Use of hybrid learning model for SAP-related technology education

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Abstract. Network educational programs are a format of interaction between universities that is gaining popularity and makes it easy to integrate courses developed and provided by other universities or organisations into the educational process. This makes it possible to significantly raise the level of education for those universities in which there is no opportunity to attract personnel of the right qualifications to organise classes according to the traditional version.

Usually, such programs use MOOCs on national platforms (openedu.ru in Russia, for example) or international platforms such as Coursera. In terms of obtaining theoretical knowledge, this approach looks very attractive, but the possibilities of providing practical tasks and using specialised software are limited by the framework of the particular online platform. And this is a barrier for the universities to join the network programs that require specialised software as a hands-on practice tool.

The solution to overcome this barrier can be in using of a hybrid learning approach, when students acquire the theoretical knowledge in the form of a MOOC and have practical assignments either at their universities, if there is an appropriate material base (software access), or using cloud-based SaaS services owned by partner organisations.

The article gives an overview of the SPbPU's experience in developing this "hybrid model" of online courses for studying SAP-related technologies and solutions, its economic value and use cases for incorporating SAP-related technologies and solutions in the educational process, taking into account the current state of the education market for SAP technologies.

Keywords: SAP, e-learning, blended learning, learning environment, higher education, S/4 HANA, HANA, MOOC.

1   Educational market and educational technologies in use

There are quite a few ways to develop learning process using distance technology, starting from training courses on Russian and international platforms, such as openedu.ru, Stepich, Lectorium, Intuit, EdX, Coursera, etc. [1]. These courses are usually free of charge, but if the student would like to get a certificate, he (for example, student in Russia) will pay about $30 for the courses on national (Russian) platforms and $80 or more for the courses on foreign platforms.

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The bottlenecks of most of massive open online courses (MOOCs) are their low economic component, although they usually do not pursue commercial goals, and the low conversion rate of those who have reached the end of the course. Typically, 5-7% of students pass the final test. But of course, there are exceptions. Open.sap.com can serve as one of the striking examples of a successful MOOC platform. It offers a wide range of free courses on various topics, both related to SAP products and general education (for example, "Programming on Snap!", "Basics of sketching for IT business", "Introduction to Statistics", etc.) According to the data of 2018, the number of students on the platform was about 150 thousand people, and the number of registrations for various courses was about 800 thousand. Moreover, more than 50% of those who registered actually took part in course and the share of those who successfully completed training is about 25% [2].

Thus, we see that MOOCs courses continue to gain popularity, opening access for everyone to the content generated by the best universities and the most innovative companies. At the same time, we observe constant exploration and further development of the field of knowledge related to the construction and application of MOOCs, and the growing number of studies on the topic confirms this observation [3]. Of course, also the technology behind those educational instruments has to develop, to provide sufficient functionality and support. [8]

Despite the development of technology and availability of MOOC's recording instruments (for example, almost all large universities in the Russia have their own professional studios or self-recording studio), the process of developing truly high quality content is still quite time-consuming. This also applies to a course support processes, which require constant updating, especially in the subject areas as innovative technology, manufacturing, IT.

From the quality assurance point of view, the skills, acquired by students, usually assessed by different types of tests and with use of proctoring tools – monitoring and control procedures – to confirm the fact of individual evaluation. Usually, proctoring is a paid service and accounts for about half the cost of certificates for Russian platforms.

The practical assignments in MOOC are also have organizational difficulties, both for technical (infrastructure) and support (supervising) reasons. For IT related courses, it seems to be less problematic.

Here it is reasonable to use blended learning model, where online work is combined with classroom activities. This is so called «flipped classroom model», when almost all theoretical part (lectures) are going online, while practical assignments are done in classroom. Such a scheme is very effective for internal purposes, because allows you to unload faculty from routine lectures, gives students more freedom in attending (watch/listen) lectures or watch them again. While during classroom practical assignments faculty can get a feedback and communicate with the student [4] [9]. A significant number of studies conducted to study the results of MOOC's usage, including the MBFL model (MOOC-Based Flipped Learning – "an inverted class based on MOOC"), confirm the improvement in student performance, an increase in their involvement in the educational process and an increase in the level of interaction among themselves, as well as more efficient use of time spent in the class, compared to the

traditional teaching model [5]. However, in this approach it is difficult to achieve the real "mass" access to the course.

Another option to overcome problems is to use "distributed class model", when students can be at any location and come to the classroom only on fixed predefined times. However, even here distance participation in face-to-face workshop is also an option. A similar approach is applied by SAP Education, offering the opportunity to participate in their workshops remotely [7].

