

CASE STUDIES AND BEST PRACTICES IN GERMANY

Erasmus+ KA2 project: “REACT - Creation of a Collaborative Environment in e-classrooms”

Intellectual Output 2 “Creation of a set of innovative activities, tools and educational collaborative methods adapted to a virtual classroom curriculum”

Erasmus+ Project
KA2 - Cooperation for innovation and the exchange of good practices
Project Number: 2020-1-DE02-KA226-VET-007926



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Blended Learning- DevOps Competencies for Smart Cities

INTRODUCTION

Results like learners' engagement and learners' control over the time, place, path, or pace are the most desirable due to the world's scenario of transformation to digitalization, information, and communication technology utilization. Therefore, blending the learning approach provides the best-of-both classrooms by combining online learning educational materials and opportunities for interaction online with traditional place-based classroom methods. The requirement of the setup is the physical of both the teacher and the student. A blended learning approach was used for the DevOps Specialization Training Course, and it was combined with the e-learning and face-to-face (online) lectures.

OVERVIEW

The online and self-study component of the Blended training course had foreseen at least 288 hours of study time for a total duration of 24 weeks or 360 hours, including Face-to-Face learning (24 hours; 6 days of training), and assessment (48 hours). The Face-to-Face (online) learning training included a 'flipped classroom' approach, where instructional learning was conducted outside the classroom and class-based activities supported the practical application of learning attained.

The tasks like learning by doing activities in the form of co-creation workshops, group activities, and DIT (Do it Together) supported peer learning and knowledge sharing. The tutor acted as a facilitator rather than delivering a traditional role. However, due to the pandemic activities like face-to-face training could not be implemented. Therefore, the activity was replaced with online training via online collaborative tools (i.e., Webex)

APPROACH

Blended learning is an approach to learning that combines face-to-face and online learning experiences. Ideally, each (both online and offline) will complement the other by using its strength.

Selection of learners for the Specialization Courses: -

The selection of 20-25 candidates was conducted in each country in order to ensure a balanced representation among the three different profiles available for DevOps: Smart City Planner, Smart city IT manager, and Smart city IT officer.

Application Process to boost collaboration and inclusiveness in the classroom: Registration for DevOps specializations Course started after the completion of the DevOps MOOC in January 2021 and lasted for three weeks. The registration form included a questionnaire asking applicants to provide personal and demographic data and notifying them that all data would

be acquired and used according to the General Data Protection Regulation (EU 2016/679) in order to coordinate the learning activities of the specialization course and for research purposes. Personal and demographic information included first and last name, email, phone number, gender, age group, education level, country of residence/work, country of origin, vocational/academic area of specialization, current or future job position, employment sector, participation in the DevOps MOOC and successful completion of the DevOps MOOC. All applicants were requested to provide their consent to store and use these data; otherwise, they could skip the questionnaire and proceed with the registration by providing only their full name, phone, and email. 228 people registered for the DevOps specialization course with 61% of them having participated in the DevOps MOOC (97% of them completed it successfully).

Diversity is shown through figures: -

Figure 1 shows the distribution of applications per partner country.

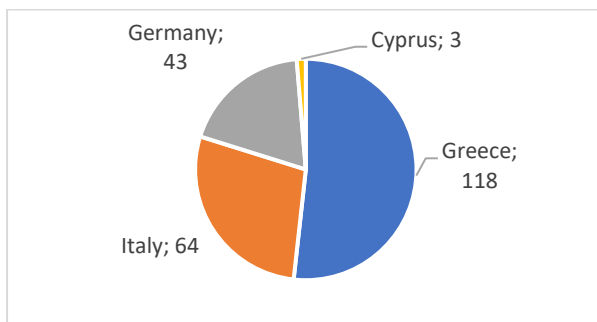


Figure 1 - Application per country

The most selected profile was “Smart City Planner” (Figure 2) with 137 preferences, while the more technical profiles registered respectively 60 applications for the “Smart City IT Manager” and 69 for the “Smart City IT Officer”.

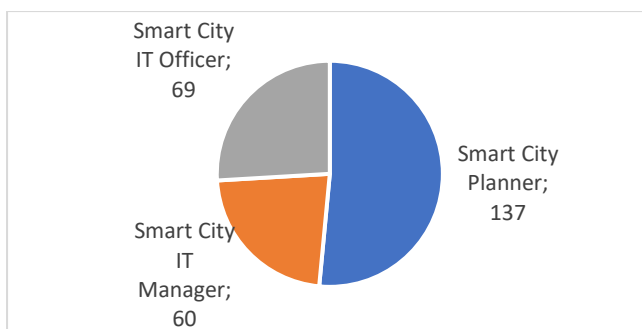


Figure 2 - N. of applications x job profile

With regards to the generalities of the applicants, as expected also from the results of the research activities, the majority were male (169) with 50% of them being over 35 years of age. On the other hand, it is interesting to underline how the gender gap, although it still relevant, reduces for younger generations of applicants (Figure 3).

