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WeGa-Student: cooperative e-learning module in horticulture

Undergraduate students from the Universities of Applied Sciences in Osnabrück and Weihenstephan-Triesdorf as well as the Leibniz Universität Hannover visited a cooperative e-learning course in the winter semester 2011/2012 on the topic of quality management and quality assurance, specifically the horticultural requirements. The aim of the collaboration between the three universities was to improve the teaching at all participating locations through the pooling of expertise. Students and teachers gave a mostly positive feedback at the end of the course.

Keywords
E-Learning, quality management

Abstract
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E-Learning has become a popular tool in education. This is mainly due to the fact that by now powerful web-based software systems, called Learning Management Systems (LMS), are available, which support the learning process organizationally. However, LMS used in many schools and most universities such as Moodle, Ilias or Stud.IP are often downgraded to distribution stations for worksheets and lecture notes. But the more students and teachers get used to learning management systems, the more their manifold potential is recognized. Also in university training in the field of horticulture learning management systems have been used for years. Under the project name "WeGa Student" the first university-wide online course for students of horticulture was performed, with online learning units and teleteaching via live stream, in the winter semester 2011/2012 in the WeGa Horticulture Research Network.

Common preparation

Preparations began one year earlier with the establishment of the WeGa Horticulture Research Network [1]. It is the objective of WeGa to promote and secure sustainable value in the horticulture sector by pooling scientific expertise. This includes the promotion of a common network teaching and transfer of the latest scientific findings in educational courses. "WeGa-Student" is a project in which the University of Applied Sciences of Osnabrück, the University of Applied Sciences of Weihenstephan-Triesdorf and the Leibniz Universität Hannover have joined in order to create a common educational module for their B. Sc. students [2].

Table 1 shows how the teaching module was integrated into the curricula of the participating universities and how many students selected "WeGa student" in the first year as part of their curriculum. The idea of common education and cooperation offers a number of advantages which are listed in **Table 2**. The primary goal of the cooperation between the three universities is, however, to improve the teaching in all participating locations. Since this goes ahead with the listed positive effects it may possibly provide stimulation for further projects of this kind.

Content and concept of the teaching module

"WeGa student" includes the topics of quality management and quality assurance and their specific requirements in horticulture. As a conceptual framework for the new teaching module the so called "Blended Learning" concept was chosen, which combines the benefits of classroom teaching and e-learning methods. "WeGa-Student" consists of three main components:

- Online learning units in learning management system Moodle (7 lessons)
- Weekend-Workshop (classroom teaching)
- Expert presentations via videoconference system (Teleteaching)

The focuses of the seven online learning units were: quality and quality management, certification standards, process quality, standards of product quality, shelf life, measurement methods for determining quality and quality control, documentation and retro-traceability. The topics were divided among the participating universities, processed on site and then provided via the learning management system Moodle for students of all participating locations. Students worked independently on the topics and were responsible for their own time management, which was welcomed by all participants. Generally, the students evaluated the online learning units mainly positively (**Figure 1**).

During the three-day weekend workshop at Dienstleistungszentrum Ländlicher Raum (DLR) Rheinpfalz students could apply

Table 1

Integration of the "WeGa-Student" module at the associated institutions and class size per institution in the first project year [3]

Hochschule ***Institution***	**Modulname und Bestandteile** ***Module name and parts***	**ECTS**[1] ***ECTS***	**Teilnehmer** ***Class size***
Hochschule/*University of Applied Sciences* Osnabrück	Prozess- und Produktsicherheit im Gartenbau/*Process reliability and product safety in horticulture*: WeGa-Student Übungen und Hausaufgaben/*Exercises and homework*	**5 (total)** 2 3	10
Hochschule/*University of Applied Sciences* Weihenstephan-Triesdorf	Qualitätsmanagement/*Quality management*: WeGa-Student Vertiefende Vorlesungen/*Extended lectures*	**5 (total)** 2 3	12
Leibniz Universität Hannover	Technische Verfahren der gartenbaulichen Pflanzenproduktion/*Technical procedures of horticultural plant production*: WeGa-Student Vorlesungen zu technischen Verfahren/*Lectures on technical procedures*	**6 (total)**[2] 3 3	14

