

Open Education Practices as Answer to New Demands of Training in Entrepreneurship Competences: The Role of Recommender Systems

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Abstract. Entrepreneurship in Europe is a priority as a powerful driver of economic growth and job creation. The increasing demand for this skill and to reduce unemployment requires innovative ways to train. This paper present the StartUp model composed by the redefinition of Entrepreneurship in terms of competences and an Open Educational Practice based on an Open Learning Architecture including steps of a quality lifecycle model for OER. A critical component of this model, the recommender system is described. This work has been done in the context of the European Project StartUp funded with support of the European Commission.

Keywords: OER · OEP · Open Educational Practice · Entrepreneurship · Competences · Recommender system · Linked data

1 The Entrepreneurial Spirit in Europe

Competences related to entrepreneurship are considered a key factor to put in place in this period of economic recession. The Communication from the Commission to the Council, the European Parliament, the European Economic and Social committee and the Committee of the Regions – “Implementing the Community Lisbon Programme: Fostering entrepreneurial mind-sets through education and learning”, COM(2006) 33 final [1] declares that entrepreneurship is a key competence for growth, employment and personal fulfilment and that the education systems can greatly contribute to successfully addressing the entrepreneurial challenge within the EU.

The unemployment crisis that this project is addressing are well-known: “the impact of the crisis on employment and the social situation increased as the unemployment rate rose from less than 7 % in 2008 to 10.8 % in 2013, putting 9 million more people out of work. The effects were unevenly spread across the EU however, with unemployment rates in 2013 still only around 5 % in Austria and Germany against over 25 % in Greece and Spain” [2].

The skills that the European Union identified as crucial for the new job market may be summarised in the following points: flexibility/adaptability; effective communications skills; problem solving; creativity; interpersonal skills; teamwork [3]. OER can potentially be a powerful tool in order to develop these new skills that the new knowledge society developed after the crisis requires.

We also need to consider the fact that, across Europe, many more people will struggle to access higher education in the future as fees are raised and current unemployment levels have an effect on our ability to afford traditional education.

Today a massive number of multilingual OER collections are available online. The growth of the OER movement over the past decade has meant that it has become more and more difficult to have an overview of OER initiatives globally, and even locally. One of the main objectives of StartUP therefore, is to help users to use them more effectively, by bringing a huge range of resources, focussing on enterprise skills, together in one platform that will provide a structured procedure to access sources from around the world.

2 Entrepreneurship and the Startup Model as an Open Education Practice (OEP)

The StartUP model has been the main result carried out under the StartUP project (www.startupproject.eu), a 32 month project co-funded with support by the European Commission. Its general objective is to enhance the professional skills of learners (school and university teachers and students, trainers, trainees, informal and non-formal learners) using open and flexible, ICT-innovative and pedagogically-rich and tailored learning paths with a specific focus on the development, extension and expansion of entrepreneurial skills.

The overall aim of the StartUP project is to develop an innovative pedagogy and assessment approach, based on OER (Open Educational Resources) to support the diverse individual learning pathways and to better assess all types of learning outcomes and future learning needs related to entrepreneurship competences.

The StartUP model is composed of two components: a definition of the Entrepreneurship concept based on competences and the elements of the Open Educational Practice offered to develop the Entrepreneurship.

2.1 The Entrepreneurial Competences Matrix

Different methodologies and different tools were designed and used during the research activities. Initially a desktop research was employed to catalogue and systematize school and academic curricula in the entrepreneurship field in all the Project partner countries (i.e. in Italy, Austria, Spain, Malta and the UK), as well as the corporate training programmes in the different sectors and for different business roles. Sharing previous experience with other ongoing projects was very useful in completing the desktop research on entrepreneurial competences. Different tools have been elaborated and used by the partner as online questionnaire (for external partners and for

stakeholders), Guidelines for interviews and Guidelines for Focus Groups. Research involved experts (internal and external), stakeholders, trainers of secondary schools and adult trainers.

The “Entrepreneurial Competences Matrix” (Fig. 1) is the result of these research activities. The Matrix groups competence area in four “Cluster”: “Business skills”, “Management skills”, “Communication skills” and “Self-development skills”. For each competence Description of the competence in the entrepreneurial context (examples) and related Learning Outcomes are provided. The Matrix constitutes the shared knowledge base for the StartUp open practice. The competences listed in the Matrix are linked to the Open Educational Resources to be included in the StartUP model.

