



MHSC Barring Project

# TRAINING ASSESSMENT

Valencia Kuppusamy – Rock Engineer  
vkuppusamy@golder.com




MHSC





# PRESENTATION OUTLINE

- 
- Training Objectives and Methodology
  - Feedback on the Evaluation of Training Practices
  - Beneficial Barring Training Initiatives
  - Neuroscience and its role in training within the SA Mining Industry
  - Conclusions and Recommendations



# PROJECT OBJECTIVES

## Training Assessment Objectives

- Evaluate the efficacy of barring training and assessment methodology;
- Identify beneficial training initiatives;
- Suggestions to improve Barring training practices;





# PROJECT METHODOLOGY

## Data Collection

- Collection of barring and barring related training material from the champion mines;
- Visits to the mine training centres (Surface and UG);
  - Observed barring training practices;
  - Interviewed learners and trainers;
- Interviews with UG mine workers to assess barring competency and obtain feedback on barring training.





# PROJECT METHODOLOGY

## Training Evaluation Methodology

- In accordance with the SAQA standards for barring (US ID:244416);
- A five category rating system was used to evaluate:
  - Training facilities, (UG training centres, UG surface mock-ups, classroom facilities);
  - Training materials (i.e. presentations, lesson plans, multi-media, etc.);
  - Training approaches (traditional, experiential, and performance-based approach);
  - Learning theories (behaviourist, cognitivist, humanist, social and situational);
  - Assessors/Trainers and the assessments methods;





# FEEDBACK ON TRAINING PRACTICES - Gold

## ■ Training Facilities and Barring Equipment:

- Mostly on-the-job training underground.
- No dedicated UG training centre;
- UG mock-ups on surface and classrooms were generally adequate with an exception of those mock-ups that are still in the development stages;
- Condition of barring equipment is generally fair;

