Australian Government

Department of Education, Employment and Workplace Relations

MSL914001A Prepare practical science classes and demonstrations

Revision Number: 1

MSL914001A Prepare practical science classes and demonstrations

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to manage the day-to-day running of science teaching laboratories and the preparation of practical experiments, demonstrations and field trips.

Application of the Unit

Application of the unit	This unit of competency is applicable to technical assistants and technical officers working in the secondary and tertiary education sectors. It also applies to zoos, aquariums and museums that run education programs. Personnel are required to assess and treat risks associated with practical activities. Some personnel may have the additional role of fire warden, first aid officer or occupational health and safety (OHS) representative. They may also have other skills, such as boating, SCUBA diving or trade qualifications. They may work autonomously but are required to liaise closely with teaching staff about the design and scheduling of practical activities. Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section 'This competency in practice'.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Ensure safe work practices	1.1. Organise and perform risk assessments to identify hazards and analyse risks associated with planned practical activities 1.2. Select and implement appropriate controls for identified risks and monitor their effectiveness 1.3. Ensure preparation and conduct of practical activities are performed in accordance with relevant regulations, codes, guidelines and enterprise procedures 1.4. Select, fit and use personal protective clothing and equipment and ensure that it is used by students and teachers 1.5. Ensure materials and equipment are handled, prepared, stored and disposed of safely 1.6. Address incidents and emergencies as they arise
2. Plan work schedule	2.1. Plan schedule of classes and demonstrations in consultation with teaching staff to ensure timely delivery 2.2. Communicate effectively with staff and students using appropriate negotiation and conflict resolution skills 2.3. Prioritise work activities and manage time to meet deadlines 2.4. Modify work plan to deal with contingencies as they arise
3. Organise experiments and demonstrations	3.1. Collect materials and equipment from appropriate sources 3.2. Perform pre-use checks, prepare material and equipment and organise ready for use 3.3. Demonstrate practical skills, techniques and use of materials and equipment, as required 3.4. Organise clean-up operations and recycling or disposal of wastes 3.5. Trial experiments and demonstrations and recommend variations or alternatives
4. Manage resources	4.1. Operate practical activities within approved budgets 4.2. Maintain and control stocks of materials and equipment 4.3. Maintain storerooms, preparation areas and laboratories fit for purpose

ELEMENT	PERFORMANCE CRITERIA
	4.4. Evaluate and select materials and equipment and make recommendations for purchase 4.5. Order, receive and store materials and equipment using enterprise procedures 4.6. Organise quotes and bookings for transport and accommodation for field trips, as necessary 4.7. Service and/or repair laboratory equipment where feasible 4.8. Arrange for the servicing or repair of equipment by appropriate personnel or accredited service agents, as necessary

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- using problem solving techniques and contingency planning
- clarifying/designing practical activities and assessing resource needs
- working with teaching staff and students to assess risks, develop and implement controls and monitor their effectiveness
- preparing laboratory experiments and demonstrations on time with the correct materials and equipment
- maintaining the laboratory fit for purpose
- obtaining stocks of materials and equipment

Required knowledge

Required knowledge includes:

- scientific terminology used in common practical activities
- relevant legislation, regulations and codes governing practical activities
- technical details of sampling, testing, equipment and instrumentation used in common practical activities
- enterprise procedures for the purchase, handling and storage of materials and equipment
- principles of budgeting, operational planning and efficient resource use
- principles of risk assessment, risk management and hierarchy of control
- relevant enterprise health, safety and environment requirements

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors should ensure that candidates can: • clarify/design practical activities and assess resource needs • work with teaching staff and students to assess risks, develop and implement controls and monitor their effectiveness • prepare laboratory experiments and demonstrations on time with the correct materials and equipment • work with teaching staff and students to ensure all practical activities are performed safely (through demonstrations and monitoring of practical activities) • manage contingencies and resources within level of responsibility • maintain the laboratory fit for purpose • liaise with suppliers to obtain stocks of materials and equipment using enterprise procedures • work effectively with students and staff who may have diverse work styles, cultures and perspectives.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or simulated workplace environment. This unit of competency may be assessed with: • *MSL944001A Maintain laboratory/field workplace safety* • *relevant MSL974000 series of units of competency* • *relevant MSL975000 series of units of competency*. Resources may include: • laboratory/field work environment, equipment and materials • personal protective equipment and safety equipment • enterprise OHS management system, policies and procedures.
Method of assessment	The following assessment methods are suggested: • review of operational plans, schedules and budgets

