

Formal and Non-Formal Methods in Food Chemistry and Engineering Education

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Mentoring in learning has been adopted lately as one of the near-work education method. In the virtual mentoring, either individual or group mentoring, the learning and development of the actors, mentees, may increase a lot with the help of other participants and their experiences. [1] The mentor-actor relationship can supervise the actor to a path that fulfils the wishes and future for a remarkable goal of career [2]. The pedagogical strategy framework was used to find the critical points of the structure in the learning process and to find the best digital methods to use in the chosen *team learning system*. [3,4] The knowledge of food sciences of the mentors teaches the profession of, for instance, the food chemistry and engineering for the actors. The peer group mentoring (PGM) is a tool to the career development [5]. The networking and mentoring improves training, develops competencies and new learning environments, as well as the collaborative relationships between novice and experienced actors.

Keywords: professional education, mentoring, PGM, food

1. Introduction

As work is changing, also the education methods and learning spaces as well as facilities must provide new possibilities for the modern education systems. The staff in food industry is widely spread around in the countryside, also in the cities. This causes needs for flexible learning in several locations at the same time. To reach proper education in food sciences means that the education methods must meet the needs for several varieties of skills. Digital learning methods together with novel pedagogical methods are expected to bring for the younger Y-, Z-generation, and the present generation, easier ways to reach the needed education.

Web-based learning methods have developed fast the last decades. The social media tools and hardware development has challenged the pedagogical side to find the best learning ways to enhance good competences in food sciences. Project and team learning, with the help of mentoring, is an easy application for the use of new tools, mobile centers and new digital hardware. The digital natives have special expectations for learning methods independent on place.

It is a challenge to ensure teaching and mentoring quality in new types of learning environments keeping up the standard of professionals also in the 21st century. New food factories and new learning environments have created a huge variety of job opportunities for newly qualified professionals. eMentoring is a vehicle to sharpen ones' professional skills. [6] There is a difference between the idea of benefits in relationships between mentors and mentees. Mentees' benefits are clear, but the mentees do not find the benefits for the mentors. [7] Mentoring as a tool in educating in higher education institution courses has not been published a lot, yet.

2. Methods

In methodology we need to separate two definitions: *coaching and mentoring*. Here, coaching is understood to include active guidance to lead to one's career path, where mentoring is more following the actor, mentee, and giving advice when needed in a form that the mentee needs to find the solution him/herself. The mentor gives examples from real life that has happened and what has been the consequence of such case and helps in, for instance, making analyses by making questions. The tools used in mentoring are pair meetings, seminars, visits to different organisations, peer mentee group evenings, round table discussions, and thematic workshops. [2]

The pedagogical strategy framework was used to find the critical points of the structure in the learning process and to find the best digital methods to use in the chosen *team learning system*. Options of using digital tools like mobile center was the mentees' own choice. Only the learning platform was fixed by the mentor/teacher and institute. Feedback was used for developing the course in the future. The motivation of students was measured by interviews. Those not willing to learn new tools were also activated by other team members. [3,4] The method was used for Food Industrial Plant Design course with 6 groups.

Peer group mentoring (PGM) has also been a tool for teacher career development. [5] In the action research the newcomers and experienced educators were mixed in the same group to give the possibility to develop by peer group mentoring. The new teacher will be boosted into creating new infrastructure for modern learning purposes. The method

was used in food chemistry course carried out with 10 teachers of 2 experienced and 6 newcomers. Both type of teachers participated in equal conditions during the sessions.

3. Results

Mentoring in learning has been adopted lately as one of *the near-work education method*. In the virtual mentoring, either individual or group mentoring, the learning and development of the actors may increase a lot with the help of other participants and their experiences. [1] The mentor-actor relationship can supervise the actor to a path that fulfils the wishes and future for a remarkable goal of career [2]. The knowledge of food sciences of the mentor teaches the profession of, for instance, food chemistry and engineering for the actor, mentee.

It is important to remember that the mentor does not necessary need to know everything, and this is why uncertainty is a common feeling. The mentee needs to be active with questions, bringing up both positive and negative things during the process. It is important to make a good plan for the meetings like in **Table 1**, to get an efficient mentoring session, as time is a limiting factor. The goals in learning must be defined in the beginning of the mentoring programme.

