



Setting the Scene

The first session for 2019 of the Mathematics and Science Community of Practice opened with a talk by Dr Lucy Glover on the effects of unconscious and implicit gender bias in the scientific/academic workplace. Lucy heads one of eight teams in the Department of Parasites and Insect Vectors at the Institut Pasteur in Paris (where her work includes *Trypanosoma brucei*, the parasite responsible for African Sleeping Sickness).

This was followed by an exploration of the implementation of common assessments by the Ekurhuleni North District of the Gauteng Department of Education. This topic was presented by Senior Phase Subject Advisors for Mathematics and Science, Sharitha Kalideen and Nakedi Matlala, together with Deputy Chief Education Specialist, Dr Christa Roux.

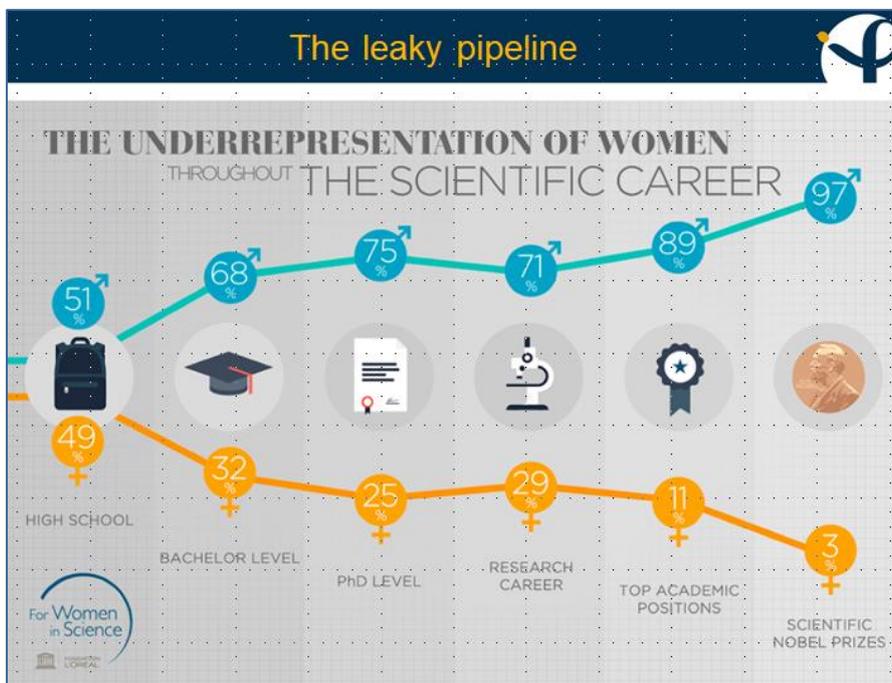
The presentation and panel discussion focussed on the rationale for implementing district-level common assessments, the process by which the assessments are set and moderated, the analysis of the results, and the subsequent support, remedial and development interventions provided to teachers, learners and schools that form a crucial part of the overall process.

Click [here](#) to view the presentation



Overview of Presentation 1

Unconscious and implicit gender bias in the scientific/ academic workplace



Men and women are very differently represented throughout the trajectory of a scientific/academic career, although they start from a similar position in high school.

Women the world over cite similar reasons for leaving careers in science. **Salary bias** means that women never catch up to men despite being of equal competence and doing the same job. In research institutes, **unequal access to resources** means women have to work harder in order to perform to an equal extent, and

are at a disadvantage in terms of the publications, grants and ratings needed to further their careers.

Women also have **less access to effective mentorship** and with that, the tools with which to mature within their field. **Parenthood** is another important driver of gender imbalance in scientific careers.

Unconscious (or implicit) biases are learned stereotypes that are automatic, unintentional, deeply engrained, universal, and able to influence behaviour.

Unconscious bias is very difficult to deal with. We think we work without bias, and do not recognise our own, so learning how to get rid of those biases is very important.



Dr Lucy Glover

Recognition (and therefore the ability to progress) in an academic/scientific career is largely dependent on a person's research publications – but the influence of bias is particularly pronounced in the processes by which papers are accepted for publication.

There is evidence that when papers are edited and reviewed by men (which is mainly what happens as most editors, reviewing editors and reviewers are men), women are far less likely than men to be published in that space.

