

The Course Resource Appraisal Model

A User Guide to the CRAM Tool

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1. Aims and purpose of the tool

As we make the transition from conventional teaching models to running a programme, module or short course wholly online, it is important to consider the extent to which this process is beneficial to both students and staff. If it improves the learning experience but at the cost of increased staff workload, it will be unsustainable; if it improves workload but diminishes the quality of the learning experience, it will be unacceptable.

The critical question for an online course strategy is: can we improve quality without increasing the per-student workload for academic staff, for higher student numbers? The Course Resource Appraisal Model is an online modelling tool that enables a course team to model and test their approach to going wholly online. It elicits the main teaching-learning design ideas and parameters, and summarises the implications of these in terms of the resulting learning benefits and teaching costs. Where the result looks non-viable, the team can experiment with changing any of the parameters and so work out a more effective and sustainable course design.

The term 'module' is used throughout this Guide for a course that provides guided learning for several hours a week, for a few weeks. This is the typical use of the tool, but it is open to the user to make the duration just a few hours, or to plan a programme of courses over a longer period.

This is a modelling tool, so there are no right answers. It is simply a tool for thinking and planning.

2. Introduction

The CRAM tool is available from <http://web.lkldev.ioe.ac.uk/cram/index.html>

The tool starts by asking the user to create a New Module from scratch, or Open a Module that already exists (see Figure 1). Here we assume that

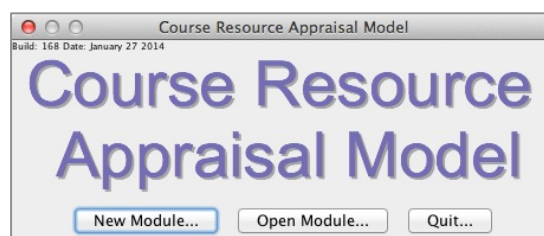


Figure 1: Startup Dialog Box

the user is creating a new module from scratch.

3. New Module dialogue box

The 'New Module' dialogue box contains several sections, as illustrated in Figure 2. The upper section contains basic details of the module. At a minimum you are required to enter the name of the module, the number of credit hours the module provides, and the number of weeks that the module runs.

3.1. Type 1 and Type 2 students

The user is asked to enter the estimated number of Type 1 (e.g. home) and Type 2 (e.g. overseas) students per run, at least for the first run. This allows you to define two distinct groups who pay different fee levels.

New Module				
Module Name		Details		
<input type="text"/>		Tutor Group Size:	<input type="text" value="0"/>	
		Credit Hours:	<input type="text" value="0"/>	
		Number of Weeks:	<input type="text" value="0"/>	
Runs				
		Run 1	Run 2	Run 3
Number of Home Students		<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Home Income for Teaching (per Student)*		<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Number of Overseas Students		<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Overseas Income for Teaching (per Student)*		<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Day rate for lower cost staff*		<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Day rate for higher cost staff*		<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Teaching & Learning Activities				
Activity	Number of Weeks	Weekly Learner Hours	Non-Weekly Learner Hours	Total Learner Hours
<input type="button" value="Add..."/>		<input type="button" value="Delete..."/>		<input type="button" value="Edit..."/>
<input type="button" value="OK"/>				<input type="button" value="Cancel"/>

Figure 2: 'New Module' Dialogue Box

Optionally, you may also enter the Type 1 and Type 2 *teaching-related income per student* for the module, and the daily rates for lower cost and higher cost members of teaching staff. Many university courses make the assumption that the teaching-related income is roughly half the student fee income, because the remainder pays for administrative costs and overheads. This is just an analysis of the teaching-learning activities. Therefore, to test whether the teaching-related costs are viable, the teaching-related share of the income should be entered here. If 100% of the fee pays for the teaching, then the full fee would be inserted here.

As an example, a postgraduate MA degree typically contains six modules. If the home and overseas student fees for the degree were approximately £6000 and £12000, respectively, then the home and overseas student fees for each module would be £1000 and £2000, respectively, and assuming that overheads are charged at 100%, the teaching-related per student income for each module would be £500 and £1000.

3.2. Costs for staffing

The distinction between lower cost and higher cost members of staff often matches the distinction between the member of staff responsible for developing, writing and preparing the course and the member of staff responsible for teaching on the course, guiding students, marking, etc.

A common example is one where there is a course leader who creates the course, and a teaching assistant who takes the course tutorials. In this example, the course leader would probably be the higher cost member of staff, and the teaching assistant the lower cost member of staff¹.