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	prepared by the candidate • review of risk assessments and treatment strategies prepared by the candidate • review of job cards detailing completed tasks • feedback from students, teaching staff, suppliers and supervisor • observation of the candidate assisting teaching staff and students during practical activities • written or oral questions to partly assess the candidate's knowledge of relevant enterprise procedures, technical details of common practical activities and his/her ability to handle a range of contingencies. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.
This competency in practice	Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. **Education** (**1**) A biology class returns from a short excursion where pond water samples have been collected. The teacher plans for the students to identify some of the common microscopic organisms present in the samples and conduct a range of tests for pH, electrical conductivity, turbidity and the presence of nitrates. The teaching assistant prepares, checks and calibrates the monitoring equipment and sets out ten microscopes with clean slides, cover slips and transfer pipettes together with waste buckets and bags for collection of biological

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	material. A sharps container is set out for broken slides and cover slips. At the end of the class, the assistant cleans, checks and stows the microscopes and collects the waste material for disposal. The assistant disposes of the waste according to enterprise procedures. **Education** (**2**) A technical officer has responsibility for the technical support of practical classes in two laboratories. Every semester, he/she prepares a detailed schedule for all classes and field trips in collaboration with the teaching staff. This involves a careful assessment of risks and implementation of controls for each kind of activity to ensure that the institution meets its OHS and environmental management responsibilities. The schedule must also satisfy the science department budget constraints, seasonal variations and the availability of key staff and items of equipment. The officer's daily routine involves the preparation of all equipment, experiments and demonstrations for classes, the checking of equipment before and after its use, general cleaning and maintenance of equipment and work areas and the maintenance of stock levels.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Codes of practice	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used

Standards, **codes**, **procedures and/or enterprise requirements**	Standards, codes, procedures and/or enterprise requirements may include:
	• Australian and international standards, such as:
	  • AS 1678 Emergency procedure guide - Transport
	  • AS 1940-2004 Storage and handling of flammable and combustible liquids
	  • AS 2252 Biological safety cabinets
	  • AS 3780-2008 The storage and handling of corrosive substances
	  • AS/NZS 1269 Set:2005 Occupational noise management set
	  • AS/NZS 1337 Eye protection
	  • AS/NZS 2161 Set:2008 Occupational protective gloves set
	  • AS/NZS 2210:1994 Occupational protective footwear
	  • AS/NZS 2243 Set:2006 Safety in laboratories set
	  • AS/NZS 2243.1:2005 Safety in laboratories - Planning and operational aspects
	  • AS/NZS 2243.3:2002 Safety in laboratories - Microbiological aspects and containment facilities
	  • AS/NZS 2243.8:2006 Safety in laboratories - Fume cupboards
	  • AS/NZS 2982.1:1997 Laboratory design and construction - General requirements
	  • AS/NZS 4452:1997 The storage and handling of toxic substances

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	• AS/NZS 4501 Set:2008 Occupational clothing set • AS/NZS ISO 14000 Set:2005 Environmental management standards set • animal welfare legislation and codes of practice • Australian Dangerous Goods Code • Australian Quarantine and Inspection Service (AQIS) Import Guidelines • gene technology regulations • Guide to physical containment levels and facility types • HB 9-1994 Occupational personal protection • National Code of Practice for the labelling of workplace substances (NOHSC:2012 (1994)) • permits for wildlife capture and handling • principles of good laboratory practice (GLP)
Hazards	Hazards may include: • electric shock • microbiological organisms and agents associated with soil, air, water, blood and blood products, and human or animal tissue and fluids • solar radiation, dust and noise • exposure to extreme weather conditions • snake, insect and animal bites • chemicals, such as acids, heavy metals, pesticides and hydrocarbons • aerosols from broken centrifuge tubes and pipetting • radiation, such as alpha, beta, gamma and X-ray • sharps, broken glassware and hand tools • flammable liquids • cryogenics, such as dry ice and liquid nitrogen • fluids under pressure, such as steam, hydrogen in gas liquid chromatography and acetylene in atomic absorption spectrometry • sources of ignition • high temperature ashing processes • disturbance or interruption of services