The obstacles are simply greater for women. How then do we keep women in science? Some of the ways that are being looked at to correct this situation include:

- Using a system of automatically generated numbers instead of names when submitting papers for review – to effectively reduce the impact of gender, racial and other biases in a short space of time
- Raising awareness of unconscious (or implicit) bias and the need to address this
- Doing more to interest girls in STEM subjects from an early age, and to sustain their interest and development
- Doing more to support and promote young women in science: identifying potential, acting as mentors, increasing maternity and family support
- Moving away from the 'publish or perish' model; creating equitable access to resources and funding
- Changing the workplace culture and hiring practices in large institutions so that men and women are treated equally.

CoP comments:

- The first stage of recognising one's own bias is the most important part of overcoming bias. An implicit bias test that gives one insight into one's own biases can be found at <https://implicit.harvard.edu/implicit/>.
- Gender is only one of many biases – we also need to look at racial bias.



Overview of Presentation 2

Click [here](#) to view the presentation

Implementing common assessments in the Ekurhuleni North District

In introducing the presentation, **Sharitha Kalideen**, subject advisor for Senior Phase mathematics in the Ekurhuleni North District, noted that many people associate common assessments with unfairness, stress, and faultfinding. The Ekurhuleni North District takes a completely different view, seeing them instead as an ongoing practice for improving the quality of teaching and learning. **“We are using the education system that we have, and the structure that is there, to make sure that we change the face of education in Ekurhuleni North.”**

A key driver of this intervention was the disjuncture between the results being achieved for assessments set by schools in the district, and the results these same schools were achieving in national assessments such as the Grade 9 ANAs.

What were the reasons for this disjuncture? Were subjects being taught at a low level? Were schools not preparing learners for the type of questions they were meeting in the national assessments? In addition, many Grade 11 learners were changing from maths to mathematical literacy and many were changing from science. Did this mean that learners were not being adequately prepared for the higher order tasks and questions they encountered in Grades 11 and 12?

This District's efforts to resolve these issues led it to implement common assessments in all subjects in 2013. The intention was to:

- expose teachers and learners to best practices and the kinds of questions found in national assessments
- ensure that assessments reflected the cognitive levels and standards required by CAPS
- understand the underlying causes of the poor TIMSS and ANA results, and to
- create a platform to address the problems.

The process of setting, moderating, marking and analysing the common assessments

Schools and teachers are closely involved throughout the process, under the guidance of subject advisors. Teachers in the various district clusters bring questions and answers to PLC meetings, where they are interrogated. The PLC leaders from the different clusters then meet to collate this material and compile and quality assure the question papers and memoranda. Care is taken to reflect CAPS requirements for content and cognitive levels. Question papers are then moderated at cluster level by teachers and both moderated and proofread at district level by subject advisors, after which they are translated into Afrikaans and proofread again.

All schools in the district are invited to participate in the common assessments¹.

The analysis of the results at both school and district level is a vital part of the process. Teachers collect statistical and diagnostic data while marking, which gives them insight into the specific aspects that their learners struggle with and enables them to determine what remediation measures are needed.

All schools are required to provide both statistical and diagnostic analyses of their results to the District. The District uses the reports and data sent in by schools to conduct its own detailed (item) analysis of the results for the District as a whole, and augments this data with information that it collects by engaging in collaborative conversations with SMTs and teachers. This is then used to identify problematic elements for remediation and/ or developmental purposes.

- The statistical analysis enables the District to identify schools where learners are not performing as expected. Subject advisors then visit those schools regularly and assist the SMTs to implement appropriate intervention strategies.

¹ Participation is not compulsory. 90% of schools participated initially. This has since increased to more than 92%.

- The diagnostic analysis enables the District to identify specific topics and aspects of topics that learners across the various schools find particularly challenging. The subject advisors then intervene in the District as a whole to address these problem areas.

The main generic findings were:

- Schools struggled with curriculum coverage and as a result some topics were not being taught
- Class activities focussed on knowledge and routine procedures – further investigation revealed that certain of the textbooks used by teachers targeted knowledge and routine procedures, and neglected problem-solving and complex procedures
- Learners lacked understanding of the terms and concepts used in formal assessment – this led to questions being left blank when learners did not know what was expected from a question.

Key maths content-related aspects were:

- Teachers not doing enough examples with learners, or not emphasising the steps and procedures sufficiently
- Maths terms and concepts being introduced verbally, but not being properly taught and worked with sufficiently to build understanding
- Over-reliance on a single textbook – learners become familiar with a particular type of question and there is a disjuncture if questions are asked differently in the common or national assessments
- Learners completing too few activities per topic – this reflects the pressure on teachers to complete the ATP and keep within the timeframes.

