Appendix A. Educational Scalability Analysis Instrument (ESAI)

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This instrument is developed by researchers of the Dutch Open University from the SOONER project (www.sooner.nu). Information regarding the theoretical framework of this instrument can be found in the associated journal article (Kasch, Van Rosmalen & Kalz, 2017). As explained in the article, designing scalable MOOCs and providing formative assessment and feedback in MOOCs is a challenge. This instrument has been developed to provide insight into educational designs of MOOCs in particular and can be used by MOOC designers, teachers but also students to get insight into the scalability of the course design. The instrument was used in a pilot study to identify scalable best practices and the results can be found in (Kasch, Van Rosmalen & Kalz, 2017).

The instrument is divided into five sections with each a different focus: background information of the MOOC, student-teacher interaction, student-student interaction, student-content interaction, final general questions. Depending on the design of the course it will take you approximately 60 minutes to analyse it with this instrument. To make the analysis manageable we only analysed one week or one module (referred to as Unit of Learning (UoL) in this instrument) of a MOOC. Additionally, only those UoL's were analysed which contained any form of formative assessment and feedback. The instrument provides you both with qualitative/descriptive as well as quantitative information about the educational scalablity of a UoL. Especially the detail questions will provide you with additional in-depth information which can enrichen your analysis. The following items can be used for quantitative analysis: 6b, 7, 9, 10, 11, 16, 17, 18, 25, 26. The answer options from these items are linked to scores ranging from 1 to 4. The low(er) the score the less it adds to a scalable course design with the focus on formative assessment and feedback.

A. Background information and complexity levels

In the first section of this instrument you will write down some general background information of the MOOC and analyse the complexity level of the learning goals and learning activities of the chosen UoL.

1. Name of the reviewer and date of analysis (dd-mm-yy)

2. Weblink and name of the MOOC

3. Domain
Choose one of the following options
○ Education & Teaching

○ Programming

○ Health & Medicine

○ Business & Management

○ Humanities

○ other

4. Name/title Unit of Learning (UoL)

5. The UoL takes place in the ___ week of the MOOC

6. To what extent are the learning goals of the Unit of Learning (UoL)/MOOC explicitly mentioned?
Choose one of the following answers

○ very high extent

○ high extent

○ low extent

○ no learning goals are stated

Comments:

Additional information regarding item 6:

Depending on the course learning goals are given on several levels, e.g. course level, week level, task level. If there are no learning goals stated on the Unit of Learning level we used the learning goals on the MOOC level, i.e. learning goals that were given at the beginning of the MOOC.

A learning goal should give information on four components:

1. behavior: what should students do with the learning material? Indicated via verbs that indicate the activity you expect the students to do.

2. content: indicate very precisely on which content the student has to perform the activity. Not: Statistical quantities; but for example: the average

3. requirements: under which terms does the student have to perform, for example by using SPSS? The requirements/terms influence the behavior and learning activities

4. standard: what is the needed minimum performance for students to succeed in the learning goal? What does the student need to do to reach the learning goal?

*very high extent: All four components are included/mentioned in the learning goals

*high extent: The four components are partly/largely included in the learning goals

*low extent: The four components are (not) explicitly mentioned in the learning goals

*no learning goals are stated: Students are not informed about the learning goals of the MOOC or the UoL

Q6b. What do you assume is the highest complexity level of the learning goals?
Choose one of the following answers

○ Knows (score 1) The student demonstrates factual knowledge

○ Knows how (score 2) The student demonstrates knowledge application. Shows that (s)he understands the material

○ Shows how (score 3) The student demonstrates learning. Shows that (s)he can apply knowledge and skills within a defined context

○ Does (score 4) The student performs in practice. Shows that (s)he can apply knowledge and skills in (related) real world problems that are ill-structured

Comments:

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Q7. The set of learning activities provided in the UoL operate and are assessed at the complexity level (indicate the highest level applicable):
Choose one of the following answers

○ Knows (score 1) The student demonstrates factual knowledge

○ Knows how (score 2) The student demonstrates knowledge application. Shows that (s)he understands the material

