

Vanessa Grace Booc & Liisa Timonen



Evaluation and Quality Assurance

NordERP - Northern Embrace for Enterprise Resource Planning System



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Summary

The goal of this report is to summarize the feedback received from the partners, coordinators and participants of the three different intensive courses fulfilled within the duration of the project life and evaluate the performance of the project concerning the work packages and activities set by the project team.

The first step was to identify the overall goals of the project and once this was completed, analysis was performed together to see the results, overall feedback, concrete benefits of the projects and the plans for the future of the project results.

Overall feedback of the project has been positive with providing the partner organizations more material and experiences for teaching ERP-software. Apart from that, the development of English language materials for operations management, enterprise resource planning, process design and optimization, lean thinking and simulations are beneficial to foster mobility and internationalization.

The intensive programmes has been a positive experience to nearly 100 students from all the partner institutions from the Baltic and Nordic countries. The evaluation received is positive with the request for continuation. It is also important to note while there were some delays in executing the project plan, the partner institutions have in the end managed all the tasks within the expected time schedule and delivered very good results.

About the project

BACKGROUND

NordERP project is designed under Nordplus Horizontal programme to foster graduate employability, industry involvement and regional development and to create more innovative and international multi-disciplinary education. It brings together higher education and business partners from Finland, Estonia and Norway. The idea is simple: the partners develop; test and pilot tools for establishing production simulation environment and ERP (enterprise resource planning) software programme as one of the main tools for integrated teaching of mechanical/manufacturing engineering, business economics, information technology and multicultural skills.

The partners build a learning environment simulating real production process, where students from different disciplines will work together to tackle problems, communicate and learn together as they would be a real working industry team. In this digital simulation environment, the enterprise resource planning process is explored with a multidisciplinary approach. In the learning process the students, teachers and companies learn iterative co-creation of knowledge and skills making the most of each other's' expertise in order to develop high quality, profitable products and services and efficient teams.

For the partner universities, the project increases international student and personnel mobility in the form of intensive workshops and network establishment. The business partners benefit from the possibility of the system development based on user experiences. The intensive workshops that will explore the ways to utilize production simulations and ERPi during the project will provide a continuous and expandable medium for further student and personnel mobility. Furthermore, NordERP promotes internationalization at home and staff development among all the partners.

”” In this digital simulation environment the enterprise resource planning process is explored with a multidisciplinary approach.

PURPOSE

- » To understand and document educational needs around production process and ERP (enterprise resource planning) from the view of partner HEIs (Higher education institutes).
- » To create a framework that can be used in teaching production process related topics.
- » Raise the level and quality of university education in this multidisciplinary field which may benefit from the simulation environments.
- » Benefit of students, teachers, businesses and partner HEIs, in the end also the regions by increasing the expertise and skills.
- » Bring all the benefits from this project and associated (national) projects together finding and promoting synergies.
- » Implement a project where the good qualifications and skills across disciplines come together bringing added value and new perspectives to all.
- » Bridge the currently existing gaps between lean concepts dissemination and use the lean concepts within mechanical/machine/manufacturing engineering contexts with the use of games in operational and business environments.

AIMS AND CONTRIBUTION

The partners share three main aims: first, by the end of the project the ERP-programme has been established as one of the tools for multidisciplinary production and business-oriented teaching among partner universities, and second, the partners have created a pedagogical scheme for the student and industry integration and, third, the partners have created an international university and business network, who together develop the education and region. In addition, the partners work for design and implementation of joint international intensive courses about ERP in the future.

ACTIVITY

- » Clarification/analysis of a topic
- » Conferences/seminars/workshops
- » Development of teaching material (also for web)
- » Dissemination of results/publications
- » Establishment of network for further cooperation

WORK PACKAGES

NordERP has following steps; First, build the team of multidisciplinary and internationally varied experts to develop the simulation environment; second, develop and pilot the simulation environment together with the students; third, organize pedagogical training for the teachers to utilize the simulation; and fourth is to organize three intensive workshops where the simulation is established into the pedagogical practices of the partner HEIs in multidisciplinary and multicultural teams.

Objectives are the following, 1) define the pedagogical goals to be reached with the help of the simulation environment, 2) define tasks needed in setting the simulation environment and utilizing it in education, and 2) find individual experts that can be assigned to these tasks. Experts from different fields within the partner network will provide their input into this highly collaborative process. Following sections describe each of the work packages.