The main science content-related aspects were:

- Scientific terms and definitions being introduced verbally, but not being formally taught and used sufficiently to build understanding
- Insufficient activities requiring learners to solve problems, think critically, and evaluate, analyse and interpret data (to build higher-level thinking skills)
- ‘Practical activities’ being done as theory and textbook exercises, due to a lack of resources
- Project tasks not being done as per requirements.

Specific aspects of maths and science content that learners struggle with can be found in the presentation.

Responding to the problems

The Ekurhuleni North District mainly uses its network of active PLCs to reach teachers. Some approaches being used to address problems and support teachers are:

- Providing **‘revision and intervention’ worksheets** that cater for all cognitive levels, together with lists of ‘action words’ for questions and activities (aimed at filling the gaps left by textbooks that neglect problem-solving and complex questions or procedures)
- Improving **lesson structure and quality** – e.g. by requiring teachers to include more examples and teach keywords and formal terms

- Improving **monitoring of learning** by requiring schools to conduct post-topic assessments (based on past papers and reflecting CAPS cognitive level weightings) for diagnostic and intervention purposes
- Providing **additional resources** in the form of previous exam question papers, question banks and study guides developed by PLCs and subject advisors
- Including intervention and support classes in formal time tables.

Other improvement strategies implemented by the District:

- Improving teachers' content and pedagogical content knowledge through PLCs, workshops and other interventions such as pairing of teachers
- Improving HODs' understanding and management of pre- and post-moderation structures
- Frequent monitoring and provision of support to schools and teachers; tracking learner progress, especially of progressed and condoned learners; monitoring adherence to the ATP and assisting schools that fall behind to compile and implement effective catch-up plans
- Providing training on the setting of question papers – this targets schools that opt out of the common assessments, but is open to, and well attended by, all schools in the District
- Moderating all question papers set by schools, to ensure compliance with CAPS requirements
- Monitoring attendance at meetings and training interventions and following up on non-attendance, particularly in the case of under-performing schools.

Positive impact

The common assessments – and all the work that is being done around them by the subject advisors, teachers and schools – have had a noticeably positive impact in several areas. These include the manner in which lessons are presented in the classroom and the quantity and quality of learning activities. Schools are covering the curriculum within the required time and as per the ATP. There is evidence of support being provided to learners who require it. The quality and application of assessment within the schools has improved, and there has been a slight improvement in the maths and science pass rates within the District.

Ironically, the success of this on-going intervention has brought about some additional challenges. The increased amount of work being done by learners, teachers and HoDs has increased the need for effective planning and preparation by both schools and the District. Overloaded teachers, overwhelmed HODs and overcrowded classrooms continue to impede progress, as does the lack of subject specialists, especially in Grade 7 maths and science. An unanticipated effect has been the migration of Grade 8 and 9 teachers who have been developed through this intervention, to the FET Phase.

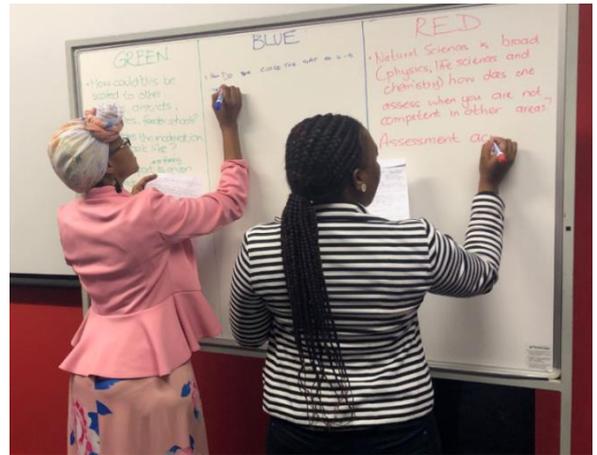
Group and Panel Discussions

CoP participants conversed in groups to formulate questions to the panel.

Can common assessments be scaled to other subjects, districts, provinces and feeder schools?

Common assessments are already being widely used at national, provincial and district level.

- On a national level, common assessments are conducted in Grades 10 and 11 in maths, science, accounting and economics.
- On a provincial level, common assessments are conducted in Grades 6 and 9 in maths, science, EMS and English FAL (as applicable).
- Many districts conduct common assessments. Ekurhuleni North provides common papers in terms 2 and 4. Although schools are not obliged to use these papers, the participation rate is over 92%.



The panel highlighted the need to consult and obtain stakeholder agreement prior to implementation, as many people are opposed to common assessments for a variety of reasons. In Ekurhuleni North, a commitment to consultation and quality has led to widespread acceptance.