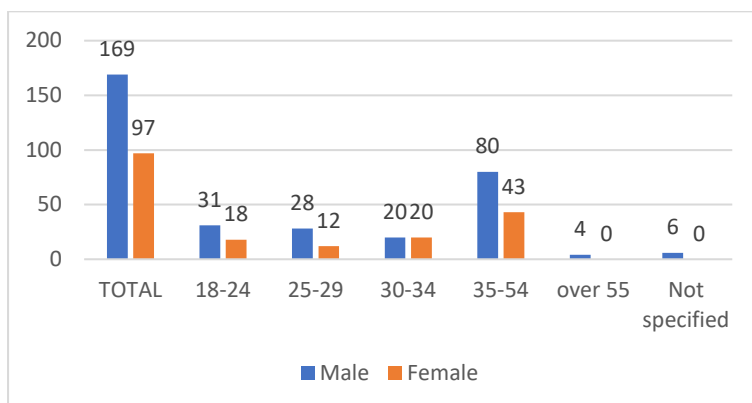


Figure 3 - Age and gender of applicants

Methodology: With the replacement of face-to-face sessions due to COVID 19 with online mentored workshops, the blended training was scheduled in order to offer a module every week, starting from February 2021 until August 2021 for a total period of 23 weeks. Each module started on the first available working day of the week, usually on Mondays with an introductory online mentoring session of 1 hour with the facilitator. The facilitator had the opportunity to describe and comment on the learning material and, if necessary, to provide information and guidelines for the implementation of the related practical assignment to be submitted before the end of the following week. Learners could study online material in a self-paced manner during the week and discuss eventual issues and doubts during the second online mentored workshop organized on Thursdays or Fridays, depending on the calendar of each partner. With the closure of the module, participants in the course were always asked to complete a self-guided choice test as a learning activity. Here the successful completion of the tests was required for the final delivery of the attendance certificate.

RESULTS

The main findings are presented. If it is possible, information in facts, numbers, etc.

Table 1, it is shown the total effort on study time calculated by multiplying the total number of slides produced for each module * by 5 minutes of study and adding 5 more minutes for each question included in the multiple-choice questionnaires administered to the learners at the end of the module.

MODULES	Total Required study time	
	Minutes	Hours
5. Ambiguity Tolerance	485	14,08333333
7. Emotional Awareness	565	15,41666667
9. Intercultural Skills	560	15,33333333
10. Project and Process Management Part 2	552	15,2
11. Design Thinking	405	12,75

12. Decision Making and Problem Solving	580	15,66666667
13. Leadership and Management Skills	505	14,41666667
15. Knowledge Management	327	11,45
16. Advanced Presentation skills	611	16,18333333
17. Software development life cycles and agile methods	775	18,91666667
18. IT Quality Assurance	400	12,66666667
19. IT security	475	13,91666667
24. Introduction to Artificial Intelligence	300	11
25. Introduction to ITIL	625	16,41666667
27. Repository management	411	12,85
28. Continuous integration	655	16,91666667
29. Configuration management	200	9,33333333
30. Using build, deployment, and monitoring tools	375	12,25
31. Code Analysis and continuous testing tools.	735	18,25
34. Smart services and operating procedures	475	13,91666667
35. Smart city sustainability	370	12,16666667
36. Smart city standards and legal issues	640	16,66666667
37. Smart city resilience	350	11,83333333
38. Urban management	540	15
39. Citizen Driven/Citizen Orientation/User Experience Design	370	12,16666667
40. Smart city procurement	910	21,16666667
41. Digital twins	291	10,85
42. Green Smart City	600	16

Table 1 - Total required study time x module

Therefore, it was possible to calculate the overall study effort for the different profiles as follows:

Smart City Planner	Smart City IT Manager	Smart City IT Officer
<ul style="list-style-type: none"> • Total study hours: 306,6 • Total learning outcomes: 263 	<ul style="list-style-type: none"> • Total study hours: 333,18 • Total learning outcomes: 289 	<ul style="list-style-type: none"> • Total study hours: 250,57 • Total learning outcomes: 204

At the end of the pilot, 96 trainees successfully completed the blended training, representing 42% of those who registered, and 80 of them continued with the work-based learning training.

CONCLUSIONS

Blending learning provides the platform for diverse and flexible learning environments and helps incubate literacy and learning. After experiencing the blended learning, the students learn to deploy critical thinking skills to contribute to a smart city where it is required to create, collaborate, and communicate with the mediation of information and communication technology networks.

Blended learning features of doing activities in the form of co-creation workshops, group activities, and DIT (Do it Together) supported peer learning and knowledge sharing, creating high-quality collaborative learning experiences.

The features of doing activities in the form of co-creation workshops, group activities, and DIT (Do It Together) supported with peer learning and knowledge sharing in blended learning creates high quality. Collaborative learning experiences for learning for practical work and in their regular lives.