High Level Training Clinic – Translating Training to Competency

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THE UNIVERSITY OF ARIZONA

The University of Arizona, Tucson
IMR
Lowell Institute for Mineral Resources

Purpose

- Use knowledge from other sectors
- Transition from training to education
- Tie all the safety pieces together
- Measure
- **Create a competency and capability model and certificate program**

Existing IMR Training

- Training new Trainers (Steve Gravley)
  - MSHA-approved trainer for "blue card" training
- High-Level Training with Active Learning (Laurie Wilson)
- Leadership (Eric Lutz & HS TAC)
  - Mining Institute for Supervisor Leadership (Tucson every April – 3 days)
- Competent Person (David Brown, at the mine site)
- Emergency Response (Brenda Granillo, customized exercise design on site)
- Serious Games (Leonard Brown, commercial product with training support and customizable products)

Outcomes

- Define competencies and education materials for "High-Level Trainers" (HLT)
- Increase capacity of HLT – more and better trainers
- Assessment methodologies
- Serious games to increase trainee engagement
- Competency and capability model for emergency response
- Improve safety leadership
- Textbook materials
- MSHA "blue card" training
- Network trainers

Blue Card Training

- Trainer: Steve Gravley, gravleys@email.arizona.edu
- A "Blue Card" indicates that an individual has been approved by MSHA (Gov) to train, 1. Newly employed inexperienced miners, 2. Experienced miners and 3. Annual refresher, both for surface and underground mining. These individuals must have mining experience and attend a "Train the Trainer Course".
- Complete 3-day course and apply for MSHA blue card to become trainer
- On site or at UA
- How to use high level training
- How to use active learning
- Complete this before or after High Level Training course

High-Level Training

- Trainer: Laurie Wilson, lauriewilson@email.arizona.edu

- 3-day course
- On site or at UA
- 1.5 days on 10 competencies for high-level training
- 0.5 days on using active learning
- 0.5 days on serious games for safety training
- 0.5 days on writing training curriculum

Can be completed before or after “blue card” training

- Certificate of completion
- Competency Based
- Measurable Objective Learning
- Active hands-on

Mining Institute for Supervisor Leadership

1. To Build Leaders, Build People
   - Supervisor or Manager or Miner = Leader
2. To Improve
   Safety Culture and Enhance Productivity
3. Mining-focused
   - Taught by leading mining H&S professionals
4. Hands-On
   - 2.5 day course
   - Active learning styles
5. Mentored
   - Mentees become mentors
   - Longitudinal project

MISL Topics

- Business Management
- Communication
- Compassionate Leadership
- Conflict Resolution
- Hazard Recognition
- Professional Miner
- Regulatory Compliance
- Risk Management
- Team strategic planning
- Time Management

Breakthrough Leadership

1. Inventing the Future, A Breakthrough Leadership Program for the Mining Industry and Its Stakeholders
2. February 7-10, 2017
3. 4-day program
4. JV between UA IMR and Vanto Group
5. www.imr.arizona.edu

Emergency Preparedness & Response

Brenda Granillo, MS, MEP bgranill@email.arizona.edu

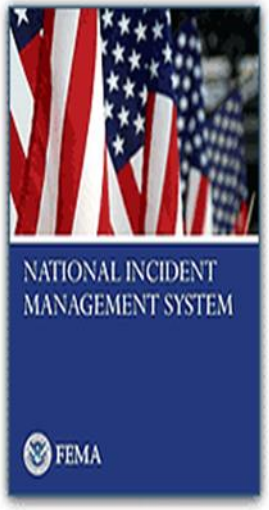
- The core elements of mine emergency response include escape, rescue, and Incident command.