What process is followed to moderate/ pre-moderate common papers?

[Note: This question reflects a concern with the quality of questions found in some common assessment papers in the past. It was not stated in which papers these problems had occurred.]

Ekurhuleni North uses a careful process involving PLCs to set and moderate common assessment papers (described above). The panel noted that this process not only results in error-free question papers and memoranda, but also builds teachers' competence. The District is concerned to avoid any loss of teacher skills in terms of setting and moderation, or over-dependence on the District for quality assessment. Schools therefore set and moderate their own papers in terms 1 and 3. Teachers receive support within their PLCs for this, and the District provides training in the setting and quality assurance of question papers as well. These skills are also needed to ensure that school-based assessment is on standard.

What framing is given to schools so that the results of common assessments are not used in a punitive way towards teachers?

Whatever the issues revealed by the common assessments, the Ekurhuleni North District's entire focus is on providing support to schools, teachers and learners. The evidence-based reports (received from the schools) and the District's detailed diagnostic analysis of the results show up the problems and determine what form this support takes and what aspects it addresses.

The PLCs – peer learning communities – are the main vehicle through which the District intervenes. Teachers learn best from other teachers, so the District uses the PLCs that meet 3 times per term in each cluster to develop teachers. The District also takes a proactive approach to challenges and problems, addressing them in subject meetings and content training workshops. This includes providing training at the beginning of a term to prepare teachers to handle issues that could be expected to arise during that term's teaching and learning.

How do we close the gap of 4 - 5 years in Grade 8 with a congested ATP?

To address learners' content gaps in a proactive way, the Ekurhuleni North District has introduced baseline assessments for maths in the Senior Phase, which include questions from Grades 3 - 6. Teachers administer the appropriate assessment before starting a topic, which enables them to see the gaps and misconceptions that learners have in respect of that topic. They can then begin to address the learners' challenges while introducing and teaching that topic in the classroom.

After completing a topic, teachers use informal assessment to identify challenges and put intervention strategies into place – normally these would take place during the afternoons and could consist of teaching of basic skills or re-teaching of certain aspects of the topic. The District also encourages teachers to provide revision worksheets, especially where transport issues make it difficult for learners to attend extra classes in the afternoons.

ATP congestion is a significant challenge and the District endeavours to provide as much support as it can to help teachers manage this, as well as the high numbers of learners who are adjusted to the next grade. The DBE has recognised the need to reduce ATP congestion, and feedback on last year's curriculum review is awaited.

How are school-based assessment (SBA) marks used to adjust Grade 12 exam marks?

[Note: The panel was unable to give a precise answer to the question posed, but provided the following general response.]

If the difference between the exam mark and the school-based assessment (SBA) is more than 10%, then the SBA mark is adjusted according to a sliding scale. This applies both ways, whether the SBA mark is higher or lower than the exam mark.

For this reason, it is very important to base the SBA on the same standard as the examination to ensure that SBA marks count. The SBA must not be too easy (some teachers mistakenly believe that a higher SBA mark will boost the learners' overall total) nor too difficult (some teachers deliberately make SBA tasks more difficult as they see this as a way of developing their learners). If there is a large difference between the exam mark and the SBA mark, the sliding scale adjustment can reduce the SBA mark to the extent that it loses its impact.

Schools need to be alert to this issue and to address discrepancies between SBA and exam marks from Grade 4 onwards.

How can one assess practical activities in overcrowded classrooms and with a congested ATP?

The expectation is that teachers should not only use written tasks to assess learners. What activities are there that we can use in crowded classrooms to draw assessment information, when we cannot even move around?



GDE Deputy Chief Education Specialist, Dr Christa Roux, Subject Advisor for Senior Phase Mathematics, Sharitha Kalideen and Subject Advisor for Senior Phase Science, Nakedi Matlala

Peer marking is one approach that enables teachers to gauge their learners' grasp of a topic in crowded conditions. In the Senior and FET Phases, learners are mature enough to mark work and identify problems. Teachers can then get feedback from the group leads and use this to do a basic diagnostic analysis.

This is an important issue, which should be looked into on a broader scale and at a high level.

Regarding the 'lack of time to assess practical work', the ATP does allocate time and indicates where the practical assessment fits in, so this is really an issue of time management. The current review of the ATP is expected to alleviate the congestion in future.

Why are we mostly focussing on Grade 12?

Interventions should never only be at Grade 12 level – they are needed all the way up through the school.

What does content training for teachers consist of?

