issue of responsibility. Here difficult questions are posed; for example, what are the responsibilities of the teacher? What are the responsibilities of the learners? What is learning? Following this, a basic cybernetics tutorial was attempted. To provide the teacher with an introduction to a cybernetic view in her own thinking, I introduced topics in the training based on Glanville's (2008) paper "A cybernetic musing: five friends" owing to its simplicity in describing a few cybernetic concepts. This paper addresses five topics or friends as Glanville terms it. His friends are:

(1) a description of a thing is not that thing (the description is not the thing described);

(2) circularity;

(3) the Turing Test;

(4) the Black Box; and

(5) the Principle (Law) of Mutual Reciprocity.

Each topic was discussed and examples of how these topics fit into the pre-school context were presented. For example, Glanville (2008, pp. 168-169) states:

> The Principle (or Law) of Mutual Reciprocity states that, if through drawing a distinction we are willing to give a certain quality to that we distinguish on one side of the distinction, we must also permit the possibility of the same quality being given to that which we distinguish on the other side of this distinction: If I distinguish myself from you and I consider I am intelligent, I must consider that you (which I distinguish from I) might also be intelligent […].

This principle explains how qualities such as intelligence may be understood to belong to both participants in an interaction; shared, *in the between* (Glanville, 2008). Within the pre-school context, we should seek to find positive qualities both in another and ourselves through an approach of generosity. In the same light, the teacher who sees misbehaved or naughty children, should also see this too can be mutually reciprocal. What role has the teacher played to have children who are misbehaving? Is the teacher also misbehaving? Discussing cases and analysing them assisted in the training for each principle. When the teacher was able to synthesise and integrate these five topics, it was becoming clear that a change in perspective was approaching. The next step was to discuss the theme of responsibility again and see if there was any difference in answers, now comparing answers from the beginning of the training with answers given after the cybernetics tutorial. After the teacher was familiar with the five friends, her answers to the initial questions differed – "a difference that makes the difference" (Bateson, 1979, p. 99). The next hurdle is to determine the how for these questions. Now the focus moves to an investigation of the process. The questions can now be framed as

such: how does the teacher take responsibility in the class? How do you know learning is taking place, and so forth? What is interesting is that many people mistake a *what* for a *how*. To answer a *how* question, it is important to focus on process, who is doing what and what steps were followed. The cybernetics is in the doing or being rather than in the definitions of things. This is the motivation for a focus on process. Next we discussed observation and ethics. This not only provided the teacher with a footing in cybernetics but also paves the way for explaining the context of the Teachback. What is Teachback and why is it used? Learning from the lessons of Pask (1975) and coworkers in their Conversation Theory, the teacher would need to determine if the children's understandings are within the range of her understandings of each of their understandings. She would need to perturb each child to compare the interpretations of observations. Using Pask and Scott's (1973) Teachback – a method in which, after the teacher has presented to the learners the topics of the learning outcomes, the learner is invited to teach back his/her understanding of this material/information to the teacher. The teacher uses this method as a form of error correction to reduce the gap in understandings of the constructs being discussed. The teacher was asked to Teachback some of the cybernetics principles we had discussed in the session allowing her to experience the Teachback for herself. This also allowed me to observe her understandings of my explanation of cybernetics and whether she understood the Teachback concept.

2.3 Hypothesis

As this experiment was a two groups design, a hypothesis was created as follows.

The total correct answers obtained for the first group (traditional teaching method) would be lower than the total correct answers for the cybernetic group:

$$H_o: \mu_1 = \mu_2$$
$$H_1: \mu_1 < \mu_2$$

where μ_1 is the total correct answers obtained from the population group 1, μ_2 is the total correct answers obtained from the population group 2 ($\alpha = 0.05$).

The purpose of this study is to determine if a cybernetic approach to pre-school tuition is an improvement over a traditional teaching approach, in terms of how well the children could remember the learning outcomes of the lesson.

