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Explorative Case Study on the Utilization of ERP Systems

by SME Manufacturing Industry and Educational Sector in North Karelia

KARELIA UNIVERSITY OF APPLIED SCIENCES

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Introduction

In companies today, enterprise resource planning (ERP) systems are commonly used. At the European level, the number of enterprises using ERP has risen from 31% to 34% between years 2014–2017 (Eurostat 2019). However, there are vast differences between different industry sectors, manufacturing industry being one of the two most eager utilizers of ERP systems with their percentage being around 44% in 2017 (Eurostat 2019). The vast numbers of ERP users suggest that educational institutions, especially in their degree programs related to manufacturing, should equip students to have at least the minimum readiness to use ERP as one of their professional tools from the very beginning of their career. NordErp project is a multinational and multidisciplinary project between three higher education institutions and one business partner that was started to explore and develop the teaching of ERP and production simulation in an intercultural and interdisciplinary learning approach. In this endeavor, gamification methods are used as applied pedagogical tools. In NordErp project, one of the initial objectives has been to acquire knowledge on how ERPs and production simulations are used in the industry and how they are taught in educational institutions today. This body of knowledge will serve as a starting point in our efforts to identify future needs for the industry and education respectively and to identify possibilities for integrating these two.

Production simulations, or simulations in manufacturing systems, have been generally used in the manufacturing industry, and for example studies by Rasmunssen (1978) and Lang et al. (1991) have found them to be the second most popular management science when asked from production managers. How then should educational institutions teach ERP through production simulations in order to provide their students with sufficient skills? When we look at the role of the ERP software in manufacturing industry, we find

it to be the tool enabling successful integration of the production and business processes management. This holistic nature of the ERP software makes them complex systems to master. In order to better understand the ERP software and production simulation in SME industry and education, an explorative case study was carried out during spring 2017. The case study targeted both industrial and educational sectors in North Karelia, Finland. This report presents data collected during the exploratory case study, and provides some observations and future suggestions drawn from the data.

Motivation for this case study has been threefold. First, we were interested in finding existing practices related to ERP and production simulations both in small to medium-sized companies and in education. In this way we could better understand what kind of pedagogical solutions already exist and examine whether and to what extent approaches used in education support the needs of the industry. For NordErp project, the study provided valuable information when designing the steps that the project would then take when implementing our own intensive courses on production simulation and ERP. Second, we looked for information on the future needs regarding production simulations and ERP in industry and education. This information was considered to benefit further research and future efforts to find solutions that are needed but which are not yet realized by industrial or educational sectors. Third, the case study aimed at finding information on what kind of practical integration possibilities are welcomed but not yet utilized between the educational sector and industry in relation to ERP and production simulations.

The rest of the paper is organized into four chapters. First, we will provide background for the existing studies on the usage of ERP and production simulations in industry and in higher education. The design and methodological choices of the case study are then presented followed by the procedure of the actual implementation. Next, results of the case study are presented and discussed. Finally, conclusions from the case study will be drawn.

Background

There exist several studies on the utilization of ERP software in the contexts of medium and large-sized companies. Research has often focused on the implementation process of companies deciding to start using ERP in their everyday business operations. Based on such studies, several practical models for the implementation process have been developed. Today, an increasing number of studies focus on the application phase, for example, on the special challenges of training new employees into using ERP software.

Along with the more wide-spread utilization of ERP in the industry, educational institutions such as universities and universities of applied sciences have also started to emphasize ERP as an important subject of study. The significance of ERP has slowly been recognized by academia and the ERP related courses have found their way to the curricula of HE institutions. Researchers have also noticed this trend in education and there is an increasing research interest on the contents and composition of courses focusing on ERP. When examining the role of ERP in higher education, it seems that despite the fact that ERP courses have been included in the curricula, coverage of ERP has not traditionally been very significant, at least according to a study by Watson & Schneider (1999). Another example of ERP education research is a study by Jensen et al. (2005), who carried out an analysis of the challenges of ERP in education[1].

Despite the increased interest, most of the research still focuses on the utilization of ERP in medium to large-size companies and on ERP education within individual ERP related courses. In order to complement the picture, research on the use of ERP in SMEs and teaching of ERP in multidisciplinary settings outside individual classrooms is needed, espe-

1 For an extensive literature review, see for example Ali & Miller (2017) and a more concise overview of ERP related research, for example Addo-Tenkorang, & Helo (2011).

cially since there does not seem to exist that much research data on the use of ERP in SMEs or on ERP education in universities of applied sciences.