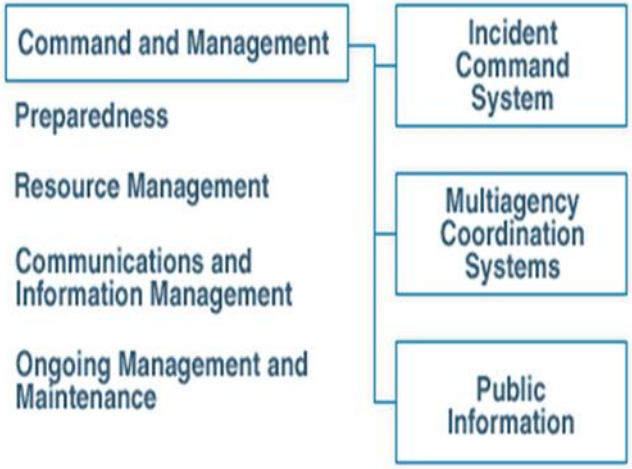
Current Gaps in Mine Emergency Preparedness and Response

- **Planning, training, exercising and evaluation efforts are done in isolation of one another.**
- Core Competencies for Preparedness and Response were not existent (UA has developed and 2 competency frameworks)
    - Emergency Preparedness Model with KSAOs for individual miner
    - Emergency Response Model with KSAOs for organizational leadership, and command and control.
- Mine Emergency Response Plans are not consistent
    - Not operational
    - Not comprehensive –or all-hazards in nature
    - Many do not include emergency support functions
- Training Needs to be experiential and competency-based
- Evacuation Drills and Exercises and not capability-based

Planning

- Deliberate and robust systematic approach
- Builds on existing and proven models of emergency management
- National Preparedness System (foundation)
  - National Incident Management System
  - National Preparedness Cycle
  - Homeland Security Exercise and Evaluation Program (HSEEP)





Developed and Validated 2 Competency Models (Preparedness & Response)

- 6 Domains
  - Leadership and Decision-Making
  - Communications and Crisis Management
  - Threat Identification and Hazard Analysis
  - Regulatory Compliance
  - Worker Safety and Health
  - Miner Resiliency
- Defining Knowledge, Skills, Abilities, and other attributes (KSAOs) for training purposes
  - Final product resulted in 2 competency frameworks
    - Emergency Preparedness Model with KSAOs for individual miner
    - Emergency Response Model with KSAOs for organizational leadership, and command and control.

Training

- The alignment of domains, competencies, KSAOs and learning objectives is critical to developing a curriculum.
- 4 core training elements:
  1. Interactive competency review and capability-based activities;
  2. Scenario-based experiential learning;
  3. Virtual reality gaming; and
  4. Post training debriefing.
- Finalizing a 6 hour emergency response competency-based training program

Experiential Training & Virtual Reality Gaming

- Course Objectives:
  1. Understand emergency response system planning and organizational command and control.
  2. Recognize your role in emergency preparedness and response efforts.
  3. Understand how to manage and assess information to maintain situational awareness in emergencies.
  4. Recognize signs of acute mental and physical distress and implement life-saving measures.
  5. Maintain good communication and interpersonal skills to manage emergency information in a coordinated fashion.
  6. Take protective actions to minimize exposure to hazards and impeding threats.

Course Agenda

Time	Focus
7:30-8:00	Registration
8:00-8:30	Introductions and Ice Breaker
8:45-9:00	Competency Self-Assessment (Pre)
9:00-9:30	Harry's Hard Choices (HHC) Game Play Tutorial
9:30-10:30	**Leadership and Decision Making** • Mine Emergency Response System • Incident Command System (ICS) fundamentals • Emergency Response/Operations Plan
10:30-10:45	Break
10:45-11:45	**Situational Awareness** • Hazard Recognition • Mine Maps and Escape Way Routes • Selection and use of proper PPE
11:45-12:15	LUNCH
12:15-1:15	**Communications** • Emergency Communications Triangle • Principles of Crisis and Emergency Risk Communications • Non-Verbal Communications • Managing Stress and Psychological First Aid
1:15-1:45	Harry's Hard Choices Game Play
1:45-2:00	Break
2:00-2:45	Post Training Debriefing/Hot wash • HHC Post Session Dashboard Review-Group • HHC Post Session Dashboard Review –Individual
2:45-3:00	Competency Self-Assessment (Post)

