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ADDENDUM A:
DEPARTMENT OF BASIC EDUCATION

**A1: LETTER TO THE REGIONAL OFFICE OF THE DEPARTMENT OF BASIC
EDUCATION**

**A2: RESPONSE FROM REGIONAL OFFICE OF THE DEPARTMENT OF BASIC
EDUCATION**

LETTER TO THE REGIONAL OFFICE OF THE DEPARTMENT OF EDUCATION



P.O. Box 19885

Noordbrug

2522

14 April 2011

The Regional Executive Office

Attention: Mr. H. Motara (District Director)

Potchefstroom

2530

Dear Sir

Permission requested to involve teachers and learners in study

I am Joany Fransman, lecturer at the North-West University. I am enrolled with the University for my PhD degree. I am also currently involved in a research project with the title: **Using adapted lesson study to facilitate mathematics teachers' meta-cognitive thinking skills** in which I plan to complete my doctoral study titled: **Using adapted lesson study to facilitate mathematics teachers' meta-cognitive thinking skills when using mathematics vocabulary.**

The effective teaching of Mathematics is a national priority. It makes academic sense that mathematics teachers should be given a strategy, a method, a know-how to teach mathematics more meta-cognitively and therefore the need for lesson study. Therefore the purpose of this study is to investigate the ways in which the meta-cognitive thinking skills of mathematics teachers can be facilitated by means of adapted lesson study in the use of mathematics vocabulary and how collaborative action research promotes professional development among the teachers.

This study will provide teachers with the opportunity to reflect more deeply on their own teaching practises and involvement in the project and to experience another aspect of the education research process. The study that will be written about the team's work will be shared with the Further Education and Training (FET) teacher community for the purpose of advancing professional practice and the effective use of action research as a means of professional development for teachers.

I am therefore requesting permission to involve all the voluntary Mathematics teachers and their learners in the FET phase from the following 2 secondary schools: BA Seobi Sec. School and Resolofetse Sec. School. I might add that the schools were identified with the help of the Mathematics subject specialist for the district, Mrs.H. Anthunes. (Communication available upon request)

Teachers will be requested to take part in the following research activities: Surveys; lesson observations; individual interviews; focus group discussions; workshops (at least 2), lesson study sessions and research team meetings. Learners will only participate in vocabulary achievement tests and lesson observations. Only the lesson observations for the lesson study purposes and the achievement tests will be done in school time and on the school premises. All other research activities will be done after hours. It is envisaged that the researcher or assistant will visit each school approximately 6-10 times per year. These visits will be solely to participate in class activities and will in no way take the teacher out of the classroom. The project will be 3 years in duration (2011, 2012 and 2013).

I trust that my request will receive your favourable consideration. Please fax your response on this request to the following fax number: 018 299 4558.

Kind regards

(Mrs) J.S. Fransman

083 50 70691

RESPONSE FROM REGIONAL OFFICE OF THE DEPARTMENT OF BASIC EDUCATION



education
Uelasho la Thuto
Onderwys Departement
Department of Education
NORTH WEST PROVINCE

Telephone: 018 234 2200
E: 018 234 2200
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POTCHEFSTROOM 9500
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DR KENNETH KAUNDA DISTRICT

DIRECTOR: PROFESSIONAL SERVICES

15 April 2011

Mrs J S Fransman
Lecturer – PhD Degree Student
North West University
Potchefstroom Campus

**PERMISSION TO CONDUCT RESEARCH: USING ADAPTED LESSON STUDY TO FACILITATE
MATHEMATICS TEACHERS' META-COGNITIVE THINKING SKILLS WHEN USING MATHEMATICS
VOCABULARY AT SCHOOLS IN THE POTCHEFSTROOM AREA OFFICE - DR KENNETH KAUNDA
DISTRICT**

The above matter refers

Permission is hereby granted to you to conduct research in schools in the Potchefstroom Area Office, Dr Kenneth Kaunda District under the following provisions:

- > **the activities you undertake at school should not tamper with the normal process of learning and teaching;**
- > **you inform the principals of your identified schools of your impending visit and activity;**
- > **you provide my office with a report in respect of your findings from the research; and**
- > **you obtain prior permission from this office before availing your findings for public or media consumption.**

Wishing you well in your endeavour

Thanking you

DR S H MVULA
DISTRICT EXECUTIVE MANAGER
DR KENNETH KAUNDA DISTRICT

cc: Mrs S Yssel – Area Manager, Potchefstroom

100%

100% OF THE TOTAL

100% OF THE TOTAL

ADDENDUM B:

ETHICS APPROVAL DOCUMENT FROM NORTH-WEST UNIVERSITY



NORTH-WEST UNIVERSITY
YUNIBESITHA BOKONE BOPHIRIMA
NOORDWES UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Fakulteit Opvoedingswetenskappe
Faculty of Education Sciences

Verwysingsnr. / Reference nr.

FAKULTEIT OPVOEDINGSWETENSKAPPE / FACULTY EDUCATION SCIENCES

Notule

Vergadering

Fakulteit Opvoedingswetenskappe

Navorsingsetiekkomitee

Datum: Donderdag, 24 November 2011, 14:15

Plek: Seminaarkamer 299E, C6

ITEM		Bladsy/ Page
1.1.1	Projekhoof	Dr MS van der Walt (Notule van 22 September 2011)
	Studente/Span	
	Etieknommer	
	Titel	
	Besluit	
		Dr A Roux, Me JS Fransman, Me N Esterhuyse, Dr M Molepo, Mr T Saziwa, Mr S Adjei, MATD 413-geregistreerde studente, BEdHons-studente
		NWU-00027-11-S2
		Using adapted lesson study to facilitate mathematics teachers' meta-cognitive thinking skills
		Prof Meyer gee terugvoering oor die aansoek. Hy stel dit dat al die probleme uitgesorteer is, en dat die aansoek magtiging mag ontvang. Die komitee verleen magtiging .

ADDENDUM C: CONSENT FORMS

C1: TEACHER CONSENT FORM

C2: LECTURER CONSENT FORM

C3: LEARNER CONSENT FORM

C1: TEACHER CONSENT FORM

Informed Consent: Mathematics teachers' metacognitive skills and mathematical language in the teaching-learning of trigonometric functions in township schools

Date: November 2011

Project Title: Using adapted lesson study to facilitate mathematics teachers' metacognitive thinking skills.

Principal Student Investigator (Researcher):

Joany Fransman
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Supervisor :

Dr. Marthie Van der Walt
Lecturer: Mathematics Education
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082 438 1140 (cell)
Marthie.vanderwalt@nwu.ac.za

INVITATION

You are invited to participate in a design-based research study. You were selected to take part in this study because you are a qualified Mathematics teacher teaching in the FET phase of one of the following 2 identified schools: B.A Seobi Sec. School and Resolofetse Sec. School.

The purpose of this study is to investigate the ways in which the metacognitive thinking skills of mathematics teachers can be facilitated by means of adapted lesson study in the use of mathematics vocabulary and how collaborative action research promotes professional development among teachers.

WHAT IS INVOLVED

This study will comprise of two components: A school action component and a university research component. The study will require that you become part of a research team consisting of 12 members, viz. 6 Mathematics teachers, 5 lecturers and the researcher who will have regular research team meetings. As part of the team you are expected to identify a common area for improvement in the teaching of Mathematics focusing on the use of mathematics vocabulary in the Further Education and Training (FET) phase. Activities for this component will involve reflecting, analyzing and documenting your own teaching practises and involvement in the project.

The university research component of this activity will require the following additional expectations:

- To permit the video taping of lesson observations as well as your regular teacher research team meetings relating to your own action research project. These meetings will be after hours to be scheduled by your team. The video recordings of these meetings will be used to document your brainstorming and decision-making as you work through the action research process.
- To respond to questions or prompts that I will send via sms/e-mail to you each month. These will provide me with a record of your decision-making and reflection over the duration of the project. Your responses should take no more than 15 minutes each month. Examples of the questions or prompts are:
 - What possibilities and/or opportunities for mathematics teaching and learning when using mathematics vocabulary are you becoming aware of as a result of your collaboration in your action research project?
 - What challenges, obstacles and/or difficulties for teaching and learning when using mathematics vocabulary are you experiencing while working collaboratively on your action research project?
 - Is your participation in the project influencing the way you use mathematics vocabulary in any of the mathematics topics that you teach? If so, how?
 - Is working collaboratively with one another on this project influencing your own classroom practice? If yes, how so?