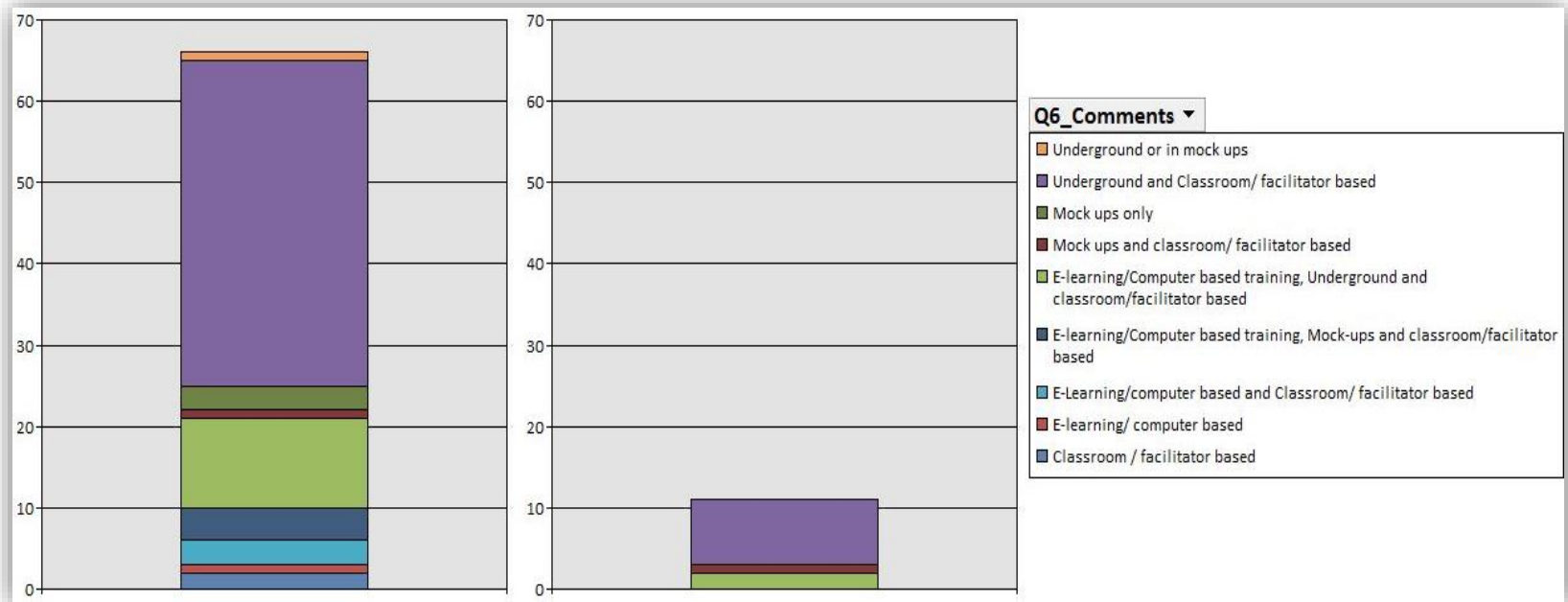




# FEEDBACK ON TRAINING PRACTICES

## Feedback on Training from UG mine workers

- Most barring training was carried out underground with the theory component being classroom based.
- Refresher training carried out every 6 months.



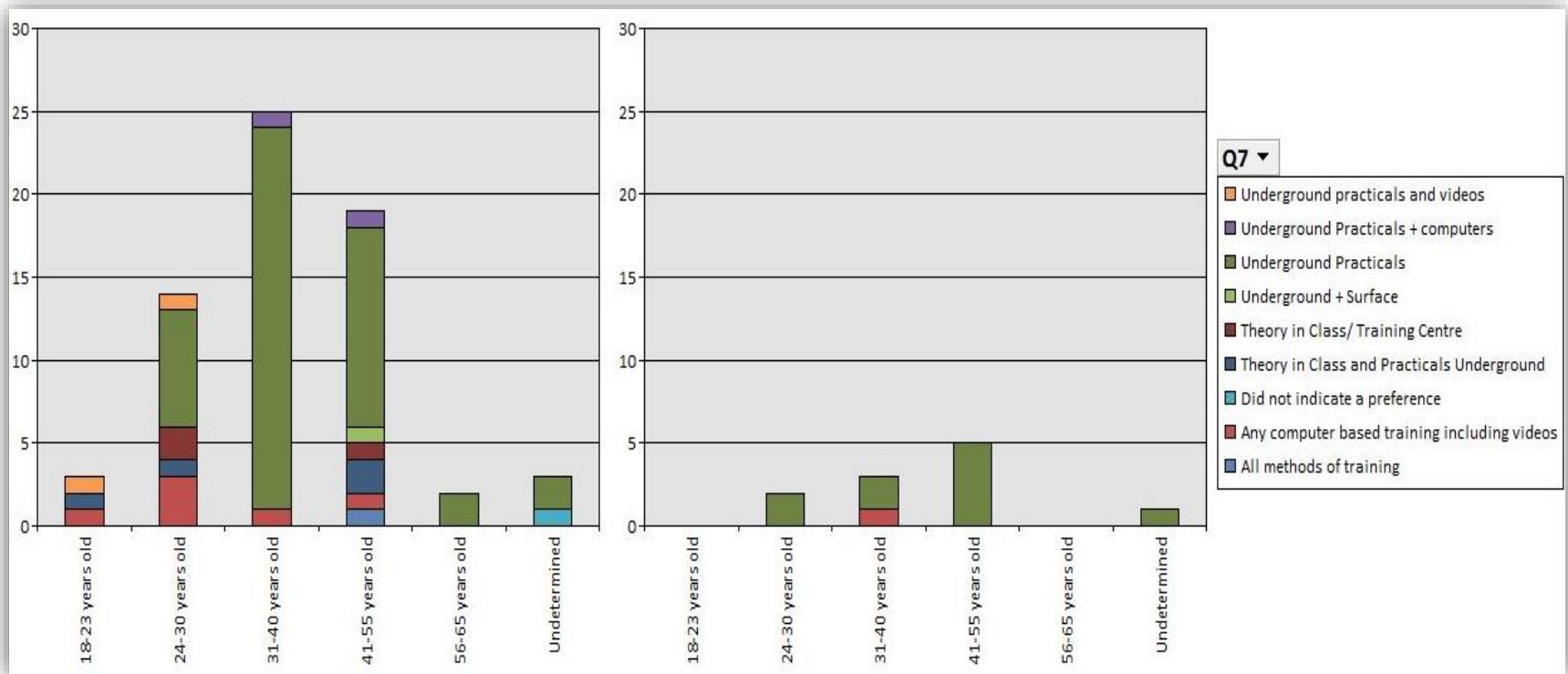
Responses for Question 6: "How was the training done?" for the gold mines