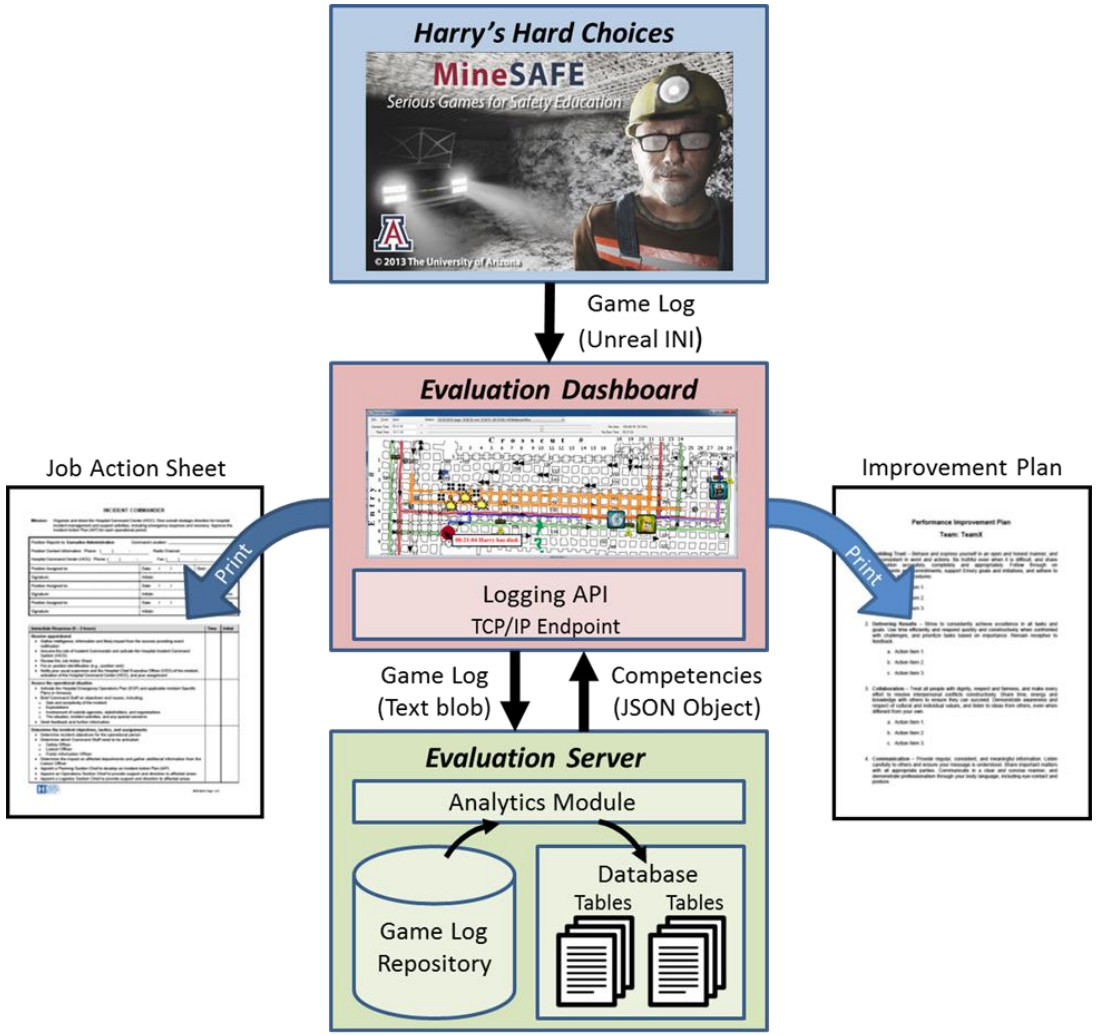
Exercise Support

- The UA research team will provide technical assistance to the mine site to improve their exercise process.

