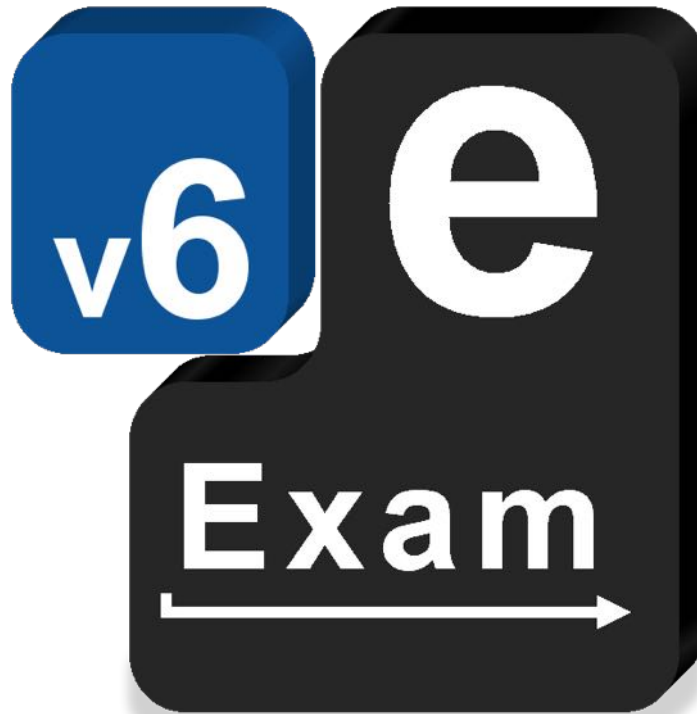


Preparing Exam Materials



e-Exam System v6

This document provides:

- Preparing offline exam documents, materials and configuration files.
- Preparing online exam quiz and configuration files.
- Compatible file formats.

Acknowledgements

The e-Exam System version 5 and version 6 platform project is supported by an Australian Government grant. The project is being lead by Monash University in partnership with nine Australian Universities.



The views expressed in this document do not necessarily reflect the views of the Australian Government Department of Education and Training or participating institutions.

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This is a work in progress! Last Updated 24 May 2019

** Note some features are still under development*



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Introduction

This guide focuses on preparing materials and questions documents (or quiz) for an e-Exam.

Note: For information on the production, preparation and management of e-Exam USB sticks, please refer to the 'Admin tool guide' or 'Alternative admin guide'.

Offline exam modes

An offline e-Exam utilises the student client USB to house the exam questions, additional materials and response medium. Questions are distributed on the USB. Responses saved to and collected back from the USB. These exams will be conducted offline using the student client e-Exam USB stick, i.e. without any networking during the exam session.

The e-Exam client supports multiple file formats. The most common files used in offline exams are word processor documents (doc, odt) and spreadsheets (xls, ods). Presentation slide files, PDF and plain txt are also supported. Additional software applications can also be installed to support many more formats. See 'Multimedia file formats' for further information on compatible audio, video and image file formats.

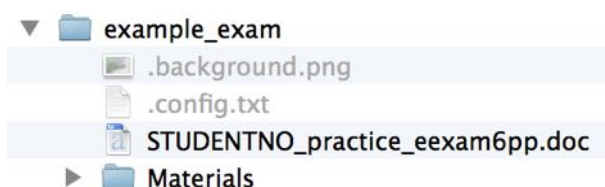
Word processor document

The section assumes that the exam questions and responses will be contained within a single file. Students will enter their responses in a copy of the exam file that is automatically created when the exam starts, made so the original is preserved.

