



UNIVERSITY OF JOHANNESBURG
FACULTY OF EDUCATION
NOVEMBER EXAMINATION 2014

PROGRAMME: M.ED
 MODULE: MATHS AND SCIENCE LEARNING: ADVANCES IN THE FIELD
 CODE: MSL9X20
 TIME: 3 HOURS
 MARKS: 100
 EXAMINERS: Prof. U. Ramnarain
 Prof. J.J.J. de Beer
 MODERATOR: Dr N Govender (University of KwaZulu-Natal)
 (This paper consists of 3 pages)

INSTRUCTIONS:

You need to answer any **TWO (2) questions** in this paper. Read the questions carefully before answering them. The following rubric will be used in guiding our assessment of your answers:

Criteria	Level 1	Level 2	Level 3	Level 4
Introduction	-weak introduction of topic -thesis is weak and lacks an arguable position	-adequate introduction that states topic, thesis and some of the subtopics - thesis is somewhat clear and arguable	-proficient introduction that states background information, controversial question, topic, thesis, and all subtopics in proper order - thesis is a clear and arguable statement of position	-exceptional introduction that grabs interest of reader and states background information, controversial question, topic, thesis, and all subtopics in proper order - thesis is exceptionally clear, arguable, well developed, and a definitive statement
Quality of Information / Evidence	-limited information on topic or inaccurate information	Some accurate evidence but still inadequate	Detailed information with accurate & critical evidence	extremely detailed and accurate with critical evidence from a variety of sources
Support of Ideas / Analysis	-limited connections made between evidence, arguments and counter-arguments -lack of analysis	-some connections made between evidence, arguments and counter-arguments -showing analysis	-consistent connections made between evidence, arguments and counter-arguments -showing good	-exceptionally critical, relevant and consistent connections made between evidence, arguments and counter-

			analysis	arguments -showing excellent analysis
Organization / Development of Ideas	-paper lacks clear and logical development of ideas with weak transition b/w ideas and paragraphs	-somewhat clear and logical development of subtopics with adequate transitions b/w paragraphs	-clear and logical subtopic order that supports thesis with good transitions b/w paragraphs	-exceptionally clear, logical, mature, and thorough development of subtopics that support thesis with excellent transition b/w paragraphs
Conclusion	-lack of summary of topic, with weak concluding ideas	-adequate summary of topic, with some final concluding ideas	-good summary of topic, with clear concluding ideas	-excellent summary of topic (with no new information), in proper order with concluding ideas that leave an impact on reader
Language Conventions	- inconsistent grammar, spelling and paragraphing throughout paper	-paper has some errors in grammar, spelling and paragraphing	-paper is clear, with mostly proper grammar, spelling and paragraphing	-paper is very concise, clear, with consistently proper grammar, spelling and paragraphing

Answer any TWO (2) questions. Your essays should provide evidence of critical thinking, and provide as many examples and references to relevant research as possible. Each essay should be 5 – 6 pages long.

QUESTION 1

Teachers differ from scientists, not necessarily in the quality or quantity of their subject matter knowledge, but in how that knowledge is organized and used. In other words, an experienced science teacher's knowledge of science is organized from a teaching perspective and is used as a basis for helping students to understand specific concepts. A scientist's knowledge, on the other hand, is organized from a research perspective and is used as a basis for developing new knowledge in the field (Cochran, 1997).

Implicit in the above excerpt is the notion of teacher pedagogical content knowledge (PCK). Discuss the importance of teachers having well developed PCK in science teaching. Use the following headings in your answer.

1.1. Shulman's (1986) notion of Pedagogical Content Knowledge (PCK)

1.2. Pedagogical representations that are inherent to PCK

1.3. The importance of PCK in science teaching

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QUESTION 2

In view of the challenges science teachers encounter in coming to terms with sweeping curriculum reforms, discuss what you consider to be effective professional development for in-service teachers.

[50]**QUESTION 3**

Lederman (1992) indicated that the following aspects related to the Nature of Science (NOS) are important for science learners: (a) scientific knowledge is tentative, (b) empirically based, (c) subjective, (d) necessarily involves human inference, imagination, and creativity, (e) necessarily involves a combination of observations and inferences, and (f) is socially and culturally embedded.

Write an essay on the nature of science, by using the following headings:

- What is meant by the NOS? Unpack the tenets using examples.
- Why are teachers' perceptions of the NOS so important for their teaching?
- Discuss how professional development should be planned so that science student teachers acquire a holistic and valid understanding of the nature of science.

[50]**QUESTION 4**

Warford (2011) advanced the Vygotskian concept of “zone of proximal development”, by coining the term “zone of proximal teacher development”, or the ZPTD. Discuss teacher education and professional development, by referring to the ZPTD, and the implications for both pre-service and continued teacher professional development.

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Any 2 X (50)

TOTAL: 100