INTERMEDIATE (W) MODULES JOINT BOHS-OHTA INTERIM GUIDANCE FOR TUTORS ON FORMATIVE PRACTICAL ASSESSMENT FOR ONLINE COURSES

1. Introduction

In order to ensure that on completion of individual W500 series modules, students have the capability to carry out basic practical assignments, all examination candidates must undertake practical exercises and write them up to an appropriate standard for marking by the course tutor during the course. The tutor is responsible for the detailed design and marking of these formative assessments. These are an essential part of the candidate assessment process and are subject to random audit by BOHS for quality assurance purposes.

In the current COVID-19 situation, many approved course providers have moved to online delivery of W module courses in order to protect the health of both students and tutors. The transition has not been without its challenges, in particular, in ensuring that students who don't have access to their own instrumentation, can receive some level of practical tuition.

Notwithstanding the difficulties created by the current emergency, many professions and university courses now use simulations to deliver essential practical training online and indeed there is a long tradition of using simulation exercises in the military and emergency services. Technology such as virtual microscopes and online engineering simulations offer the prospect of realistic measurement simulations for occupational hygiene education and there is considerable scope for innovation.

Occupational hygiene tutors are already trialing simple work tasks and measurement simulations for online delivery of training and assessment exercises. This document offers guidance to W module tutors on ways of ensuring that students receive a **minimum** standard of practical tuition and assessment when this is delivered online without direct "hands-on" access to occupational hygiene instrumentation.

This guidance should be read in conjunction with the existing guidance on formative assessment that is published on the BOHS web site (http://www.bohs.org/qualifications-training/bohs-qualifications/occupational-hygiene-qualifications/). This document will be regularly reviewed in the light of feedback from students, tutors, professional bodies and other stakeholders.

As an alternative to the approach that is outlined below, approved training providers can choose to delay the practical assessment elements of online W500 series courses until such time as they are able to run these elements of the course in a face-to-face format using either the training provider's equipment, or the student's own equipment. It should be noted that BOHS will not issue any certificates until the duly signed report that the specified formative assessment has been completed successfully has been accepted by BOHS.

2. General Principles

Given the need to maintain social distancing, tutors delivering online training will need to use some form of simulation of instrument set-up, operation and measurement techniques in order to develop and test practical skills in each candidate. The formative assessment should be clearly linked to learning outcomes and designed by the course tutor(s) to test the basic skill of the candidate in

measuring specified parameters and in analyzing and reporting on the data obtained. The following general principles aim to ensure that a minimum standard of practical training and assessment is met by these exercises: -

(i) It is assumed that students will not generally have access to their own instruments or laboratory facilities. Where students have instruments available during the course, they could be encouraged to lead a short session (supported by the tutor) where they describe principles of operation and potential sources of error. Such students can demonstrate some of the required practical skills by a synchronous video link with the tutor.

(ii) As a minimum standard, students who don't have instrumentation should undertake practical measurement exercises by proxy, where through a synchronous video link with the tutor, they verbally instruct a "neutral" assistant to carry out the necessary steps for calibration, operation of the instrument and recording measurements.

(iii) Each student should be assessed individually by the tutor using the synchronous video link. Prompting by either the tutor or "neutral" assistant during the measurement task should be avoided. Feedback on task performance should be provided individually to each student as soon as possible after the completion of the simulated measurement task.

(iv) The simulations should, as far as possible, be set within the context of a realistic workplace measurement scenario. This might be done by embedding the exercise within a written or video case study that presents a task and operational environment together with supporting contextual data. A set of appropriate readings (from instruments similar to those used in the proxy exercise) can be included for the student to analyse and report on.

(v) It may take longer to grasp the detailed sequence of operation of an instrument when working online. Tutors should make available step by step video footage (or suitable links to third party resources) of instrument set-up, operation and measurement techniques that students can view as often as needed to prepare for formative assessment and as a continuing source of reference.

(vi) Where video footage is used to demonstrate measurement techniques in workplace conditions or the step by step process of setting up and calibration, active learner engagement should be encouraged through set questions, quizzes and student presentations.

(vii) It is permissible to use suitable mobile phone apps (e.g., for noise assessment) to teach the principles involved in measurement/analysis and to become familiar with units. Students must be made aware, however, that such apps are to be used strictly for educational purposes and are not a substitute for instruments that comply with appropriate standards and that are properly calibrated and maintained.

(viii) Tutors should be prepared to offer additional support and coaching to students who are working in isolation without access to senior colleagues or mentors.

(ix) The set up and measurement exercises should be written up by each student to the standards expected for a laboratory notebook or field notes and submitted for assessment at the end of the simulation exercise. All derived data and calculations should be included so that they can be checked.