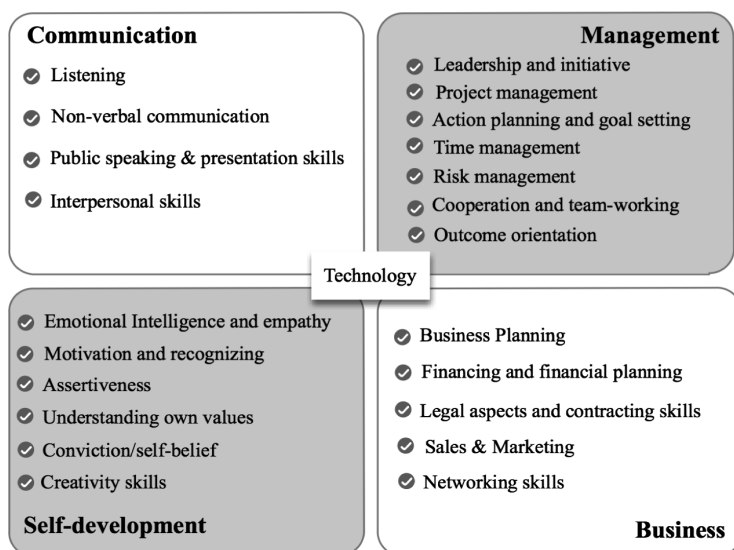


Fig. 1. Clusters and skills of an entrepreneur.

2.2 The Startup Open Education Practice

All the work done by the partners has been clearly managed as an Open Educational Practice (OEP) as well as its quality, trying to integrate in its results a typical lifecycle model for OER.

The rationale behind this open practice and the reason the consortium was developed, was based on the fact that only a minimum amount of Open Educational Resources (OER) and tools available online are currently used in the lifelong learning sector and vocational education training. The Open practice is analyzed in detail along the Sect. 3: In Sect. 3.1 there is reflection about the challenges for Open Educational Practices and how these ones match with OER components of the StartUp model. A complete description of the importance and impact of the results produced by the recommender system of this model is showed in the Sect. 3.2. Conclusions are summarized in Sect. 4.

3 Critical Factors in Open Education Practices

The report “Beyond OER” [4] came to the conclusion that OER are in principal available but are not frequently used, by several causes: (1) lack of institutional support, (2) lack of technological tools for sharing and adapting resources, (3) lack of skills and time of users, (4) lack of quality or fitness of OER, (5) personal issues like lack of trust and time. These are the challenges of successful Open Educational Practices, defined by two dimensions, openness in resource usage and creation and openness in pedagogical models [5].

These causes help us to identify the issues we consider keys to have a successful open practice, that in our opinion are the existence of productive communities, diffusion and adaption of OERs, OER quality and localization and the personalized learning.

- **Communities:** There has been a growing interest in recent years in Communities of Practice (CoP) and Networks of Practice (NoP) in connection with informal knowledge gathering, notably in the fields of education and both knowledge management and innovation within organisations. Lave and Wenger [6] define a community of practice as “a set of relations among persons, activity and world, over time and in relation with other tangential communities of practice”.

In simple terms, communities of practice are groups of people who share a common pursuit, activity or concern. Members do not necessarily work together, but form a common identity and understanding through their common interests and interactions.

Many different communities of practice exist and we may all be members of several, for example, through our work or hobbies. They are often informal and self-managed. For some communities of practice we may be a core member, whereas for others we may sit on the periphery. Communities of practice are repositories of explicit or formal knowledge.

However, like CoPs, members often participate in several networks of practice. Networks of practice have the same features as communities of practice but may have weaker ties [7].

The stakeholders of Open Educational Practices are the ‘open educational governance’ community, i.e. those actors who are involved in open education from all perspectives. In this case this practice is aimed at all educators, students and self-learners of any age and professional background, who have an interest in enterprise and wish to develop their skills using OER.