- By incorporating Homeland Security national standard for exercise design, conduct, and evaluation, the quarterly mine emergency evacuation drills, mandated under 30 CFR 75.1504, can be enhanced through capabilities and performance metrics to assess the transfer of knowledge and competencies to an operations setting.

Evaluation Methods and Tools

- A self-assessment tool for emergency preparedness and response competence.
- Harry's Hard Choices Virtual Reality Game to be used as the pre and post assessment to assess change in competency.
- An individualized job action sheet and performance improvement action plan.



Serious Games

- Leonard D. Brown, PhD, ldbrown@email.arizona.edu
- Computer games increase engagement, promote critical thinking
- MineSAFE: Software Architecture for Education in Mine Safety
  - Contextualized - realistic "sandbox" 3D environments
  - Game-oriented – fun, competitive, randomized
  - Personalized – support for literacy and ESL
  - Modular – rapid prototyping and adaptable for sites, methods
- Versatile hardware support for displays, input devices
  - Mobile devices including tablets & phones
  - Virtual Reality using Oculus Rift & other headsets
  - Emerging Augmented Reality capabilities

Harry's Hard Choices

- A training scenario for mine emergency preparedness & response
  - Substantial coverage of CFR Part 48 training topics
  - Evacuate your crew in the face of many dangers

- Emphasis on situational & environmental awareness
- Competitive design w/ scoring-based game play

- Use cases: Competency evaluation, evac. drill prep, scenario-based decision making, identification of training gaps, leadership training