The model only asks for two approximate staffing cost figures, because these are essentially rough estimates to support the design process, not exact budget figures.

For digital development especially, there is often technical support, which may be higher cost or lower cost than the teaching staff. The appropriate split can be entered in the definition of each teaching-learning activity.

3.3. Teaching-learning activities (TLAs)

The lower section of the 'New Module' dialogue box contains a list of Teaching & Learning Activities (TLAs) for the module, which is initially empty. To add a new activity, click the **Add...** button, which takes you through a sequence of dialogue boxes (the TLA Creator Wizard) to provide the description of the activity, outlined in Section 4. When you have entered the activities for the module, the **OK** button of the 'New Module' dialogue box closes the dialogue box and opens a new window that describes the module, as detailed below.

3.4. Module level activities

You can include module-level activities to cover those undertaken by a member of teaching staff, such as staff induction, staff evaluation, module evaluation, module leadership, module administration, module review, setting up the virtual learning environment, assessment-related activities not included under learning hours, and professional development.

On large courses, with several tutors each supporting some proportion of the student cohort, each tutor may be involved in such activities. The Tutor group size is used to calculate the number of tutors, so that module activities calculate these hours across the total number of staff on the course.

¹ A nominal day is often assumed to be 7.5 hours.

4. Creating teaching-learning activities

The (Teaching–Learning Activity) TLA Creator Wizard presents you with a sequence of steps to create a teaching–learning activity. In the first step (shown in Figure 3), you decide whether to browse the existing pre-defined activities, or to create a new activity from scratch.

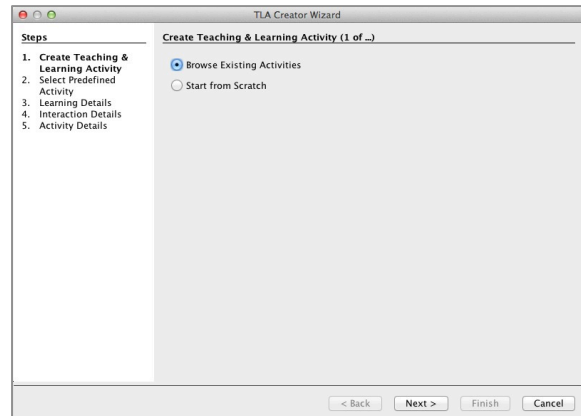


Figure 3: TLA Creator Wizard—First Step

We first describe the user interface flow if you browse existing activities, and then the user interface flow for creating a new activity from scratch.

4.1. Browsing existing TLAs

You are presented with an interface for browsing a collection of predefined TLAs in terms of the type of student interaction and type of feedback to the student. For example, in Figure 4, the user has selected check boxes to browse for an activity that takes place at a specific time for which there is a tutor present, where the tutor provides feedback to the student. The window shows all the predefined activities with those properties. When an activity is selected,

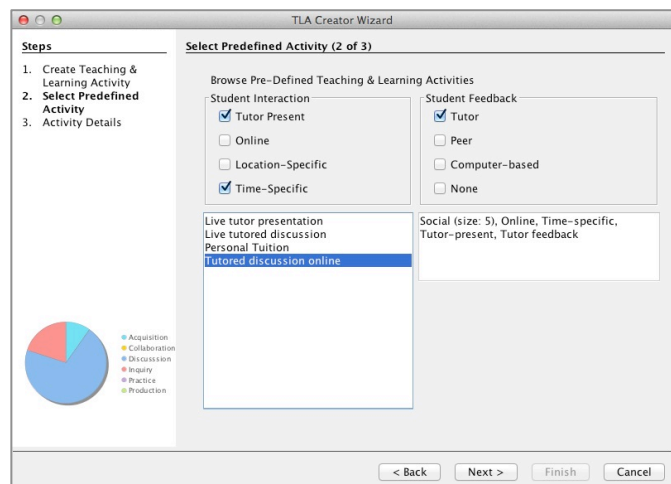


Figure 4: Selecting a pre-defined Teaching-Learning Activity

a description of its characteristics is provided in addition to the distribution of learning types defined for that activity, which is shown in the pie chart. In Figure 4, the user has selected ‘Tutored discussion online’. Here the pie chart is showing that for this TLA the dominant learning type is ‘discussion’, along with learning through ‘inquiry’ (such as asking questions of the tutor) and ‘acquisition’ (such as listening to the tutor’s explanations or watching presentations). It also indicates that the tutor group size is 5. This value is used to estimate total support time. If tutors are supporting small groups, then the total support time will depend on how many there are, calculated by dividing the cohort size by the group size.