- Focus group interviews with me or the research assistant (60 minutes in length) after the lesson observation that will also be videotaped.
- One individual interview with me or the research assistant. This will be audio-taped.

Please take note: The information you provide will be kept confidential. Your name will not appear in any thesis or report resulting from this study; however, with your permission, anonymous quotations may be used.

Shortly after the interview has been completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or clarify any points that you wish.

POTENTIAL BENEFITS AND RISKS

This study will provide you with the opportunity to reflect more deeply on your own teaching practises focussing on more effective ways of using mathematics vocabulary.

You will also be contributing to effective mathematics teaching and assist mathematics teaching in an attempt to improve learners' performance in mathematics in the following way: The results of your team's work will be shared with the FET teacher community for the purpose of advancing professional practice and the effective use of action research as a means of professional development for teachers.

You will also have the opportunity to work towards an effective Mathematics lesson through lesson study.

Another direct benefit is your own professional development and growth as a Mathematics teacher!

There are no known or anticipated risks associated with participation in this study. However, the lesson observation and lesson study activities that will be embarked upon in this project might hold some discomfort. You will also be participating in an intensive collaborative team project. This brings with it the possibility of conflict and differences of opinion amongst team members. The university facilitators are available to assist you in resolving inter-personal issues within your team should they arise. In addition, you will be asked about the success of the lessons and your work on the action research project. This might present potential for others to judge your expertise. However, pseudonyms will be used to keep your identity confidential. In addition to this, I will make sure that your rights will be protected.

CONFIDENTIALITY

Pseudonyms will be used for the names of participants in the reporting of the findings from this study. The master list of participants' real names and their pseudonyms will be kept in a locked cabinet in the researcher's office. If an individual participant withdraws from the study, any data pertaining exclusively to the participant will be destroyed. However, it will be difficult to remove individual data from the focus group discussion. This will be explained during the information session.

On December 31, 2020 (seven years after the completion of the study in 2013) all data including paper documents will be destroyed by shredding and electronic files (emails and computer files) deleted or erased. Until this date all data will be kept by the principal researcher in a locked file cabinet in a locked office.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled. If an individual participant withdraws from the study, any data pertaining exclusively to the participant will be destroyed. However, you should take note that it will be difficult to remove individual data from the focus group discussion. There are no consequences for withdrawing from the research study.

FEEDBACK AND PUBLICATION OF RESULTS

There will be regular feedback and discussions at each visit and finally at the SANPAD dissemination workshop/conference in 2013. Results of this study may also be published in professional journals and presented at other conferences. You can e-mail me at joany.fransman@nwu.ac.za.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the researcher or the Faculty Supervisor (where applicable) using the contact information provided above. If you have any comments or concerns about your rights as a research participant, please contact the research office of the North-West University at +27-18-299 4780 or +27+18 299 4551or +27+18 299 1861 or at <http://www.nwu.ac.za>

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____

Signature: _____ Date: _____

C2: LECTURER CONSENT FORM

Informed Consent for lecturers: Mathematical language and metacognitive skills as catalysts in the teaching of trigonometric functions in township schools

Date: November 2011

Project Title: Using adapted lesson study to facilitate mathematics teachers' metacognitive thinking skills.

Principal Student Investigator (Researcher):

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Supervisor :

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082 438 1140 (cell)

Marthie.vanderwalt@nwu.ac.za

INVITATION

You are invited to participate in a design-based research study. You were selected to take part in this study because of your knowledge ability in mathematics education and your research expertise. The purpose of this study is to investigate the ways in which the metacognitive thinking skills and the mathematical language of mathematics teachers can be facilitated by means of adapted lesson study in the use of mathematics vocabulary and how collaborative research promotes professional development among teachers.