○ Shows how (score 3) The student demonstrates learning. Shows that (s)he can apply knowledge and skills within a defined context

○ Does (score 4) The student performs in practice. Shows that (s)he can apply knowledge and skills in (related) real world problems that are ill-structured

Comments:

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Additional information regarding item 6b:

The division of complexity levels of the learning goals and learning activities is based on Miller's Pyramid (1990) starting by the lowest complexity level (knows) and ending by the highest complexity level (does):

(1) Knows: The knowledge a student must have.
• Examples of actions the student has to perform: name, identify, sum up, repeat, read, give a definition, name the method, label, underline

(2) Knows how: The student knows how to apply his/her knowledge.
• Examples of actions the student has to perform: declare, explain, interpret, plan, put in order, select, summarize, give an example of, identify inconsistencies, comparison between, combine, state differences between

(3) Shows how: The student shows that he/she can use his/her knowledge in a simulated situation.
• Examples of actions the student has to perform: demonstrate, apply, use, perform, construct, design, organize, make a plan, invent, chair meetings, discuss, evaluate, defend, analyse

(4) Does: The student shows that he/she can use his/her knowledge in everyday practice.
• Examples of actions the student has to perform: are the same as for the 'shows how' level

If the course does not state learning goals on the UoL level (on a module of weekly level) than use the learning goals that were given for the entire course/MOOC. Depending on the clarity of the learning goals it can be difficult to identify their complexity level. Therefore it can help to use the learning activities of the UoL as a guideline for the complexity.

Additional information regarding item 7:

The division of complexity levels of the learning goals and learning activities is based on Miller's Pyramid (1990) starting by the lowest complexity level (knows) and ending by the highest complexity level (does). See additional information item 6b!

B. Student-Teacher interaction

The following items will help to investigate aspects of Student-Teacher (S-T) interaction with the focus on formative assessment and feedback.

Q8. The teacher has the role of providing formative feedback to the students:
Choose one of the following answers

⊙ Yes

⊙ No

*If the answer is no, continue with section C Student-Student interaction

Q8b. If the teacher does provide formative feedback, describe the context in which feedback is given. Does the formative feedback relate to the learning activity with the highest complexity level or not?

Q9. The feedback role of teacher in this UoL is clearly explained i.e. when, how it matches with the assignment, and with what criteria:

⊙ Very little (score 1) The design doesn't give information about whether, when, how and on what the teacher will provide feedback to the students.

⊙ Somehow (score 2) The design gives the students some information about when, how and with what criteria the teacher provides feedback. However, not everything is communicated clearly.

⊙ Much (score 3) The design gives clear information about when, how and on what criteria the teacher will provide feedback. It might also be mentioned how the students should apply/use the feedback.

⊙ Very much (score 4) In the design the criteria of score 3 are met but additionally it is explained how the student should apply/use the feedback. It might also be clear how elaborated the teachers feedback is.

Additional information regarding item 8:
We speak of S-T interaction when students and/or teachers interact with each other. Video's or worked examples that are created by the teacher beforehand during the course development independently of student input will are not considered as S-T interaction but rather labeled as Student-Content (S-C) interaction (see section C). Only learning materials or reactions that are made by the teacher as reaction to student's input such as a live hangout, personal feedback or forum reactions are considered as S-T interaction.

In this instrument, formative assessment and/or formative feedback is used in a liberal way. Any communication aiming at responding, guiding or giving feedback on a student's input such as happens in forums is seen as formative feedback. Any details will be sorted out in subsequent questions.
The goal of formative assessment and feedback is to support student learning and not to assess it.

Additional information regarding item 8b:
Does the student receive feedback on the learning activity with highest complexity level or is the feedback provided on another learning activity. Check your answer on item 7 to see whether the feedback is related to that learning activity or not.

Q10. The feedback role of the teacher in this UoL is sensitive to the number of students:

○ Very little (score 4) The design enables/supports the teacher in providing feedback to larg(er) numbers of students at once in an effective way.