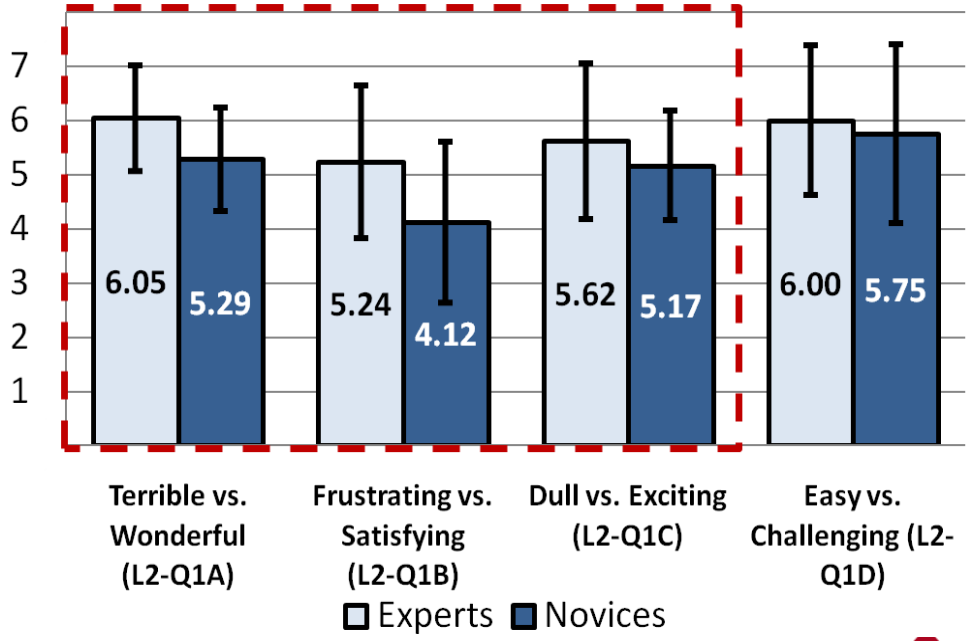
Game Consequences

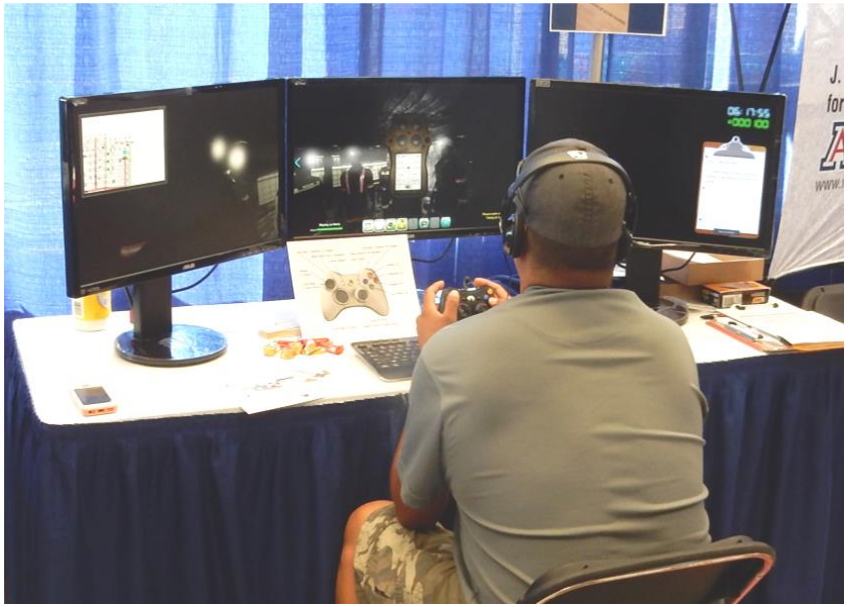
- Consequences are cumulative
  - Qualitative: Graphic portrayals
  - Quantitative: Scores, morale
- Quality of outcome depends on user choices, efficiency
  - No-win conditions possible
  - Stealth assessment
- Dynamic, changes each time
  - Multiple levels of difficulty
  - Tailor to users' skill set

Trap	Consequence(s)
Irrespirable Gas	Fatigue, asphyxiation
Roof fall	Blocked egress, crushing
Fire zone	Blocked egress, burns
Defective SCSR	Asphyxiate
Defective gas meter	False gas readings
Inoperative refuge	Asphyxiate, time penalty
Inoperative mantrip	Time penalty, fire
Inoperative shuttle	Electrical fire, burns
Methane pocket	Explosion, loss of crew
Broken lifeline	Disoriented, loss of miner
Uneven ground	Stumbling, leg injury
Collapsed pillars	Blocked, time penalty
Damaged electricals	Electrocution
Damaged phones	Loss of communication

Usability Studies

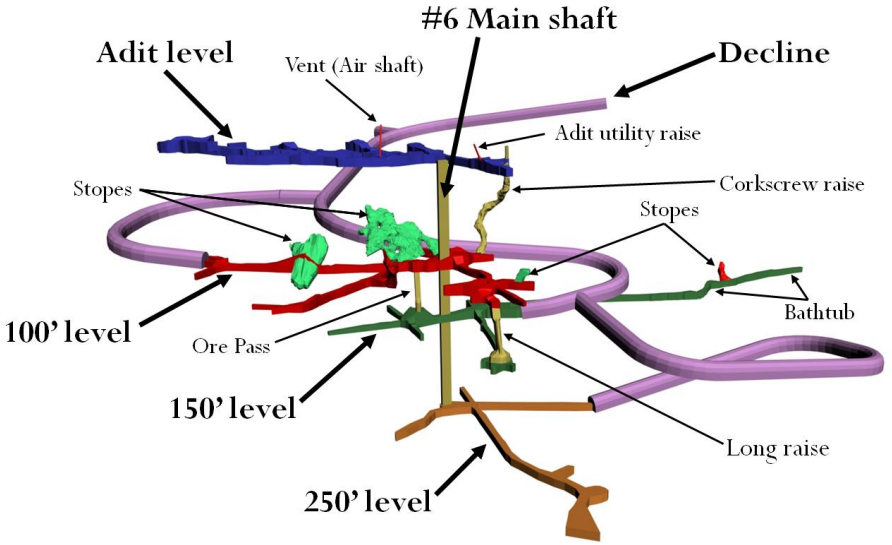
- Studies examined technology acceptance
  - Over 100 trainers & mine workers participated
  - Eastern & western mining regions represented
- Results & user feedback
  - High satisfaction & willingness to replay => **high acceptance**
  - Most liked: Challenge, Realism, Breadth, Gaming elements