WHAT IS INVOLVED

The study will require that you become part of a research team consisting of Mathematics teachers, the researcher and the project leader and other lecturers who will have regular research team meetings. Activities for this component will involve reflecting, analyzing and reflecting on lessons given by different teachers in the project.

The university research component of this activity will require the following additional expectations:

- Focus group interviews with me and the teachers, as well as the project leader (90 minutes in length) after the lesson observation that will also be videotaped.

Please take note: The information you provide will be kept confidential. Your name will not appear in any thesis or report resulting from this study; however, with your permission, anonymous quotations may be used.

Shortly after the interview has been completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or clarify any points that you wish.

POTENTIAL BENEFITS AND RISKS

This study will provide you with the opportunity to reflect more deeply on teaching practises focussing on more effective ways of using mathematics vocabulary and metacognitive skills.

You will also be contributing to effective mathematics teaching and assist mathematics teaching in an attempt to improve learners' performance in mathematics in the following way: The results of your team's work will be shared with the FET teacher community for the purpose of advancing professional practice. You will also have the opportunity to work towards an effective Mathematics lesson through lesson study.

Another direct benefit is your own professional development and growth as a Mathematics educator!

There are no known or anticipated risks associated with participation in this study. However, the lesson observation and lesson study activities that will be embarked upon in this project might hold some discomfort. You will also be participating in an intensive collaborative team project. This brings with it the possibility of conflict and differences of opinion amongst team members. However, pseudonyms will be used to keep your identity confidential. In addition to this, I will make sure that your rights will be protected.

CONFIDENTIALITY

Pseudonyms will be used for the names of participants in the reporting of the findings from this study. The master list of participants' real names and their pseudonyms will be kept in a locked cabinet in the researcher's office. If an individual participant withdraws from the study, any data pertaining exclusively to the participant will be destroyed. However, it will be difficult to remove individual data from the focus group discussion. On December 31, 2020 (seven years after the completion of the study in 2013) all data including paper documents will be destroyed by shredding and electronic files (emails and computer files) deleted or erased. Until this date all data will be kept by the principal researcher in a locked file cabinet in a locked office.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled. If an individual participant withdraws from the study, any data pertaining exclusively to the participant will be destroyed. However, you should take note that it will be difficult to remove individual data from the focus group discussion. There are no consequences for withdrawing from the research study.

FEEDBACK AND PUBLICATION OF RESULTS

There will be regular feedback and discussions at each visit and finally at the SANPAD dissemination workshop/conference in 2013. Results of this study may also be published in professional journals and presented at other conferences. You can e-mail me at joany.fransman@nwu.ac.za.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the researcher or the Faculty Supervisor (where applicable) using the contact information provided above. If you have any comments or concerns about your rights as a research participant, please contact the research office of the North-West University at +27-18-299 4780 or +27+18 299 4551 or +27+18 299 1861 or at <http://www.nwu.ac.za>. Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____

Signature: _____ Date: _____

LEARNER CONSENT FORM



Informed Consent: Mathematics teachers' metacognitive skills and mathematical language in the teaching-learning of trigonometric functions in township schools

Date: November 2011

Project Title: Using adapted lesson study to facilitate mathematics teachers' meta-cognitive thinking skills.

Principal Student Investigator (Researcher):

Joany Fransman
Lecturer: Mathematics Education
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Supervisor :

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Lecturer: Mathematics Education
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Marthie.vanderwalt@nwu.ac.za

INVITATION

Dear Mathematics learner

(Please Note: This form may only be completed by learners who are 18 years or older at the time of completion of this form. Learners who are not 18 years yet, must please give this form to their parents to complete on behalf of them)

You are invited to participate in a design research study. You were selected to take part in this study because you are a Mathematics learner in the FET phase of one of the following 2 identified schools: Resolofetse Sec. School, BA Seobi Sec. School. The purpose of this study is to investigate the ways in which the metacognitive skills and the mathematical language of mathematics teachers can be catalysts for the effective teaching/learning of trigonometric functions by means of adapted lesson study.

