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**Title: An investigation into ways of improving the effectiveness of access-level mathematics courses at the University of South Africa (UNISA)**

**SUMMARY**

This thesis outlines the need for and the development of a Mathematics Access Module at the University of South Africa (UNISA). It highlights a number of issues that arose in the process of attempting to provide effective access to mathematics.

- A consideration of the specific reasons for the provision of access to mathematics at UNISA
- The design of the Mathematics Access Module: pedagogical and philosophical perspectives; selection of content, delivery and assessment; increased levels of support
- A focus on reading skills as a barrier to academic success in mathematics, and attempts to address this problem
- An investigation into an alternative form of assessment
- The need for some form of diagnostic assessment to identify students at risk of failure and channel them into appropriate support

The main finding of the research is that providing access involves not only content but also context: ascertaining whether the necessary background for learning is in place, and creating the required conditions for learning, are as important as selecting relevant mathematical topics.

**Key terms:** mathematics, access, disadvantaged students, educational opportunities, South Africa, distance learning, reading skills, reading intervention, video, formative assessment, diagnostic assessment

### **List of acronyms or abbreviations**

|        |  |
|--------|--|
| AARP   | Alternative Admissions Research Programme                |
| ADEA   | African Distance Education Association                   |
| AIDS   | Acquired Immune Deficiency Syndrome                      |
| AL     | Those for whom English is not a first language           |
| ARC    | ACCUPLACER Reading Comprehension                         |
| BAT    | Basic Arithmetic Test                                    |
| BICS   | Basic interpersonal communication skill                  |
| BLD    | Bureau for Learning Development (previously BUT)         |
| BSCCD  | Bureau for Student Counseling and Career Development     |
| B. Sc  | Bachelor of Science                                      |
| BUT    | Bureau for University Teaching (later BLD)               |
| CALP   | Cognitive academic language proficiency                  |
| CAMP   | Cognitive academic mathematics proficiency               |
| CHE    | Council for Higher Education                             |
| CMQ    | Computer-marked question                                 |
| CPT    | Computerised Placement Test                              |
| CRESST | The Center for Research, Evaluation, and Student Testing |
| CSET   | College of Science, Engineering and Technology           |
| CUP    | Committee of University Principals                       |
| DACST  | Department of Arts, Culture, Science and Technology      |
| DET    | Department of Education and Training                     |
| DSS    | Department of Student Support                            |
| DTU    | Distance Teaching University                             |
| EADTU  | European Association of Distance Teaching Universities   |
| ESP    | Educational Support Programmes                           |
| ETQA   | Education and Training Quality Authority                 |
| ETS    | Educational Training Service                             |
| FET    | Further Education and Training                           |
| FRD    | Foundation for Research and Development                  |
| GCIS   | Government Communication and Information System          |
| GNA    | Global Network Academy                                   |
| HEQC   | Higher Education Quality Committee                       |
| HG     | Higher Grade   |
| HIV    | Human Immune Virus                                       |
| HSRC   | Human Sciences Research Council                          |
| ICDL   | International Computer Drivers Licence                   |
| ICE    | Institute of Continuing Education                        |
| ICT    | Information and Communication Technology                 |

|            |  |
|------------|--|
| IT         | Information technology   |
| JET<br>KZN | Joint Education Trust<br>KwaZulu-Natal                                   |
| L1         | Those for whom English is a first language                               |
| L2         | Those for whom English is not a first language                           |
| LMQ        | Lecturer-marked question   |
| MDA        | Mathematic Diagnostic Assessment   |
| MEDUNSA    | Medical University of South Africa                                       |
| MCQ        | Multiple choice question   |
| MSEB       | Mathematical Sciences Education Board                                    |
| NAETE      | National Association of Educators of Teachers of English                 |
| NARSET     | National Access and Retention in Science, Engineering and Technology     |
| NCS        | National Curriculum Statement  |
| NCTM       | National Council of Teachers of Mathematics                              |
| NEC        | National Extension College   |
| NQF        | National Quality Framework   |
| NSB        | National Standards Body  |
| NWOOP      | Natuurwetenskap oorbruggings en ondersteuningsprogram                    |
| OBE        | Outcomes-Based Education   |
| PQ4R       | Preview, question, 4 aspects of reading: read, reflect, rewrite, review  |
| PTEEP      | Placement Test in English for Educational Purposes                       |
| READ       | Read, Educate and Develop  |
| RIDE       | Research in Distance Education   |
| RME        | Realistic Mathematics Education  |
| SACTE      | South African Council for Teaching English                               |
| SADC       | Southern African Development Community                                   |
| SAFCERT    | South African Certification Council                                      |
| SAMS       | South African Mathematical Society                                       |
| SASEN      | South African Science Education Network                                  |
| SAT        | Scholastic Achievement Test  |
| SAUVCA     | South African Universities Vice-Chancellors' Association                 |
| SET        | Science, Engineering and Technology                                      |
| SFP        | Science Foundation Programme   |
| SG         | Standard Grade   |
| SYSTEM     | Students and Youth into Science, Technology, Engineering and Mathematics |
| TIMSS      | Third International Mathematics and Science Study                        |
| TIMMS-R    | Third International Mathematics and Science Study - Repeat               |
| TTT        | Teach – Test – Teach   |
| UDW        | University of Durban (Westville)   |
| UCT        | University of Cape Town  |
| UKOU       | United Kingdom Open University   |
| UNESCO     | United Nations Educational, Scientific and Cultural Organisation         |

|       |   |
|-------|---|
| UNIFY | University of the North Foundation Year |
| UNISA | University of South Africa              |
| UP    | University of Pretoria                  |
| UPE   | University of Port Elizabeth            |
| UPFY  | University of Pretoria First Year       |
| USA   | United States of America                |
| UWC   | University of the Western Cape          |
| <br>  |   |
| VSI   | Video Supplemental Instruction          |
| <br>  |   |
| Wits  | University of the Witwatersrand         |
| wpm   | words per minute                        |
| <br>  |   |
| ZPD   | Zone of Proximal Development            |