In universities of applied sciences in Finland, one important focal point is the regional impact of the educational institution on its surrounding area. Universities of applied sciences traditionally work in close co-operation with local industries when designing and implementing their curricula. For example, close ties with local businesses and industry are one of the three main strategical points for Karelia University of Applied Sciences (Karelia 2019). The reported case study takes some initial steps in the direction of providing necessary empirical data to increase the regional impact and to find common interests between various educational programs in order to create multidisciplinary teaching opportunities.

Research Design and Methodology

The aim of the present study on the utilization of ERP has been to shift the research focus from large-sized industries and universities to SMEs and universities of applied sciences. We have gathered data on the current situation of how ERP and productions simulation are being utilized in everyday practices of SMEs and in everyday teaching activities of the selected degree programs of Karelia UAS. We have been especially interested in investigating the practices around ERPs and production simulations in the settings typical to the region. The following research questions for the case study were formulated from the general goals of the NordErp project:

1. How ERP is used in the companies?
2. How ERP is taught in educational institutions?
3. How production simulations are used in the companies?
4. How production simulations are utilized in educational institutions?
5. What kind of future needs can be identified in relation to ERP and production simulation in companies?
6. What kind of future needs can be identified in relation to ERP and production simulation in educational institutions?

Based on our initial motivation presented in the Introduction and context presented in the previous chapter, exploratory case study was selected as the research methodology in order to better map out the practices that exist in SME industry and higher education in the area in which Karelia University of Applied Sciences operates. It was assumed that the case study method would work best as a preliminary means of investigation in our situation where more exact formulations of research problem and research questions were difficult due to the lack of sound theoretical framework.

The case study method is generally used to investigate contemporary phenomena in their real-life contexts, especially when there are no clear boundaries between the phenomena and contexts (Yin 1984, 23). According to Zainal (2007), this method allows a researcher to closely examine the data, e.g. in a purposefully selected and narrow geographical area or among a very limited number of research subjects. In qualitative, explorative case studies, researchers press for understanding the complex interrelationships between all existing phenomena (Stake 1995, 37). Yin (2014) describes exploratory study as an attempt "*to answer questions typically framed by the pronoun what*". According to Hancock & Algozzine (2011, 37) exploratory case study design "*. . . seek[s] to define research questions of a subsequent study or to determine the feasibility of research procedures . . .*" and it is "*. . . often a prelude to additional research efforts . . .*" With our explorative case study, we aim to paint an overall picture that would be concise enough in order to find priorities and insights for more definite investigations that can be carried out in the future.

In the present study, the use of ERP and production simulation was investigated within Joensuu region. When selecting local companies, focus was on small and medium-sized enterprises that operate in discrete manufacturing. The discrete manufacturing field was chosen since it is one the most eager industrial utilizers of ERP software based on the report from Eurostat (2019). For the case study, two companies, Kirike and Viimet were selected. When selecting participants from educational institutions, our focus was on degree programs that have ERP and/or production simulation related courses in their curriculum. The three degree programs from Karelia University of Applied Sciences that were chosen to represent the educational sector included Mechanical Engineering, Business Economics and Business Information Technology.

The explorative case study was carried out by the researchers of Karelia University of Applied Sciences taking part in the NordErp project. Research was conducted through semi-structured interviews by project participants from each of the project partner institutions. This paper, however, reports only the study conducted in Joensuu region. The interview templates are presented in Appendices A and B. Interviews were either 1) face-to-face interviews or 2) email-interviews followed by phone or face-to-face discussions with the interviewee. Moreover, a literature review regarding two topics, 1) the use of ERP in SMEs and 2) pedagogies used in ERP related courses in higher education, provided secondary data. The literature review was utilized for background analysis when choosing the methodology and framing of the case study method.

The company interview template available in Appendix A consisted of an introduction and a company overview that the interviewer was supposed to fill in with the help of the interviewee. Moreover, there were twenty multiple choice questions with an option for the respondent's own freely formulated answer and some room for additional commentary. In addition, the template included seven background questions that the interviewer was ex-

pected to utilize when asking possible follow-up questions in order to obtain the necessary data to answer the research questions 1, 3 and 5. Background questions were also utilized when the interviewer wrote his own summary of the interview.