In the next step, shown in Figure 5, the wizard prompts you to enter the number of hours spent on this activity by the learner and by members of the teaching staff.

If the activity takes place weekly, enter the number of weeks for which the activity takes place, along with the number of hours per week that the learner is expected to spend on it.

If the activity takes place only once or irregularly (such as fieldwork, or a summative assessment), enter the total number of hours the learner is expected to spend for the whole module on that activity under 'non-weekly hours'.

You can then enter the number of hours it takes teaching staff to prepare the activity for each run, and the number of hours it takes them to support the activity.

For example, in Figure 5 students are expected to spend 3 hours per week over a period of 10 weeks engaged in tutored discussion online. The user estimates that it will take 3 hours per week in the first run of the module for the teacher to prepare for the 3 hours per week of learner time, reduced to 2 hours per week and 1 hour per week in subsequent runs.

Figure 5: TLA Creator Wizard—defining teacher time against learner time

The number of hours per week needed to support the activity (for all the five students who are members of the tutor group) in this case, is 6 hours, that is, twice the number of hours the students are expected to spend (perhaps assuming that the tutor reads and comments on all discussion threads, whereas students will not). This amount is constant across all three runs of the module because the amount of per student, or per group support is assumed to remain stable.

You may also specify the degree to which a lower or higher cost member of teaching staff engages in preparing or supporting this activity. In the example provided, the user estimates that a higher cost member of staff is responsible for preparing the activity (such as designing the resources, questions, and activity roles) for all three runs, whereas a lower cost member of staff is responsible for supporting learners (such as presenting tutorials) for all three runs.

The **Finish** button closes the wizard, and the activity is added to the list of activities in the ‘New Module’ dialogue box shown in Figure 2. From there, the activity can be edited or deleted.

4.2. Creating a new TLA

Instead of browsing existing teaching–learning activities, you can create a new one from scratch (for example, when the list of existing activities is insufficient). The sequence of dialogue boxes is similar to that in section 3.1, with the addition of two extra steps described below.

If you select the option ‘Start from Scratch’ in the first step of the TLA Creator Wizard (as shown earlier in Figure 3), the next step (Figure 6) prompts you to enter the name of the activity, the learning types it elicits and the nature of the learning experience it provides. The learning types for each activity are represented in terms of sliders, in which each slider represents the percentage of each learning type elicited by each activity². The button labelled **Normalise** can be used to make the percentages add up to 100%.

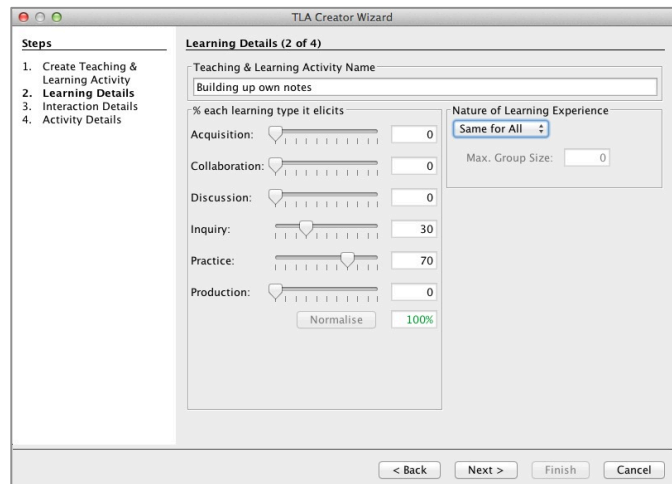


Figure 5: TLA Creator Wizard—entering Learning details for a Teaching–Learning Activity

You can then select the nature of the learning experience for the activity from the drop-down menu of the following options: Personalised, Social and Same for All, with the following definitions.

- A *Personalised* TLA is one in which each student receives feedback from a program, or quiz, or works with a tutor. It assumes that the tutor group size is one student.
- For a *Same for All* activity each student interacts in the same way with a tutor or the materials. The group size is the cohort size for the run of the module.
- For a *Social* activity students are working with other students in a group—this asks you to enter the maximum size of each group (which of course affects the total tutor hours).

² See the Appendix for definitions of learning types.

The next step prompts you to enter the interaction details for the activity: the Student Interaction and nature of the feedback to students, received from tutor, peer or computer, or none. You can select any number of the four kinds of Student Interaction, and one kind of Student Feedback. In Figure 7, we illustrate a completed example for the activity named 'Building up own notes'.