# FEEDBACK ON TRAINING PRACTICES

## Feedback on Training from UG mine workers

- Preferred method for barring is practical training underground.



Responses for Question 7: "Which method did you think was best/learn the most from/find useful" for the gold mines

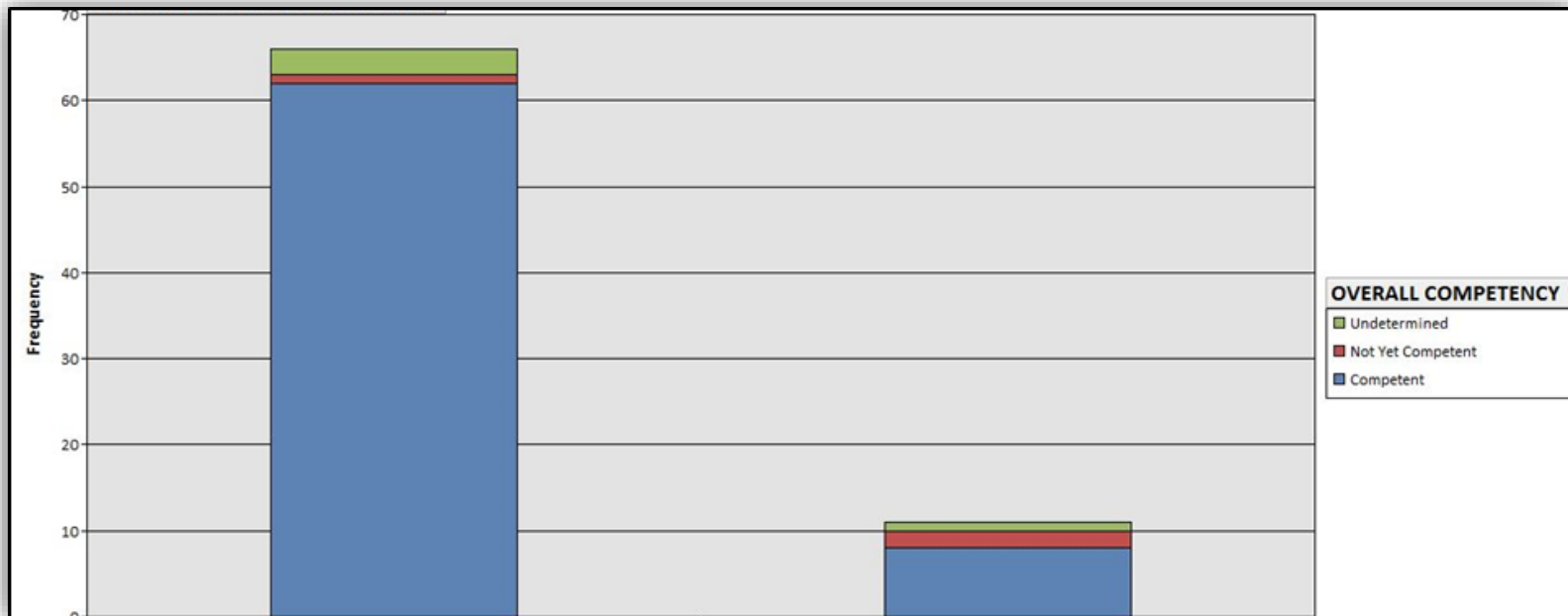




# FEEDBACK ON TRAINING PRACTICES

## Barring Competency Assessments

- Overall barring competency is good based on questionnaire/survey data.
- UG barring observations not aligned with the competency assessments.