WPs	Partner responsible
WP1 – Management	FI - Karelia
WP2 – Pedagogical learning tools	EE
WP3 – Simulation environment and ERP development	NO - UiS
WP4 – Gamification	FI - Karelia
WP5 – Intensive workshops	NO - UiS
WP6 – Sustainability and dissemination	EE
WP7 – Evaluation and quality assurance	FI - Karelia

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Feedback from the Intensive Programme (IP) Participants

The comments mentioned below are actual feedback gathered from the participants of the 3 different intensive programmes throughout the project where a feedback form was distributed, and students would give top 5 positive experiences and top 5 areas for development. The answers were summarized and the score reflects the number of times it was mentioned in the feedback form.

IP1 JOENSUU 2018. FEEDBACK FROM 36 STUDENTS

Feedback : Top 5 - Positive	Score
Factory/company visits	19
Lego simulation and gamification	18
Group work	13
Work with different students from different countries	10
Cool/clever lecturers and organizers, funny and nice	9
Food, sightseeing, entertainment and accommodation	7
Lab sessions is more practical	4
Easy communication with other students	3
Lemon soft	2
Teaching Environment & Moodle good	2
Good pre-learning materials, but a little heavy	1
A lot to learn, but taught in a way that wasn't hard	1
These kind of IP`s and programs should definitely continue	1

Feedback: Top 5 - development ideas	Score
More company visits, specially John Deere	19
Better organization of arrivals, accommodation	19
Improve timetable, shorter lectures w/ breaks, longer time for lunch	11
Lemon soft too time consuming	8
Better Moodle instructions/access - IT issues should be solved beforehand	8
Building our own factory and having a competition to make it better	6
More time in the lab./practical tasks	6
More Lego simulation and gamification	5
Felt sleepy in long classes with minimum breaks in between, sounds system not available	5
More group discussions	4
Need transport from school to residence	3
Pre learning was heavy	2
More six sigma and lean	2
More guests who could talk about real life problems at their factory's	2
Need espresso/coffee	2
Better case study	2
Need more fund for students	2
Computers were slow	1
More diverse lecturers and lecturers	2
More difficult group assignments	1
Just one room for all lectures	1
The organizers should be given mere beer for their hard work	1
These programs should be organized in summer	1
The final year students want to participate in IP2 and IP3 if possible	1
All students should be included to simulations	1
More activities outside of intensive course	
Quick rundown on the pre reading materials so that everyone is on the same page	1
Language skills	1
More supportive mentoring	1

Comments IP1

Over 40 students from 3 different countries participated in the IP1 in Joensuu, Finland. The factory / company visits, Lego simulation, gamification, and the group work scored the highest in the feedback. Accommodation, timetable and more company visit were areas for development.

IP2 TARTU NOVEMBER 2018. FEEDBACK FROM 11 STUDENTS

Feedback: Top 5 - Positive	Score
This IP was good, will recommend to others	7
Good free time/socializing activities	7
Great company visits	9
Good facilities, school and accommodation	4
Nice to see machining, laser cutting and 3D printing	4
Project work & laser cutting very interesting	3
The whole week was well organized. Had time to socialize and learn at the same time	2
We had a real problem to solve. This was like problem based learning	1
Different students from different countries	1
Need more IP`s of this kind. Govt. Should give more funds for this.	1
Got the opportunity to see a new city and learn different things	1
2-3 students from the course did not know much about CNC machining, was good they could participate and learn	1
Very good social activities, museum and factory visits	1
Brain storming, then produce a final product was nice to learn	1

Feedback: Top 5 - development ideas	Score
Could have been better participation from Tartu and Norway students	4
Could have more time on project	3
Should get info in pre learning state about the project	3
Main goal of the project was not clear at the beginning	2
Felt a little uneasy at the beginning because the other students were cold	1
Felt like the project was not serious	1

Comments IP2

Fifteen (15) students participated in the IP2 in Tartu. There were 11 students from Finland, 2 from Norway and 2 from Estonia. Both Norway and Estonia had a problem with participation because it was in the middle of the semester. It was also during the time where students were very busy with exam. In addition, the IP was built up in a different conceptual manner than the other IPs. This time, focus was set on learning manufacturing technologies. Computer aided design, rapid prototyping (3D printing) and CNC machining. All the feedback was taken into consideration planning for the final IP.