(x) Tutors should institute appropriate checks to ensure that the work is actually undertaken and written up by the student.

(xi) Evidence of each student's participation in the formative assessment in the form of video footage, screen shots, reports or other supporting documentation should be retained by the tutor/course provider. This evidence may be audited by BOHS.

(xii) Students should be encouraged to consolidate their learning of measurement methods following the module by undertaking practical assessments or shadowing colleagues etc., as soon as it is safe to do so.

3. Assessment Requirements for Specific Modules

3.1 Core Modules

W501 Measurement of Hazardous Substances

The assessment tests the basic skill of the candidate in the personal sampling of exposure. The proxy or other simulation exercise must, therefore, involve.

a) The setting up and calibration of sampling pumps for vapour sampling with charcoal tubes. (The student should verbally instruct the assistant in the sequence of steps involved, assembly of the sampling train and calibration)

b) The correct assembly set up and use of a sampling pump and cyclone sampler for measurement of respirable dust.

c) The set up and use of a sampling pump and open face (IOM or similar) filter head for sampling of inhalable dust.

d) The correct positioning of sampling equipment on the wearer. The assistant should be instructed in the correct positioning and attachment of the sampling head. The student could be asked to comment on sources of error and measures that can be taken to ensure reliable results.

e) The use of data sets which are relevant to each of the above sampling exercises, to allow candidates to demonstrate their ability to calculate and interpret results. These can be presented within the context of a case study or workplace scenario and should include:

- weights of filters before and after dust sampling, together with flow rates and sampling periods.
- for respirable dust sampling, typical laboratory results for crystalline silica analysis of collected dust.
- typical laboratory results giving the amount of contaminant on both sections of a charcoal tube together with flow rates and sampling periods.
- workplace scenarios that will allow candidates to calculate 8-hour time-weighted average exposures and compare these with allowable exposure limits.

The tutor's assessment is completed and reported on as described in https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JB.2-16-11-2020-W501-Practical-Evaluation-Document.pdf

W503 Noise – Measurement and its Effects

The assessment tasks should be designed to test the basic skill of the candidate in making measurements to assess the risks from workplace noise. Students should be shown video footage of a range of noise-creating plant or equipment and the contexts in which they are found. Students should be shown equipment needed to undertake workplace noise measurement and approaches followed in the workplace.

Students may be given an experience of noise measurement through use of a suitable mobile phone app (e.g., CDC NIOSH SLM app or Android equivalent) to record environmental noise from a domestic source (e.g., automatic washing machine and tumble drier running simultaneously) with appropriate safety precautions.

The above exercise, if chosen should be supported by a measurement by proxy exercise which in any case is the minimum required, where each student has to verbally instruct an assistant by synchronous video link in the following elements: -

- The set up and use of an integrating sound level meter

- The set up and use of personal noise dose meters

The measurement of sound frequency (including octave band levels) for specific noise sources or in noisy environment can be demonstrated using video footage. Frequency analysis apps are available which enable octave band analysis of pre-recorded soundtracks.

The evaluation of the acoustic performance of two types of hearing protector against typical industrial noise can be undertaken within the context of a case study that the student works on individually following online teaching.

Access to reference material and written procedures is allowed during these exercises.

The tutor's assessment is completed and reported as in https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JD.2-16-11-2020-W503-Practical-Evaluation-Document.pdf

W505 Control of Hazardous Substances

This assessment aims to test the basic skill of the candidate in making relevant measurements to assess the performance of local exhaust ventilation (LEV) systems. The tutor will need to set up a model LEV system with the key components (hood, ducting, filters, fan) so that students can undertake realistic measurements while working remotely. The system will need to be capable of being modified to represent different LEV scenarios (e.g., effects of various degrees of source containment, duct angles, fan characteristics and airflows). Pre-drilled sample points in ducts can be labelled and sealed so that the student has to select the correct measurement points. The student will need to direct the assistant by means of verbal instructions to undertake the following: -

- Visualization of air flows as a means to test control (smoke tubes, smoke generators and dust lamps) on at least two typical ventilation configurations.
- Duct measurements using a manometer with pitot tube attachment, and calculation of an average duct velocity from the data.
- Measurements of static pressure at different points in the model ventilation system, and understanding of how static pressure data can be used to diagnose faults in the system (blocked filter, blocked ducting, holed filter)
- Measurements of face velocity or capture velocity using appropriate anemometers and interpretation of data for a selection of tasks (case studies or scenarios may be used).

Access to reference material and written procedures is allowed during these exercises.