○ Somehow (score 3) The design enables/supports the teacher in providing feedback to larger groups seperately.

○ Much (score 2) The design does not enable/support the teacher in providing feedback to small numbers/groups of students at a time.

○ Very much (score 1) The design does only enable/support the teacher in providing feedback to one student at a time.

Comments:

Q11. The formative assessment and feedback is specific and explains and elaborates on weak and strong points:
Choose one of the following answers

○ Very little (score 1)

○ Somehow (score 2)

○ Much (score 3)

○ Very much (score 4)

Additional information regarding item 11:

Very little (score 1) = Feedback simply indicates whether the answer is strong **or** weak or correct **or** incorrect by providing a score or a check mark/cross.

Somehow (score2) = Same as score 1 but additionally provides a short explanation why the feedback is either correct **or** incorrect.

Much (score 3) = Same as score 2 but provides an explanation for why the answer is correct (strong) **and** why it is incorrect (weak).

Very much (score 4) = Same as score 3 but additionally provides information on how the answer could be improved.

Q11b. The teacher´s formative feedback is supported with:
Check any that apply

☐ nothing

☐ rubrics/examples

☐ content orient hints

☐ process orient hints

Comments:

Q12 Detail question: In the UoL, the teacher provides the following form of formative feedback
Check any that apply

☐ Feed-up (indicates where the student is going in terms of given evaluation criteria and standards)

☐ Feedback (indicates how the student performed at this learning activity; progress will be discussed)

☐ Feed-forward (indicates which approach is needed in order to grow and meet the evaluation criteria)

Comments:

Q13. Detail question: In this UoL, the teacher provides formative feedback...
Check any that apply

☐ whilst the students are carrying out a task

☐ after students have completed/send in a task

Comments:

Additional information regarding item 12:
We used the three feedback types as Hattie & Timperley (2007) distinguish them.

Additional information regarding item 13:
Whilst students are carrying out the task: feedback is provided during the learning process or during a task. Think of formative feedback that is provided during forum discussions.

After students have completed/send in a task: feedback is not provided whilst the student is doing a task but afterwards

Q14. Detail question: In the UoL, the teacher provides formative feedback via the following tool(s)...(give a short description)
Check any that apply

☐ a worked example/template

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[                                                        ]
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☐ a rubric

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[                                                        ]
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☐ an instruction video

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[                                                        ]
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☐ a live hangout

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[                                                        ]
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☐ email

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[                                                        ]
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☐ other, namely

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[                                                        ]
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C. Student-Student interaction

The following items will help to investigate aspects of Student-Student (S-S) interaction with the focus on formative assessment and feedback.

Q15. Students have the role of providing peers with formative feedback:
Choose one of the following answers

○ Yes

○ No

*If the answer is no, continue with section D. Student-Content interaction

Q15b. If the student does provide formative feedback, describe the context in which feedback is given. Does the feedback relate to the learning activity with the highest complexity level or not?

Q16. The peer-feedback role of the student in this UoL is clearly explained i.e. when, how it matches with the assignment and with what criteria:
Choose one of the following answers

○ Very little (score 1) The design does not give information on what, to whom, when, how and with what criteria the students have to provide peer-feedback.

○ Somehow (score 2) The design gives some information on what, to whom, when, how and with what criteria the students have to provide peer-feedback. However, not everything is communicated clearly.

○ Much (score 3) The design communicates the criteria of score 2 clearly and might also mention how the students should apply/use the peer-feedback.

○ Very much (score 4) The design has met the previous listed criteria of score 3 but also provides students with a training about how to provide peer-feedback.

Additional information regarding item 15:

Students can learn together, provide to but also receive from each other formative feedback. Students can provide each other with formative feedback in several ways and via different tools such as a forum. However, a forum in itself is not scored regarded as S-S interaction per se. Only, if students have received a clear task/role to provide peer's with formative feedback this item can be scored with 'yes'.

Additional information regarding item 15b:

Does the student receive feedback on the learning activity with <u>highest complexity level</u> or is the feedback provided on another learning activity. Check your answer on item 7 to see whether the feedback is related to that learning activity or not.