To prepare materials for a particular exam, it is recommended that you create a new folder to store the materials (on your computer hard drive and/or User drive of the Admin USB). In the exam specific folder place:

1. **The exam question document** that will be opened upon e-Exam start. (Refer to the section 'Guidelines for preparing exam question documents').
 - The file name must be prefixed with "STUDENTNO_" (without quotes). E.g STUDENTNO_myexamfile.doc
 - Do **not** put *spaces* in file names because this will break the launch process. Instead use dash or underscores.
 - The question file will be placed into the root of the eexam drive on an e-Exam USB.
2. **Optional: A 'Materials' sub-folder.** Place all other materials related to the exam itself into this sub-folder. It is advisable to setup links from the question document file to each of the materials. (See the example exam disk image for an example of a document with links to local files.)
 - The Materials folder will be placed into the root of the eexam drive on an e-Exam USB.
 - See 'Multimedia file formats' for further information on compatible audio, video and image file formats.
3. **The security background wallpaper image.** This needs to be unique per exam sitting.
 - Images need to be PNG and at least 1920 pixels wide by 1280 pixels high.
 - The file must be named ".background.png" (without quotes). This is a 'hidden' file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.
4. **A local configuration file** (see 'Configuring e-Exam system' in the Admin tool guide).
 - The configuration needs to be set to [exam] type=office.
 - The file must be named ".config.txt" (without quotes). This is a 'hidden' file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.

The finished exam folder should look something like this:





To deploy the material, place the contents of this folder onto the 'eexam' partition (drive) of an e-Exam USB. This can be done manually using Apple OSX/MacOS or Linux.

Alternatively, see the 'Admin tool Guide' for how to use the Admin tool 'Deploy exam materials to e-Exam USB drives' function. You will be asked to select the folder that contains the exam material. The tool will then copy the entire folder contents to the 'eexam' partition of each attached e-Exam USB stick.

Guidelines for preparing the exam question document

1. File format:

- Use ".doc" format files rather than ".docx". The latter are not as well supported by Libre office, particularly when using complex formatting such as multiple columns, nested tables, drawing objects with boxes, text boxes, arrows etc. If the file is .docx then use 'Save As' and select the .doc format when saving a copy.
 - i. The use of Math editor or formulae or special characters may not carry over when the document is opened in the e-exam system. Preparing the document within the e-Exam system using Libre Office saving files as .odt may be advised in this case.
- Use .odt (open document format) if preparing exam files directly in Libre Office.
 - i. Note, if using Libre Office on Windows or OSX to create the e-exam document please note that the same fonts may not be available as in the e-Exam system (See advice regarding use of fonts below).

2. File naming:

- Do **not** use *spaces* in file names. Instead use underscores `_` to separate words in the file name. The e-Exam system may fail to open the document if the file name contains spaces.
- Prefix the file name with "STUDENTNO_" (without quotes). The e-Exam system requires this text string in order to find and open the correct exam question file.

3. Document editing and layout:

- Use plain generic/common fonts.
 - i. Set the default 'normal style' to use Times New Roman'.
 - ii. It is best to use Times New Roman for questions and Ariel for response areas. Set response areas to dark blue text also helps students easily identify their own text (See example exams for ideas on question formats/layouts).
 - iii. Font substitution is likely to occur when moving from Windows or MacOS/OSX to Linux (e-Exam system). The use of generic/common fonts will minimise any disruption to formatting because the equivalents on each platform are very similar. However, non-roman character fonts (e.g Chinese, Arabic, Korean etc) are likely to experience greater degree of changes when font substitution occurs because the fonts used are less consistent/common across different systems. In this case reformat the document using Libre Office inside the e-Exam system.
- Use tables instead of columns when a multi-column page layout is required. These tend to be more stable when moving between systems and software.
- Avoid using drawing objects or floating text boxes to hold or position key information or create diagrams or layouts because these are not very 'stable' when opened in LibreOffice / e-exam system. i.e. the positioning of these is likely to change unpredictably. Instead it is best to insert images that contain diagrams or to use table structures to create more complex layouts.
- Do not insert multimedia/video/audio files into a document. Instead store multimedia or reference files in a separate 'Materials' folder and create a link to the file (see demonstration/example exams).
- Avoid changes in page orientation within the same document e.g. Avoid having some pages portrait and others in landscape. Portrait orientation is recommended. It also means text sizes will be larger when the zoom is set to 'page width'.
- Set the zoom to 'page width'. Maximise the document window and set the document view size as 'page width'. Then save the document. This will mean the document will

open full width on most screen sizes. This maximises the readability of text on the screen by default. Students will still be able change the zoom.

