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Constructive Alignment of the E-learning Course Introduction to Dairy Technology

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In constructive alignment focus is on the coherence between intended learning outcomes (ILO) of the course, teaching learning activities (TLA) and assessment tasks (AT). Constructive aligned teaching is based on the hypothesis that students use the teaching learning activities to construct their knowledge or teaching outcomes. It is therefore important to actively use the ILOs and the TLAs to tell the students what they should learn and how they should lean it. The goal is to provide good teaching in a positive learning environment, through the use of constructive alignment to ensure increased learning outcomes and deeper learning (Biggs & Tang 2007).

Problem formulation

The objective of this project is to analyse the constructive alignment of e-learning course introduction to dairy technology and how the intended learning outcomes (ILO), the teaching learning activities (TLA) and the assessment tasks (AT) are related and balanced. This analysis will form the basis for reflections on what actions that can be taken to improve the course.

Description of the course

The e-learning course introduction to dairy technology is an MSc course in the program of Food Science and Technology, at University of Copenhagen. The course objective is to give an introduction to dairy chemistry,

dairy microbiology, dairy equipment, dairy processing and dairy product quality. The course is an introduction course and it is therefore important that the students get a basic knowledge of the terminology within dairy technology. However, it is also important that the students learn to use this knowledge for discussions and reflections. They should be able to apply their knowledge and evaluate factors of importance for the quality and production of dairy products: from milk production to the final product. The course took place for the first time as e-learning in block 1 (September-November) 2011.

The course was designed based on the 5-stage model for online teaching developed by Salmon (2004): Stage 1 – access and motivation, Stage 2 – online socialisation, Stage 3 – information exchange, Stage 4 – knowledge construction and Stage 5 – further development of knowledge.

The model states that it is important to spend time on getting use to the online teaching learning environment before moving on to exchanging and constructing knowledge. This is the foundation for creation of a positive learning environment and the feeling of an online classroom. The central assumption for the model is that the students through the course should get to the point where they construct knowledge together (Stage 4/5).

Introduction to dairy technology consists of eight e-modules of one week duration each and then the exam. The first e-module focus on introduction, familiarisation with Absalon and online socialisation, this is followed by six subject specific e-modules for information exchange and knowledge construction, one e-module with project work focusing on construction and further development of knowledge and then the exam.

I have been the main responsible for designing the e-learning course but in close collaboration with the course responsible, the teachers for the individual e-modules and the IT-learning center at LIFE. As part of the development of the course I updated the ILOs, changed the TLAs, the ATs and worked with the use of different learning resources. The course has now been running for the first time as e-learning and it is time to evaluate the alignment of these elements. When the course was running my specific teaching responsibilities were related to three of the e-modules and then I acted as e-guide through out the course. The overall key role for the e-guide was to ensure a positive teaching learning environment, follow the students performance and check whether they met the defined deadlines and take action of they did not.

Intended learning outcomes (ILO) course level

The ILOs for introduction to dairy technology is divided into knowledge, skills and competences. The course ILOs are unistructural to extended abstract in terms of SOLO levels. It is intended that the course ILOs can be operationalised into ILOs for the different e-modules and the TLAs. In the teaching team we have discussed the use of the verb 'discuss'. We have decided that it should belong to the relational level of SOLO terms as we think that you have to be able to explain causes, analyse and relate topics when you are discussing. After completing introduction to dairy technology the student should be able to:

Knowledge

- *Sum up* the chemistry of milk constituents
- *Sum up* the various unit operations in milk processing
- *Reflect* on the factors affecting milk production, milk composition and milk quality
- *Reflect* on how the dairy industry interacts with the surrounding world

Skills

- *Apply* principles from colloid chemistry and physics to analyse processing of dairy products
- *Apply* principles, theories and frameworks to case studies relating to dairy processing
- *Evaluate* quality of scientific literature and resources

Competences

- *Argue* coherently and think critically within the framework of dairy processing
- *Reflect* and *discuss* factors of importance to dairy product quality from milk production to final products
- *Reflect* on the role of dairy production and processing in society

Under knowledge the basics of what the student should know after course are given and it is both of declarative and functioning nature. The

focus is on the basic knowledge of the chemistry of milk and the unit operations used in milk processing. The use of 'reflect' show that the students should be able to bring their knowledge to the level of extended abstract as well. Under skills the focus is on the students ability to 'apply' principles from their basic knowledge and 'evaluate' the quality of learning resources. Under competences the focus is on what the students can use the knowledge and skills from this course for in other connections. The use of 'argue', 'reflect' and 'discuss' shows that the students should have the competences to use their knowledge in a broader context within the subject field of dairy technology but also in a broader context.