Q17. Detail question: Students know with what goal they have to provide peer-feedback:
Choose one of the following answers

○ Very little (score 1) The goals for giving peer-feedback are not mentioned.

○ Somehow (score 2) The goals for providing peer-feedback are vaguely mentioned. There is room for interpretation.

○ Much (score 3) The goals for providing peer-feedback are clearly mentioned and explained.

○ Very much (score 4) The goals for providing peer-feedback are clearly mentioned, explained and supported by an example.

Q18. The peer-feedback is specific and explains and elaborates on weak and strong points:
Choose one of the following answers

○ Very little (score 1)

○ Somehow (score 2)

○ Much (score 3)

○ Very much (score 4)

Q18b. The peer feedback is supported with:
Check any that apply

☐ nothing

[ ]

☐ rubrics/examples

[ ]

☐ content oriented hints

[ ]

☐ process oriented hints

[ ]

Additional information regarding item 18:

Very little (score 1) = Feedback simply indicates whether the answer is strong **or** weak or correct **or** incorrect by providing a score or a check mark/cross.

Somehow (score2) = Same as score 1 but additionally provides a short explanation why the feedback is either correct **or** incorrect.

Much (score 3) = Same as score 2 but provides an explanation for why the answer is correct (strong) **and** why it is incorrect (weak).

Very much (score 4) = Same as score 3 but additionally provides information on how the answer could be improved.

Q19. Detail question: The student gets prepared/trained to give peer-feedback:
Check any that apply

☐ via guidelines on how to use the tool

[   ]

☐ via an instruction video

[   ]

☐ via a training in how to formulate formative feedback

[   ]

☐ other

[   ]

☐ the student gets not prepared

[   ]

Q20. Detail question: In this UoL peer-feedback is structured as follows...(explain)
Check any that apply

☐ the student is automatically assigned to a group

[   ]

☐ the student receives peer-feedback in turn for providing it

[   ]

☐ other, namely:

[   ]

Q21. Detail question: In this UoL, the students provide peer-feedback...
Check any that apply

☐ whilst the peer is carrying out a task

[   ]

☐ after the peer has completed/send in a task

[   ]

Additional information regarding item 21:

Whilst student is carrying out the task: feedback is provided during the learning process or during a task. Think of formative feedback that is provided during forum discussions.

After the student has completed/send in a task: feedback is not provided whilst the student is doing a task but afterwards

Q22. Detail question: In the UoL, the student provides the following form of formative feedback:
Choose one of the following answers

○ Feed-up (indicates where the peer is going in term of given evaluation criteria and standards)

○ Feedback (indicates how the peer performed at a learning activity; progress will be discussed)

○ Feed-forward (indicates which approach is needed in order to grow and meet the evaluation criteria)

Comments

Q23. Detail question: In the UoL, the student provides peer-feedback via the following tool(s). Explain:

☐ a worked example/a template

☐ a rubric

☐ an instruction video

☐ a live hangout

☐ email

☐ other, namely

Additional information regarding item 22:
We used the three feedback types as Hattie & Timperley (2007) distinguish them.

D. Student-Content interaction

The following items will help to investigate aspects of Student-Content (S-C) interaction with the focus on formative assessment and feedback.

Q24. The learning environment has the role of providing students with formative feedback.

○ Yes

○ No

If the answer is no, you can continue with section E. Final questions

Q24b. If the learning environment does provide formative feedback, describe the context in which feedback is given. Does the feedback relate to the learning activity with the highest complexity level or not?

Q25. The feedback role of the learning environment in this UoL is clearly explained to the students:
Choose one of the following answers

○ Very little (score 1) The design doesn't give information about on what, to whom, when, how and on what criteria the learning environment provides feedback.

○ Somehow (score 2) The design gives the students some information on the criteria listed in score 1 however, not everything is communicated clearly.

○ Much (score 3) The design gives clear information on the criteria listed in score 1.

○ Very much (score 4) The design has met the criteria of score 3 but also provides information about students should apply/use the feedback.