- If you require anonymous marking then omit collection of the student name inside the question/response document (see also the 'Admin Guide' document section 'recommended settings > student names').
4. Always test the document in Libre office within the e-Exam system.
- As outlined above, the font set and configuration of the e-Exam system is likely to vary from the word processor you used to prepare the original document.
 - If adjustments are needed then perform the changes in Libre Office/e-exam system. Save the updated file to the answers partition. Then remount the USB (in OSX/Linux) and copy the updated file to the eexam partition. Be sure to prefix the updated file name with "STUDENTNO_" (without quotes).

Spreadsheet document

The section assumes that the exam questions and responses will be contained within a single file. Students will enter their responses in a copy of the exam file that is automatically created when the exam starts, made so the original is preserved.

To prepare materials for a particular exam, it is recommended that you create a new folder to store the materials (on your computer hard drive and/or User drive of the Admin USB).

The overall directory structure is as per the word processor version above with the exception of using a spread sheet instead of a document file.

In the exam specific folder place:

1. **The exam question spread sheet file** that will be opened upon e-Exam start. (Refer to the section 'Guidelines for preparing exam spreadsheet documents').
 - The file name must be prefixed with "STUDENTNO_" (without quotes). E.g STUDENTNO_myexamfile.xls
 - Do **not** put *spaces* in file names because this will break the launch process. Instead use dash or underscores.
 - The question file will be placed into the root of the eexam drive on an e-Exam USB.
2. **Optional: A 'Materials' sub-folder.** Place all other materials related to the exam itself into this sub-folder. It is advisable to setup links from the question file to each of the materials. (See the example exam disk image for an example of a document with links to local files.)
 - The Materials folder will be placed into the root of the eexam drive on an e-Exam USB.
 - See 'Multimedia file formats' for further information on compatible audio, video and image file formats.
3. **The security background wallpaper image.** This needs to be unique per exam sitting.
 - Images need to be PNG and at least 1920 pixels wide by 1280 pixels high.
 - The file must be named ".background.png" (without quotes). This is a 'hidden' file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.
4. **A local configuration file** (see 'Configuring e-Exam system' in the Admin tool guide).
 - The configuration needs to be set to [exam] type=office.
 - The file must be named ".config.txt" (without quotes). This is a 'hidden' file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.

Guidelines for preparing the exam question spreadsheet

1. File format:
 - Use ".xls" format files rather than ".xlsx". The latter are not as well supported by Libre office. If the file is .xlsx then use 'Save As' and select the .xls format when saving a copy.
 - Use .ods (open document spreadsheet) if preparing exam files directly in Libre Office.
 - i. Note, if using Libre Office on Windows or OSX to create the e-exam spreadsheet please note that the same fonts may not be available as in the e-Exam system (See advice regarding use of fonts below).
2. File naming:
 - Do **not** use *spaces* in file names. Instead use underscores _ to separate words in the file name. The e-Exam system may fail to open the document if the file name contains spaces.
 - Prefix the file name with "STUDENTNO_" (without quotes). The e-Exam system requires this text string in order to find and open the correct exam question file.
3. Spreadsheet file editing and layout (see also the 'example' section below):
 - Avoid placing or hiding 'answers' in the spreadsheet. The locking of spreadsheets is far from assured. It is relatively easy for students to view hidden and 'locked' content in a spreadsheet.
 - i. Use a separate spreadsheet file to evaluate responses and calculate grades. Do not place the evaluation (gradebook) spreadsheet on the USB! An example of how to separate the questions and responses from the evaluation and grading process is provided in Hillier and Grant (2018).