- **Diffusion and Adoption of OER:** An organisation commencing from a zero state, from which it moves to develop competence in OER, when it is able to develop OER competence among only a small quantum of learners (even be it high competence), it will only manage what we call a ‘Silent representation’. An OER ambition can however be successfully underpinned if the development of OER competence is widely adopted by learners throughout an organisation. In the case of such a collective learning ambition, with a clear strategic intent, the organisations likely to move from ‘Silent representation’ towards ‘Successful strategic exploitation’ [8].

- **Quality and OER Localization:** Teachers and students as prospective creators of OER are the main actors to develop a culture of quality within their own respective local communities of practice. Institutions supporting development and use of OER can also to adopt these quality guidelines in their internal quality assurance practices.

Defining quality in absolute terms is elusive because it depends upon whose perspective we choose to adopt. However, quality has been fairly well defined by Harvey and Green [9] as being on five dimensions, with Fitness for Purpose as the dimension most relevant to quality for open educational resources (OER). Fitness for Purpose indicates that the purpose needs to be defined, and this depends on whose perspective we adopt. An OER highly rated as excellent quality by students in their remedial learning, but which teachers elsewhere find terribly difficult to adapt, change the language, and relocalise to another culture and context.

An OER highly rated as excellent quality by students in their remedial learning, but which teachers elsewhere find terribly difficult to adapt, change the language, and relocalise to another culture and context. So, on one level the OER is high quality, but on another higher level this same OER is low quality and unusable.

There are three levels were originally designed to visualise the processes of localisation and internationalisation, according to the level of the reusers: depending on whether they were the intended end-users (notably the student learning), were the intermediate users (the providers, teachers, or translators), or were the store-keeper users (the repositories, portals and institutions) [10].

- **Personal Learning Environment (PLEs):** The proliferation of learning innovations such as personal devices, granular and distributed applications, services, and resources, requires the learner to develop his or her own strategies for managing the various information streams and tools to support learning. A PLE is created by learners in the process of designing and organising their own learning,. PLEs are distinctly learner-centred and foster autonomous learning. PLEs are interconnected in a digital ecosystem of media, tools and services and act as a gateway to an open and connected learning experience. This approach marks a shift towards a model of learning in which learners draw connections from a pool of digital and non-digital building blocks, aggregating, mixing and combining them into unique constellations as part of learning.

While emphasizing the active role of a learner, the PLE approach implies that learning is not located in a specific time and place, but is an ongoing, ubiquitous and multi-episodic process. As PLEs allow the collocation of diverse learning activities, tools, and resources, contexts permeate and learning becomes connected [11].

3.1 Challenges of the Startup Model vs Architectural Basic Components

The StartUp model can be considered as an Open Learning Architecture where a high degree of openness in pedagogical models in combination with a high degree of OER usage and creation result in a high degree of maturity of OEP in which OERs are used [12]. It encompasses:

- An innovative method for evaluating the learning needs of individual users in the entrepreneurial sector. This is possible by using a virtual expert able to provide users with suitable individual training paths, based on their specific needs and using the most effective contents which are freely available online.
- An online peer review community will ensure the quality of the OER contents included in the learning sets.

The StartUp Open Learning Architecture is composed basically by a virtual expert that simulates the behaviour of a real expert, an authoring system, allowing all users to take an active part in the process of development/localization/remix of OERs, and a rating system, stimulate discussions among the target group and promote collaborative and peer to peer learning. All these three basic components constitute the basic StartUp model and the model as a whole matches the main challenges highlighted before as critical to the success of open practices: personal learning environment (Virtual expert), localization and quality (authoring system and rating system).

- The *Virtual Expert* simulates a real expert conducting, in a flexible and smart way, a multidimensional analysis on users' training needs, taking into account data such as personal interests, age, educational background, prior knowledge, learning style, etc. The Virtual Expert processes users' data and produce a set of recommended resources to fulfill their training needs and the acquisition of new competences, creating a personalized training set with OERs corresponding to a particular user profile. At the end of the training needs process the virtual expert will summarize user's training needs in the entrepreneurship field recommending an optimal training path (made by OERs) to be pursued to achieve professional goals and new competences with an estimate of the time for their achievement.
- The *Authoring System* (i.e. "Share your OER") allows users to take an active part in the process of development/localization/remix of OERs. Users not only benefit by the chance to learn through OERs calibrated on their profile, but also actively participate in the improvement and customization of the training sets.