Nevertheless, any practical workshop require relevant infrastructure and qualified lectures, who can assist students in their assignments. If this is not the case, you can use lectures with little experience in a particular field to help with practical classes and at the same time provide quick feedback, often online, with an expert. This option, for example, has worked well for SAP end-user training projects.

In general, when organising training, one cannot limit himself by fixed educational models, but should look towards a combination of all kinds of communication methods and use a wide range of appropriate tools.

An important trend in modern education is the fixation of the student's digital footprint. And online courses provide a huge amount of information in a format well suited for machine analysis. The results of offline training are usually limited to estimates, because it is difficult to organise the fixation of the trajectory "offline" education.

2 SAP-technology educational processes in universities in CIS

2.1 SAP-Technology programs structure

SAP technology training strategies can be classified as described bellow

Narrow training of specialists in internal programming language ABAP. Because the language is proprietary, it does not make sense outside the SAP ecosystem, the demand for graduates is local, while the cost of training and educational systems is rather high. This option is possible only if there is a strong partner, who will provide financing for infrastructure and lecturer. There are few successful implementations of this case in the CIS region. Nevertheless, often new to SAP academic program universities consider this particular option as the most understandable from the point of view of the organisation of the educational process.

Training of consultants for SAP. In general, the university can prepare an initial consultant, especially considering that TS410 certification course "Integrated Business Processes in SAP S/4HANA" is available for them. While preparing programs of such type two factors should be taken into the account. Firstly, the future consultant will need not only knowledge of SAP technologies, but also have to have a set of soft skills –project management, communications, change management, presentation skills, etc. As well as knowledge in the field of future specialisation – logistics, finance, production management, etc. – also should be an important part of educational process. And here universities are traditionally strong. The second factor – the university's lack of real practice in implementing SAP systems and lack of narrow specialists in SAP functional modules. Here again universities cannot work without a partner

– a system integrator with the wide SAP practice, which will help with the missing competencies and students' practices. In classification of consultants' levels adopted in the SAP ecosystem, the university can prepare a K0-K1 specialist.

The third, also obvious way, is to use SAP systems either as **a separate "SAP course"** or **as a basic system for disciplines** such as "Corporate Information Systems". By itself, the "SAP course" does not make much sense educationally as a standalone subject. Firstly, because the technology themselves are different, although they usually use an ERP system, and secondly, students will need a lot of knowledge related to the work of a modern enterprise for conscious work.

Finally, the option that should have become the basic one is the **inclusion of modules related to products or technologies in standard training programs** in various areas – management, finance, logistics, marketing, data processing, etc. Given the pool of covered technologies, we can say that in almost any discipline there is a place to use SAP products. The complexity of the implementation of this – is the difficulty of mastering the corresponding software products by lecturer.

Further, it is essential to highlight the activities of **Next Gen Lab centres** as a form of project-oriented work commissioned by companies. An urgent recommendation for such centres is the inclusion of their activities in the standard educational process, thus providing students with extra skills, knowledge, motivation and, in some cases, basic funding. In this case, the problem and expert support are coming from the customer and SAP landscape and basic skill and knowledge – from university. As a result, such collaboration should bring the problem solving up to the prototype stage and the centres should serve as the interface between companies (with their tasks), SAP technologies and students. Despite the fact that this approach is now more and more popular in the Russian educational environment, it is quite expensive in terms of resources and management, and requires trained project mentors.

2.2   Educational Infrastructure

SAP University Alliances Program (UAP) is a global academic initiative of SAP SE that includes more than 3500 educational institutions in 116 countries. There are two forms of participation in this initiative: associate membership and full membership. Both forms grant access to SAP University Alliances curricula and community membership, but the institutions that choose for full membership also acquire access to teaching systems to reinforce theoretical knowledge with the practice of working with real SAP products. [8]

A large number of software products and technologies are available to educational institutions as part of the SAP University Alliance Program (UAP). Some of these solutions, for example, cloud analytics SAP Analytics Cloud of development tools at SAP Cloud Platform, are offered as trial versions with the possibility of extending of the trial period for education purposes, others, for example, SAP Lumira or SAP Predictive Analytic are available as full versions.

The main business solutions, such as the flagship ERP system SAP S/4HANA, the analytical platform SAP HANA or SAP BI systems and a number of others are available only according to the cloud-based hosting model.

This is a convenient scheme, in which from end-user it is only requires to install the client program (GUI) on the local computer or even just to use a browser (IE, Chrome, FireFox) and access to the SAP systems can be organised from any class-room, as well as from students' home computers.

The SAP systems (on hosting as a part of UAP) come with a ready-to-use dataset, customised/configured business processes and case studies. Cases are globally developed by the UAP UCC/ACC and universities involved and adapted (both materials and master-data are localised) into the Russian language (in case of CIS region) by the SAP ACC at SPbPU.