- To will help direct student responses to the correct places, establish cells to collect responses.
 - i. Change the background colour to indicate where responses are expected.
 - ii. Lock non-input cells. Lock all cells except those where responses or input is expected. The lock is not a security measure, serves to avoid accidental editing of the spread sheet.
 - Use plain generic/common fonts.
 - i. Set the default 'normal style' to use Times New Roman'.
 - ii. It is best to use Times New Roman for questions and Ariel for response areas. Set response areas to dark blue text also helps students easily identify their own text (See example exams for ideas on question formats/layouts).
 - iii. Font substitution is likely to occur when moving from Windows or MacOS/OSX to Linux (e-Exam system). The use of generic/common fonts will minimise any disruption to formatting because the equivalents on each platform are very similar. However, non-roman character fonts (e.g Chinese, Arabic, Korean etc) are likely to experience greater degree of changes when font substitution occurs because the fonts used are less consistent/common across different systems. In this case reformat the document using Libre Office inside the e-Exam system.
 - Charts do not always convert well from Excel. E.g. you may find that axis labels loose their spread or interval. In this case the chart may need to be edited or recreated in Libre office Calc.
 - Avoid using drawing objects or floating text boxes to hold or position key information or create diagrams or layouts because these are not very 'stable' when opened in LibreOffice / e-exam system. i.e. the positioning of these is likely to change unpredictably. Instead it is best to insert images that contain diagrams or to use the grid of the spread sheet create the layouts.
 - Do not insert multimedia/video/audio files into the question file. Instead store multimedia or reference files in a separate 'Materials' folder and create a link to the file (see demonstration/example exams).
 - Avoid changes in page orientation within the same document e.g. Avoid having some pages portrait and others in landscape. Portrait orientation is recommended. It also means text sizes will be larger when the zoom is set to 'page width'.
 - Set the zoom to 'page width'. Maximise the document window and set the document view size as 'page width'. Then save the document. This will mean the document will open full width on most screen sizes. This maximises the readability of text on the screen by default. Students will still be able change the zoom.
 - If you require anonymous marking then omit collection of the student name inside the question/response document (see also the 'Admin Guide' document section 'recommended settings > student names').
4. Always test the document in Libre office within the e-Exam system.
- As outlined above, the font set and configuration of the e-Exam system is likely to vary from the spread sheet software you used to prepare the original document. Be sure to check layouts, chart details and diagrams using the e-Exam system.
 - If adjustments are needed then perform the changes in Libre Office/e-exam system. Save the updated file to the answers partition. Then remount the USB (in OSX/Linux) and copy the updated file to the eexam partition. Be sure to prefix the updated file name with "STUDENTNO_" (without quotes).

Example spread sheet and evaluation process

Below is an example of using a spread sheet as a form for an offline e-Exam. For further information on this example see Hillier and Grant (2018).

An example question and response collection spreadsheet is shown below. Note: this is no evaluation formulae and no hidden 'answers' in this file.

