

Improving STEM Education through Teacher Development and Support

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What is STEM Education?

- WHAT IS STEM?
- S: Science
- T: Technology
- E: Engineering
- M: Mathematics
- STEM Education: A teaching and learning that integrate concepts taught in separate subjects and different grades with more emphasis on application knowledge to real life situations

Expectations from STEM Education teachers

- Making STEM education Real
- Proficiency in the teaching of Mathematics and Science
- Collaborating with other institutions (e.g.; universities) involved in STEM
- Releasing the Teaching Responsibility: That is involving learners in teamwork/group work (Inquiry-based teaching and learning)
- Seeking out Professional Development Opportunities
- Staying on top of changes in the field

“Can the Quality of the System Exceed the Quality of Its Teachers?”, Jordan Tinney

The answer is a resounding NO.

Indeed

“No Nation is better than the quality of its Education”, Anonymous

Establishment of CPTD center in Limpopo

- In 2008 Limpopo Department of Education established Mathematics, Science and Technology (MASTEC) Institute.
- The MASTEC Institute provides Continuous Professional Teacher Development programme for Mathematics and Science teachers
- Twice per academic year teachers are identified by districts and sent to MASTEC for content and methodology residential training programme
- The programme lasts for three weeks and then teachers go back to their schools.
- The programme is SACE endorsed
- In one academic year 320 teachers of Mathematics and Science are developed professionally

What informs the Contents of Professional Development Programme?

- Research Literature on Teachers' Content and Pedagogical Needs
- New topics introduced in the Curriculum
- Examination Results
- Integrated Quality Management System(IQMS) reports on teacher professional development requirements
- Item Analysis reports done by Subject Advisors
- On-site school support reports by Subject Advisors
- On-site follow up teacher support by CPTD facilitators

Teacher Development

- The Limpopo Province established MASTEC Institute in 2008 mainly to address Teacher Development Needs in Mathematics; Sciences and Commercial Subjects.
- The Institute is manned by relevantly qualified staff ready to capacitate teachers on content and pedagogy of Mathematics and Sciences
- Teachers come to the centre for THREE weeks to attend a rigorous session on identified content and methodology
- Initially they are subjected a pre- test to assess their knowledge
- To assess the impact of the training teachers write a post-test to evaluate the impact of the training

Follow through Support

- After each session at the centre teachers return to their work stations
- Facilitators from the centre visit the school as a follow through support
- Subject Advisors on the other hand provide regular on-site support to the graduates from the CPTD
- The regular support instills confidence to the teacher which results in the teacher acquiring Mathematics and Science disciplines content knowledge

Impact Analysis

- To establish if teacher development and support programmes yields intended results the NSC results are used as indicators over the past three years i.e.; 2015 – 2017
 - Learner participation in STEM subjects
 - Learner Performance in STEM subjects

Learner Enrolment and Performance in MST subjects (2014 – 2017)

| SUBJECT | 2015 | | 2016 | | 2017 | |
|---------|--------|-------------|--------|-------------|--------|-------------|
| | Wrote | % | Wrote | % | Wrote | % |
| AGRS | 32 106 | 76.2 | 32 858 | 71.1 | 30 158 | 64.4 |
| LFSC | 62 531 | 68.5 | 65 349 | 63.2 | 58 719 | 68.9 |
| MATH | 40 673 | 52.1 | 43 589 | 53.9 | 40 723 | 50.1 |
| MLIT | 61 282 | 68.2 | 60 824 | 62.4 | 46 613 | 66.9 |
| PHSC | 33 680 | 59.6 | 34 969 | 62.3 | 33 584 | 63.2 |

Learner Participation....

| SUBJECTS | 2015 | | 2016 | | 2017 | |
|----------|-------|------|------|------|------|------|
| | wrote | %P | wrt | %P | wrt | %P |
| CVLT | 543 | 97.4 | 739 | 98.9 | 653 | 96.3 |
| CATN | 1372 | 90.2 | 1100 | 90.9 | 1023 | 93.3 |
| INFT | 176 | 94.9 | 162 | 90.1 | 174 | 81.6 |
| GRDS | 2077 | 98.7 | 2550 | 97.9 | 2383 | 95.9 |
| MCHT | 379 | 96.8 | 469 | 94.5 | 449 | 98.9 |
| ELTT | 568 | 97.9 | 739 | 95.9 | 631 | 97.1 |