It is also necessary to note the economic game ERPsim – a simulator, which use the ERP interface of the S/4HANA system. The game has several modifications and is a perfect mean to get acquainted with ERP in a playful way. The game was created by HEC Montreal (business school).

2.3 Educational resources

Universities now have several online resources available:

Portal of the University Center for Competencies in the EMEA region (http://sap-ucc.com). It provides access to globally developed materials for training students for each of the hosting products, as well as infrastructure for registering students and providing them with the opportunity to work remotely with educational systems (for example, from home).

The **opensap.com web resource** is a complete online learning platform that contains dozens of SAP courses, mainly in English. For those universities that do not have difficulties with English-language materials, the inclusion of these courses as elements of the relevant disciplines can be recommended.

For lecturers the **SAP Learning Hub Academic Edition** resource is available. It features a variety of both proprietary SAP materials and those developed by universities. The preferred format is e-books and archives with educational materials. Without adaptation, these materials are not suitable for student learning.

In general, we can summarize that all this creates a convenient landscape for the use of distance educatinal technologies.

3 Use of hybrid educational model

3.1 SPbPU experience

Peter the Great St.Petersburg Polytechnic University (SPbPU) has accumulated sufficient experience in organisation of training using distance technologies. MOOCs from SPbPU are available on almost all major educational online platforms.

In the field of blended learning, a very interesting course "Fundamentals of Project Activities" was implemented at SPbPU. All 2nd year students of all fields of study (technical and natural sciences, humanities and economics) simultaneously attend this

course. This turns into 4,500 students and about 500 projects that students carry out during the duration of the course.

The course required a specific architecture. The authors tried to optimise and automate as much as possible of all course management processes. As a platform LMS MOODLE is used, but with a number of improvements and add-ons.

The course has a blended learning format, which includes a theoretical MOOC course and separate project courses for each of the projects that are carried out offline with the result recorded in the online course. For each course-project a mentor is assigned, who is responsible mainly for the methodological part and is not an expert in the field of the ongoing project. This approach has proven itself and has allowed to collect a high-quality digital footprint of students.

3.2 Blended educational model модель and change of the support model

The Figure 1 shows a traditional blended model of teaching IT technologies appended with routines of the proposed hybrid model. The difference is that in the proposed scheme, students can generally refuse to attend computer classes, as access to the system can be obtained directly from home.
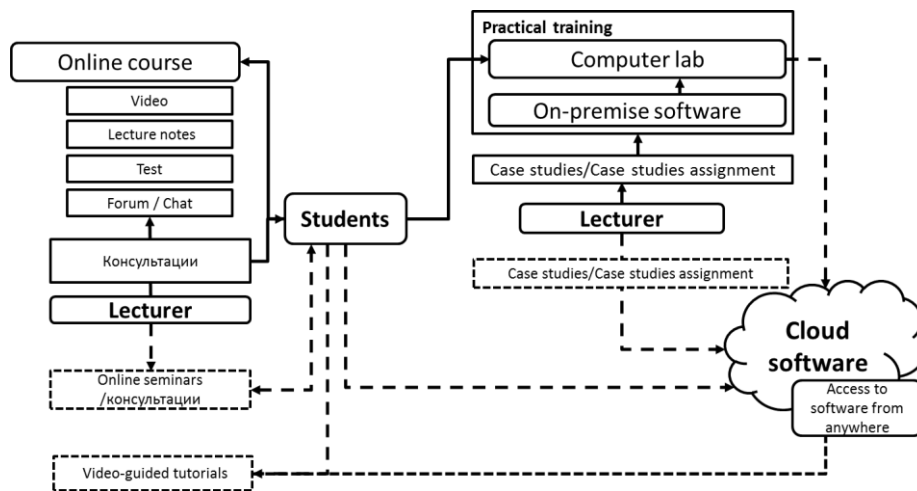

Fig. 1. Traditional blended model and proposed hybrid model. Additional (compare to blended model) elements and links are shown by dotted line.

Support processes, done by the lecturer, can be replaced with the detailed video tutorials, a series of online tutorials and supporting webinars through the web conferencing facilities. This does not abolish the use of computer classes, but reduces the qualification requirements for the lecturer, who run practical classes with students. This is very important given such a complex area as ERP systems.

The next step, which have to be assessed – is it possible to remove completely the local lecturer from the scheme. If so then it is possible, in principle, to change the model of university courses in SAP technologies.

Nowadays, a standard process is: SAP system, a set of guidelines and help on-demand are delivered to universities. For training of lectures standard trainings (TTT) with a duration of 3-5 days are used. Some lecturers can additionally pass certification courses such as TERP10 or TS410.