The educational interview template provided in Appendix B followed a somewhat similar structure to the company interview. The template consisted of an introduction and the overview of the educational institution that the interviewer was supposed to fill in with the help of the interviewee. The template also contained 19 open questions and six background questions that the interviewer was expected to utilize when asking possible follow-up questions to be able to answer the research questions 2, 4 and 6. Background questions were also utilized when interviewer summarized the interview.

Implementation of the Case Studies

In the preliminary meetings of the NordErp project group during late 2017 and early 2018, the questions for the case study were formulated by the team members who work in the fields of discrete and continuous manufacturing, mechanical engineering, business information technology and business economics. Two sets of questions were created, one for the companies (Appendix A) and one for the educational institutions (Appendix B). The interviews were conducted in two SMEs and three degree programs of Karelia University of Applied Sciences during late spring 2017. For the companies, the questions were first sent for perusal by e-mail, which was then followed by phone interviews. Before the interviews, brief description of the company was written to the Company Overview section of the report. At the beginning of the phone interview, necessary background information was recorded to the Basic Information section of the interview report. After the interview, the interviewer wrote down his own observations with the help of the research questions.

The interviews with the educators were carried out face-to-face. Before the interviews, brief description of the educational institution was written to the Educational Institution Overview section of the report. At the beginning of the interview, necessary background information was written to the Basic Information section of the interview report. During the interviews, the key points of answers were written down. The answers were verified through further discussion with the interviewee. When necessary, follow-up questions were asked. After the face-to-face interviews, the interviewer also recorded the observations he had made during the interview.

Information gathered through the interviews was then summarized and both similarities and differences in the procedures of the two companies in the usage of ERP and production simulations were analyzed. Similar comparisons were made regarding the data collected from the lecturers in the three degree programs.

Results

COMPANY DATA

We will first report the results from the interviews carried out in the industrial sector. The data regarding ERP illustrates the current situation. After presenting the ERP related data, production simulation is reported in a similar way starting from the current situation and continuing then to the future needs in the companies.

ERPs typically consist of several modules that may or may not be utilized independently. Table 1 shows the different ERP modules the two companies use in their operation. As can be seen, both companies use or plan to use various modules of ERP.

Table 1. ERP modules that are in use or are planned to be taken into usage in the interviewed companies.

Modules	Kirike	Viimet
Production	yes	yes
Logistics	yes	yes
Quality Management	yes	no
Financial Management	yes	yes
CRM	yes	no
Payroll Administration	yes	yes
Human Resource Management	yes	no

Both companies had faced similar challenges when they had decided to utilize ERP and had started to implement it into their daily activities. In their replies, both company representatives considered the implementation process to be slow and challenging. Most persistent problems were found in the production and quality control modules. The means to overcome these challenges were similar in both companies and included simulation, testing, as well as requests for additional guidance and consultation mainly from the software provider.

In both investigated companies, ERP usage extended to all the employees. Both office staff and employees in production used ERP in their daily activities. In both companies, staff training was done step-by-step using a test database with the company's own operations.

In the two companies, production simulations were not utilized. Instead, a separate test database was used when the companies needed to do problem solving or run tests on their production process. The interviews revealed that companies considered production simulations an interesting tool that could be used in the future. The main reason for not including production simulations into existing practices was the lack of familiarity with them and insufficient resources to investigate their use.

EDUCATIONAL DATA

This chapter reports the results gained from the interviews with educators. The ERP related data represents the current situation in the educational institutions. After the he data regarding production simulation focus is moved to the answers that target future needs relating to both ERP and production simulations.

In all three degree programs, teaching of ERP was included in the curriculum to some extent. In Business Economics, ERP was taught as a main topic in two four-credit courses with two different emphases, those of accounting and marketing. The ERP software used was Lemonsoft. In Business Information Technology, ERP was taught in one five-credit course. At the time of the case study, Microsoft Dynamics Nav ERP software was used. In the future, the ERP software will possibly be replaced by Microsoft Dynamics 365 or Lemonsoft. In Mechanical Engineering, the principles of ERP were taught to an extent of one credit as a part of a five-credit course on production management and optimization. At the time of the case study, no actual ERP software was used. Possible utilization of Lemonsoft ERP software was planned for the future.

In Business Economics, the ERP modules covered in accounting entailed financial management, payroll administration, post calculation and budgeting. In Marketing, the CRM module was used. In Business Information Management, the ERP modules of production, logistics, and financial management were used. In Mechanical Engineering, teaching centered around the production module of ERP.