3. The experiment

3.1 Demographic

A research study was conducted in a Germiston based pre-school in the South African context. This study looks at the efficacy of two different teaching styles. The demographic for this study were pre-schoolers aged four-six years comprising of a multi-cultural group. The experiment was conducted in English. The majority of the children in the pre-school have attended an English speaking school in order to learn English; thus, the children are not native English speakers. The children who were used for the study could speak English and were sampled in the following manner. All the eligible children – children aged four-six were listed alphabetically. Two groups were created, namely the traditional and the cybernetic. The eligible children were grouped sequentially selecting one child to the traditional group with the next child in the alphabetical list being selected for the second group (cybernetic group), the third child selected for the traditional and so forth. Thus, the total sample group was purposively

sampled in terms of age, and then systematically sampled in terms of names. There were 16 children in each group. The groups were balanced in terms of average age of children.

3.2 The team

In keeping with a cybernetic epistemology, I feel it important to briefly introduce the team who undertook the study to allow the reader to gain some idea about the people involved. Anne the school principle has 19 years' experience in pre- and primary school having worked and managed various schools, ranging from Montessori child-centred, to traditional group focused. There were two additional teachers who have been trained in the traditional teaching approach from mainstream South African tertiary institutions. Cybernetics is a brand new way for thinking for this team.

3.3 The lesson plan

A single theme was selected, which was used for both groups. The theme was African wild animals. The lesson consisted of a definition of what a wild animal is, followed by information about seven wild animals. We specifically choose topics that would not be considered general knowledge; for example, under the topic of hippopotamus, the children were supposed to know that they can run faster than a human, they weigh more than a small car, they can be very aggressive and that they are herbivores. Another example: the term given to a group of zebras is a herd, while a group of lions is called a pride. These learning items would not be readily known by the pre-school children. It was confirmed with the teachers that they had not covered the experiment's learning outcomes prior to the lesson; thus, their students have not been exposed to these learning outcomes in the pre-school. The available materials used for both groups were the same. There were two picture books. The explanations were provided verbally and no electronic media were used.

There were two groups, each with the same theme and learning outcomes. The difference between the two groups was the method of delivery and approach offered by the teacher. For the first group – traditional approach- the teacher offered the lesson according to the lesson plan structure. The teacher covered the learning outcomes and asked the children questions as she would normally do in her classes. In the second group – cybernetic group – the teacher now used a cybernetic approach. Incorporating the learners' suggestions and allowance of learner choices in the theme order, which was a focal area. This did, however, run the risk of there being a topic left out. The second teacher sat in on this lesson and confirmed that all the outcomes were still covered. This group had the Teachback. The children were given the opportunity to present their understanding of the work and the teacher provided a response to the children's Teachback allowing for error-correction. The two groups had their lessons on the same day, which meant that group 1 was first, followed by group 2. The children were called to a separate class for each group lesson.

3.4 Assessment method

Two assessments were conducted on each group of 16 children (32 children in total). There was an immediate assessment, which took place directly after the lesson for each group. The second assessment took place one day later. The assessment comprised of ten questions that were based on the outcomes of the lesson. The same assessment questions were used for both groups and for both assessment sessions of groups 1 and 2.

There were two teachers present in each lesson and the one who was not presenting made sure that all the items of the lesson were covered so that both groups were matched in terms of outcomes presented. This was important as the cybernetic group had a spontaneous theme changing and did not follow the rigid lesson plan order. The second teacher ticked off that all the topics were covered so that for both groups they had completed the same themes. After the lesson, the children were called one by one to the teacher and asked the ten question assessment. There were two teachers, thus of the 32 children, 16 went to one teacher and the other 16 went to the other teacher in a parallel style. During the next day's assessment, the children who were assessed by the first teacher and children assessed by second teacher were now swapped and assessed by the opposite teacher respectively, to reduce testing bias. The assessments were conducted one-to-one and the other children could not hear or see their peers when they were being assessed.

