EXTRACURRICULAR VOCATIONAL TRAINING IN HIGHER EDUCATION: RESUME OF EXPERIENCES AFTER TEN YEARS OF PRACTICE

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Introduction

With the implementation of the Bologna process in Germany, curricula – originally designed for diploma and magister programs – had to be transferred to three-year bachelor programs. The general purpose was to enable university students to enter the world of works with a qualified (academic) degree earlier.

In the context of the German language speaking countries, unique characteristics were required for the new academic bachelor degree in distinction from the regionally traditional (non-academic) bachelor degrees, which were provided by the industry and the chamber of crafts after three years lasting apprenticeships (Dobischat et al., 2008). Different to the modus operandi *learning on the job* as it is the rather common concept outside the German-speaking countries, the education of apprentices in industry and crafting disciplines is not limited to the particular tasks arising from the daily business in an employing enterprise but, within the particular branch, they are expected to being practically prepared for the full range of tasks from any kind of job. For that purpose, the apprentices are demanded to visit a branch-related school for professionals, which ensure that even very specialized enterprises can employ apprentices. In these schools, lectures are provided on general job-related theoretical knowledge and hands-on training to achieve the full range of practical skills. In order to receive the degree, apprentices must prove their abilities in theoretical and practical exams. The difficult competitive situation for the academic bachelor degree holders particularly gets obvious when it comes to apprenticeships with the purpose to educate assistants for academic disciplines, like biological, chemical and architectural assistants, system programmers, and management assistants in the health industry. Another difficulty for the design of the academic bachelor degrees arose from the demand that education in universities generally is expected to be fully sustainable (timeless). Teaching application-related competences in the framework of academic education as demanded by the industry is understood as a contradiction against this very basic principle: Applications, however mainstream they might be used in a specific field, might easily be substituted as soon as new technologies emerge.

During the redesign of the curricula, most of the theoretical contents from the prior diploma and magister programs eventually were adopted for the new bachelor curricula on the cost of practical experiences, which the students earlier achieved in the context of several seminars, field trips, and hands-on trainings. While the understanding of basic principles and methodologies was focused, practical research skills were reduced to a minimum assuming that these were rather irrelevant for the work in the industry but exclusively required for academic working purposes. Consequently, related practical research skills and experiences were related to the consecutively designed master programs. These were meant to establish the beginning of an intended academic career. It is still not fully clear which specific abilities distinguish academic bachelor degree holders from non-academic bachelors in terms of advantages on the job market at entry-level. Sure, academic bachelors have a deep general understanding of the context and above that, also a basic understanding of typical strategies, measures, and theories, which the non-academic bachelors lack to a large extent. Just, at least for the first years of employment, enterprises still perceive a higher return of investment if employing the cheaper non-academic bachelors who far quicker can fully be integrated within current work processes.

The program erp4students was 2006 launched with the purpose to solve the found educational dilemma. Since it was designed as an extracurricular offer, the basic principle of sustainable education in universities was not in danger. In this paper, first, the program itself is being introduced according to its contents, structure and demographic development, and afterwards, so far made experiences are discussed alongside with the results of our latest quality-related questionnaire.

The program erp4students: Course offer, processes, and implemented quality strategy

Without excluding the theoretical understanding of the field, the educational program *erp4students* offers learners the opportunity to intensively engage with practical aspects of Enterprise Resource Planning (ERP). In today's world of work where just a little percentage of enterprises remains without the support of Information Technology, understanding and to know how to deal with ERP systems is fundamental for a big part of the work force. However, the program does not focus the learned lessons on the in-depth understanding of the underlying theoretical concepts and mechanisms of ERP (such are focused in detail within our basic lecture in the context of Information Systems). Instead, basic theoretical understanding is provided and the students are led through many hands-on sessions in order to achieve practice-relevant competences in working with the world's leading ERP software, which, with a market-share of 24% (2013), is the solution of the SAP SE (Colombos, 2014).

In the launching year in 2006, a single course on Integrated Business Processes with SAP ERP (TERP10) was exclusively provided in German language to students of our own university. Nowadays, the program erp4students covers a total of thirteen courses, most available at least

in German and English language, some additionally in Spanish and Russian. Figure 1 shows the current offer.