In all three degree programs, teaching of ERP was done through traditional lectures and exercises as the primary pedagogical method. In addition, Business Economics students were required to carry out an interview with a representative of a company using ERP, Business Information Technology students were asked to compile a learning diary during the course, and Mechanical Engineering students visited a company using ERP as a part of their ERP course.

The data used in teaching ERP were organized in the degree programs slightly differently. Business Economics used artificial training data, training materials for Business Information Technology were provided by Microsoft Dynamics Alliance, while Mechanical Engineering relied on selected books and lecture notes.

What comes to the use of production simulations in teaching, the approaches and methods differed between the degree programs. In Business Economics, no production simulation was used. Business Information Technology used a simple, make-to-order production process, while Mechanical Engineering had a complete production simulation game.

The challenges that were experienced in Business Economics included the lack of resources, and insufficient co-operation and sharing of knowledge with others. In Business Information Technology the main challenge was to deepen the integration of ERP into teaching. In Mechanical Engineering, the development needs included the familiarization with Lemonsoft software, content creation in connection with business economics lecturers, and creation of simple and suitable solutions to introduce the new concepts to the students.

When examining future needs for teaching within degree programs, the following issues emerged. In Business Economics, there was a desire to cover the different functionalities of ERP more thoroughly. Business Information Technology expressed two types of needs. Firstly, there is a need to make the ERP related economic processes more understandable to the students at a general level, and secondly to better integrate ERP into teaching. In Mechanical Engineering, familiarization with Lemonsoft software and content creation with the business economics lecturers were identified as future needs.

Discussion

The interview data were used to find answers to the six research questions presented in Introduction. The questions are discussed first in pairs, and then some general observations are drawn based on the data as a whole.

Questions 1 and 2: How ERP is used in the companies and how ERP is taught in educational institutions?

In the two mechanical engineering companies, ERPs was considered promising and sufficiently beneficial despite the time-consuming and challenging implementation process. Several ERP modules for different areas of operation are in use in both companies. There appeared to be a desire to utilize ERP as a holistic solution that covers most parts of the whole business. Implementation process was found hard and the interviewees expressed needs for further consultation and training.

In educational institutions, the data suggest that teaching of ERP happens in a fragmented way and there is not enough cooperation between the degree programs. Teaching is organized from the point of view of the subject field and concentrates on those parts of the ERP system that are central for the specific degree program. There were some connections with the industry in the form of company interviews and visits, but not through practical exercises or projects.

Questions 3 and 4: How production simulations are used in the companies and how production simulations are utilized in educational institutions?

At the time of the interviews, product simulations were not used in the two participating companies. Instead, the companies relied on their own test databases when they wanted to solve problems and do testing related to their production process.

In education, two out of three degree programs utilized a production simulation process as one of their pedagogical tools. Both the simplified production process of the Business Information Technology and the production simulation game of Mechanical Engineering used artificial data for the purposes of the simulations.

Questions 5 and 6: What kind of future needs can be identified in relation to ERP and production simulation for companies and what kind of future needs can be identified in relation to ERP and production simulation for educational institutions?

Based on the interview questions, it seems that one of the most laborious part of the ERP utilization for companies is the implementation phase, which includes also staff training. Training in the two companies was carried out with the help of test databases. Production simulations were found interesting, although they were not yet used.

For educational institutions, the future needs in relation to ERP were to integrate the ERP systems into teaching more holistically and deeply. In addition, the desire for more multidisciplinary approach was brought up by the interviewees.

When examining how ERP is used in companies and how it is taught, there seems to be a strong contradiction between the tightly integrated processes of the SME industry and the diverse and separate courses and methods of teaching different parts of ERP systems in education. Furthermore, in the educational sector there seems to be a desire for more integrated, multidisciplinary approach that would approach teaching ERP from a holistic perspective.

When it comes to production simulations, they seem not to be extensively utilized either in SME industry or in educational institutions at the moment. There were some small-scale simulations used in two out of the three degree programs, but large-scale production simulations utilizing different aspects of ERP in different parts of the production process were missing. According to the interviewees, attitudes towards this kind of utilization were not negative. However, based on their answers, there seemed not to be enough resources.