The two teachers who undertook the assessment were briefed and given examples of what would be acceptable. Further, during the assessment the teachers communicated and verified they were allowing similar amounts of freedom in answers. For example, in the lesson the children were told that elephants have a very good sense of smell. However, under the topic of the rhino they were also told that rhinos too have a good smell sense. Thus, when the assessor asked each child which animal has the best sense of smell, many children answered that the rhino did. In these cases the assessor asked if there is another animal who has even a better sense of smell. If the child said elephant, then the teachers allowed that to be counted as a correct answer. The assessment method and assessment criteria were matched for both groups and for both testing days, excepting the second assessment day had the assessors swapped to reduce testing bias.

When the learners answered the questions during the assessments, they were not told if they made errors; the teacher just went to the next question. This was to enable the next day's test to be one without priming.

4. Results

There were 16 children in each group with each child being asked ten questions. The maximum that each group could score in terms of correct answers was 160. Table I summarises the results and provides a few descriptive statistical calculations.

Table I shows that the cybernetic group did considerably better than the traditional group. The notable achievements were the number of correct answers observed being higher than for the traditional group. The cybernetic group achieved a 46 per cent increase in correct answers. To determine the statistical difference between the means of two independent groups, a *t*-test was conducted. The cybernetic group had a higher mean number of correct answers ($M = 5.56$, $SD = 1.68$) than the traditional group ($M = 3.81$, $SD = 1.41$), $t(29) = 3.14$, $p < 0.001$. Effect Size Cohen's $d = 1.11$ (large effect). Table II shows the results for this test.

Correlating the scores between the same group's assessments (immediate versus next day) showed that there was little difference for the correlation, which was better than 0.92. Thus, the ability for the learners to answer the assessment questions correctly after one day, matched well. Table III tabulates the Pearson *r* correlations.

4.1 Limits

The groups were matched for sample size, testing environment, teaching tools; however, the cybernetic group did take six minutes longer. There was a concern

Parameter	Group 1: traditional immediate assessment	Group 2: cybernetic immediate assessment	Group 1: traditional next day assessment	Group 2: cybernetic next day assessment
Number of correct answers	61	89	58	86
Mean	3.81	5.56	3.62	5.37
SE	0.42	0.36	0.45	0.35
Median	4	5	4	5
Mode	5	6	5	5
SD	1.68	1.46	1.78	1.41
Sample variance	2.83	2.13	3.18	1.98
Minimum	1	3	0	3
Maximum	6	8	6	8
Percentage increase	–	46	–	48

Table I. Summary of results for the two groups for all assessments – both the immediate and the day later assessment

Immediate assessment	*Group 1: traditional*	*Group 2: cybernetic*
Observations	16.00	16.00
df	29.00	
t-Statistics	3.14	
P(T ⩽ *t*) one-tail	0.002	
t-Critical one-tail	1.70	
Next day assessment		
Observations	16.00	16.00
df	28.00	
t-Statistics	3.08	
P(T ⩽ *t*) one-tail	0.002	
t-Critical one-tail	1.70	

Note: Unequal variance

Table II. *t*-Test: differences between the means of two independent groups for the traditional vs the cybernetic group

Traditional-immediate assessment compared to next day assessment		Cybernetic-immediate assessment compared to next day assessment	
Pearson correlation	0.95	Pearson correlation	0.93
df	15.00	df	15.00

Notes: Comparing group 1's result with the same group's results taken the next day. Comparing group 2's result with the same group the following day

Table III. Pearson correlation between immediate and next day assessment for each group

amongst the staff members that owing to the cybernetic group's lesson and assessment taking place at the end of the morning work session (9:30 a.m.), the children would be tired and irritable. This meant that while the cybernetic group had six additional minutes, which is probably in the group's favour, the lesson also took place during an unfavourable time of the morning. The staff members who were involved in the study – having extensive experience with the children and their behaviour patterns

during the day – noted that at about 9:30 a.m. onwards most children start to get fidgety and want to play outside, having started their work period from 8:00 a.m. Thus, we felt that the trade-off of a few extra minutes vs the challenging time of day equalled the playing field.

Scott (2000) refers to his Teachback method in terms of summative assessments. Within this experiment the children were given the opportunity to teach back even formative parts of the lesson. For example, when the teacher introduced the new word of herbivore and explained its meaning, a child may have been asked to teach back this meaning they understood. The children were not expected to provide a summative explanation of the whole lesson, especially since this is a pre-school study.