Issue	Course Content	Languages
SAP ERP	Integrated Business Processes with SAP ERP (TERP10)	DE, EN, ES, RU
	SAP ERP Customizing I (Beginner)	DE, EN, ES
	SAP ERP Customizing II (Advanced)	DE, EN
	Introduction to Enterprise Resource Planning	EN
SAP BW	SAP BW I (Beginner)	DE, EN, ES
	SAP BW II (Advanced Business Intelligence)	DE, EN
	SAP BO - SAP BusinessObjects and SAP HANA	DE, EN
	Data Warehousing (Beginner)	EN
SAP CRM	SAP CRM (Beginner)	DE, EN
SAP PPS	SAP Productions planning und control I (Beginner)	DE
	SAP Productions planning und control II (Advanced)	DE
ABAP	ABAP I (Beginner)	DE, EN
	ABAP II (Advanced)	DE, EN

Figure 11. The program *erp4students*: offered courses

Figure 1 displays all presently offered courses regarding the targeted issues of SAP, the expectable course content, and the languages, in which the courses currently are available. Further course translations are in progress. All courses in *erp4students* are driven by case studies: For each case study, learners first study 50-100 pages of theoretical background in printable PDF-documents, particularly designed for self-learning situations. Subsequently, they apply their achieved knowledge through practically completing a realistic ERP-specific case study within the original SAP-environment. Knowledge is transferred to a deep level of understanding, which – after a reflection phase – eventually leads to competences. This concept is the same for all case studies. For any problems the learners experience, tutor support is available 24 hours/seven days a week; response times to incoming requests often are below one hour. Even though such a round-the-clock supervision is challenging to facilitate, students repeatedly reported it as the strongest asset, which they – even in Germany where university education is expected to being free of charge – are willed to pay for. The program is made for its learners and not for profit. Thus, it was possible to keep the expenses on a manageable low level. After the successful completion of all case studies within a particular course, the students receive a certificate from our university. These in-house certificates are not just confirmation letters signifying a course-completion, but the students can use them to ask their home university for recognition of the credit points (we recommend to do this before starting). Additionally, these certificates are the precondition to register for the official SAP examinations with a massively reduced fee (only available for current university students). These examinations can be taken at defined locations at fixed intervals.

For the initially launched course in 2006, a total of 63 students from the University of Duisburg-Essen registered. In 2015, students from 110 countries registered for 5,200 courses. Through the whole period, the course completion rates were above 80% (in Austria even

above 90%). We assume reaching this very low dropout rate also because the participation is not fully free of charge, but still well affordable for university students.

Figure 2 displays all relevant processes to maintain *erp4students*, starting with the registration procedure and ending with the submission of certificates. Three different groups of active entities are involved, which are the learners (dark grey), the tutors (here: Tutoring System; light grey square in the middle of the figure) and the administration (lower light grey square). Some of the administrative processes are fully automatized.
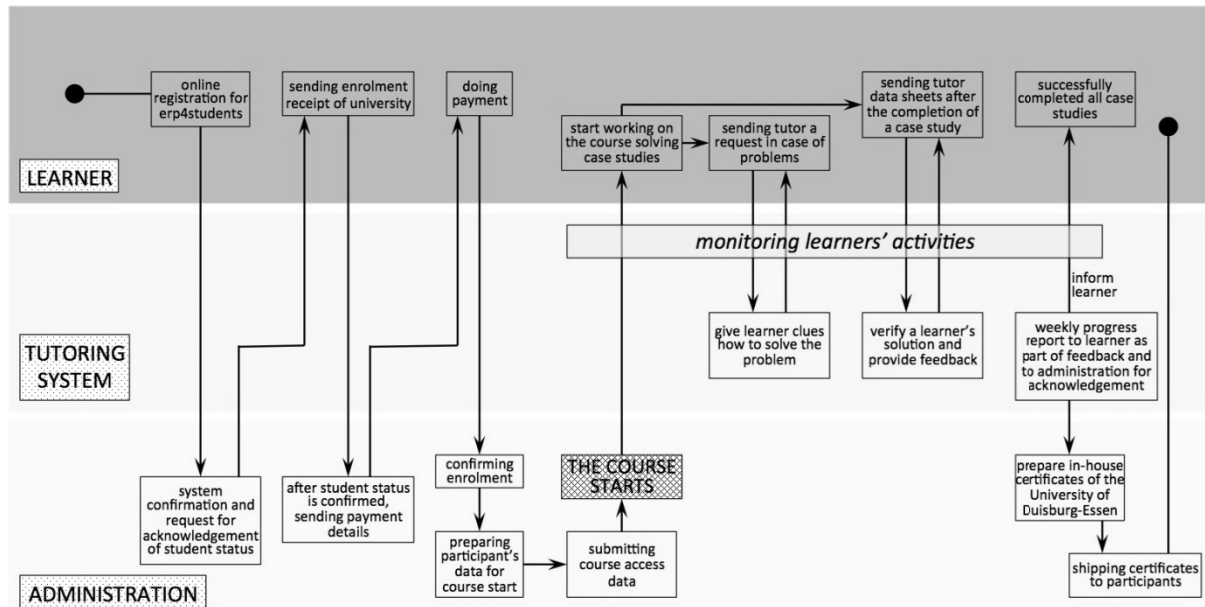