Users can actually take an active part in the process of development/localization/remix of OER using an authoring system made available to them. The user will be able to develop an OER from scratch to adapt/remix an existing OER both in term of contents and format, translate and localize an existing OER, and to link to an OER, stored in an OER repository, as it is.

The distinguishing feature of OER is the freedom with which they can be used, reused and repurposed thanks to their open licence. Several of the steps of an evolved lifecycle model such as editing, evaluation and use/repurposing [4]. In OER, these steps do not happen consecutively, but instead, they can happen simultaneously in the processes of 'checking and editing', or 'checking and approving'. Then each system of the architecture is described more in detail emphasizing how the open features of OER are managed.

- Initiating the creation of the 'idea' of the learning resource – the process whereby the initial author decides on a set of learning objectives the resource should be designed to address.

- Describing the learning resource using metadata, which is defined as structured data about an object that supports functions associated with the designated object. The metadata follow the LOCWD model [13]. LOCWD is a vocabulary devoted to linking OERs, open licenses, OER/OCW repositories, and other academic information using the Web. Thanks to the LOCWD vocabulary, the system will try to automatically extract some metadata, but the user will always be able to check (and possibly correct) the metadata automatically set by the system. In case users would like to link an already available OER, the metadata that should be automatically extracted by the system are: Title, Alternative title, Abstract, Language, Tags, Author name, Author organization, Date created, OER provider, URL source, License, Encoding format, Duration.
- Checking and editing the learning resource through multiple iterations improving the resource.
- Discovering new resources. It refers to the identification of relevant learning resources and their evaluation in terms of fitness for purpose for their intended use. The StartUp model makes available a recommender system using Serendipity search tool to discover new OER. The recommender includes also an analysis of information based on social networks as twitter. With influential users identified in the network of the retweets the recommender selects the tweets that have URLs that were written by them and suggest OERs to be recommended.
- Additionally a set of processes are executed to find related hashtags published in relevant tweets and the topics associated to the keywords of search giving to the user an updated overview of the topic.
- The *Rating System* allows collaborative and peer-to-peer learning and assessment of resources. An online community is set to promote discussion and collect feedback on the training sets. Users rate the quality and relevance of OERs: assessing the “Quality” means assessing user experience about how to access and navigate into the interface, its layout, and the quality of contents; assessing the “Relevance” instead measures the relevance to the training set proposed.
 - Evaluating and rating the quality and relevance as a social ranking, which can be described as a form of crowd-sourced peer-review. We consider “Quality” as the combination of two more specific parameters allowing us to conduct a multi-dimensional analysis: User experience about how to access, to navigate, effective and nice interface/layout, and the quality of the contents (clear, well explained and presented, without spelling error...). “Relevance” instead wants to measure the actual relevance according to the OER users. The trend will be that only the best quality OERs will remain in the training lists and moreover they will be part of the correct training sets thanks to the relevance parameter.
 - Repurposing: Also concerning the relevance, an OER must be rated at least a certain number of times (threshold to be defined) because of statistical significance. Users who consider an OER of little relevance must specify the reason. For this, specific closed form questions will be asked the users to allow the automation of the process. Only after a certain number of error notifications the

system will modify the metadata and reallocate the OER in the right training set (corresponding to the right profile). In this way, the system will automatically and continuously improve the fruition of the training lists thanks to the collective intelligence of the community who will use it.

3.2 A Critical Problem: Feeding OERs to the OER Gateway Through the Recommender System

The components described above are not sufficient to ensure the success of an open practice. Creating communities from scratch requires the use of the platform has enough appeal and interest to potential users interested in training in entrepreneurship. Issues as stimulation for registration of new users, and a sufficient number of users for this community can not be ignored and hope that they enroll spontaneously. The size of the communities is essential to ensure the expected results, and influences largely critical factors noted above, as the adoption of the platform for target groups provided with access to sufficient resources since the moment of the creation of the community, the increment of more OERs available, better quality of these OERs ordered by relevance and a more accurate selection of training paths adapted to the user's needs.

That is the reason it has been included a recommender system.