Was the second group cybernetic? Who determined that this was a cybernetic group? The answers to these questions are what make cybernetic studies complex. There is always an observing system with its inherent filtering and its own beliefs and values being imposed along the way. One way to improve the cybernetic standing of this study would be to incorporate what Tom Anderson (1987) used in his therapy sessions with families – a reflecting team. This is a group of people (other therapists) who observe the goings on during the therapy session and can then comment on the therapist and family conversations that they observed. The family then can comment as well. This hopefully allows for multiple perspectives and pattern observation. However, it would still be the ultimate observer who provides an answer to the first question, which in this case is the reader.

Larger group sizes may become challenging when young children are expected to listen to their peers. Smaller groups are easier to manage.

Defining what it means to have a traditional approach to teaching is also challenging with the many personal interpretations of traditional teaching. This paper was not intended to criticise traditional teaching. Rather, by adding a cybernetic perspective and tools from Conversation Theory, further improvements can be achieved.

4.2 Research implications

Any teaching style that allows for improved learner performance would be welcomed in any pre-school. One benefit of the cybernetic approach is that it takes each child's social and cultural background into account during the lesson. For example, children are given the opportunity to teach back their understanding of the topics. In describing their understanding they often provide contextual information. This contextual information is unique and is even more interesting when dealing with multi-cultural groups. This is particularly true of many South African schools. By allowing the children to discuss their context in the class, this also provides a basis for other children and the teacher to understand and work with the cultural diversity.

4.3 Further study

This pilot study is a start to an area of research comparing two different teaching paradigms. The early findings suggest that this is a viable topic. This experiment stands in as a first step and should now be followed by a more comprehensive experimental design. Multiple groups across different subjects with different teachers. In order for one teaching style to be favoured over another, several iterations of similar studies comparing traditional and cybernetic approaches should be undertaken to justify a teaching style change. The authors plan on redoing the study with two new teachers and a larger group.

The Teachback method may also have benefits for children learning language, as the Teachback requires the child to express themselves verbally in front of the teacher and peers. The teacher and peers can comment, which provides additional language practice for the children. This would form a long term study comparing groups that use the Teachback as part of their daily curriculum vs a class that does not.

This paper addressed one method for cybernetics training for one of the teachers. As discussed in the paper, there are challenges in learning cybernetics. Further experiments on the effectiveness of cybernetics training is also a viable study area.

5. Discussion and conclusion

The teachers who took part in this study did not anticipate that there would be any difference between the two groups. Their main concern was that the cybernetic group had their lesson at a time which they know is usually troublesome – prior to play time. While the teachers were doing the assessment they already noticed a difference in the ability of the children to answer the questions correctly. The hypothesis was confirmed and the result was statistically significant in favour of the cybernetic group. There are challenges facing a teacher who embraces a cybernetic epistemology in the classroom. Expecting a large group of pre-schoolers to listen while their peers are talking is not an easy task. Smaller groups work better. As the children get used to the conversational style – knowing they will all get a chance – the class does improve in terms of turn taking rules of conversation.

Glasersfeld (1992) knows that to engage in reflexive conversation, there needs to be an attitude of openness and curiosity on the part of the teacher. The teacher needs to create a classroom atmosphere that is conducive to both teacher student conversation, as well as student to student conversation. Using the Teachback method, the children are empowered to express their understandings, which need not only be directed at the teacher. The children are encouraged to find a partner and teach back to their peers their understanding of the lesson theme (student also has a chance to take the role of teacher). The teacher and children can then both have a chance to reply to the student. This we found successful as some children were able to add both correct and incorrect comments, which was also a revision for the children both reiterating what the correct information was, as well as determining that some children were not on the same page. The teacher can listen to how the child came up with their answer and this also assists in creating a new story that the child can try (which also has the correct answer within it). The teacher should use the child's story as a basis and not discount the child's way of understanding. With English not being a first language for these children, conversational learning would be especially beneficial as they are also rehearsing their language skills in front of the teacher.

Note

1. In this study both groups used the same media, which was only two books on wild animals.

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