



Innovative Inductive Network Learning Collaboration between Industry and University

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Abstract

This paper outlines training strategies for professional development of employees to enhance the organisation's ability to deal with problems in daily production.

Reflections in this paper build on experiences gained in a unique partnership on further education between the Norwegian University of Life Sciences and TINE, Norway's largest dairy enterprise. The partnership has resulted in a module-based learning programme at Master's level.

Special attention will be given to a module in dairy technology, formed as a cross-organisational learning network, based on an inductive teaching and learning approach. Course topics are not defined by the university teachers, but arise from observations and problems experienced by the enterprise and described by the participants. The university teachers' role is to teach and guide students in discovering theory, which may be of help to define their specific problems correctly. Furthermore, the teachers moderate the dialogue between the course participants to reach possible solutions as a joint effort between participants and teachers.

In addition to focusing on the pedagogical approach, the effect of web-based technology as a means to support the learning network across organisational and geographic boundaries is evaluated. Organisational and cultural framework and preliminary results at organisational level, for the enterprise as well as for the university, is also touched upon.

1. Introduction

In 2004, TINE and the Food Science Alliance started a collaboration on research, university degree studies and continuing education. The Food Science Alliance is a strategic alliance between the Norwegian University of Life Sciences (UMB) and the Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima).

In the field of continuing education, this collaboration has resulted in many 10 credit courses at Master's level. A common goal for all the courses is to increase TINE's dairy expertise. Employees in TINE can take the courses individually or combine them in a bigger study programme. For especially ambitious employees, the composition of course modules and an in-depth paper can give a total of 90 credits. If the admission criteria are met, this will result in an experience-based Master's degree in Industrial Food Production.

Several of these courses have previously been subject to thorough evaluation from course participants and their managers. In addition to an evaluation of the content and learning process, the focus has been on the value of the acquired knowledge in the work situation and how best to organise the further development of dairy expertise in TINE. Here, both course participants and managers have highlighted network learning as a potentially good work method. The idea of involving the academic environment at UMB to chair such network groups to ensure new research-based knowledge was also brought up [1].

The TINE group's production entities are spread across the whole of Norway. Gathering course participants in one place is both time-consuming and expensive. Using web-based courses as a way of rationalising training in TINE has been discussed for years in the cooperation between UMB and TINE. The opportunity to realise this goal came about when Norway Opening Universities (NOU)



called for applications for funds for developing web-based training with the focus on cooperation between educational institutions and the business community.

The Centre for continuing education at UMB was, in cooperation with TINE, awarded funding for developing and implementing two pilot projects: one course called Learning network in dairy technology and one called Organisation and management, both 10 credits. The idea was that a collaboration would help to find good educational, practical and technological solutions to the special challenges involved in combining work and studies.

In this article, we will summarise some important experiences from these pilot projects so far. The experiences are based on the project evaluator's observations and project log, conversations with project owners from TINE and the academic staff at UMB, as well as a questionnaire survey of the course participants conducted half way through the courses.

2. Inductive educational approach

The courses are based on an inductive educational approach. The inductive method starts with concrete individual cases in the form of previously learned experiences, examples and experiments and moves on to a general, overall understanding. The inductive teaching method is often described as problem-based learning, discovery learning or experience-based learning, whereby students are encouraged to take the initiative to a much greater extent, assume responsibility for finding knowledge and processing this in the learning process.

This represents a new way of thinking in assignment-based continuing education. The academic staff must reconsider their traditional role as the 'absolute' expert in defining and disseminating research-based knowledge. The inductive approach is used in both courses, but was really emphasised in the Learning network in dairy technology course. In this course, the topics are based on specific problems in dairy technology, as defined by the managers of the TINE group and the course participants. The primary task of the academic staff at UMB is therefore to find and present relevant research that can help the participants to define the problems correctly, to supervise the participants both individually and in groups so that they can find relevant solution alternatives, and to be the moderator in the learning process.

3. Horizontal learning

One important feature of learning networks is that defining problems and suggesting relevant solutions are the participants' joint responsibility. The practical organisation of the knowledge sharing involves each participant presenting one problem from his/her own production area. After the presentation, everyone works on the problem in question for a two week period. The other participants have to comment and provide input on each individual participant's problem. Feedback shows that even though working on your own problems is more motivating, working on other people's problems that may seem far removed from your own problems may increase the general level of knowledge and organisational knowledge and may provide ideas as to how to solve your own problems.

The teacher's role as process manager is primarily about facilitating a good dialogue where problems are investigated and participants attempt to solve problems together.

For learning in networks to work, the participants must be willing to share their problems openly and to provide input to the problems of other participants. This is especially challenging in networks consisting of competing enterprises and organisational entities. From previous innovation networks [2], we have experienced that time must be set aside for social activities to improve communication and trust between the participants and thereby increase the likelihood that they will share their experiences. Feedback from students indicates that the absence of physical meetings to get to know each other may hinder open communication and optimal learning.

4. Web-based organisation of teaching

We have used the learning platform Fronter, which has a so-called Liveroom where the participants meet. They can see and hear each other by way of a web camera and microphone. Liveroom works as a normal classroom with a common board for sharing different forms of information. In addition to the real time function, Fronter can also be used asynchronously through a shared archive function. All



participants can post information in the archive. Here you can find video recordings from lectures and the work place, as well as photos, texts, interesting links etc.

Except for an initial physical meeting, all teaching and other sharing of information has taken place in joint online meetings and by everyone, both students and teachers, posting input and academic background material in the digital archive.