IP3 JOENSUU MARCH 2019. FEEDBACK FROM 30 STUDENTS

Feedback: Top 5 - Positive	Score
Working with international groups give good experience in workshops, projects etc	22
Get to know other cultures	18
Good lean thinking and Lego project	15
To visit John Deere factory was good	9
Learn good practices of process optimization, product making process	8
Keep up the good work staff. Need more courses in the future too	7
Very good group work, specially playing games in group	9
Food, living conditions good and nice	5
Learned lean theory fundamentals, creative thinking to solve problems	4
Practical learning is easy to remember	3
Learned Kan Ban, Dmiac, vsm, six sigma, lean etc was very good	3
The whole course was thoroughly planned	3
Thanks to the staff who was involved for this course (Smart teachers and awesome students)	3
Learned about things that should not be done in a team	1
Visit to Genius Process was very good	1
I knew these things from before; but I learned more in practical teaching	1
Paper plan games, drawings and number games were good	1
Got good information on financial reports	1

Feedback: Top 5 - Development ideas	Score
Visit companies who have implemented lean methods	18
Give more information before course starts	6
Use more AR/VR presentations	3
Teams should play at the same time so nobody can steal ideas from others	2
Instructions was not loud enough. Language skills can be improved	2
Should change groups more often	1
Learn more on waste reduction	1
Not only Lego games, but more exciting games as well	1
5 sigma and 6 sigma are old techniques. Need to update	1
Too many things to learn in a short time period	1
Pre learning materials was hard	1

Comments IP3

IP₃ was better organized because of the past learnings with the two previous IPs. 30 students participated in the intensive program that was again held at Karelia University in Joensuu, Finland. The overall feedback for IP₃ was excellent. Developmental areas which were mentioned during the previous IPs were taken into consideration like the company visit to company's like John Deere. The better-organized IP also lead to better participation and in turn fostered student mobility and internationalization.

MOBILITY OF STUDENTS

Students	IP 1 Joensuu	IP 2 Estonia	IP 3 Joensuu
Finland	14	11	14
Estonia	15	2	14
Norway	12	2	10
TOTAL	41	15	38

MOBILITY OF LECTURERS

Lecturers	IP 1 Joensuu	IP 2 Estonia	IP 3 Joensuu
Finland	3	3	3
Estonia	1	3	1
Norway	-	1	1
TOTAL	4	7	5

Feedback from the partners

The results mentioned here is referring to the responses of the project partners when a questionnaire was distributed. The different feedback received were divided between 6 parts as seen as headings below.

A) BENEFITS DERIVED FROM THE PROJECTS

Briefly, describe how your organization has benefited from the project.

- » Using pre-learning to give some basic information for students in the future.
- » Lecturers have now more material and experiences for teaching ERP-software's.
- » More English language material for operations management, enterprise resource planning, process design and optimization, lean thinking and simulations.
- » Readymade course platform to teach these issues on the Moodle environment.
- » More learning games for teaching situations.
- » Mechanical engineering and IT students exchange mobility that also resulted to credits.
- » AR-simulation about discrete production process developed by BIT students in co-operation with BIT degree programme and SMERec-project of Karelia University of Applied Sciences

- » Business school students benefited from the first training and students from department of mechanical and structural engineering and material science benefited from the second trainings. Lab engineer also involved in the training and he is currently trying to implement some of the learnings.
- » Students have learned more about LEAN technology.

B) SUCCESSES AND DIFFICULTIES

Briefly indicate the encountered successes and/or failures within the work packages?

WP 1- Management

Success: The project coordinator managed the project in an organized and systematic way. Information was available to the partners.

Failures: Unbalanced workload with the participating institutions.

WP 2- Pedagogical learning tools

Success: Gamification and learning, problem-based learning, co-operation between the students in multicultural groups. Three intensive week implementations with multinational and multidisciplinary student teams.

Failures: Using the ERP software Lemonsoft during the first intensive week there was too much to learn about the software for couple of hours.

WP 3- Simulation environment and ERP development

Success: Simulation environments which means in this case simulation games with Lego bricks, paper planes, tennis balls, plastic grains, number games and standard fish drawing game works well. These simulations shows for students really fast the theory and practice.

Failures: Using the ERP software Lemonsoft during the first intensive week.

WP 4- Gamification

Success: Simulation games were good, pre-learning with collecting points were also good one. Competition between the groups with the games gives more motivation to find out good solutions for games and problems.

Failures: There is need to clarify more the rules of the games. Integrating gamification into the pre-learning part of intensive weeks in Moodle did not realize itself as planned and it needs more development and testing.

WP 5- Intensive workshops

Success: Intensive weeks for students worked well. Each intensive week had participants from all the partner institutions, with lots of exchange students taking part. This produced a strong diversity of nationalities in the participants, which together with different degree programmes involved created a genuinely multinational and multidisciplinary atmosphere.

Failures: Maybe in future we could make a rotation in changing the students from each group.