WHAT IS INVOLVED

This study will require that you take part in the following activities:

- Lesson observations which will be videotaped: These videos will be used for the sole purpose of research. Your face will be blurred by means of computer software for this purpose.
- Assessment.

Please take note: The information you provide will be kept confidential. Your name will not appear in any thesis or report resulting from this study; however, with your permission, anonymous quotations may be used.

POTENTIAL BENEFITS AND RISKS

There are no known or anticipated risks associated with participation in this study. However, the lesson observation and lesson study activities that will be embarked upon in this project might hold some discomfort. Pseudonyms will be used to keep your identity confidential. In addition to this, I will make sure that your rights will be protected.

CONFIDENTIALITY

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VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled. If an individual participant withdraws from the study, any data pertaining exclusively to the participant will be destroyed. However, you should take note that it will be difficult to remove individual data from the focus group discussion. There are no consequences for withdrawing from the research study.

FEEDBACK AND PUBLICATION OF RESULTS

There will be regular feedback and discussions at each visit and finally at the SANPAD dissemination workshop/conference in 2013. Results of this study may also be published in professional journals and presented at other conferences. You can e-mail me at joany.fransman@nwu.ac.za.

CONTACT INFORMATION AND ETHICS CLEARANCE

This study has been reviewed and received ethics clearance through the Research Committee at the North-West University (NWU-00027-11-S2). If you have any questions about this study or require further information, please contact the researcher or the Faculty Supervisor (where applicable) using the contact information provided above. If you have any comments or concerns about your rights as a research participant, please contact the research office of the North-West University at +27-18-299 4780 or +27+18 299 4551or +27+18 299 1861 or at <http://www.nwu.ac.za>

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: _____
Signature: _____

Age of learner: _____
Date: _____

School: _____

ADDENDUM D:

DATA COLLECTION INSTRUMENTS

D1: QUESTIONS FOR INDIVIDUAL INTERVIEW WITH TEACHERS

D2: LESSON OBSERVATION SCHEDULE

D3: TRIGONOMETRY ASSESSMENT TASK

D4: QUESTIONS FOR FOCUS GROUP DISCUSSIONS 1 -5

QUESTIONS FOR INDIVIDUAL INTERVIEW WITH TEACHERS

Addendum D1

Questions for individual interview with teachers

- Do you like Mathematics? Motivate your answer.
- Where did this liking in Mathematics begin?
- What motivates you in the teaching of Mathematics?
- What do you see as challenges in Mathematics teaching?
- Choose (in order of "most difficult" to "easy" to teach) between the following areas of mathematics teaching:
 1. Algebra
 2. Geometry
 3. Trigonometry
- Comment on the way you have been taught Mathematics:
 1. In school
 2. In a tertiary institution.

LESSON OBSERVATION SCHEDULE

Lesson Observation Schedule

Lesson:

Date:

Presenter:

School:

The four guiding principles for the introductory teaching of trigonometry

- From concrete to abstract
- From particular to general
- Context of new concept
- Favorable reactions from students

Criteria	Observations
The nature of the mathematical content	
Questioning	
Motivation and teaching strategies	
Homework	
Use of class time	
Verbal behaviour of learners	
Task orientation of learners	
Assessment	
Teacher expectations and stereotyping	

Any other observations:.....

TRIGONOMETRY ASSESMENT TASK

Addendum D

Trigonometry Assessment task

Mathematical language and Metacognition in Trigonometric Functions (Based on questionnaires of Daniela Lucangeli and Cesare Cornoldi and Wilson, Jeni)

Example of task (Trigonometric Functions)

Look carefully at this task (but don't try to solve it):

Task 1: A 6m long ladder with its foot in the street makes an angle of 30° with the surface of the street when its top rests on a building on one side of the street. The same ladder makes an angle of 40° with the street when its top rests on a building on the other side of the street while the foot of the ladder remains in the same position. How wide is the street (to the nearest meter)?