*Overall Competency for the Gold Industry based on questionnaire data.*

## Feedback on the Training Evaluation

- Training activities were considered effective if:
  - SAQA specific outcomes and cross-critical field outcomes was achieved;
  - It is aligned with the organisations vision, values and aid in attaining their goals;
  - Promotes learning of the individuals that would improve their skills, knowledge, understanding and overall competency;
  - Brings about change in action and behaviour of trainees that is reflective of the mines health and safety culture.
- The five category rating system was used to describe the level at which these outcomes were achieved by the various champion mines.  
(O = Outstanding, M = More than Satisfactory, S = Satisfactory, I = Improvement Needed, U= Unsatisfactory)



# FEEDBACK ON TRAINING PRACTICES - Gold

## Summary of the Evaluation on Training Practices

	Barring Practices	Training Approach	Learning Theories	Trainers/ Assessor	Overall Barring Competency	SAQA Specific Outcomes	SAQA Critical Outcomes
<b>GOLD</b>	M	S	S	M	S	S	S
	S,I	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S	S	S, I	S	S,I	S,I
	S	S	S	S, I	S	S,I	S,I
	S	S	S	S, I	S	S	S
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S,I	S,I
	S	S,I	S	S, I	S	S	S,I
	S	S,I	S	S, I	S	S	S,I

Rating System Description:

**O = Outstanding**  
**M = More than Satisfactory**  
**S = Satisfactory**  
**I = Improvement Needed**  
**U = Unsatisfactory**



# FEEDBACK ON TRAINING PRACTICES - Platinum

## Evaluation of Training Practices Summary

	Barring Practices	Training Approach	Learning Theories	Trainers/ Assessor	Overall Barring Competency	SAQA Specific Outcomes	SAQA Critical Outcomes
PLATINUM	M	S, I	S, I	S, I	M	S	S, I
	S	S, I	S, I	S, I	S	S, I	S, I
	S	S, I	S, I	S, I	S	S	S, I
	M	S, I	S, I	S, I	M	S	S, I
	S, I	S	S	S	S	S	S, I
	S	S	S	S	S	S	S, I
	S	S	S	S	S, I	S	S, I
	S, I	S	S	S	S	S	S, I
	S,	S	S	S	S	S	S
	S, I	S	S	S	S	S	S, I
	S, I	S	S	S	S	S	S, I

**Rating System:**  
 O = Outstanding  
 M = More than Satisfactory  
 S = Satisfactory  
 I = Improvement Needed  
 U = Unsatisfactory



# FEEDBACK ON TRAINING PRACTICES - Coal

## Summary of the Evaluation on Training Practices

	Barring Practices	Training Approach	Learning Theories	Trainers/ Assessor	Overall Barring Competency	SAQA Specific Outcomes	SAQA Critical Outcomes
COAL	M	M	S	M	M	S	S
	M	M	S	M	M	S	S
	S	I	I	I	S	S,I	S,I
	S,I	S	S,I	S	S,I	S	S
	S	S	S	S	S	S	S,I
	S	S	S	S	S	S	S,I
	S,I	S	S,I	S	S,I	S	S,I
	S	S	S	S	S	S	S
	S	S	S	S	S	S	S
	S	S	S	S	S	S	S

Rating System

Description:

**O = Outstanding**  
**M = More than Satisfactory**  
**S = Satisfactory**  
**I = Improvement Needed**  
**U = Unsatisfactory**



# BENEFICIAL TRAINING INITIATIVES

## ■ ***Learner Miner Shadowing:***

- On the job training with the guidance and continual coaching from all team members resulting in knowledge and skills being acquired. This is training method makes use of the behaviourist and social/situational learning theories.

## ■ ***Buddy Barring:***

- The concept of buddy barring reinforces teamwork behaviour, prevents exhaustion of a single barrer, and improves efficiency if done correctly.