The tutor's assessment is completed and reported as in https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JF.2-16-11-2020-W505-Practical-Evaluation-Document.pdf

W507 Health Effects of Hazardous Substances

The existing formative assessment (https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JH.2-16-11-2020-W507-Practical-Evaluation-Document.pdf) for this module may be easily adapted for online presentation as it involves a data interpretation exercise and a risk assessment case study.

3.2 Optional Modules

W502 Thermal Environment

The assessment activities are designed to test the skill of the candidate in making measurements for the purpose of assessing the thermal environment. It is difficult to give the student an experience of

the range of workplace thermal conditions by online presentation. However, there are some excellent video demonstrations on YouTube which show the effects of climatic extremes on the human body and these may support case study exercises. It is also possible to use simple computer models of human thermal response to explore the effectiveness of simple control measures.

It is unlikely that students will have access to the thermometers required for WBGT measurement and tutors should consider setting up a measurement by proxy simulation where the student verbally instructs an assistant via synchronous video link in the following exercises:-

- Measurement of Temperature and humidity.
  One method from the following along with use of psychrometric charts: -
  a) The setup and use of a static dry bulb and natural wet bulb thermometer and determination of relative humidity.
  b) The setup and use of a whirling hygrometer and calculation of relative humidity
  c) The set up and use an air temperature and relative humidity instrument(s) to give direct readings.

- Techniques for measuring low non-directional air movement such as the hot wire anemometer or Kata thermometer (and derivation of non-directional air velocity from nomograms).
- The set-up of a globe thermometer and use of measurement data from this and the dry bulb/natural wet bulb thermometers to calculate a WBGT value. Alternatively, a direct reading WBGT instrument may be used. Students can also be taught how to estimate WBGT levels from meteorological data (a useful strategy when in WBGT instruments are not available).
- Case studies should be used to illustrate the use of thermal environmental monitoring equipment such as those described above, or alternatively, real-time monitoring equipment, for assessment of working environments in respect of heat stress and/or thermal comfort. This exercise should include provision of contextual data and a description of tasks being undertaken as well as environmental data to test the candidate's ability to consider work regimes and to reduce the risks to workers. This work should involve the use of tables and charts from thermal environmental standards to interpret results.

Access to reference material and written procedures is allowed during these exercises.

The tutor's assessment should be completed as in https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JC.2-16-11-2020-W502-Practical-Evaluation-Document.pdf

W504 Asbestos and Other Fibres

This assessment, if undertaken online, should simulate the sampling of air for respirable fibres and subsequent slide preparation as well as sampling from bulk materials as in a buildings survey.

The following exercises need to be included in a simulation by synchronous video link:-

- Set up and use of an air sampling system for asbestos fibres in air with suitable high-volume pump, flexible tubing, filter holder and filter media. The student will need to direct the assistant in assembling the correct sampling train and in the sequence of actions for undertaking calibration and measurement on site.
- Similarly, the student should direct the assistant through the stages in the preparation of slides for counting.
- Counting of slides is currently difficult to simulate online however BOHS is exploring the use of a virtual microscope which may enable individual students to gain experience of using counting rules.

- Sampling of bulk materials for asbestos identification may be simulated using non-hazardous materials and again the student can direct the assistant through the steps in the process and the precautions required. One training provider has given candidates a “direct experience” of bulk sampling using materials easily obtained from hardware stores and PPE available locally or ordered in advance of the course

Access to reference material and written procedures is allowed during these exercises

The tutor’s assessment is completed as in https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JE.2-16-11-2020-W504-Practical-Evaluation-Document.pdf

W506 Ergonomics Essentials (including Manual Handling and DSE)

In this assessment the ability of the candidate to make ergonomic risk assessments and recommend risk reduction measures is tested. The process recommended in the existing guidance (https://mk0bohsx5kak7rlajjs.kinstacdn.com/app/uploads/2020/11/JG.2-16-11-2020-W506-Practical-Evaluation-Document.pdf) is easily adapted for online presentation as effective ergonomic assessments can be undertaken using pre-recorded video footage and still photographs, together with contextual data.

One exercise should focus on the practical assessment of ergonomic risks at a typical office workstation. The student working remotely could assess a home workstation using a camera, tape measure and ergonomics checklist. Alternatively, they could review a video recording or photographs and measurements provided by the tutor and feedback their risk assessment and recommendations in a written report.

The second exercise should be a study of a workplace situation which may be presented as a series of photographs, videos, drawings and/or text for the candidates to evaluate and report on their findings. Simple ergonomics checklists and tools could be used to enhance the value of this exercise and to encourage a critical approach to risk assessment.

Access to reference material and written procedures is allowed during these exercises.