Conclusions

In order to better understand the utilization of ERP and production simulations in SME industry and education respectively, a case study reported in this study was carried out. Since the topic itself was broad and only familiar to the researchers mostly from the point of view of researchers´ own educational backgrounds in their own degree programs, an explorative case study design with semi-structured interviews as a data gathering method was chosen as a research method. With the case study, we were trying to find answers to questions concerning the use of ERP and production simulations in SME industry and their role in the curricula of degree programs of a university of applied sciences. Based on the results and the discussion presented in this report, it seems that although ERPs are used in quite a holistic way in the SME industry and taught quite broadly in various degree programs in the university of applied sciences under study, the integration 1) between different degree programs and 2) between the educational sector and SMEs is still shallow. This is in contrast with the result that interviewed educators desired more holistic and integrated methods for teaching ERP, which at the same time would seem to meet the SME industry´s needs to use of ERP better. The study suggests that a production simulation that demonstrates various ERP functionalities, for example through a product life cycle in discrete manufacturing, could be helpful in ERP related education. On the other hand, production simulations could enable fast and inexpensive testing of new concepts for companies.

Findings of this explorative case study would, in our opinion, provide an interesting starting point for more detailed research. Such research could be carried out in the form of illustrative case studies with more data in which the joint interests between SMEs and UAS degree programs, especially Business Economics, Business Information Technology, and Mechanical Engineering, would be investigated further in the context of teaching ERP with an approach of multidisciplinary production simulations.

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Appendix A

Case study report for [INSERT COMPANY NAME HERE]

INTRODUCTION

This report summarizes information collected for NordErp project from a representative of a company named in the report title. Information is acquired through interview and it targets usage of ERP system in the company. During the NordErp project, this information is used in connection with similar information collected from educational institutions in order to further develop ERP related education.

COMPANY OVERVIEW

Name of the company: ?

[WHAT TO POINT OUT IN COMPANY OVERVIEW:

» OWNERS OF CAPITAL AND BUSINESS GROUP BELONGING

» AGE OF THE COMPANY

» BRAND NAMES

» STAFF DESCRIPTION

» CLIENT GROUPS

» PRODUCTS DESCRIPTION

» PRODUCTION VOLUME

» PRODUCT AND PRODUCTION SPECIALITY]

COMPANY INTERVIEW

Basic information

Date(s) of the interview: ?

Method of the interview (e-mail, by phone, face-to-face, ...): ?

Interviewer: ?

Interviewee (name, position, role in the company in relation to ERP and/or production simulation): ?

Interviewer's own observations and notions related to background questions

1. How and to what extent ERP is used in the company?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 3-12]

2.What modules of ERP are utilized?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 4, 7 -12]

3. What kind of knowledge of ERP is required from the employees?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 13-20]

4. How ERP system is taught to new employees?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 15-20]

5. How and to what extent production simulations are used in the company?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT COULD BE UTILIZED HERE WAS NOT UNFORTUNATELY ASKED BY THE QUESTIONS]

6. Is there a need for production simulation tools and simulation creators in the company?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT COULD BE UTILIZED HERE WAS NOT UNFORTUNATELY ASKED BY THE QUESTIONS]

7. If there is a need asked above, could it be elaborated in more detail?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT COULD BE UTILIZED HERE WAS NOT UNFORTUNATELY ASKED BY THE QUESTIONS]

Questions

1) What is the size of the company?

a) Micro

b) Small, 30 persons 3-5 milj. €

c) Medium

d) Large

2) What is the branch of the company?

a) Automotive

b) Oil&Gas

c) Constructing

d) Metal

e) Machine

f) Other .....

3) Is the EPR system in use in in the company's all areas?

a) Yes

b) No

4) If yes, in which areas of the company the ERP system is in use?

a) Production

b) Logistic

c) Quality management, complaints are signed and quality management is separated

d) Financial management

e) Customer relationships management, some information tracked, not in active use

f) Payroll administration

g) Human resource management

h) Calculation and budjeting

5) Did you have the problems during ERP system implementation process?

a) Yes

b) No

6) What kind of problems did you have during ERP implementation process?

a) .....

b) .....

c) .....

7) Which areas / modules of the ERP system were the most problematic?

a) Production

b) Logistic

c) Quality Management

d) Project management

e) Financial management

f) Customer relationships management

g) Payroll administration

h) Human resource management

i) .....