## ■ ***Training the Trainer:***

- Formalised training of the trainer and assessments of assessors are necessary to ensure continuous effective training. Knowledge of the learning principles would allow the trainer to adapt and address the students' needs in order to achieve the outcomes and bring out behavioural changes.

## ■ ***Corrective Behaviour Training:***

- Behavioural components are incorporated in the training if found to be the root cause of accidents.





# BENEFICIAL BARRING TRAINING INITIATIVES

## ■ ***Underground Training Facilities:***

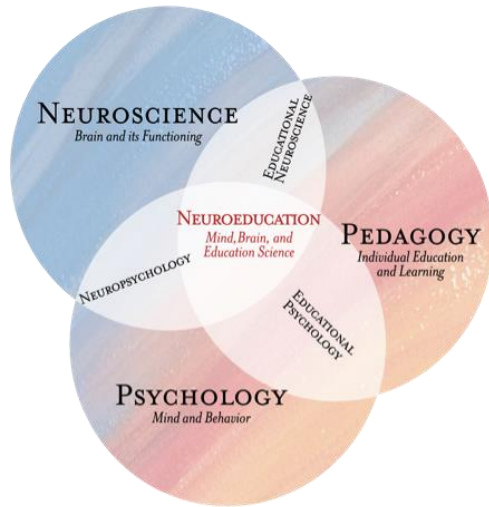
- Training facilities that incorporate learning with different media and approaches are essential to the learning of individuals. The facilities include, mechanisms that allow for simulations of underground hazardous events, models of machinery, tools etc. to familiarise learners with the job specifications. These facilities support the training methods that promote understanding, knowledge and skills to carry out specific jobs safely.

## ■ ***e-Learning:***

- Enabling the trainee to visualise the hazards related to the underground work environments in the safe place has significant benefits. The success of such a tool is dependent on the module developed. The interactive barring module is beneficial and it highlights the importance of sounding rocks in those geotechnical environments where visual aids are not adequate. It also allows the trainee to visual the hanging wall conditions and the interaction of the discontinuities that's observed.



# NEUROSCIENCE & TRAINING IN SA MINING



- In general, our mining training approaches are traditional and considers one or two learning theories.
- However, there are a few mining houses that make use of more training approaches such as experiential and performance based approaches.
- Neuroscientific research provide useful insights into the learning process that can aid in more effective and efficient learning design.
- Provides a scientific basis (biological component) for evaluating and designing training different teaching approaches;
- A better understanding of these neuroscientific concepts in conjunction with the learning theories would allow the training programs to address the root causes of accidents that are related to human behaviour.



# CONCLUSIONS AND RECOMMENDATIONS

- **Better Designed Training Material;**
  - By considering the various learning principals and training approaches, existing resources, media and facilities can better utilised and training can be improved significantly.
- **Assessment Methods to address CCFO:**
  - Continuous assessment methods that are more diverse rather. On-the-job assessors would be beneficial.
  - Frequency of refresher training.
- **Training the Trainer initiatives:**
  - Learning theories need to be included in the training the trainer's curriculum in order for the trainers to effectively adapt to the various individuals' personalities, learning styles, preferences and attitudes of people present in their classrooms. Learning theories have not been formally included in the training materials. Regular assessments of the trainers are also recommended.
- **Virtual Reality Training:**
  - This has unlimited potential. The vast technological resources available today will allow for these training methods to become more cost effective and efficient.



# CONCLUSIONS AND RECOMMENDATIONS



- Multiple Languages:
  - More than one language should be considered for training considering the diversity of the mining environment.
  - Trainers that are proficient in more than one language would also be advantageous.
- Soft skills training should be introduced to miners, team leaders and shift bosses.
  - Communication skills, teamwork and collaboration, adaptability, problem solving, critical observations, conflict resolution etc.
- Universal brain-based design principals to incorporated in the training to bring about a “change the mind-set”.
  - The diversity of people (race, gender, culture, attitudes, perceptions, habits, behaviour) within the South African mining industry makes it difficult to apply any one particular learning model. Therefore, the more universal brain-based design principles should be considered to change the human behaviour concerns within the industry.



**THANK YOU 😊**