Pre-Shift Inspections

- Identify hazards & controls
- Modular training applications
  - Many types of hazards
  - Multiple worksites possible
- Worker rights & responsibilities
  - You see it, you own it!
  - Report it? Flag it? Ignore it?
- Communication issues
  - Miscommunication
  - Someone else's problem
  - Someone already knew
- Testbed: SX Mine Lab



Aggregates Site Inspections

- Worksites under development
  - Cement plant
  - Limestone quarry
  - Sand & gravel
- Close collaboration with industry
  - Arizona Rock Products Assoc.
  - D. Brown, Mine Safety Assistance
  - Multiple industry partners
- Addresses top MSHA citations
  - Guarding of moving parts
  - Damaged electricals
  - Safe travelways
  - Berms & guardrails
  - Housekeeping

Competent Person Training

- David Brown, Mine Safety Assistance LLC, dbrown@minesafetyassistance.com
- On-site training
- Help companies understand MSHA regulations and how they are interpreted
- How to improve compliance, safety culture, and competency of workforce at the job site

Trainer Competency Model

- Occupational
  - Trainer (Safety, Technical, Environmental)
  - Superintendent of Technical Training
  - Training Mentor
  - On Job Trainer/ Field Trainer
- Already Validated
  - Department of Labor
  - American Society for Training and Development/Association of Talent Development

Practice Using the Model

- Clickers and paper
- Three questions about what mine trainers need to know and do
- Answer for your organization
  - Not important
  - Preferred
  - Essential

Do we want our mine trainers to know…

Industry-Wide Technical Competencies

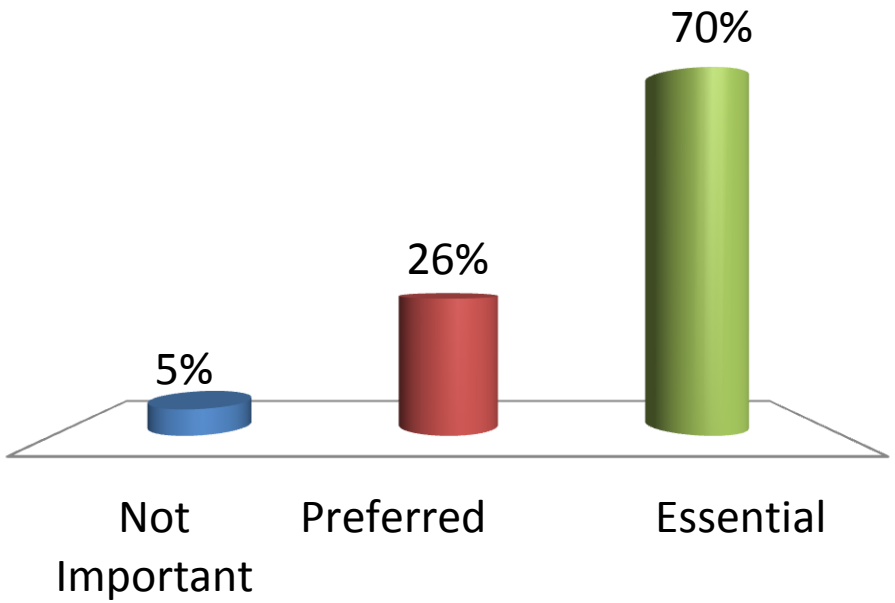
403 – Mining Methods, Operations, and Equipment