Comments

Additional information regarding item 24:

In MOOCs, the learning environment can provide formative assessment and feedback in several ways. For instance, the learning environment can react to the students' behaviour during a simulation, quiz, within a intelligent bot etc., or provide students with learning material such as worked examples which originally are created by the teacher but distributed via the environment without personal interference from the teacher and without adapting to individual student input.

Additional information regarding item 24b:

Does the student receive feedback on the learning activity with highest complexity level or is the feedback provided on another learning activity. Check your answer on item 7 to see whether the feedback is related to that learning activity or not.

Q26. The formative feedback of the learning environment is specific and explains and elaborates on weak and strong points:
Choose one of the following answers

○ Very little (score 1)

○ Somehow (score 2)

○ Much (score 3)

○ Very much (score 4)

Q26b. The formative feedback of the learning environment is supported with:
Check any that apply

☐ nothing

☐ rubrics/examples

☐ content oriented hints

☐ process oriented hints

Q27. Detail questions: In the UoL, the learning environment provides formative feedback via the following tool(s). Explain:

☐ a simulation/game

☐ an automated answer

☐ a worked example

☐ other, example

Additional information regarding item 26:

Very little (score 1) = Feedback simply indicates whether the answer is strong **or** weak or correct **or** incorrect by providing a score or a check mark/cross.

Somehow (score 2) = Same as score 1 but additionally provides a short explanation why the feedback is either correct **or** incorrect.

Much (score 3) = Same as score 2 but provides an explanation for why the answer is correct (strong) **and** why it is incorrect (weak).

Very much (score 4) = Same as score 3 but additionally provides information on how the answer could be improved.

Q28. Detail question: In the UoL, the learning environment provides the following form of formative feedback:
Check any that apply

○ Feed-up (indicates where the peer is going in term of given evaluation criteria and standards)

○ Feedback (indicates how the peer performed at a learning activity; progress will be discussed)

○ Feed-forward (indicates which approach is needed in order to grow and meet the evaluation criteria)

Comments

Q29. Detail question: In the UoL, the learning environment provides formative feedback:
Check all that apply

☐ Implicitly, whilst students are carrying out the learning activity, e.g. simulation reacts to student's behaviour

☐ Explicitly, whilst students are carrying out the learning activity, e.g. feedback is given in a clear and obvious way

☐ After the learning activity is completed

☐ Unknown

Comments

Additional information regarding item 28:
We used the three feedback types as Hattie & Timperley (2007) distinguish them.

Additional information regarding item 29:
Feedback can be given both implicitly and explicitly. Implicit feedback is not often perceived as feedback. In a simulation, for example, the student receives implict feedback regarding his/her behaviour. The simulation 'reacts' to several choices the student makes, such as chaining or selecting variables.

On the contrary, explicit feedback means that the student receives feedback consciously often orally or written such as during a quiz.

Often, both, implicit and explicit feedback are given to a student. For example: The student receives implicit feedback from the simulation but also receives explicit feedback afterwards for example via a worked example or solutions to a task.

E. Final Questions

Q30. On which platform is the MOOC provided?

Q31. Who is the MOOC provider?

Q32. Duration of the MOOC (in weeks):

Q33. How many students are enrolled?

Q34. Are students informed about the prior knowledge that is needed to follow this MOOC?

Q35. Are students informed about the expected preconditions to participate in the MOOC? Think of active participation and peer-feedback etc.

Q36. Which type of learning activities are provided in the UoL?
Check any that apply

☐ essay/written assignment

☐ blogpost

☐ design activity

☐ quiz with open questions

☐ quiz with closed questions

☐ simulation/game

☐ tools

☐ other, namely

Q37. What type of learning materials are used in the UoL?

Q38. Which roles/functions do students have in the UoL?

Q39. Which roles/functions do teachers have in the UoL?

Q40. In the UoL, the students get informed about how to use the received feedback in terms of reflection, study again part, focus for further planning or updating the assignment.

Q41. How much time did you need to analyse the UoL?

References

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