Comparing the course ILOs with the overall objective for the course the elements under knowledge do not relate to the entire curriculum. Missing are statements relating to dairy microflora and factors in relation to quality of dairy products, which is a part of the basic knowledge with in dairy technology that they get introduced to in this course. I would therefore add the following bullets to the course ILOs under knowledge:

- *Describe* the microflora of milk and dairy products
- *Describe* factors of importance for the quality of dairy products

The remaining ILOs correspond reasonably with the objective for the course. However, discussions are the main TLAs and this could be stated more clearly in the ILOs by using the term 'discuss' more explicit. In this way a better alignment with the TLAs could be obtained and it would also result in a stronger focus on the importance of the discussion activities.

We have also developed ILOs for each e-module on the basis of the operational terms used in the course ILOs. Below is an example of the ILOs for e-module 7 focusing on cheese.

- *Describe and classify* cheese
- *Summarise* the unit operations and processes for manufacturing of cheese
- *Discuss* the chemistry behind the cheese curd formation and the syneresis
- *Discuss* how the essential processing steps influence cheese quality

From my point of view these ILOs are well aligned with ILOs for the course but also to the TLAs where 'describe', 'classify' and 'summarise' links to the activities in the questionnaires and the 'discuss' to the discussions in the e-module.

Teaching and learning activities (TLA)

The course TLAs are designed to meet the e-learning environment and the resources available on Absalon. The TLAs are questionnaires, discussions, project work and the dairy vocabulary. The dairy vocabulary is used as a reflection task, where the students are asked to reflect on what they have learned in the individual e-modules by identifying central dairy technology terms and their definitions. These terms and definitions are then collected throughout the course and a common vocabulary created. The discussions are the main TLA in this course but also where I as teacher was challenged the most. In the course evaluation the students also suggested that we worked with the improvement of the discussions. In the next part, I will therefore the focus on the discussions as a TLA.

During the course I experienced that the students got tired of the format of the discussions and that it was challenging to bring the discussions from exchanging knowledge to a level where the students took more responsibility and built something together. This observation was further confirmed by the course evaluation where the students specifically stated that they did not benefit from the discussions in the way we had intended. One of the students wrote in the evaluation:

> *"To be honest, I find it difficult to relate to the way the discussions are going on. Often it seems as if (we) the students just summarize some of what we have read to make a post – and then I have trouble seeing the discussion in this . . . But it must be said that it has been very different ways in which different teachers have managed to keep the discussions going/moderate the discussions."*

As teacher I also experienced that some students contributed to the discussions only because they had to, and that their posts was based on repetitions, had at a low level of relevance and did not in anyway contributed to the development of the discussions. This is probably the backside of the forced participation in the discussions. However, the IT-learning centers experience from previous courses is that the students do not participate in the discussions if they do not have to.

We have in the teaching team discussed this situation about the discussions. The students did not reach stage 4/5 in the 5-stage model of Salmon (2004) as we had intended when designing the course. Overall, we agreed that a discussion is a very suitable TLA in an online teaching learning environment and that is was relatively well aligned with the ILOs and ATs in

this course. We agreed on focusing on the following areas to improve the discussions; 1) Evaluating our own role as teachers, 2) Changing the format of the discussions and 3) Prepare the students for the discussions.

Evaluating our own role as teachers

The concept of dialog based online teaching is challenging and a discussion with the teaching team showed that we all felt the same way. The best tool to help oneself keeping the discussions on track was to make a plan/guide for which areas should be covered in the discussions. But also that the questions put up for discussions are open ended and can be viewed from more than one side to open the discussions for the students. Furthermore, it is important to show ones presence by commenting and participate in the discussions on a daily basis to ensure development and to add value by institutionalise the subjects. To keep the students motivated it is important to interact with each student personally, to acknowledge and give them feedback on their contributions – formative feedback.