8) Did you solve all of these problems?

a) Yes, some problems if it was possible to use test database and test & try

b) No, software supplier helps

9) In which area / module of ERP system the problems were not solved?

a) Production see above

b) Logistic

c) Quality Management

d) Project management

e) Financial management

f) Customer relationships management

g) Payroll administration

h) Human resource management

i) .....

10) What kind of method and tools did you use to solve these problems?

a) Additional training

b) Simulations

c) Testing

d) Consultation

e) .....

11) Did you need additional help to solve problems?

a) Yes

b) No

12) If Yes, what kind of help did you need?

a) .....

b) .....

c) .....

13) Are all employees using the ERP system in company?

a) Yes

b) No

14) If no, who are using the ERP system in the company?

a) .....

b) .....

c) .....

15) How the employees where implemented in using ERP systems?

a) .....

b) .....

c) .....

16) What kind of training did you use for employees?

a) .....

b) .....

c) .....

17) What kind of problems did you noticed during training of the ERP?

a) .....

b) .....

c) .....

18) Did you need additional help to employees training?

a) Yes

b) No

19) If Yes, what kind of help did you need?

a) .....

b) .....

c) .....

20) How new employees are taught to use ERP system?

a) .....

b) .....

c) .....

Case study report for [INSERT EDUCATIONAL INSTITUTION NAME HERE]

INTRODUCTION

This report summarizes information collected for NordErp project from a representative of an educational institution named in the report title. Information is acquired through interview and it targets usage of ERP system in degree programmes of the educational institution. During the NordErp project, this information is used in connection with similar information collected from companies in order to further develop ERP related education.

EDUCATIONAL INSTITUTION OVERVIEW

Name of the educational institution: ?

[WHAT TO POINT OUT IN EDUCATIONAL INSTITUTION OVERVIEW:

» TYPE OF HEI (HIGHER EDUCATION INSTITUTION): UNIVERSITY, COLLEGE OR OTHER

» WHAT IS THE AGE OF HEI

» APROXIMATE SIZE OF THE ORGANIZATION: STAFF AND STUDENTS

» HOW IS THE ORGANIZATION FUNDED: BY STATE, FROM FOUNDATION OR PRIVATE

» PRIMARY STUDY PROGRAMMES OFFERED AND ON WHAT LEVELS]

EDUCATIONAL INSTITUTION INTERVIEW

Basic information

Date(s) of the interview: ?

Method of the interview (e-mail, by phone, face-to-face, ...): ?

Interviewer: ?

Interviewee (name, position, degree programme, role in the educational institution in relation to ERP): ?

Interviewer's own observations and notions related to background questions

21) With what kind of pedagogical methods ERP has been taught?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 9-12]

22) To what extent ERP has been taught?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 5-8, 14-15]

23) What modules of ERP have been covered during the education?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT CAN BE UTILIZED HERE CAN BE FOUND ESPECIALLY FROM QUESTIONS 6, 15]

24) With what kind of pedagogical methods production simulation has been taught?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT COULD BE UTILIZED HERE WAS NOT UNFORTUNATELY ASKED BY THE QUESTIONS]

25) To what extent production simulation has been taught?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT COULD BE UTILIZED HERE WAS NOT UNFORTUNATELY ASKED BY THE QUESTIONS]

26) What kind of production simulation tools have been used during the education?

[INSERT YOUR COMMENTS HERE; INFORMATION THAT COULD BE UTILIZED HERE WAS NOT UNFORTUNATELY ASKED BY THE QUESTIONS]

Questions

1. Teachers' educational and professional background?

[insert person's answers]

2. Degree programme and the course, in which the ERP is applied?

3. Level of students (bachelor, master)?

4. Are there any pre-requirements before the students can enter the course, if yes, what kinds of?

5. How many credits are devoted to ERP?

6. What modules of ERP are discussed?

7. What software is in use?

8. What kind of production process is in use?

9. What pedagogical approaches and methods are in use?

10. What kinds of materials are in use?

11. Is there any company involvement, if yes, what kind of?

12. What kind of learning project is included into teaching, if any?

13. What kinds of development needs could you identify in your teaching/course?

14. Are there any challenges in using ERP in teaching, if yes, what kinds of?

15. What qualities of the programme are in active us and why?

16. Are there some new areas the teacher would like to include into the teaching?

17. How the teacher has learned to use ERP?

18. How the knowledge and expertise are updated?

19. Is there any need for further training, if yes, what kind of?