A question from the floor on the nature of the content training provided by the District sparked a lively debate around the issue of developing teachers' content knowledge. The panel described the process as taking the form of discussions on errors that learners make in the assessments and sharing information on how to assist learners in that regard. The discussions are informed by the District's diagnostic analysis, which indicates the topics and specific aspects of topics that learners find challenging.

Outsiders (e.g. funders) could misinterpret the term 'content training' as meaning that teachers have to be taught the maths. What the District has described is the professional knowledge, which is critical, and is quite different from not knowing the maths. It would be better to use the more precise term 'pedagogical content knowledge' to show that the training is concerned with developing the teachers' understanding of how to teach the maths content. This is an important distinction.

Some teachers do lack content knowledge and need to be developed, especially in primary school, where teachers are not subject specialists. We have to be conscious of this when we engage with teachers – we need to be gentle, but the reality is that many teachers do need content knowledge, because not all of them have mastered the content of the subjects they are teaching.

Professionals know what they know, but they also acknowledge what they do not know – and do something about it.

From my experience as a teacher, and from working with teachers, it is probable that most teachers lack confidence in certain areas of their subject. We need to make this truth acceptable, and to teach ourselves content at every stage of our lives as teachers. For this reason, we cannot say that it is only in terms of pedagogical content knowledge that teachers need support. It is important to be truthful about this issue or we will make teachers feel that they are the only ones in this position of needing content knowledge.

The subject Natural Sciences is very broad (physics, life sciences, and chemistry) – how does one assess when one is not competent in all these areas?

The District does more to monitor and support teachers in those strands in which learners are known to struggle, such as Matter and Material. This includes providing 'content training' i.e. talking with teachers as to how they can successfully impart the knowledge to learners to make the strand clear.

It is true that some teachers do not have the content knowledge needed to assess all the strands competently. In these cases, subject advisors go in to the schools as facilitators and provide direct support. Where possible, teachers are also paired with colleagues within the school who are competent in the subject, to build confidence in the particular aspects that are lacking and to assist with assessment. At the same time, this issue is more about HR administration at school level, and recruiting the correct people, especially at primary level.

Facilitator's Summing Up

Although the problems raised cannot be solved in this forum, it is helpful to be reminded that other people have similar problems, and to build community around this. This session was particularly successful in this regard.

CoP participants were invited to take the issues further outside of the session, should they wish to do so.

Attendees

Name	Organisation	Name	Organisation
Aderemi Obilana	Prakis educational services	Leo Leonore	Gauteng Education
Ashmikka Singh	Actonville Primary School	Lerato Mathenjwa	Teach SA
Benter Okelo	BRIDGE	Lucy Glover	Institut Pasteur
Bonamelo Moloi	Lasec SA	Lynette Sathiah	Parkview Senior School
Bongani Manganji	Sci-Bono	Mamokete Patricia Mofokeng	Barnard Molokoane Comp School
Bronia Vollebregt	Lasec SA	Margaret Jonson	Midlands Community College
Christa Roux	GDE	Margie Vorwerk	BRIDGE
Clever Parayiwa	Sci-Bono	Misheck Zvirahwa	Harambee
Craig Pournara	Wits School of Education	Mookho Ralokoana	Sci-Bono
Don Lukhele	Sci-Bono	Nakedi Matlala	GDE
Elisa Nosengasi Mokoena	Barnard Molokoane Comp School	Nandi Ngubeni	IkamvaYouth
Elma Obilana	Prakis Educational Services	Nontobeko Mabude	MDF
Eugene Pelteret	Reflective Learning	Peter Glover	Facilitator
Eugene Zondo	Sci-Bono	Phatumusa Madladla	Sci-Bono
Frank Longwitz	3P Learning	Phumlile Mwelase	Sci-Bono
Gavin Morata	Barnard Molokoane Comp School	Richard Masemola	Teach SA
Innocentia Modomisa	Barnard Molokoane Comp School	Rupert Hermanus	Private
Itemogeng Providence Mosikare	Barnard Molokoane Comp School	Sekamotho Agnes Kulashe	Barnard Molokoane Comp School
Joseph Thocha	Tomorrow Trust	Sharitha Kalidheen	GDE
Junius Malema	Readucate Trust	Thando Moeng	BRIDGE
Kagiso Mokoena	Sci-Bono	Theodora Hlakoane	Barnard Molokoane Comp School
Keitumetse Molosiwa	Prakis Educational Services	Tracey Butchart	Reflective Learning
Keitumetse Mosiwa	Prakis Educational Services	Tshokolo Phosa	Barnard Molokoane Comp School
Lebogang Njoro	Sci-Bono		