Changing the format of the discussions

The format of the discussions especially in the late part for the course i.e. e-module 5-8 could be developed to improve the teaching learning situation. The discussions could be made in a way where the students have to work more together so they get obligated towards each other and therefore contributes to the development of the discussions in a more constructive way. This could be done by structuring the discussions in activities such as: discussion in groups with different roles i.e. consumer, farmer, dairy company vs. authorities, writing statements/discussions posts in an essay-like style, let the students make i.e. spoken PowerPoint presentations to each other and the use of peer-assessment between the students.

Prepare the students for the discussions

The students could also be trained in making better posts for discussions. An activity could be added to the introduction e-module, where the students together should reflect over and discuss what a good post in a discussion should contain to add value, bring the discussion further and what elements that can be used to recognise the contributions from fellow students. Furthermore, they could also touch upon their expectations to their own level

of activity and to the contribution from their fellow students. Overall, resulting in a didactic agreement for the discussions. Maybe it would even be possible to let them make the evaluation criterions for the student performance in the discussions them self (see section on assessment tasks).

Assessment tasks (AT)

The ATs is designed to test both declarative and functioning knowledge and consists of continuous assessment as well as a final summative assessment. The final grade is based on 50% from the students performance in the e-modules and 50% from the final exam. This setup was selected to ensure activity from the students in the online TLAs. In this part, I will focus on the criterions for the evaluation of the students performance in the e-modules, where they were evaluated on their completions of questionnaires and their contributions to discussions.

The questionnaires were designed mainly to test the students basic knowledge of terminology and concepts within dairy technology. To pass at least 75% of the answers had to be correct in each questionnaire. We did not want the student to have the feeling of an exam at these questionnaires. They were therefore given: three permitted tries to answer, a PDF file with the questions beforehand and a discussion thread where they could discuss "questions and comments about the questionnaire". I had the preconception that the students would use such a discussion for giving each other the specific answers for the individual questions, but that was not the case at all. In stead the students asked questions like this instead:

> *"Hi!! Has anyone tried the first test? I had some problems especially with two questions, the ones which are about aerobic sporeformers that spoil the dairy products and psycrothrophic bacteria important in dairy products. Does anyone know where I can find more information about the role of bacteria in dairy products?"*

Indicating that at least some of the students really tried to work in depth with their understanding of the curriculum. I also got the feeling that the student did not see these questionnaires as exams.

The students performance in the discussions were evaluated on the basis following criterions:

- Posts must contribute to the discussion in a meaningful way and address the given tasks

- Posts must add new content/perspectives to the discussion
- Posts must contribute to the development of the discussion
- Posts must demonstrate that associated learning outcomes have been achieved
- Posts must be based on your own words and arguments (please read the document Referencing, Citation and Plagiarism)
- Reply on comments from teachers and fellow students throughout the discussions
- Post a minimum of two separate times throughout each discussion
- Make correct citations to sources you have used
- Respect the word limit on 150 words per post

I found these criterions very use full when evaluating the student performance in my e-modules. I think they are well aligned with the purpose of the discussions as a TLA and the ILOs for the individual e-modules. However, the criterions were set by the teaching team. They were therefore not the students rules for assessment of good quality posts in the discussions. To increase the students knowledge of how such criterions are used in the course and to increase their motivation to deliver high quality contributions to the discussions it could be relevant to let them come up with these criterions them self. It could i.e. be a part of the new activity for e-module 1 on how to contribute to discussions in a meaning full way that they should formulate these criterions together.

6.1 Conclusion

The course is relatively well aligned, but as changes can be implemented to develop the course – adjustment of the course ILOs but also the format of selected TLAs and ATs. Actions that can be taken are:

- Align the course ILOs with the overall objective for the course and add the following bullets under knowledge:
  - Describe the microflora of milk and dairy products
  - Describe factors of importance for the quality of dairy products
- Improvement of the discussions, through:
  - Evaluating our own role as teachers
  - Changing the format of the discussions
  - Prepare the students the discussions

– Letting the students define the criterions for the evaluation of their performance in the discussions. Resulting in a didactic agreement for the discussions.

These suggested changes should contribute to increased learning outcomes and a deeper learning for the students.

All contributions to this volume can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/2011-4/

The bibliography can be found at:

http://www.ind.ku.dk/publikationer/up_projekter/kapitler/2011_vol4_nr1-2_bibliography.pdf/