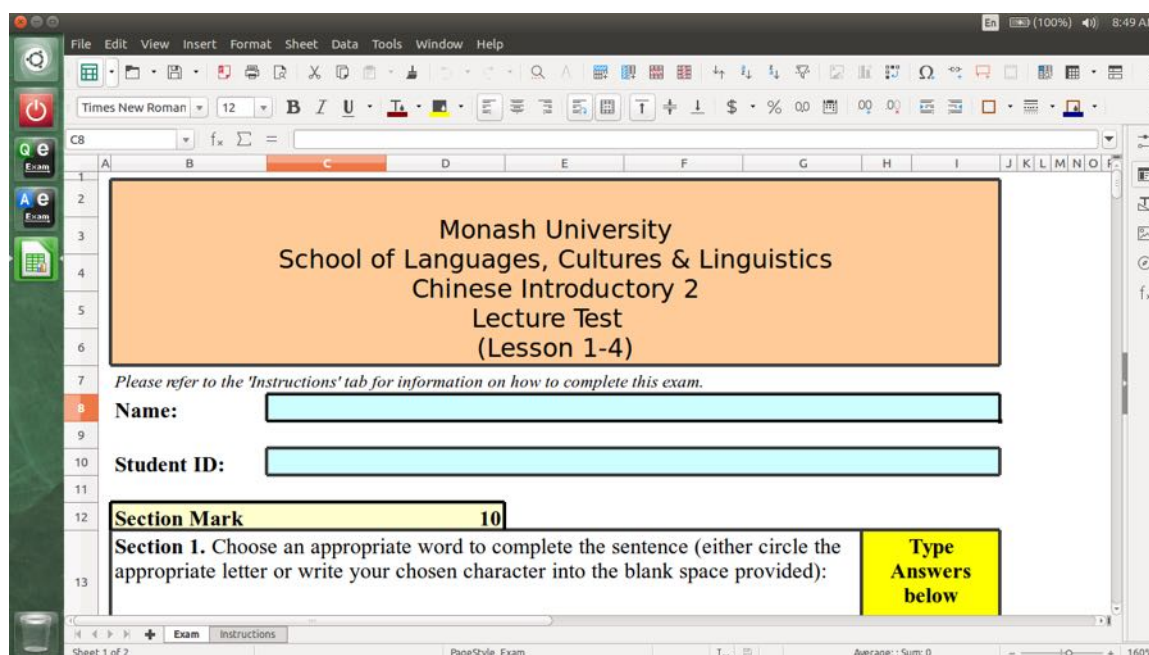


Figure 1 Define input cells in the spread sheet in the style of a form

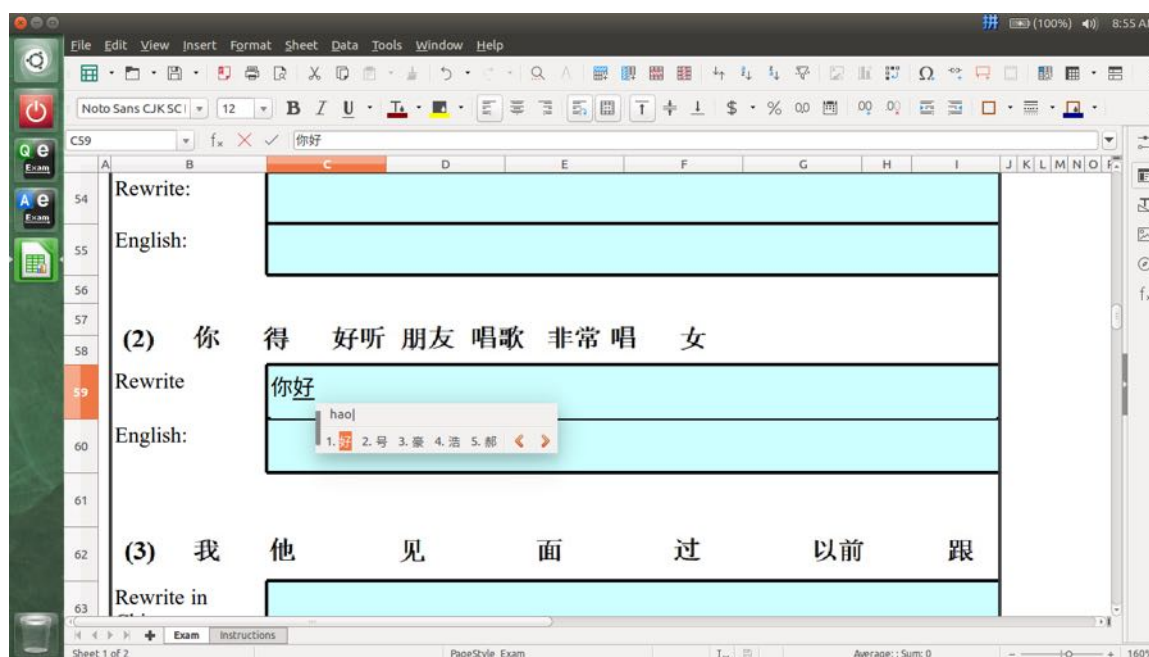


Figure 2 Define response cells in the spread sheet in the style of a form

The workflow to use the spread sheet is outlined next. Note that the evaluation and grading of responses takes place in a separate spread sheet.

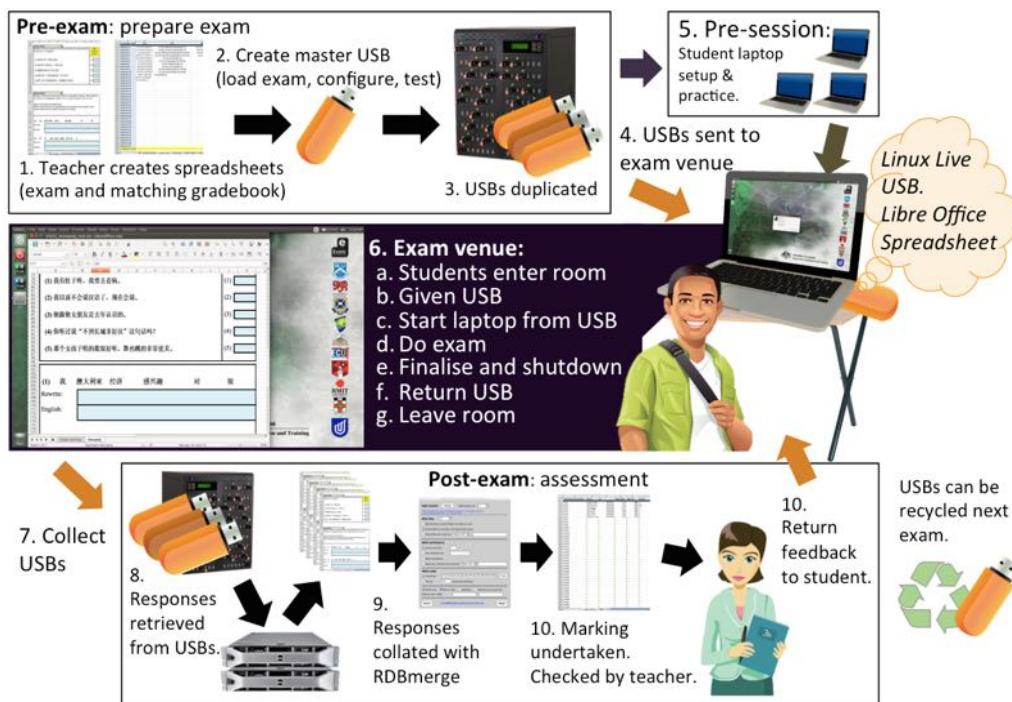


Figure 3 Workflow for offline e-Exam using spread sheet as a form

Note: only the exam question file is placed on the USB. The gradebook file is not put on the USB.

Following the exam, responses are retrieved from individual response files and merged into a single sheet. This can then be evaluated by grade book formulae. The components of a gradebook are shown below.

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11	High		92%	9.22	1.00	1.00	1.00	1.00	1.00	1.00																																																																																																																																																																																																																																																																																																																													
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<p>* Evaluated by a nested formula in excel. It iterates through each possible answer for a given question (pseudo shown). =IF (personname="", "", IF (IFERROR (MATCH (answerkey, response, 0), "na") <>"na", markkey, IF (IFERROR (MATCH (< . . .))))</p>																																																																																																																																																																																																																																																																																																																																							

Figure 4 Division of spreadsheet files for evaluating responses from an offline e-Exam

Online networked exam modes

The section assumes that the exam will be conducted online using the student client e-Exam USB stick configured to use Safe Exam Browser and a suitably configured Moodle server. The questions are presented and the responses will be collected on a networked server.