Choose the correct option (a-e)

Do you think that you will solve the task correctly? (Prediction)

- (a) You are absolutely sure that you will solve it in the right way.
- (b) You are quite sure that you will solve it in the right way.
- (c) You are not sure/you don't know how correctly you will do it.
- (d) You are really sure and you think that you will probably not succeed.
- (e) You know that you won't be able to do it in the right way.

Put the following phases in order necessary to solve this task by marking from

1-3: (Planning)

- _____ extract the information necessary for this task
- _____ read the assignment well;
- _____ draw a diagram;
- _____ highlight important concepts and terminology.

Now try to perform the task.

ADDENDUM D4: QUESTIONS FOR FOCUSGROUP DISCUSSIONS 1 – 5

Questions for Focus group discussion 1

After seeing video recording of the lesson:

1. What is your general impression of the lesson?
2. Comment on the way the trigonometric functions had been introduced within the lesson.

Questions for focus group discussion 2

Show video recording of two lessons...

1. Give a clear description of the kind of learner that featured in the video recording.
2. Now give a clear description of the kind of learner which you have hoped to see in the recording.
3. How can the gap between the answers for questions 1 and 2 be addressed?
4. What are the challenges that teachers face in the teaching of trigonometric functions?
5. How can the challenges in question 4 be addressed in the teaching of trigonometric functions?
6. How can the metacognitive skills of the teacher be used in the teaching of trigonometric functions?
7. How can the usage of mathematical language (terminology) within the teaching of trigonometric functions be addressed?

Questions for Focus group discussion 3

To teacher who presented the lesson: Please reflect on the lesson in terms of the following:

- Did you follow the lesson 100% as it was planned by the group?
- If no; please explain reasons for not following the lesson and indicate the places where the lesson was adjusted.
- If yes; give reasons for not adjusting it.

To Group:

Look at the lesson and discuss:

1. Do you think we have reached our aims? Motivate...(Hint...Look again at the outcomes for our lesson on the poster)
2. In your opinion:
 - What did work? Why did it work?
 - What did not work? Why did it not work?
3. Now indicate how we can improve this lesson in order for learners to learn, focusing on the use of metacognitive skills and mathematical language.

Questions for Focus group discussion 4

To teacher who presented the lesson: Please reflect on the lesson in terms of the following:

- Did you follow the lesson 100% as it was planned by the group?
- If no; please explain reasons for not following the lesson and indicate the places where the lesson was adjusted.
- If yes; give reasons for not adjusting it.

To Group:

Look at the lesson and discuss:

1. Do you think we have reached our aims? Motivate...(Hint...Look again at the outcomes for our lesson on the poster)
2. In your opinion:
 - What did work? Why did it work?
 - What did not work? Why did it not work?
3. Now indicate how we can improve this lesson in order for learners to learn, focusing on the use of metacognitive skills and mathematical language.

Questions for Focus group discussion 5

To the teacher who presented the lesson:

Please reflect on the lesson in terms of the following:

- Did you follow the lesson 100% as it was planned by the group?
- If no...please explain reasons for not following the lesson.
- Indicate the places where you have adjusted the lesson.

To the Group:

1. The planned outcomes of the lesson were:

At the end of the lesson learners will be able to:

- (i) Understand the basic concepts of triangle trigonometry;
- (ii) Apply trigonometric functions to solve mathematical and real-world problems.

Do you think the outcomes have been reached? Motivate.

2. Metacognition in its simplest form refers to **thinking about thinking**. Comment on the use of metacognitive skills used by:
 - (i) the teacher; and
 - (ii) the learners in the lesson.
3. Comment on the use of **mathematical language used** in the lesson. How can the use of mathematical language be stimulated in follow-up lessons?
4. You have been taking part in discussions with other mathematics educators around the teaching and learning of trigonometry. Please reflect on your experiences in this collaboration.