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	• occupational overuse syndrome, slips, trips and falls • manual handling, working at heights and working in confined spaces • crushing, entanglement and cuts associated with moving machinery or falling objects • vehicle and boat handling
Hazard control measures	Hazard control measures may include: • ensuring access to service shut-off points • recognising and observing hazard warnings and safety signs • use of material safety data sheets (MSDS) • labelling of samples, reagents, aliquoted samples and hazardous materials • handling and storing hazardous materials and equipment in accordance with labelling, MSDS and manufacturer's instructions • identifying and reporting operating problems or equipment malfunctions • cleaning and decontaminating equipment and work areas regularly using enterprise procedures • using personal protective clothing and equipment, such as hats, hearing protection, gloves, safety glasses, coveralls, gowns, body suits, respirators and safety boots • applying containment procedures through the use of appropriate equipment, such as biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets and Class PCII and PCIII physical containment facilities • following established manual handling procedures for tasks involving manual handling • reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/waste water, gases, smoke, vapour, fumes, odour and particulates to appropriate personnel
Risk assessment	Risk assessment includes: • analysing the risk • identifying factors influencing the risk and the

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	range of potential consequences • effectiveness of existing controls • likelihood of each consequence considering exposure and hazard level • combining these in some way to obtain a level of risk • comparison of the determined risk with pre-established criteria for tolerance (or as low as reasonably achievable) and the subsequent ranking of risks requiring control

Hierarchy of control	Hierarchy of control includes:
	• the preferred order of risk-control measures from most to least preferred, that is:
	  • eliminating risk
	  • substituting with a lesser hazard
	  • isolating personnel from hazard
	  • engineering controls
	  • applying administrative controls, for example, procedures and training
	  • using personal protective equipment

Typical materials	Typical materials may include: • live flora and fauna, such as plant specimens • animals, such as rats, bacteria, algae, insects and fungi • blood and blood products, human or animal tissue and fluids • teaching aids, such as textbooks and videos • distilled water, reagents, chemicals, disinfectants, detergents, agar media and plates • consumable items, such as syringes, pipette tips and weigh boats • oils/lubricants, fuels, industrial gases, cryogenics, such as dry ice and liquid nitrogen • equipment spares, such as fuses, bulbs and batteries • paper and stationery • reference samples and standards
Typical equipment	Typical equipment may include: • analytical instruments, such as ultraviolet-visible (UV-VIS) and atomic

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	absorption spectrometers(AAS) , gas chromatography (GC) and high pressure liquid chromatography (HPLC) • animal cages • autoclaves • balances • blenders, centrifuges and separating equipment • cell counters and staining machines • dishwashers, refrigerators, freezers, ovens, microwave ovens, incubators and water baths • fume hoods, biohazard containers and biological safety cabinets • gas cylinders • glassware (burettes, pipettes), plastic ware, glass, plastic and quartz cuvettes • hotplates, mantles, burners and muffle furnaces • light and fluorescence microscopes • microtomes and tissue processors • teaching aids, such as DVD players and computers • thermometers, pH meters and ion selective electrodes • ultrasonic cleaners
Incidents and emergencies	Incidents and emergencies may include: • workplace injury and accidents • biological and chemical spills • leakage of radioactivity • fire • bomb • security threats
Contingencies	Contingencies may include: • new information • urgent requests • modified activities • changed situations • late instructions from appropriate personnel • substitution of reagents
Sources of materials and	Sources of materials and equipment may include:

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equipment	• field trips, including land and sea-based • botanic gardens and parks • abattoirs • commercial suppliers • other institutions • blood bank • shops
Demonstration of techniques and use of equipment	Demonstration of techniques and use of equipment may involve: • teaching staff • other technical staff • students during practical classes • students doing projects or postgraduate studies
Resource management	Resource management may include: • preparation of operational plans • schedules and budgets • handling of petty cash and reconciliation of bank statements • contacting suppliers and completing order requisition forms • use of an enterprise credit card
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements: • all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time • all operations assume the potentially hazardous nature of samples and require standard precautions to be applied • where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health

Unit Sector(s)

Unit sector	Communication/organisation

Competency field

Competency field	

Co-requisite units

Co-requisite units		