Best Practices on
Higher Education Apprenticeship (HEA)

ApprEnt
Refining HE Apprenticeships
with Enterprises in Europe

Authors

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Suitability of this case to the AprrEnt definition of HEA

Workplace/ training   Mentoring   Remuneration   Formal programme   Certification   Contract/ Agreement

Evaluation of how the programme/practice reaches the following goals Scale: 1 = not at all; 2 = very little; 3 = somewhat; 4 = well; 5 = very well					
	1	**2**	**3**	**4**	**5**
i. Enhances relevant working life skills and qualifications	☐	☐	☐	☐	☒
ii. Promotes professional growth	☐	☐	☐	☐	☒
iii. Develops learning environment practices as a whole	☐	☐	☐	☐	☒
iv. Develops work-based learning practices and materials	☐	☐	☐	☐	☒
v. Improves work performance	☐	☐	☐	☐	☒
vi. Improves tutoring and mentoring practices	☐	☐	☐	☒	☐
vii. Enhances University-Business collaboration	☐	☐	☐	☐	☒
viii. Showcases potential aspects for programme standardisation	☐	☐	☐	☒	☐

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Title

The Internet of Things (IoT) programme of UNAVE-UINFOC/UA

Description

Model

The University of Aveiro (UA) offers Bachelor's, Master's and Doctoral programmes, as well as programmes of Higher Professional Technical Courses (CTeSP) taught in its Polytechnic Schools. The contact with the employers allows to adjust the training according to the needs of the labour market. The University has a LLL Unit that promotes ECTS creditable training actions and works in straight connnection with UNAVE - Association for Professional Training and Research of the University of Aveiro – which is recognized as a National Professional Certification entity. Due to this cooperation, UA is able to deliver training actions that are both academic and professionally certified.

Apprenticeships are not envisaged by UA, as, due to national regulations, any payment of the work/research, students develop within business partnerhsips, is interely on the company initiative. Therefore we have internships, that are carried out in workplace environment, but are not recognised as apprenticehips. Sometimes, if an ERASMUS scholarship is assigned to our working students or a large company decides to pay its interns, we regard these activities as apprenticeships.

Another partnership involving some form of remuneration for the apprentices is the one with the National Institute for Employment and Training (IEFP). Given the present situation, where graduates often do not find a job or have been fired, the Institute contacs UA and asks for a reorientation training action/course in order to abilitate these graduates with skills that might allow for a better chance of being employable. If, on one hand, this kind of partnerships foster the cooperation between higher education and employment structures, on the other hand, being compulsive for unemployed graduates registered in the IEFP, some of the trainees are not motivated. UA has produced some training actions in this context, in different areas such as entrepreneurship and IoT, especially for graduates whose degrees did not include relevant skills and knowledge.

Best practice

Professional reorientation training actions

A professional reorientation training action based on the Internet of Things concept was developed by the University of Aveiro as a response to a demand from a Governmental Institute. The trainees are unemployed graduates from areas of studies that have little to do with information technology, communication and electronics. The training action includes classroom lectures with hands-on activities and a work-based learning internship extendable to a professional apprenticeship. The hard work of identifying internship places in companies paid back as all the trainees were able to complete the training action. The good results are a strong motivation to replicate the training action.

The Internet of Things concept (IoT) is evolving very fast and it is expected that will lead to a major organizational change and generate a huge turnover. This concept is based on internet access to systems, objects and devices, boosted by recent developments in communications, networks, software for systems, mobiles and Web, the Web itself, the machine to machine connections, in embedded systems, and even in the behaviour of the people themselves.

The IoT Training Course context

The University of Aveiro (UA) accepted the challenge put forward by a governmental institution (GI), to requalify for ITCE (information technology, communication, and electronics) a group of unemployed people with a bachelor/master's or even doctoral (level 6, 7, and even 8) degree in other scientific areas. UA realized that currently there is a cross-cutting need of specialised

knowledge that has led to professionals outside Engineering and Science areas to take the lead in organizations where innovation is critical (see, one of many examples, Digital Catapult in the UK, an accelerator of digital ideas, whose director has a Social Sciences background).