[1] European Credit Transfer System
[2] Der Unterschied ergibt sich aus den verschiedenen Prüfungsordnungen./*Discrepancies are caused by different specifications in the examination regulations.*

Table 2

Benefits and mid-term effects of cooperative teaching

Vorteil/*Benefit*	**Mittelfristige Folgen/*Mid-term effects***
Bessere Koordination zwischen den Hochschulstandorten *Better coordination between colleges*	Einheitliches Ausbildungsprofil/*Uniform education profile*
	Erhöhung der Mobilität durch Erleichterung eines Studienortwechsels *Student mobility increased by encouraging a change of the place of study*
Dozenten mit besonderen inhaltlichen Schwerpunkten können ihre Themen für alle beteiligten Standorte anbieten *Teachers with special competence can offer their knowledge to all participating colleges*	Größeres Kursangebot/*Increased offer of courses*
	Kontinuierliche Verbesserung durch gegenseitige Unterstützung *Continuous improvement through mutual support*
Kompetenzen der Beteiligten werden gebündelt *Bundling of capacities of all those involved*	Reduktion des Arbeitsaufwandes des Einzelnen *Reduction of the individual's workload*
	Kostenersparnis/*Cost savings*

and intensify the acquired knowledge in group work exercises. A number of external experts gave also practical and fundamental insight into their everyday work and the increasing importance of quality assurance in the sector. Main topics of the workshop were certification and the conduct of audits for quality control. The newly acquired knowledge could then directly be used in pilot operation of the DLR Rheinpfalz in a short audit.

Using the example of mango tasting, a brief insight was given into the diversity of tasks in quality management, including certification and sensory. For the expert presentations external lecturers and scientists from the WeGa Horticulture Research Network were invited, who used a video conferencing system to give lessons about their field of expertise from their current working location. Lessons were streamed live via internet to the other campuses. The students had the possibility to ask questions and discuss with the lecturers from the transmission room in their respective locations.

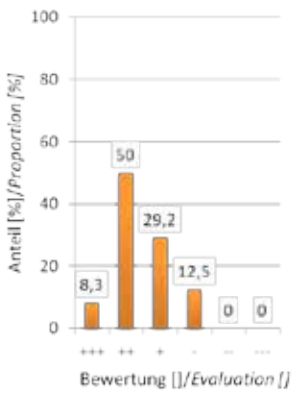
Organization is important

Conducting an online course has the advantage that the work for three groups of students in three campus locations has to be done only once, which means that both personnel and time resources are spared. The implementation of a course of three Universities and two federal states (Lower Saxony and Bavaria) must be well-coordinated in timing and content and requires a regular and good communication between all stakeholders to avoid duplication or confusion. Communication was mostly performed via phone and email and regular virtual audio conferencing over the internet. A meeting of all stakeholders was only needed for preliminary discussion and debriefing of the module, and was a part of the weekend workshop.

Research

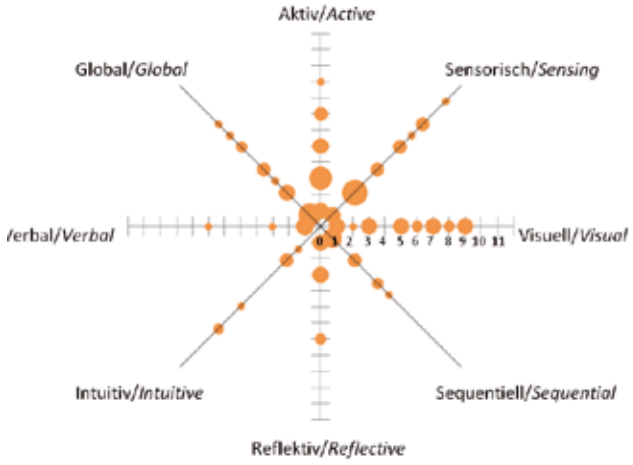
In addition to the educational experience the project partners could make with "WeGa student", the project also provides the material and data to support scientific research, which is especially interested in the learning style profiles of the students of the three participating universities and has the objective to offer lessons which also encourage students with learning style profiles not adequately supported by conventional lecture teaching. With the classic face-to-face lectures as classroom instruction, where a teacher gives a talk to a group of students on a specific topic, not every student can be reached. If the teach-