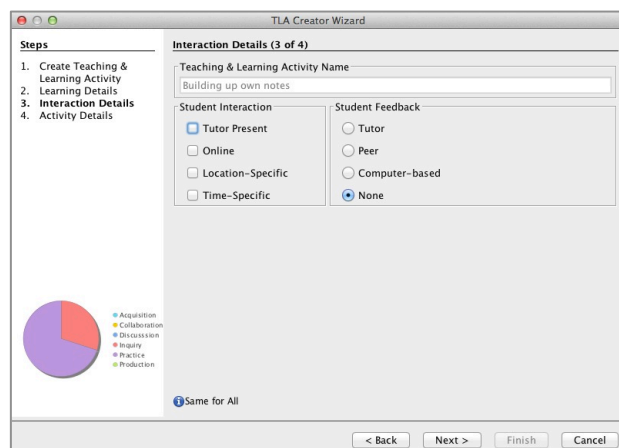


Figure 6: Entering Interaction details for a Teaching–Learning Activity

The final step prompts you to enter the number of hours spent on this activity by the learner and by members of teaching staff. This is the same information as described earlier in section 3.1 (when browsing predefined activities).

The Finish button completes the entry of the details of the new activity, which adds the activity to the list of activities in the 'New Module' dialogue box as described in section 2.

When all the detail of the module and activities have been entered the **OK** button closes the 'New Module' dialogue box and opens a new window with the overview of the module.

5. Open Existing Module

Instead of creating a new module, you can open an existing module. The user is presented with a dialogue box from which to choose a file containing a module description—the file ends with the extension '.mamx'. Example modules can be downloaded from the website.

It is not possible to open a .mamx file directly, only from within the CRAM tool.

6. CRAM Window

The CRAM window provides a display of the data for a single CRAM module. The numeric data are arranged in concertina format tables on the left-hand side of the window, alongside charts and a summary table in the right-hand side, i.e. the header of each 'pane' can expand and collapse.

The following paragraphs describe each pane of the CRAM Window, with reference to Figure 8, in which all panes have been expanded.

6.1. Module Data

The Module Data pane of the CRAM window presents the details of the module as originally entered, as described in section 0 above. You can directly edit all the fields in this pane, which in turn will update the contents of the tables and the charts.

6.2. Student Hours

The Student Hours pane presents a list of the teaching-learning activities in the module in terms of the learner hours assigned to each activity. Each activity is presented as a row in the table, with an additional row that describes the learner hours assigned to self-regulated learning. The program calculates this by subtracting the sum of the total TLA learner hours that have been defined from the number of credit hours defined for the module

The total number of learner hours for an activity is calculated from the product of the number of weeks and the number of hours, and the number of non-weekly hours.

You can edit the details for an activity by double-clicking on a row of the table (except for the row that describes self-regulated learning), or by selecting a row and then accessing the menu option **Activity - Modify Activity....** Either operation gives you a dialogue box in which you can modify the details of the activity.