This type of exam requires a network connection for all students in the exam room.

Unlike off-line exams, there are (*normally) no exam materials provided on the USB stick when an online exam is used.

* unless very large files are to be provided.

Moodle quiz exam

There are two components to prepare:

- Moodle quiz (on the server): The quiz contains the exam questions and other materials that will be provided to the student when they begin the exam. The Moodle quiz will need some specific settings to ensure it is secure.
- The student client USB: There will be a set of configuration files to be placed on the student client USB. The USB need not contain any exam questions or content.

Student client USB configuration

It is recommended that you create a new folder to store the configuration files for each exam (on your computer hard drive and/or User drive of the Admin USB). In the exam specific folder place:

1. **The security background wallpaper image.** This needs to be unique per exam sitting.
 - Images need to be PNG and at least 1920 pixels wide by 1280 pixels high.
 - The file must be named ".background.png" (without quotes). This is a 'hidden' image file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.
2. **A local configuration file** (see the 'Admin tool guide' for detailed configuration instructions).
 - The configuration needs to be set to [exam] type=seb
 - The domain of the Moodle server and file path (URL) to the quiz should be placed at [network] moodle_server= and moodle_path= See 'Admin tool guide' for additional required settings.
 - The file must be named ".config.txt" (without quotes). This is a 'hidden' text file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.
3. **Optional: A network user configuration file** can be used to allow automatic log-on to a WiFi network using a common username and password. E.g. you may elect to set up a special network account for this purpose. (see the 'Admin tool guide' for detailed network configuration instructions).
 - The configuration file must include a username and hashed password (see the 'Admin tool guide' for 'automatic WiFi logon' instructions).
 - The file must be named ".net_user.txt" (without quotes). This is a 'hidden' text file.
 - The file will be placed into the root of the eexam drive on an e-Exam USB.
4. **Optional: A 'Materials' sub-folder for large files.** In general moderately sized files should be embedded in the Moodle quiz questions (e.g. images, audio and short videos). However, if large files are to be provided via links (e.g. large PDF, large video, high definition images, documents, spreadsheets, CAD files, programming code files etc) then it is a good idea to place a copy of these onto the USB within the materials folder. This ensures the files are available to the student even if a network outage was to occur during the exam.
 - Be sure to refer to the location of the files in the Moodle quiz question instructions.
 - The Materials folder will be placed into the root of the eexam drive on an e-Exam USB.
 - See 'Multimedia file formats' for further information on compatible audio, video and image file formats.

Moodle server Quiz setup and configuration



Each exam will need a matching Moodle Quiz.

The Moodle server must be configured to work for 'robust' e-Exams. A standard Moodle server will lack several features (see 'Admin tool guide' for further information).

Be sure to test all elements of the quiz before the exam using an e-Exam USB stick with Safe Exam Browser.

Prepare the quiz questions as per normal Moodle procedures (re https://docs.moodle.org/en/Quiz_module), but note the following:

- If using a separate Moodle server for exams, consider placing a short text question set to zero marks as a space for students to enter their ID information. This can be located at the beginning of the quiz. This helps ensure student identity and responses can be easily connected if responses are exported from the server.
- Embed rather than link multimedia content within questions. This includes images, audio files and short videos. Playable media should be less than 10 minutes duration. This ensures that this content is cached to the student's browser when the exam starts.
 - Linked files will not be cached.
 - Longer media files will not be initially cached beyond the 10 minute mark.
 - See 'Multimedia file formats' for further information on compatible audio, video and image file formats.
- Warning: The hot spots of 'drag-and-drop-into' questions are not defined correctly if these questions appear on secondary pages in the quiz. The symptom is that the hotspots reduce to a single pixel in size. Reloading the page fixes the issue however this would not be successful in the case of a network outage.
- Warning: Third party quiz question plugins have not been tested. In particular if they are properly cached or autosaved when offline. Always test non-standard question types before use in an exam.