This is responsible for nurturing the community with an important set of resources organized by competencies and filtered by relevance. The Recommender is a function of the system which provides users with more resources than the OERs selected for the training set. It helps discovering new resources with the Serendipity search tool, use such resources as basis for new OERs, it helps networking through the suggestion of Twitter accounts and hashtags (analysis of keywords) and present users several food for thought (see Fig. 2).

The StartUP model uses the LOCWD model, a vocabulary devoted to linking OERs, open licenses, OER/OCW repositories, and other academic information using the Web. The LOCWD vocabulary is available in <http://purl.org/locwd/schema/> and was defined by the UPM. Following the LOCWD model and completing them with metadata directly related to the objectives of the project, i.e., data about cluster of competences and competences, we use the following list of metadata which will describe univocally each OER selected/localized/remixed/developed both by partners and StartUP platform users. Due to the StartUP metadata assuming the LOCWD vocabulary, the system will automatically extract many of the metadata recommended by the system, but the user will always be able to check (and possibly correct) the metadata automatically set. In case users would like to link an already available OER, the metadata that should be automatically extracted by the system are: Title, Alternative title, Abstract, Language, Tags, Author name, Author organization, Date created, OER provider, URL source, License, Encoding format and Duration.

The description of the types of resources that feeds this system is essential to understand the impact of this with respect to the objectives for third system. The sources of information are Serendipity search tool, twitter and topics on the web of data.



Fig. 2. Different sources to feed the StartUp model.

These resources can be openly licensed documents and media and are discovered in our model through web services. A Web service is a method of communication and a standardized way of integrating web-based application over the World Wide Web. Its objective is to provide a way to its clients to access to these resources. Web services are language and platform independent. These services are externally available, which provides a common discovery mechanism for OER consumers.

The Serendipity Component for OER Recommender. The Serendipity Web service component proposes a way aimed to simplify development of recommendation systems over Linked OER Data. Recommender system development for the Semantic Web data typically requires ontology/vocabulary, rules and rule-based inference engine to be applied over the RDF data. The design of the component focuses on three main principles: abstraction, extensibility, and interoperability. Abstraction is achieved by providing higher level of constructs. Extensibility is achieved by designing each module that is independent of the underlying implemented systems [10]. Interoperability is achieved by to enable interchanging and integration with other systems. The application of the technique includes modeling a user's learning path needs (profile information) and resource properties based on Serendipity OER vocabulary (LOCWD). Then, a list of open educational materials recommended for the user can be generated based on recommendation rules externally defined by domain expert users, e.g. learning paths defined by entrepreneurship experts. Given a Linked OER Data Graph (G), and a user entrepreneurship learning path which contains a roadmap to launching their own development of entrepreneurship, we recommend a ranked list of resources which belong to items of G similar to a certain item i according to the user preference.

The output of this Web service is a single ranked list of OER, which is then converted into a format required by the Startup recommender system. We decide to use RDF and JSON as format for representing the resources. The recommendation processor provides algorithms for calculate the similarity value between items and make top N recommendations. Findings by competencies appear in Table 1.

OER Recommendation Based on Social Network Analysis. In these days, much of the information published on the Web is published on social media, represented through social networks such as Facebook or Twitter. Twitter is a social media network where millions of daily messages called tweets are exchanged. A tweet could have hashtags, words preceded by #, that can be used to identify the subject of the message; users, through re-tweets or RT and mentions; and may also include links to other resources that expand the original content or show interesting information.

In [14] the authors established the research problem: “Find a group of URLs posted on Twitter that can be used as OERs and that complement the training needs of a person in a particular domain.” This problem has the following features and restrictions:

- The raw materials are the URLs.
- The URLs will be considered as complementary OERs.
- Need a mechanism to capture a lot of information because of the specific needs of users is unknown.
- We cannot use traditional recommendation techniques because the user profile is unknown and as said [15] this techniques would require each URL to have feedback from several users to compute reliable recommendations.

With these features, and restrictions, the solution to the problem is use alternatives techniques such as: (i) query expansion, via Link data, as a mechanism to capture a lot of information; (ii) social network analysis as a means to get recommendations, but the recommendation takes in to account only the tweets with a valid URL; (iii) the influence of users as a mechanism which guarantees the quality of the OERs.