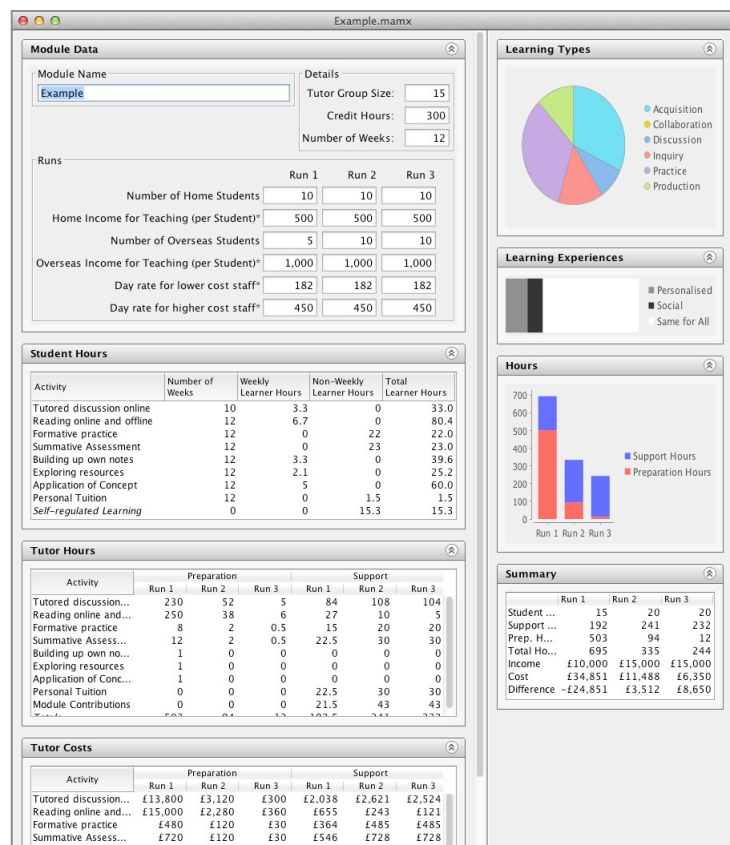


Figure 7: Example Module

You can remove an activity from the module by selecting it in the table and then selecting the menu option **Activity - Remove Activity...** in which case you have the chance to confirm removal of the activity.

Finally, you can add an activity via the menu option **Activity - Add Teaching & Learning Activity...** This operation prompts takes you to the TLA Creator Wizard as described in section 3.

6.3. Tutor Hours

The Tutor Hours pane presents an alternative view of the activities in the module, where the number of tutor hours is displayed.

Tutor hours include the hours spent on preparation and support for each activity, together with time spent on module-level activities.

For each activity, the table presents the number of hours that are required to prepare for the activity and to support it for each of three runs³. The values in the table are calculated in the same way as described in the Student Hours panel.

The calculation of the number of hours to support a run of a teaching–learning activity takes into account the activity’s learning experience. For example, a Social activity may have a tutor group size of 15. If the student cohort for the run is 30, then two tutor groups will be required, and thus the number of hours to support the activity is multiplied by two.

Likewise, the calculation of the number of hours to support a run of a **module-level activity** takes into account the number of tutor groups for the module as a whole. For example, if the tutor group size for the module is 20, and the student cohort for a run is 40, then the calculation assumes that two tutors will undertake the module activity.

The user may edit the details of the teaching-learning and module activities in the same way as described for the Student Hours pane. Similarly, the user may remove an activity by selecting it in the table and using the menu option as described above.

³ A Module-level Activity does not require separate preparation/support times.

The user may add a teaching-learning activity to this table as described for the Student Hours pane, and add a Module Activity via the menu option **Activity - Add Module Activity....** This prompts you to complete the details for the module activity as illustrated in Figure 9. The dialogue box is similar to the one described earlier, except in this case there are no learner hours or teacher preparation time.

	Hours per Week	Non-Weekly Hours	Higher Cost Staff	Lower Cost Staff
Run 1:	0	0	0%	100%
Run 2:	0	0	0%	100%
Run 3:	0	0	0%	100%

Figure 8: New Module Activity Dialogue Box

6.4. Tutor Costs

The Tutor Costs pane presents a similar view to that of the Tutor Hours pane, but displays the costs of preparing and supporting the module’s activities. For each activity, the table presents the cost incurred to prepare and support the activity for each of three runs⁴. The values are calculated as in the Tutor Hours pane, but include the percentage allocation to lower and higher cost members of staff, along with their respective day rates⁵.

6.5. Learning Types Chart

The Learning Types Chart is a pie chart that summarises the distribution of learning types for the module. You can hover the cursor above a segment of the pie chart to view the name of the segment in addition to the percentage of learning type that the module elicits. An example is shown in Figure 10. See Appendix 2 for the definitions and origin of these learning types.

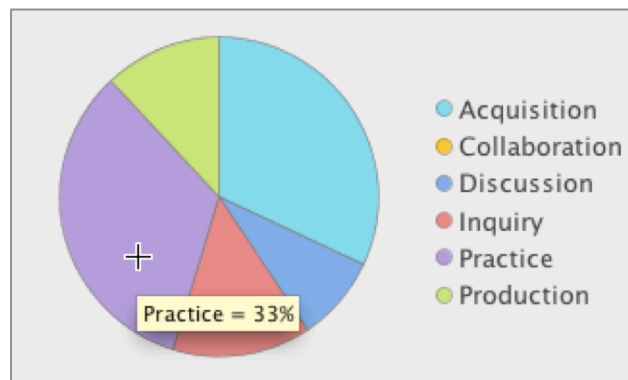


Figure 10: Learning Types Chart

⁴ A Module Activity does not require separate preparation/support times.

⁵ A nominal day is considered to be 7.5 hours.

6.6. Learning Experiences Chart

The Learning Experiences Chart summarises the distribution of learning experiences for the module. You can may hover the cursor over a segment of the bar chart to view the name of the segment in addition to the percentage of learning experience that the module provides. An example is shown in Figure 11.