In the Dairy technology course, weekly online meetings have been organised throughout the teaching period. Each participant's problem is the focus of attention for a two week period. The problem is presented on the room's whiteboard in the form the student finds to be most expedient. During the presentation, both the lecturer and the other participants provide feedback, ask questions to clarify the topic further etc. Feedback is given orally or in writing in a chat window. In other words, dialogue is synchronous, in the same way as in an ordinary classroom.

The dialogue also takes place asynchronously after the online meeting. Within a two week deadline, all participants have to provide written feedback to the participant who 'owns' the problem in question. Everything is placed in a shared archive, so that everyone has access to all information.

In the Organisation and management course, the participants are divided into groups of three or four students. The groups organise their own online meetings in Liveroom. Group work is mandatory. All group members meet at the agreed time to cooperate, and the teacher provides guidance in accordance with the needs of the group. The group members agree on the solutions to different cases. The group work creates an arena for discussions across departments, which in turn is meant to make students recognise problems and acquire new knowledge.

In the Organisation and management course, each participant will write a learning log, based on specific questions from the teacher. The questions are meant to provide a basis for reflection and research in the student's own department and work situation. The learning strategy behind the learning log is that the student should be able to become more conscious of problems in his/her own work situation. A review of the learning logs indicates that the students have become better at identifying shortcomings and possible improvement areas, both in an individual and organisational perspective. The learning log is meant to provide a basis for discussion in all online meetings. The students contribute their own findings, which are then linked to theories describing the topic in question.

Video recordings have been made of many lectures. All online meetings have also been recorded so that the participants can go back at any time to see what was done at the meeting. This option represents extra support and strengthens the learning process.

The evaluation thus far points to several technical challenges (sound, image) with the online meetings. However, the quality improves as the individual skills of teachers and students increase. As in all other forms of teaching, the importance of being well prepared for the online meetings in order to benefit from them is stressed. Online meetings require that teachers possess the ability to clearly communicate the preparation requirements and to lead the dialogue.

The participants emphasised the video lectures as being especially good and useful. The same applies to the written input provided by each participant to the other participants. The shared archive with folders for each problem where everyone has access to all documents is also emphasised as particularly useful.

5. The exam

The exam is meant to give the participants the opportunity to document new knowledge. In a project report, the participants have to show how theory and methods can be used, or how they have been used, to shed light on and indicate solutions to the specific problem that the individual participant has been responsible for. The final test of what the participants have learned will be their answers to the exam paper and how they manage to transfer and apply the knowledge in their day-to-day work.

6. Conditions for success

When the university prepares tailored courses for groups of employees in an enterprise, there are often expectations that the results will not be limited to individual learning. In this project, it is an expressed goal that the courses develop new dairy expertise and organisational knowledge that can be transferred to the participants' own work and the work of others, i.e. give results for the TINE group as a whole.



6.1 Sustainability

The sustainability of the project is dependent on a clear link between the individual learning benefits and the TINE group's willingness and ability to use the knowledge acquired. The academic results, in the form of new individual and collective knowledge about dairy technology and new knowledge about organisation and management, have to be relevant and applicable to TINE.

The TINE group and UMB's ambition is to acquire new knowledge and skills for the organisations through the professional development of employees, which includes the organisation of web-based learning measures and the choice of technological solutions.

Furthermore, the academic staff's ambition is that the inductive approach provides new insight into the industry's technological problems in connection with production, insight that may also contribute to the university's work on increasing the relevance and quality of teaching and applied research.

6.2 Active participants

This method requires students to be active and curious. They must also have the ability to identify connections and similarities and draw a conclusion from the experiences, i.e. to use individual experiences as a basis for general conclusions. The participants must also be willing to share their experiences despite the fact that the participating production entities to a certain extent compete with each other.

6.3 Brave and knowledgeable teachers

Courses such as these require teachers with long experience and confidence in their knowledge of theory. The teachers must also be willing and able to familiarise themselves with new educational methods and dare to try new ways of communicating their knowledge. Not least, the teachers must be familiar with problems in the industry and the day-to-day work of the participants. A good basis for such knowledge has been acquired during years of systematic research collaborations [3].

6.4 Time

We have received input indicating that one of the biggest challenges linked to these courses is that it is difficult for the participants to set aside enough time for the learning process in the middle of their busy days. It seems that this challenge is bigger than for a traditional course, where the participants often spend time away from their own work-place to attend a course.

6.5 Involvement before and after

An important condition for ensuring that the knowledge acquired is relevant and applicable is that the training is strongly rooted in the organisation's management and in the value creation process.

This development project is one of several projects in the TINE / Food Science Alliance collaboration. In addition to the external project funding from NOU, the collaboration has earmarked some of its funds for the project. The project therefore reports to the group management of TINE and the university management at UMB.

The objective of involving the production entities and the R&D entities in the work on finding good and relevant issues for the course was to ensure that the new knowledge will be put into use. Unfortunately, the work on involving these environments has not been as systematic as we would have liked, which will lead to more stringent requirements for a structured implementation of the results in both organisations.

In relation to the further development of technological solutions for the professional development of employees, the project must be rooted in the enterprise's systems, and be supported by the persons administering the systems (for example the IT entities). The work on involving these persons has been time-consuming.

One of the goals is to include the exam results in TINE's toolbox for problem solving. In future work, it is crucial that TINE establishes good arenas for communicating the knowledge developed through the courses. TINE's group management has set aside separate project funds for this purpose. In the coming period, the project group will focus on this work.



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