The following tasks were executed:

- Data recollection. StartUP has an outcome called the “Entrepreneurial Competence Matrix” these competences were expanded with the aim of find related topics through the RDF triples stored in DBpedia. The competences and its extensions were used like query expressions in the API of search of Twitter. With the data collected from Twitter, the processes of harvesting and structuring are executed so that the information is ready for discovery tasks. The final data source has 70000 tweets related with the StartUP competences.
- URL enhanced. This process has the goals of: validate, disambiguated and get additional information (title, description and metatags) of the links collected. The next steps used only the tweets with valid URLs. In the data source there are 13577 valid URLs, 31646 users and 7728 hashtags.
- Social analysis. Using social network analysis, three networks were built: hashtags networks, used to identify topics associated; re-tweets and mentions networks, that allows us to find the most influential users. A metric of centrality helped us to select

Table 1. Findings of the “Serendipity” search tool.

Competence	Skill	OER	OCW
Communication	Listening	182	11
Communication	Non-verbal communication	99	12
Communication	Public speaking & presentation skills	2413	172
Communication	Interpersonal skills	332	30
Communication	Technology	75	8
Management	Leadership and initiative	17	4
Management	Leadership	438	34
Management	initiative	81	2
Management	Project management	188	10
Management	Action planning and goal setting	2	0
		24	3
Management	Time management	1832	74
Management	Risk management	1170	54
Management	Outcome orientation	1533	61
Management	Cooperation and team-working	29	0
Management	Technology	0	0
Self-development	Emotional Intelligence	214	12
Self-development	Empathy	389	28
Self-development	Motivation	1080	52
Self-development	Recognizing	362	15
Self-development	Assertiveness	166	16
Self-development	Understanding own values	209	17
Self-development	Conviction/self-belief	432	27
Self-development	Creativity skills	140	8
Business	Business Planning	563	32
Business	Financing and financial planning	125	8
Business	Legal aspects and framework	2089	84
Business	Contracting	2089	84
Business	Sales & Marketing	530	41
Business	Networking skills	3967	301

the users and hashtags outstanding. After this step the data source has 1280 users identified as influential and 1425 hashtags (related topics).

- Recovery of OERs. The URLs published by influential users were considered as OERs. The OERs recovery has 3788 URLs.

- OER ranking. With the premise of using the collective intelligence the most representative elements of the hashtags network were used to assign a score to each of the OERs.

The process described above was able to discover influential users, related topics (hashtags) and OERs for the competences defined by the StartUP project. The Table 2 shows the results.

Table 2. Results for each competence area.

Skill	OERs	Users	Hashtags
Project management	197	97	140
Emotional intelligence	99	145	59
Public speaking	57	91	42
Time management	50	61	75
Risk management	128	61	102
Goal setting	37	52	34
Presentation skills	31	56	25
Networking skills	30	46	18
Financial planning	2383	195	340
Goal setting	173	153	109
Non verbal	293	76	205
Business planning	112	78	84
Leadership initiative	132	100	36
Assertiveness	37	32	119
Interpersonal skills	24	23	17
Team working	5	14	20

Enrichment Entities by Means of Social Knowledge Sources. Meaningful OERs can be omitted during a search based-on keywords due to matching mechanism based in words.

The service of topic recommendation has been designed to take advantage of linked data sources with the purpose of enrich or extend a determined term or tag and providing enhanced results by enriching the skills that the entrepreneur requires to improve.

Through the tag cloud, an user can choose any of the recommended topics, and the system will respond by filtering the results that are associated with the term chosen.

The potential benefits of use a function that generates a related topic list are the following (i) make it more easy for the user to understand a knowledge domain, because it allows him to explore linked concepts through hierarchical relations; (ii) offer the required support in order to incorporate functions of disambiguation and information filtering, in this way, the user will be able to find the OERs which satisfies his specific learning needs.

Next, there is exposed a case in which the entities recommendation function is used in order to find Open Educational Resource based on the entrepreneur's skills.

In the context of the Web of Data, the recommendation process begins when an term of interest is recognized as a semantic resource. As a result of the expansion process, hundred of entities can be visited; therefore, a ranking function [16] must be implemented, which determines the recommended entities by relevance order.