In the peer group mentoring system the teacher students developed some question at the beginning. They wanted to find out first the theoretical principles, the relations between the experiment and course programme, and the goal of the experiment. An important role was also with the human and cost resources and logistic and time needed. Most important was the safety conditions to consider when food chemistry was the subject. All these matters were widely discussed during the practical experiment in the mixed peer group mentoring (PGM).

In the team learning system, a web-based course in food process design was produced. The food industry was interviewed to find the needs in present knowledge and in the near future (soft system methodology), suitable to be solved during the study course of food industry plant design. The pedagogical strategy framework was used to define the critical points in the designing process and to find the best digital methods to use in the system, shown in **Table 1**. The students from two universities were given options of using tools like dropbox, facebook, and digital tools like mobile center of their own choice. The learning platform was fixed by the teacher and institute. Feedback received from 6 study groups of 8 students in 3 years was: first year depressing (too much work), second year active, and third year constructive and willing to continue the method and development. The groups were each year different and the information from the previous years' groups, also the influence of the attitude change on new study methods probably revised some of the opinion. The motivation of students increased and those not willing to learn new tools were also activated by other team members.

Table 1 The pedagogic plan for the Industrial Food Process Design e-course [3, 8].

The aim of the course	Contents	Learning, the student performance	Steering and feedback, the teachers performance	References of knowledge	The tools for eworking
Aims as competences	Description of the contents	How does the student learn this? LbD.	How and when the work is being supervised? (pedagogic, social, administartive and technical support)? Supervision throught moodle or webex. Meetings e-conference or face-to-face. Seminars throught webex (camera and mic).	Produced before or during the process? In advance will be given the frame of the task in parts according to the project schedule. Also the students study information and collect material for the task. Finally there will be a final report collected from information in the intermediate reports.	What net tools to use to support the work? First finding out what tools are available and suitable to use? Moodle and cad and other programmes, ebeam, webex (acp), skype, confluence-wiki, mobile center, free social media tools, webropol, etc.
Aim 1: Knows how to design a preparatory plan.	Content 1: Basic knowledge for designing the preparatory plan, working hour plan for follow up in schedule control.	How does the student work? Team working and in smaller groups. Networking.	Who supervises and gives feedback? The teachers give oral feedback during the meetings.	Ready printed material or teacher written material? Both.	The learning platform and its tools? Moodle, real-time net tools for communication, blogs, wikis, intranets; sms, e-mail, phones/mobiles, skype, mobile center
Aim 2: Knows how to read and draw process diagrammes	Content 2: Drawing process diagrams, making lists and	What kind of learning assignments? Larger project work divided into smaller parts.	Planning the teachers' and tutors' time schedule and amount of work.	How to use different media elements: text, sound/voice, picture, grafics, animation,	

and understands their differences.	specifications and writing instructions.			video, database? Plenty of database, pictures in diagramme production.	
Aim 3: How a larger project is performed in a team.	Content 3: Dividing work, taking in account expertise of others, reporting.	The students and the groups performance? Team work, team leader and secretary in each turn, learning meeting technology.	The teacher working hours according to face-to-face meeting sessions, theory lessons and practises.	How to use study sources? The project will be done in parts and will be presented as a seminar and a final report.	
		The plan of students' time schedule and amount of working hours? This plan will be created at the beginning of the course: Estimate and implementation table.			

4. Conclusion

Peer Group Mentoring (PGM) can be used to develop the careers of food science experts. PGM shows how networking and mentoring can improve the training of experts in food sciences. They can develop competencies, build new learning environments and study the quality for analysis, logistics, and skills needed for risk assessment. The pilot case was studied among food chemistry technicians. The participants recognized the importance of collaborative work for the actor.

In food industries where changes in the organisations are needed, it is easier to fulfil the tasks with educated employees who have learned the similar view of the consequences.

In team learning system the motivation of students was higher than in individual learning methods and those not willing to learn new digitools were also activated by other peer team members. The competence learning was deeper and more efficient and economical. The earlier used study systems and methods, as well as the previous study groups opinions gave some influence on the feedback.

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