UA is also aware that, at present, the development of ITCE solutions is providing powerful tools that allow a substantial reduction in the time needed to learn their use and the underlying concepts and, consequently, the time required to obtain results, products or solutions.
So UA dared to launch an IoT-300-hours-in-class training (duration imposed by the GI) for unemployed graduates coming from non-traditional areas in this field, such as social sciences including psychology, social work, teaching, etc. This training introduces the concepts and the potential of computer systems, Web, networking, mobile, embedded systems and internet of things through hands-on activities with the tools and with small educational projects.
Through this training the trainees will be able to perform a number of activities that may be critical to be ITCE companies or to companies where ITCE will bring an added value. We speak not of development (although we are convinced that this training can be a starting point for new 'developers') but of testing, requirements specification, commercial activity, commissioning, operations support, digital marketing, innovation, creativity, not abandoning the trainees basic know-how.

Macro Contents of the Training

- Computer internal architecture; Microcontrollers – N3; Microcontroller-applications;
- Architecture of data communications networks; Essentials of C/C++ Programming;
- Communication and organisational behaviour; Distributed systems programming – Web services with Java; Creating WEB sites.

Hours of training

The "Internet of Things" Training consists of three distinct parts:

- 1ª Part – 300-hour theoretical and experimental training in class;
- 2ª Part – 420-hour internship in a business context (work-based learning – WBL);
- 3ª Part – 9-month WBL professional internship (optional for the Company) to eligible trainees.

The Internship/Apprenticeship Context

Before the beginning of training action the UA selected a number of companies, which would host one or more selected candidates for a three-month/420 hours internship supervised by a tutor of the UA.
Also, if the trainees and the company were eligible and eager to establish a long-lasting business relationship, the GI committed to financially support a nine-month apprenticeship, thus, allowing for a year of joint work and a possible job integration.

Facts and figures

Seventy-five graduates were equally distributed in three classes. We will focus on the two classes that already concluded the Training, as the third class is ongoing, as well as on the WBL component:
- 48 trainees of which 38 trainees actually finished (21% dropout due to job opportunities that came up in the meantime);
- 24 (63%) Females; 14 (37%) Males;
- 22 (58%) had a Bachelor's and 16 (42%) had a Master's degree;
- Geographically close to Aveiro.

The internships
- About 100 companies contacted - 84 were actually interested;
- About 665 contacts were established: 400 phone calls; 250 emails sent; 15 meetings and face-to-face interviews were conducted;

- Placement rate – 100%;
- 90% of the trainees began the internship immediately after classroom training action.

Trainees' characterization
6 were born in 1987 (29 years old); the oldest was 43 years old; the youngest was 23 years old

Profile of the Companies where the Internships take place
- 35 Technology;
- 2 Management;
- 7 Services.

Critical Analysis

- What went well?
Usefulness of the new skills acquired by the trainees.

- What went wrong?
The difficulty for the trainees to leave their comfort zone was a handicap to their professional future development.

- Positive point
The possibility of the workplace internship to turn into a professional apprenticeship and later into a professional career for some of the trainees.

- Negative point
Lack of receptivity of the companies towards accommodating the trainees, which roots in the ignorance of the IoT concept.

Conclusion

An experience to strengthen and replicate because the innovative nature of the training fosters professional requalification grounded on acquired knowledge and certification, as the good results in spite of the expected challenges show. WBL approach linked with IoT is a sure way to go.

Feedback from users

Regarding the feedback from students, if we exclude the few unmotivated ones, who really did not profit form the training and had serious problems when interacting with companies, the vast majority successfully completed the internship. The result was that UA managed to get approval form the national entities to allow for a professional apprenticeship following the training action, and most of the trainees were employed by the companies where they had perfomed the work-based learning. The trainees' feedback referred to the lack of pedagogical skills of some trainers, and made suggestions for new/different contents and the time-length of the training action. They were generally satisfied, and some very much satisfied.

Relevance and Transferability

Being a reorientation program, this kind of actions could easily be transferred to HE, within the scope of guidance - both professional and academic – as UA's departmental structure allows for smooth inter- and trans-disciplinary activities. For us it is not at all difficult to involve training action experts from different areas of knowledge. In order for the programme to be recognised as useful and relevant for career progression, a new fundamental change in attitude of university teachers and managers is required.

Comments
N/A