Configure Moodle quiz settings:

- Set availability of the quiz to match the time for the exam. This could be also be done manually by hiding/showing the quiz to users. Set the duration (timer) if desired.
- Under 'Extra restrictions on attempts':
 - Require password = whatever you like (recommended for a unified start time and to help prevent unauthorised access from outside the exam room).
 - Require network address = <IP range> (recommended if the IP address range of candidates is known e.g. in a computer lab or WiFi subnet. This increases security by preventing those from outside this range from accessing the quiz. However take care to get this correct otherwise it will prevent legitimate candidates from accessing the quiz).
 - Browser Security = Safe Exam Browser (this is required otherwise any browser can be used!).
 - Experimental fault tolerant mode = yes (this allows work to continue in the event of a network outage or WiFi dropout. The e-Exam system will store responses in an encrypted "*.attemptdata" file on the USB in the event of network failure). This file contains responses entered into quiz form fields (i.e text or numerical responses) and form field selections (i.e multiple choice selections, hot-spot selections etc).
 - Allowed browser keys = the key used for SEB that is part of the e-Exam USB sticks – this key should be different! Do not leave this blank or anyone with a copy of SEB will gain access!

▼ Extra restrictions on attempts

Require password ? Unmask

Require network address* ?

Enforced delay between 1st and 2nd attempts* ? Enable

Enforced delay between later attempts* ? Enable

Browser security* ?

Experimental fault-tolerant mode* ?

Allowed browser keys* ?

Show less...

If you are also configuring, duplicating or managing e-Exam USB sticks please refer to the Admin tool guide' for further information.

Multimedia file formats

To use multimedia in the e-Exam system the following file formats have been tested and are therefore preferred.

Audio files should use .ogg format.

- This file format is supported as an embedded media file on web pages (e.g Moodle quiz, Safe Exam Browser).
- This file format is supported by the media player.
- A free open source audio file format converter "Fre:ac" is available here for all operating systems <https://www.freac.org/en/downloads-mainmenu-33>

Video files should use .ogv format.

- This file format is supported as an embedded media file on web pages (e.g Moodle quiz, Safe Exam Browser).
- This file format is supported by the media player.
- A free open source video file (and audio file) format converter "Handbrake" is available here for all operating systems <https://handbrake.fr/>

Image files should use .png.

- This file format is supported as an embedded media file on web pages (e.g Moodle quiz, Safe Exam Browser).
- This file format is supported by the media player found in the e-Exam system.
- While PNG is recommended, other common web image formats should work just fine: gif, jpg.
- A free open source image editor and file format converter "GIMP" is available here for all operating systems <https://www.gimp.org/downloads/>

PDF files are supported.

- This file format cannot be embedded in web pages – it must be provided as a link or as a copy on the USB.
- This file format is supported by the reader found in the e-Exam system.
- This file format can be created using Libre Office within the e-Exam system.



Office suite file formats supported (document, spreadsheet, presentation, drawing)

The e-Exam system uses a custom build of Libre Office version 5.2.6.2. A full list of file formats supported by Libre office is provided (remember to note the v5 caveat)

https://en.wikipedia.org/wiki/LibreOffice#Supported_file_formats

- These file formats cannot be embedded in web pages – it must be provided as a link or as a copy on the USB.
- Is supported by the office suite found in the e-Exam system.
- These file formats can be created, edited, saved and read using Libre Office within the e-Exam system.

Other file formats

These will depend on the applications that are installed into the e-Exam client USB!



Good luck :-)