WP 6- Sustainability and dissemination

Success: There is good possibility to have sustainable and almost similar course in use in the future. Some part of the NordErp intensive course materials fits for other courses. A case study about industry usage of ERP in SMEs and about educational coverage of ERP in Karelia University of Applied Sciences was carried out and will be disseminated in a form of a published report in Karelia publication series.

WP 7- Evaluation and quality assurance

Success: Student and partner institution feedback was collected. The results were mostly positive.

C) RESULTS

Briefly describe the accomplished results from the project in relation to the planned activities of the NORDERP

- » Development of teaching materials (also for WEB). - Moodle page allows the students to get necessary information.
- » Dissemination of Results/Publication. - Articles on the institution's webpages are available.

D) HOW CAN RESULTS BE IMPROVED

Briefly describe how the project results could have been improved?

- » We could have done much more collaboration between the partners. Integration between the industry and the educational sector in designing the contents of the intensive weeks could have been tighter, instead of having mainly company visits and company presentations during the intensive weeks. In the next cycle, it would be ideal to invest more on this collaboration development.

E) FEEDBACK ABOUT THE COLLABORATION AMONG PARTNERS

Briefly provide an overall feedback about the collaboration among partners?

- » This project has been interesting project from viewpoint of collaboration. There have been both challenges and nice surprises so far. There are some cultural differences between the partners how to do and manage tasks but the team has learnt to work together and take responsibilities.

F) FEEDBACK ABOUT THE PROJECT

Briefly provide an overall feedback about the project?

- » There have been great possibilities for students to have mobility, study and cooperate in multicultural environment and groups. Based on the feedback, we reached our goal of creating a working formula for carrying out multicultural and multidisciplinary intensive weeks around ERP and production simulations which is valuable for all partners.

Evaluation

ACTIVITY

	Comments	Results
Background analysis	Delay in the process but in the end published on the project webpage.	Very Good
Internal project workshops	8 internal workshops with the team through the project period. The team also had online meetings.	Very Good
Development of Teaching material	The intensive course-learning environment is created on the Moodle e-learning platform and can be used for future courses. The “NordERP LEGO simulation game” was developed for the course use.	Very Good
Dissemination of results/publications	The project has a website available. https://norderp.karelia.fi/ . All the results are published on the webpage. Partners locally published news about the intensive courses.	Good
Establishment of network for further cooperation	The partners have identified a good potential for continuation of the project work in the future.	Good

WORK PACKAGES

WPs	Partner responsible
WP1 – Management	FI - Karelia
WP2 – Pedagogical learning tools	EE
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WP4 – Gamification	FI - Karelia
WP5 – Intensive workshops	NO - UiS
WP6 – Sustainability and dissemination	EE
WP7 – Evaluation and quality assurance	FI - Karelia

Results

Students from a multi-disciplinary background have reported to have increased knowledge within gamification, simulation as well as LEAN technology. Students with both engineering backgrounds and business school benefitted from the trainings that lead to knowledge exchange. A lab engineer involved in the training had reported increased learnings thus implementing these to the teaching programmes in the local institution. Company visits reportedly added insight on the practical and best practices of process optimization and product making process.

The availability of the project webpage (<https://norderp.karelia.fi/>) has streamlined the coordination of the recruitment and evaluation of participants. While there were some changes and delays in executing the project plan, as a whole, the partners from Finland, Estonia and Norway has managed all the tasks in the expected time schedule and delivered very good results even with changes in the planned activities.

There has been a total of 8 internal workshops through the project period. The team also had online meetings in addition to the workshops. Cooperation with the participating institutions has been very good. The coordinating institution has taken responsibility with the bulk of the workload; both IP was in Karelia University but there was good support from the other participating institutions for all the IPs.

The availability of the teaching materials on the Moodle e-learning platform gives the opportunity to have sustainable and almost similar course for use in the future. It is also good to note that some part of the NordERP intensive course materials fit for other courses expanding the potential to benefit from the results and raising impacts of the project. One area of development based on the feedback received from the participants is that the courses could be designed even better by integrating the industry and the educational sector more closely together to design the contents of the intensive week.

Upon the project conclusion, the project participants have gained knowledge within the field of enterprise resource planning, simulation, optimization and lean thinking. Secondly, the collaboration between the 3 institutions has fostered, mobility between students and lecturers which lead to internationalization, knowledge exchange, networking and improved language skills. Concretely, lecturers involved in the cooperation have now increased material and expertise for teaching ERP software's. Pre-learning materials in English is readily available for students in the future. As well as a fully developed course platform that is available in the Moodle environment.