To identify the term of interest the DBpedia ontology enables a broad coverage of entities in the world, and allows entities to bear multiple overlapping types; it includes RDF data derived from Wikipedia; each resource is harvested from a Wikipedia article (which content is maintained by thousands of editors and it broad and multilingual) [17].

The image shows two side-by-side panels. The left panel, titled "Search", features the Serendipity logo and a search input field containing the word "Management". Below the input field are "Search" and "or Cancel" buttons. The right panel, titled "Results Page", displays search results for "Project Management". It includes a circular diagram with stages: Evaluate, Organize, Plan, Monitor, Control, and Learn. To the right of the diagram is a "Related topics" list: ValueProposition, EventChainDiagram, StrategicEnterpriseManagement, StrategicManagement, CriticalPathMethod, EventChainMethodology, and LinearSchedulingMethod. Below the diagram is a short description of the resource and its author, Nathaniel Dagood.

Fig. 3. Enhanced search of OER supported by a function of recommendation of topics related to a skill.

Figure 3 shows the search interface, which is used to send a request to the system. In response, the system presents a list of OERs that meet the search criteria and the topics cloud related to skill entered by the user. On the results page, for each of the related topics, the user can query its description or comment in four different languages: English, Spanish, Italian and French [18].

In Table 3, an extract of the semantic concepts related to the Management cluster are shown. The columns: low and intermediate denote the association degree of a topic with respect of a skill of interest.

In Fig. 4, a summary of the results of the recommendation services is shown. As it can see, skills related to Business and Management have the highest amount of recommended topics. On the contrary, the skill “Outcome orientation” has the least amount of recommendations. A key factor to get adequate results is to find and map each skill to the correct DBpedia category.

Table 3. Number of entities related to skills of management cluster.

Skill	Related entities according to degree association		Top-3 entities with high degree of association
	Low	Intermediate	
Leadership and initiative	66	6	Positions of authority Leadership Leadership training
Project management	288	63	Data management Information technology management Planning
Action planning and goal setting	234	17	Motivation Goal setting Ben Franklin effect
Time management	71	6	Planning Time perception Getting Things Done
Risk management	77	18	Occupational safety and health Risk Risk assessment
Outcome orientation	2	0	Motivation Goal orientation
Cooperation and team-working	187	47	Collaboration Collective intelligence Community

Communication	<i>Skill</i>	<i>Entities</i>
	Listening	29
	Non-verbal communication	82
	Public speaking & presentation skills	109
	Interpersonal skills	343

Business	<i>Skill</i>	<i>Entities</i>
	Business Planning	563
	Financing and financial planning	444
	Legal aspects and framework and contracting skills	402
	Sales & Marketing	785
Networking skills	79	

Management	<i>Skill</i>	<i>Entities</i>
	Leadership and initiative	76
	Project management	371
	Action planning and goal setting	281
	Time management	81
	Risk management	104
	Outcome orientation	3
	Cooperation and team-working	252

Self-development	<i>Skill</i>	<i>Entities</i>
	Emotional Intelligence and empathy	362
	Motivation and recognizing	160
	Assertiveness	34
	Understanding own values	31
	Conviction/self-belief	23
Creativity skills	182	

Fig. 4. Number of topics recommended for each skill.

4 Conclusions

Being entrepreneurship a key competence for growth, employment and personal fulfilment the education systems can greatly contribute to successfully addressing the entrepreneurial challenge within the EU.

This Open Educational Practice empowers the entrepreneurship teachers' and learners' skills by giving them the confidence and skills to successfully customize and incorporate the StartUp model so it best fits their teaching needs.

The basic StartUp model as a whole matches the main challenges highlighted as critical to the success of open practices: personal learning environment (Virtual expert), localization and quality (authoring system and rating system). But specifically, the recommender system prove easier to find and use, we can expect the number of users to greatly increase in comparison with the present beneficiaries, thus enhancing the community and allowing the creation of a virtuous learning circle. As a further result, a growing community could lead to an increase in the frequency of learning objects being uploaded for assessment that will then enrich the OERs available.

Furthermore, as at present the majority of OER are in English, we can even assume that among the community the most effective learning objects could be translated by trainers, to be used in their own courses. As a result, the OER number will grow across different languages, thus allowing more users to benefit from them.

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