Figure 12. Processes and active entities in *erp4students*

The whole set of processes is implemented as a dialogue between a student (in the upper frame), the tutoring system (in the middle frame), and the administration of *erp4students* (in the lower frame) and can be subdivided into three distinct sets of sub-processes (from left to right):

1. The online registration process includes the transmission of relevant personal data, the choice of a course and the completion of the payment procedure. Learners and administration are involved.

2. The course itself starts with the completed enrolment (dark field in the lower centre) and after a learner received the course access data. From here, mainly the learners are the active entities, but the progress is steadily monitored, and the learners are fully supported by tutors.

3. After a learner successfully completed all case studies, the certificates are being delivered.

Since *erp4students* is an extracurricular offer, it is crucial for the students that they can work within their own pace, spending time to work when it is available. While due to administrative reasons, all students within one semester get access to the system at the same time. However, they can start with and complete their courses whenever they are ready. The course end is defined through a fixed deadline.

In case of difficulties, which appear to overburden the learner, the tutor is to be contacted. Assumed a learner provided all relevant details, the tutor returns clues in order to support the finding of an own solution, else, the tutor might ask for more details. As a first step, the learners are encouraged to discuss their issues with other learners in the forum. We found that due to the very different learning paces and schedules of the learners, they prefer immediate solutions so that they have a chance to seamlessly go on with their work. However, our general strategy is not to support the learners through immediately solving their problems, but instead, giving them clues on how to help themselves. This approach proved to enable the learners to develop competences for problem solving in general and for the practical work with ERP systems, in particular. When a learner finished a case study, the related data sheets are submitted for evaluation to the tutor (an active process, initialized through the learner). The tutor verifies the correctness and provides feedback regarding the quality of the solution. If the solution actually meets the defined requirements, the case study is being closed. The successful completion is included in the weekly progress report, which the tutor submits to both the learner as a part of the constant feedback loop and to the administration for purposes of documentation.

Once a learner has successfully completed all case studies within the course, the last set of sub-processes is initialized: First, the tutoring system informs both the learner and the administration of this new status quo. Subsequently, the administration prepares the in-house certificate of the University of Duisburg-Essen and ships it to the learner.

In the end of each course period, the learners are asked to complete a feedback questionnaire on a voluntary basis as a means of the implemented quality strategy. This strategy follows the first part of the German quality concept *Qualitätsplattform Lernen* (Quality Platform Learning), which describes a holistic quality approach basing on three sections, i.e., the quality of educational offers, the basic quality of organizations, and measures for excellent quality in organizations. The chosen first part of the concept deals with the request for a transparent provision of information regarding the educational offers, related to clear definitions of target groups and purposes, full transparency regarding the chosen approaches for didactics and methodology, used media, implemented roles, tasks for each of the roles, measures to control learning success, technological issues, and evaluation. In this particular approach, several national and international standards have been united (Arnold et al., 2013).

While most instruments for quality assurance are implemented a single time during the phases course planning and production, the student evaluation questionnaire is a repeatedly used instrument for ongoing quality control. With the responses from the students, their

satisfaction is measured. The responses and suggestions for improvement are compared with the results from earlier semesters in order to recognize the success (or failure) of implemented improvements. Suggestions and complaints made during the course runtime (towards the tutors) additionally are collected and fully considered in terms of finding further improvement potential. The short online questionnaire, however, is used as the central instrument for the related data collection.