Provincial Comparison on Access, Participation and Performance in 2016 NSC MATH and PHSC

| PROVINCE | MATH | %ACHIEVED | PHSC | %ACHIEVED |
|-----------------|----------------|-------------|----------------|-------------|
| EC | 39 628 | 37.5 | 27 574 | 49.6 |
| FS | 10 366 | 71.3 | 8 436 | 75.5 |
| GP | 38 639 | 68.7 | 32 001 | 68.5 |
| KZN | 81 323 | 37.9 | 48 394 | 57.8 |
| LIM | 43 589 | 53.9 | 34 969 | 62.3 |
| MP | 23 316 | 53.6 | 18 917 | 62.6 |
| NW | 10 596 | 62.7 | 8 605 | 69.6 |
| NC | 2 789 | 60.7 | 2 558 | 57.4 |
| WC | 15 564 | 77.2 | 11 164 | 73.8 |
| National | 135 958 | 51.1 | 192 618 | 62.0 |

Provincial Comparison on Access, Participation and Performance in MATH (2015 – 2017)

| Province | 2015 | | 2016 | | 2017 | |
|-----------------|----------------|-------------|----------------|-------------|----------------|-------------|
| | Wrote | %P | Wrote | %P | Wrote | %P |
| EC | 39 084 | 37.3 | 39 629 | 37.5 | 35 994 | 42.3 |
| FS | 11 066 | 69.1 | 10 366 | 71.3 | 10 134 | 70.6 |
| GP | 37 053 | 69.6 | 38 639 | 68.7 | 36 937 | 67.7 |
| KZN | 85 057 | 33.2 | 81 323 | 37.9 | 68 463 | 41.6 |
| LIM | 40 673 | 52.1 | 43 589 | 53.9 | 40 723 | 50.1 |
| MP | 20 596 | 55.5 | 23 316 | 53.6 | 24 327 | 47.8 |
| NW | 10 761 | 59.6 | 10 596 | 62.7 | 10 232 | 61.2 |
| NC | 3 054 | 57.0 | 2 789 | 60.7 | 2 796 | 57.4 |
| WC | 16 559 | 74.9 | 15 564 | 77.2 | 15 497 | 73.9 |
| National | 263 903 | 49.1 | 265 810 | 51.1 | 245 100 | 51.9 |

Provincial Comparison on Access, Participation and Performance in PHSC (2015 – 2017)

| Province | 2015 | | | | 2016 | | 2017 | |
|-----------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|
| | Wrote | %P | Wrote | %P | Wrote | %P | Wrote | %P |
| EC | 21 855 | 51.5 | 27 749 | 45.9 | 27 574 | 49.6 | 24 805 | 57.3 |
| FS | 8 641 | 69.0 | 9 628 | 69.7 | 8 436 | 75.5 | 8 031 | 77.0 |
| GP | 29 093 | 68.3 | 30 548 | 67.7 | 32 001 | 68.5 | 29 178 | 70.4 |
| KZN | 45 143 | 55.8 | 50 168 | 51.8 | 48 394 | 57.8 | 43 005 | 65.1 |
| LIM | 26 691 | 66.7 | 33 680 | 59.6 | 34 969 | 62.3 | 33 584 | 63.2 |
| MP | 15 210 | 58.7 | 17 528 | 62.6 | 18 917 | 63.6 | 19 306 | 61.6 |
| NW | 8 191 | 64.0 | 9 090 | 62.0 | 8 605 | 69.6 | 8 451 | 64.3 |
| NC | 2 082 | 60.4 | 2 777 | 54.3 | 2 558 | 57.4 | 2 344 | 56.8 |
| WC | 11 091 | 70.7 | 12 026 | 73.3 | 11 164 | 73.8 | 10 857 | 74.0 |
| National | 167 997 | 61.5 | 193 189 | 58.0 | 192 618 | 62.0 | 179 561 | 65.1 |

Learner Access, Participation and Performance in MATH and PHSC (2015 – 2017)

| Years | Mathematics | | Physical Sciences | |
|-------|-------------|-------|-------------------|-------|
| | Wrote | %Pass | Wrote | %Pass |
| 2015 | 40 673 | 52.1 | 33 680 | 59.6 |
| 2016 | 43 589 | 53.9 | 34 969 | 62.3 |
| 2017 | 40 723 | 50.1 | 33 584 | 63.2 |

- THE END!

- THANKS