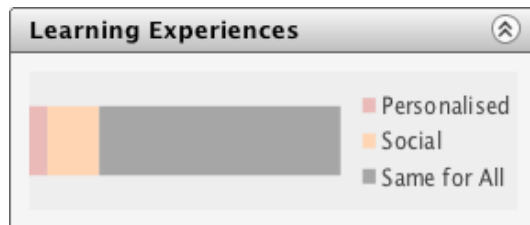


Figure 11: Learning Experiences Chart

6.7. Hours Chart

The Hours Chart is a stacked bar chart that summarises the amount of time spent by teaching staff preparing and supporting a module for all runs. You can hover the cursor over a bar of the chart to view the name of the bar in addition to the number of hours that it represents. An example is shown in Figure 12.

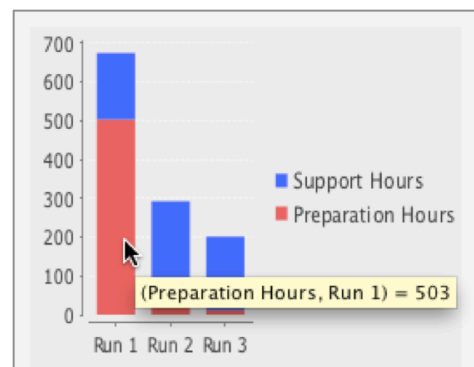


Figure 12: Hours Chart

6.8. Summary Table

The Summary Table presents a description of the module in terms of the total number of students, the hours required to prepare and support the module, the teaching-related income received and the costs incurred, and also the difference between the income and costs, for each run of the module, as in Figure 13 for a short course.

	Run 1	Run 2	Run 3
Student Nos	10	15	20
Prep. Hours	14	5	5
Support Hours	16	27	32
Total Hours	30	32	37
Income	£1,250	£1,875	£2,500
Cost	£1,157	£884	£1,005
Difference	£93	£991	£1,495

Figure 13: Summary table

7. Contact

The CRAM tool is part of the Learning Designer project, which is developing learning design tools to support teachers' collaborative innovation (<http://buildingcommunityknowledge.wordpress.com/>).

The CRAM tool is still in development, so we would very much appreciate your feedback, comments and suggestions for further development. Please contact Diana Laurillard (d.laurillard@ioe.ac.uk).

8. Acknowledgements

The underlying model of the CRAM tool was developed as part of the LDSE project (RES-139-25-0406 Technology enhanced Learning) funded by ESRC/EPSRC. The current development as a stand-alone tool is funded through the Higher Education Innovation Fund at the Institute of Education. The tool is freely available and is open source, under version 2.0 of the Apache License, from <https://github.com/designing4online/course-resource-assessment-modelling>

9. Appendix 1: Sample report output

The tool exports the data to a structure Word document, for editing into course documentation, as needed. The format is shown here.