ADDENDUM E: DATA ANALYSIS INSTRUMENTS

E1 THE CODEBOOK

ADDENDUM E1 THE CODEBOOK

Codebook for the analysis of data collected: Metacognitive skills and mathematical language of mathematics teachers in the teaching of trigonometric functions

Code 1

Label: Beliefs (Artzt & Armour-Thomas, 2002: 130)
Classification: Theory-driven
Definition: A person's convictions and inherent views about some phenomenon.
Description: Words, concepts and phrases that reflects ones views and convictions about mathematics, mathematics learning and learners and teaching mathematics.

Code 2

Label: Knowledge (Artzt & Armour-Thomas, 2002: 130)
Classification: Theory-driven
Definition: What a person knows in the general sense
Description: Words, concepts and phrases that indicate that person know about any particular phenomenon.

Code 3

Label: Goals (Artzt & Armour-Thomas, 2002: 130)
Classification: Theory-driven
Definition: That which a person sets out for him/herself to achieve.
Description: Any word or segment that indicate what the teacher intend to do or plan to do for him/herself, his/her colleagues or his/her learners.

Code 4

Label: Lesson planning (Artzt & Armour-Thomas, 2002: 130)
Classification: Theory-driven
Definition: Includes all the preparation that are done prior to a lesson in order for its smooth running
Description: Any segment that indicate any type of preparation for the lesson to be given.

Code 5

Label: Monitoring (Artzt & Armour-Thomas, 2002: 130)

ADDENDUM F:
GENERATED DATA AND DATA ANALYSIS DOCUMENTS
(ON COMPACT DISK ATTACHED)

- F1: TRANSCRIPTION OF INDIVIDUAL INTERVIEW WITH TEACHER A
- F2: TRANSCRIPTION OF INDIVIDUAL INTERVIEW WITH TEACHER B
- F3: TRANSCRIPTION OF VIDEO RECORDING OF LESSON ONE
- F4: TRANSCRIPTION OF VIDEO RECORDING OF LESSON TWO
- F5: TRANSCRIPTION OF FOCUS GROUP DISCUSSION ONE
- F6: TRANSCRIPTION OF FOCUS GROUP DISCUSSION TWO
- F7: COMPLETED TRIGONOMETRY ASSESSMENT TASK OF TEACHER A
- F8: COMPLETED TRIGONOMETRY ASSESSMENT TASK OF TEACHER B
- F9: EXEMPLARS OF COMPLETED TRIGONOMETRY ASSESSMENT TASKS FOR THE RED SCHOOL
- F10: EXEMPLARS OF COMPLETED TRIGONOMETRY ASSESSMENT TASKS FOR THE BLUE SCHOOL
- F11: TRANSCRIPTION OF VIDEO RECORDING OF LESSON THREE
- F12: TRANSCRIPTION OF FOCUS GROUP DISCUSSION THREE
- F13: TRANSCRIPTION OF VIDEO RECORDING OF LESSON FOUR
- F14: TRANSCRIPTION OF FOCUS GROUP DISCUSSION FOUR
- F15: TRANSCRIPTION OF VIDEO RECORDING OF LESSON FIVE
- F16: TRANSCRIPTION OF FOCUS GROUP DISCUSSION FIVE
- F17: COMPLETED LESSON OBSERVATIONS FOR LESSON 1 – 5
- F18: LESSON PLANS FOR LESSONS 1 - 5
- F19: HERMENEUTIC UNIT – ANALYSING THE METACOGNITIVE SKILLS AND MATHEMATICAL LANGUAGE OF MATHEMATICS TEACHERS IN THREE PHASES (ATLAS.ti 7.0)
- F20: HERMENEUTIC UNIT AS HTML REPORT (ATLAS.ti 7.0)
- F21: THE CODEBOOK

ADDENDUM G: DECLARATIONS

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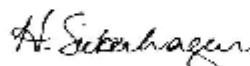
CERTIFICATE

Issued on 14 November 2013

I hereby declare that I have edited the language of the thesis

**Mathematics teachers'
metacognitive skills and mathematical language
in the
teaching-learning of trigonometric functions
in township schools**

submitted by ms Joany Fransman
for the degree PhD (Mathematics Education)
on the
Potchefstroom Campus
of the
North-West University



H C Sieberhagen
SATI no 1001489