As a novelty in the winter semester 2015/16, we extended our quality framework by implementing the Learning Culture Survey as an additional tool (Richter & Adelsberger, 2016). The Learning Culture Survey was designed for the analysis of culture-specific perceptions and attitudes of learners in terms of different educational aspects like the presumed role and expected tasks of educators (distinguishing lecturers and tutors), perceptions of and preferences regarding feedback, time management, motivation, gender issues, group-work related issues, etc. (Richter, 2014). For this purpose, learners are asked for their evaluation of 102 statements on the basis of agreement or disagreement (using a four-point Likert Scale). This was the first time to implement the questionnaire exclusively in the context of an online program. From prior implementations in the context of face to face education in universities and enterprises (professional training), we already knew that there actually is a common and relatively persistent (at least over four years) country-specific learning culture in higher education and that gender differences occur in just a small number of the considered issues (Richter & Zelenkauskaite, 2014). However, it still was unclear if online students would express the same perceptions like students in face-to-face education.

Implementation and Findings

For its first implementation in the context of *erp4students*, the online questionnaire was completed at the beginning of the course period by 100 randomly chosen participants from Germany. We expected to get insights regarding our participants' perceptions and expectations of extracurricular learning, which primarily should lead to an improvement of the provided tutorial support. Most participants of *erp4students* currently still have their origin in Germany, so that this context was most appropriate for a related investigation. While the total amount of registered learners from foreign countries already is remarkable, the hitherto registered numbers of participating foreign students per country is too low to reasonably drive culture-specific conclusions. In future, as soon as the numbers of learners from particular foreign countries increase, the Learning Culture Survey shall also be implemented in other national contexts. For comparative reasons, we additionally extracted a random sample of 100 responses out of our existing data pool from over 2,000 sample elements from the German traditional higher education context, which we collected during the course of the last years. We wanted to know if the scenario online and face-to-face education would show different results.

In the following, we focus on the most relevant issues of the questionnaire for our extracurricular vocational online education i.e., time management and services expected being provided by the tutors. Particularly the large questionnaire section related to group work has no particular relevance in the context of *erp4students*. In order to grant the students that they can work in their own pace and schedule, no tasks are designed to being solved in groups. In our latest feedback questionnaire, we explicitly asked the learners if they wished additional networking functionalities available through the platform, which clearly was denied. Thus, it is not planned for the nearer future to implement related functionalities. However, when the program is further expanded within the Asian context where social interaction has a far higher value in the context of learning, it still might become a relevant feature to ensure learner satisfaction.

Time Management: When do you do your work?

In this section, we wanted to know when learners complete their work and particularly, if asking for extension of deadlines is a general or rather an individual issue within a particular society. In former investigations we found that students, particularly from countries where higher education is not free of charge, appear to expect more flexibility regarding set deadlines. Directly after the table with the found absolute values, the percentage of positive evaluations (fully agree & agree) is subsequently displayed in the figure. A brief discussion follows.

Table 2: Time Management: German higher education vs. *erp4students* (absolute values)

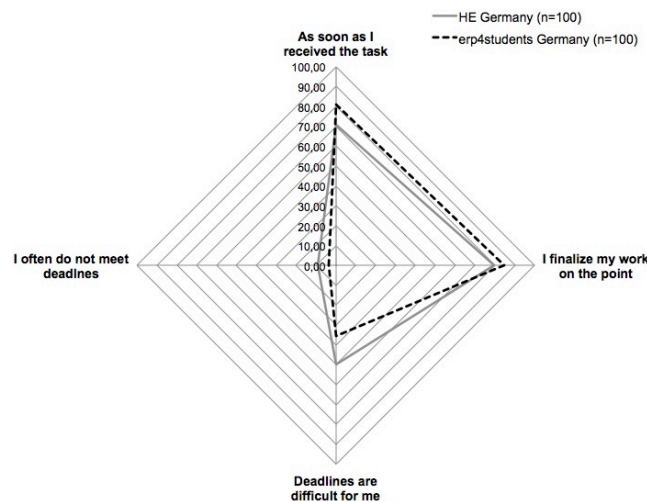| When do you do your work?	higher education (n=100)			erp4students (n=100)		
	# p	# n	# n.a.	# p	# n	# n.a.
as soon as I received the task	70	29	1	81	19	0
I finalize my work on the point	79	20	1	83	15	2
deadlines are difficult for me	48	48	4	31	56	13
I often do not meet deadlines	8	79	13	3	79	18

Figure 13. Time Management: German higher education vs. *erp4students* (percentage positive answers)

Figure 3 shows that the learners in our extracurricular online program appear to struggle less with set deadlines than their colleagues in f-2-f education. A possible reason could be the fact that they explicitly decided to take the additional extracurricular course, which means that they were fully aware of the necessary involvement from the beginning. Using all the available time, they appear to start their work earlier but rather finalize tasks on the point.