Course Resource Appraisal Statistics Summary

Module name: Standard Online 300hr MA

Number of weeks: 10

Number of credit hours: 300

Tutor group size: 15

Estimated number of home students in first presentation: 20

Estimated number of overseas students in first presentation: 0

Estimated home student teaching-related income in first presentation: 1000

Estimated overseas student teaching-related income in first presentation: 0

Learning Activities

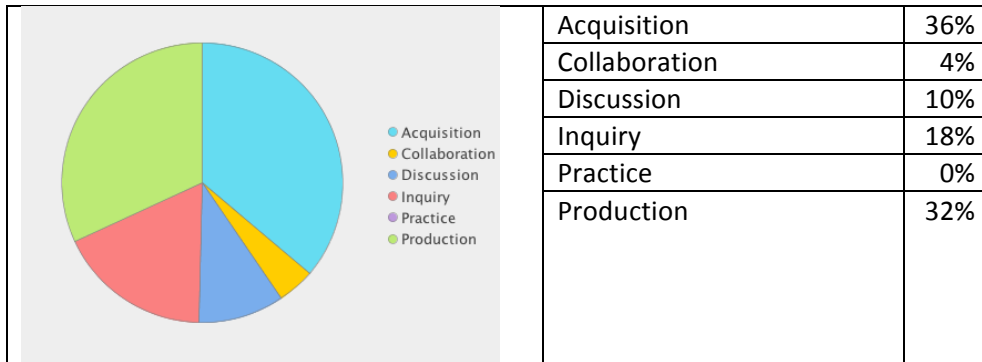
Number of learner hours online: 62

Number of learner hours face-to-face: 0

NB: this is a real example from a module, not a model for others to follow

Teaching-Learning Activity	Group Size	Number of Weeks	Weekly Learner Hours	Non-Weekly Learner Hours	Total Learner Hours
Preparation	20.0	10.0	1.0	0.0	10.0
Background Reading	20.0	0.0	0.0	66.0	66.0
Listen to pre-recorded lectures (or similar audio)	20.0	10.0	1.0	0.0	10.0
Reading online discussions	15.0	10.0	1.0	0.0	10.0
Contributing to online discussions	15.0	10.0	1.0	0.0	10.0
Participation in online discussion	15.0	10.0	2.0	0.0	20.0
Finding scholarly resources online	20.0	10.0	1.0	0.0	10.0
Tutorial time (asynchronous, via email)	1.0	0.0	0.0	2.0	2.0
Preparing assignment	20.0	0.0	0.0	90.0	90.0
Finding non-academic resources online	20.0	10.0	1.0	0.0	10.0
Self-regulated Learning	1.0	0.0	0.0	0.0	62.0
Totals	0.0	0.0	0.0	0.0	300.0

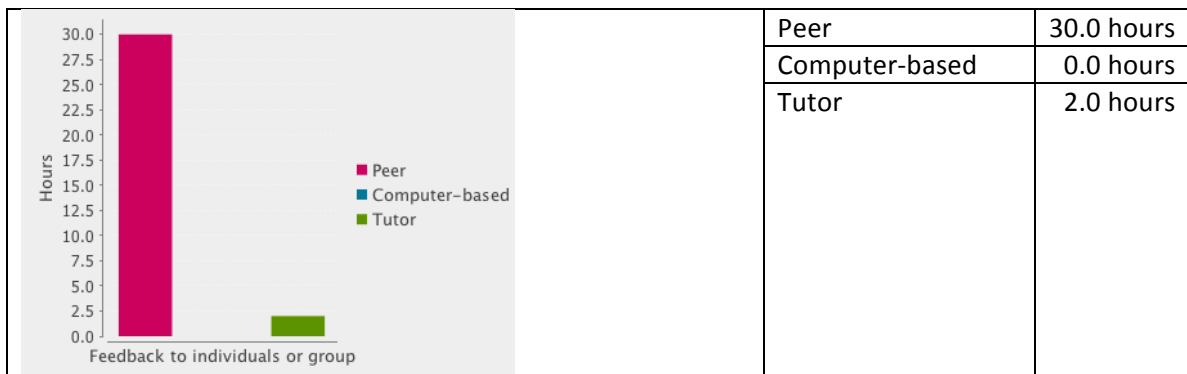
Learning Types



Learning Experience

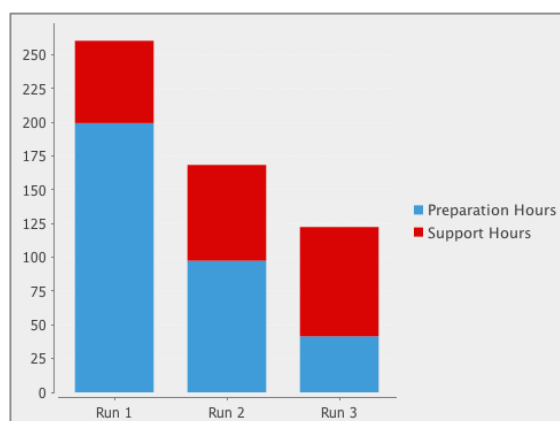


Source of Learner Feedback



Tutor Hours

	Run 1	Run 2	Run 3
Lower Rate Prep. Hours	0	0	0
Higher Rate Prep. Hours	200	98	42
Lower Rate Support Hours	61	71	81
Higher Rate Support Hours	0	0	0



Tutor Preparation Hours

Activity	Run 1	Run 2	Run 3
Preparation	3.0	1.0	1.0
Background Reading	150.0	66.0	10.0
Listen to pre-recorded lectures (or similar audio)	10.0	1.0	1.0
Reading online discussions	1.0	1.0	1.0
Contributing to online discussions	0.0	0.0	0.0
Participation in online discussion	10.0	10.0	10.0
Finding scholarly resources online	10.0	10.0	10.0
Tutorial time (asynchronous, via email)	0.5	0.5	0.5
Preparing assignment	5.0	3.0	3.0
Finding non-academic resources online	10.0	5.0	5.0
Totals	199.5	97.5	41.5