Fig. 1



Student answers to the question on how they would evaluate the online lessons overall, after absolving the course (n = 24) [4]

Fig. 2



Learning style preferences of the students (n = 32) [4]

ing and learning style of students and teachers do not match, there will be problems: students lose interest in the course and perform poorly in the test [5].

The students of the first "WeGa student" year (winter semester 2011/2012) were asked within the scientific research to complete a questionnaire [6] to determine their individual learning style preferences. The questionnaire included 44 questions, each with two possible answers, making it possible to create an individual learning style profile for each student according to his evaluation. The possible learning style preferences are illustrated in **Table 3**. When combining all four learning style dimensions there are 16 different possible learning style profiles (e. g. sensing/visual/active/global). **Figure 2** shows the result of the evaluation of the questionnaire.

The graph should be read as follows: Each spot represents one or more (depends on size) students' preferences. A high number on the scale means a strong preference for one dimension; small numbers (1–3) mean that students do not prefer any of the two possibilities of contrary learning style dimensions, e. g. active and reflective. In case a student has a preference for one side of a dimension, the value of the other side of the dimension is automatically set zero. Results show that most "WeGa student" course students preferred learning styles active, sensing and visual. Moreover, there were more students with a preference for the global learning style than the sequential learning style. Online learning units were mainly designed to support the learning styles reflective, sensing, verbal and sequential. Students with opposite learning style preferences were probably disadvantaged [5].

In the winter term of 2012/2013 for the first time an approach of learning style preference online learning units shall be offered adaptively: In addition to the contents of the course extra learning objects are developed and will be recommended for the students matching their learning style profile, which is determined by an input test. This adaptive approach for the learning management system Moodle was developed at Athabasca University in Canada [8] and was provided for testing as part of the "WeGa-Student" course.

Table 3

Felder/Silverman Learning Styles Model (FSLSM); based on [5] and [7]

Dimension ***Dimension***	**Bevorzugter Lernstil** ***Preferred learning style***	**Beispiel/*Example***
Wahrnehmung *Perception*	Sensorisch/*Sensing*	Welche Art von Informationen wird bevorzugt wahrgenommen? *What type of information does the student preferentially perceive?*
	Intuitiv/*Intuitive*	
Aufnahme *Input*	Visuell/*Visual*	Durch welchen sensorischen Kanal werden externe Informationen am effektivsten wahrgenommen? *Through which sensory channel is external information most effectively perceived?*
	Verbal/*verbal*	
Verarbeitung *Processing*	Aktiv/*Active*	Wie werden Informationen bevorzugt verarbeitet? *How does the student prefer to process information?*
	Reflektiv/*Reflective*	
Verständnis *Understanding*	Sequentiell/*Sequential*	Wie werden beim Lernen Fortschritte gemacht? *How does the student progress toward understanding?*
	Global/*Global*	

Conclusions

The experience of the first implementation of common teaching with the "WeGa Student" project has shown that it is worth to pursue this approach of networked teaching across several universities. The organizers of the partner institutions, the external lecturers and the participating Bachelor students reacted predominantly positively on this new style of teaching in horticulture. The sometimes complex organization across different curriculae and state borders was accomplished with a motivated team. In this winter term of 2012/2013 the revised and updated online teaching module will be again offered to all participating universities.

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