- 403a – *Mining cycle – Explain the typical stages in mining operations – drill, load, blast, muck, haul, dump*

A. Not Important

B. Preferred

C. Essential



Do we want our mine trainers to know…

Occupational Competencies

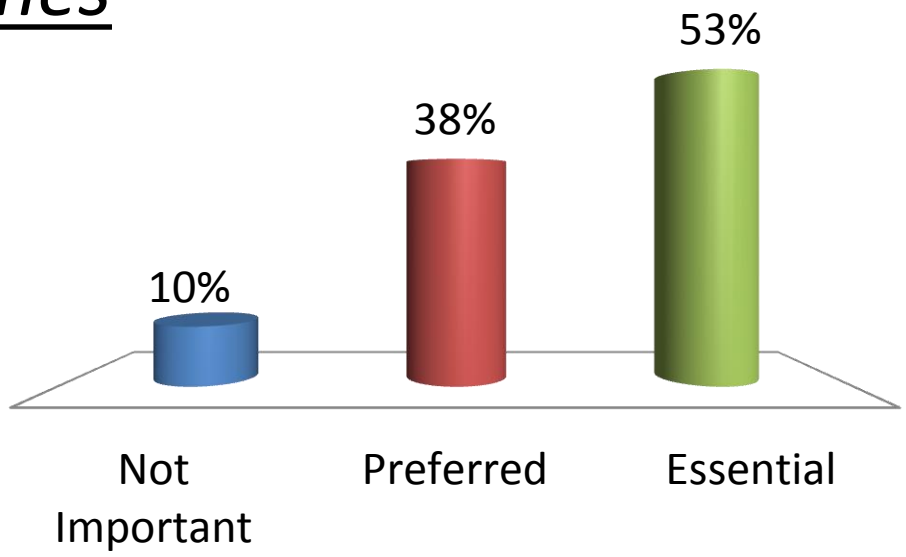
601 – Learning Theory and Psychology of Learning

- 601a – *Learning theories – Explain how different orientations or approaches to learning create different learning outcomes*

A. Not Important

B. Preferred

C. Essential



Do we want our mine trainers to know…

Occupational Competencies

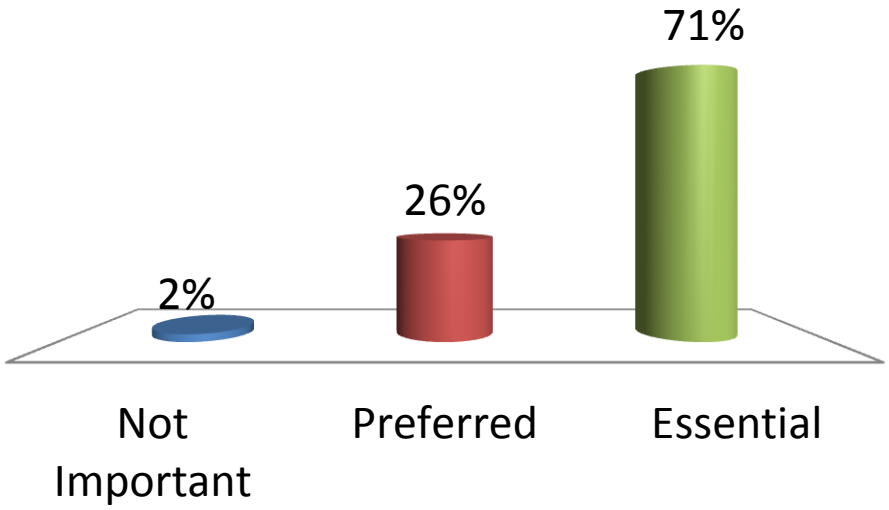
606 – Evaluating Learning Impact

- 606d – Interpretation and reporting of data – *Interprets evaluation data, creates data summaries, and clearly communicates to facilitate decision making*

A. Not Important

B. Preferred

C. Essential



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The New Face of Mining – is safe

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