Tutor Support Hours

Activity	Run 1	Run 2	Run 3
Preparation	0.0	0.0	0.0
Background Reading	0.0	0.0	0.0
Listen to pre-recorded lectures (or similar audio)	0.0	0.0	0.0
Reading online discussions	10.0	10.0	10.0
Contributing to online discussions	10.0	10.0	10.0
Participation in online discussion	0.0	0.0	0.0
Finding scholarly resources online	0.0	0.0	0.0
Tutorial time (asynchronous, via email)	40.0	50.0	60.0
Preparing assignment	1.0	1.0	1.0
Finding non-academic resources online	0.0	0.0	0.0
Totals	61.0	71.0	81.0

Cost of Teaching Time

Cost of Preparation

Activity	Run 1	Run 2	Run 3
Preparation	£180	£60	£60
Background Reading	£9,000	£3,960	£600
Listen to pre-recorded lectures (or similar audio)	£600	£60	£60
Reading online discussions	£60	£60	£60
Contributing to online discussions	£0	£0	£0
Participation in online discussion	£600	£600	£600
Finding scholarly resources online	£600	£600	£600
Tutorial time (asynchronous, via email)	£30	£30	£30
Preparing assignment	£300	£180	£180
Finding non-academic resources online	£600	£300	£300
Totals	£11,970	£5,850	£2,490

Cost of Support

Activity	Run 1	Run 2	Run 3
Preparation	£0	£0	£0
Background Reading	£0	£0	£0
Listen to pre-recorded lectures (or similar audio)	£0	£0	£0
Reading online discussions	£243	£243	£243
Contributing to online discussions	£243	£243	£243
Participation in online discussion	£0	£0	£0
Finding scholarly resources online	£0	£0	£0
Tutorial time (asynchronous, via email)	£971	£1,213	£1,456
Preparing assignment	£24	£24	£24
Finding non-academic resources online	£0	£0	£0
Totals	£1,480	£1,723	£1,966

Summary

	Run 1	Run 2	Run 3
Student Nos	20	25	30
Prep. Hours	199	97	41
Support Hours	61	71	81
Support Hours per Student	3	2	2
Total Hours	260	168	122
Income	£20,000	£25,000	£30,000
Cost	£13,450	£7,573	£4,456
Support Cost per Student	£74	£68	£65
Difference	£6,550	£17,427	£25,544

10. Appendix 2: Definitions of learning types

Learning type	Learning through	Teacher's role
Acquisition	<p>Reading a text, book, paper, website, electronic text...</p> <p>Watching a teacher, demo, model performance, video...</p> <p>Listening to a teacher, discussion, radio, podcast, audio book...</p>	<p>Encourage attention and interest with a clear structure</p> <p>Make the ideas and information relevant</p> <p>Provide illustrations</p> <p>Link the content to their experience</p>
Collaboration	<p>Working in pairs or groups to produce a shared output, combining discussion and practice to reflect on how best to produce the performance, design, text, picture, report, video, diagram...</p>	<p>Define the goal of the collaboration</p> <p>Ensure they get feedback that helps them improve what they produce</p> <p>Guide them on how to work together</p>
Discussion	<p>Discussing, debating, with each other or with the teacher, describing what they know, responding to questions, asking questions, listening, commenting, challenging, critiquing, negotiating ideas...</p>	<p>Guide the focus and process of the discussion</p> <p>Suggest whether it takes the form of a debate or a dialogue</p> <p>Ensure the students challenge and comment appropriately</p>
Inquiry	<p>Investigating and inquiring into books, papers, audio–visual, physical, and digital resources with a specific goal to, e.g. find information, solve a problem, answer a question...</p>	<p>Make the resources accessible</p> <p>Provide a focus for the investigation</p> <p>Guide the students in the process of the inquiry</p>
Practice	<p>Doing something (an exercise, using a tool, an educational game, making something) to achieve a goal, by using their knowledge and using the feedback on what they do to improve their knowledge and skill...</p>	<p>Ensure the experience and practice links to the goal,</p> <p>Ensure they get feedback from the environment, a peer, or the teacher, to help them reflect and improve</p>
Production	<p>Producing a text, performance, design, picture, video, diagram, report, by reflecting on their reading, investigations, discussions, practice or collaboration</p>	<p>Define what the product should be</p> <p>Make sure it draws on previous learning or experience and relates to the learning outcome</p> <p>Set the criteria of what counts as a good product of their learning</p> <p>Offer good examples</p> <p>Provide feedback</p>

See Laurillard, D. (2012). *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology*. New York and London: Routledge.