Tutor: Which tasks and responsibilities do you assign?

This section is highly relevant for *erp4students* since the success of our program is directly related to the satisfaction of our learners with the tutoring services. Also here, the figure displaying percentage values of positive answers follows directly after the figure. We found amazingly little differences between the results from the traditional face-to-face setting of higher education and the context of extracurricular vocational online training in *erp4students*. Two aspects, however particularly raised our attention.

Table 3: Tasks and responsibilities of tutors: German higher education vs. *erp4students* (absolute values)

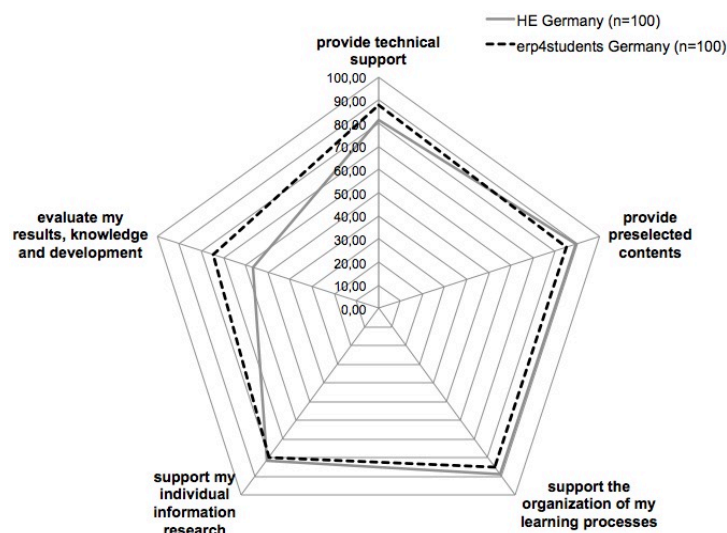| Which tasks and responsibilities do you assign to tutors?	higher education (n=100)			erp4students (n=100)		
	# p	# n	# n.a.	# p	# n	# n.a.
provide technical support	79	18	3	88	12	0
provide preselected contents	88	10	2	85	15	0
support org. of my learning processes	88	11	1	85	15	0
support indiv. information research	80	18	2	79	20	1
evaluate results, knowledge, dev.	54	42	4	74	25	1

Figure 14. Tasks and responsibilities of tutors: German higher education vs. *erp4students* (percentage positive answers)

As shown in Figure 4, the evaluation of results, knowledge and development (progress) is more expected in the online program than in the traditional learning form. We see the reason in a shift of responsibilities: While in the traditional higher education (at least in smaller classes), the professor usually is responsible for the evaluation and the tutor supports the professor, learners in *erp4students* do not have direct contact to a professor at all. As further (slight) differences, the online learners appear to be better self-organized (and thus do not expect tutors to support in this issue as much as in traditional education) and rather tend to expect receiving technical support in order to ensure that they can freely work in the system without spending unnecessary time for technical issues.

Conclusion

Compared to our results from the traditional face-to-face education, we found just a small number of differences in the responses of the learners in our program *erp4students*. The differences we eventually found were directly related to the specific conditions of our program. However, we yet cannot determine if the found differences actually were related to the online learning scenario, to the additional workload for the learners as *erp4student*s is an extracurricular program, or to the fact that the students have to pay a fee for participation. Further investigations are required for this purpose. However, the Learning Culture Survey as a means for quality management appears to being fully applicable in the context of online learning.

While we generally were looking for a way to simplify the administrative efforts with the increasing number of learners, we actually learned that a redesign in terms of automated feedback as usual in MOOCs appears not being suitable. Our established individual and prompt tutor support is considered a major success factor.

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