However, as our more than ten years of experience shows, this may not be enough and serious independent work and knowledge from a large number of areas are needed: economics, production organisation, business processes, accounting, IT, etc. Therefore, we always feel a shortage of qualified lecturers.

In a new model, SPbPU Academic Competence Centre will be able to deliver a finished product in the form of expanded support for the functioning of educational systems with the organisation of a full cycle of the educational process. It seems possible to organise the teaching of complex disciplines (which incorporate usage of SAP technology) without using the local university infrastructure and lecturers. This will be a transition from a resource provider to a full value educational product provider.

3.3   Hybrid program on S/4 HANA at SPbPU

As already stated above, there are all the prerequisites for creating distance learning courses on SAP technology for students with only one element missing – the Russian-language online course on SAP technology, adopted to be used in educational process at the university.

In 2019 such a course was created and tested on the continuing education program "Building the business processes of an intellectual enterprise". Two models were used: a combination of face-to-face and online trainings and a completely distance form.

Initially, this program was aimed to educating lecturers, providing them higher competences in SAP-related technology and using them for education. However, even the first experience has shown that such trainings are quite interesting to students as well.

The first admission to the distance course was 395 people from more than 50 universities in Russia, Republic of Kazakhstan, Republic of Uzbekistan and the Republic of Belarus. 45% of the participants were students. About 35% of participants successfully completed the course, which is a rather good result, given that the course was free and the students were not bound by any obligations.

Access to the cloud systems was provided individually for students and support was provided through forums, e-mail and online consultations.

A survey at the end of the course was filled-in by 30% of participants, among whom only 27% had work or training experience related to SAP ERP or S/4HANA. 100% of respondents found such a distance course effective for teaching students and 99% are ready to recommend the course to their colleagues.

Duration of the course was considered sufficient by 58%, 27% did not have enough time, and 7% were ready to pass it faster. The ratio of theory and practice was considered optimal by 82% of respondents. The main difficulties noted by the respondents were: the implementation of practical cases in the system and work with the interface (33% and 26%, respectively), the understanding of the theory (33%) and only 10% indicated that they had difficulties with access to the system (see Fig. 2).

There is no definite answer regarding the advantage of video instructions or written instructions for practical exercises, so most likely you need to use both options, for which 61% of respondents voted.
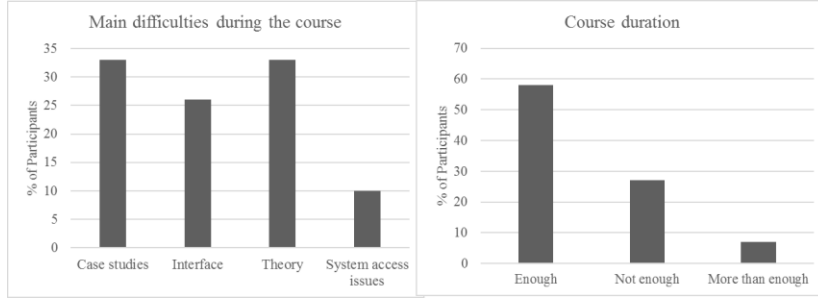

Fig. 2. Course assessment by participants (survey results).

Thus, we can conclude that the experience was successful. The usefulness of the course on a 5-point scale was rated at 4.6, which indicates a high level of participants' satisfaction. Now we are considering two basic options for using the product (see Fig. 3): in combination with standard hosting and without it, using a network educational model.
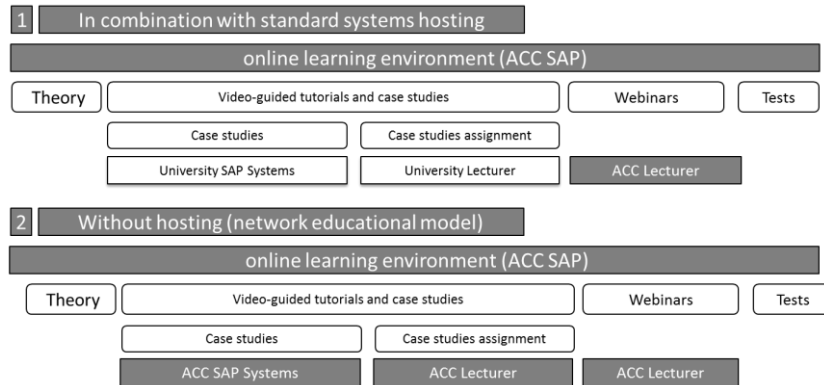

Fig. 3. Extended support options.

The partner will be able to create their own author's modules, give assignments to students and evaluate their results (see Fig. 4). This will enrich the educational process and gives company the opportunity to assess the students on real tasks.
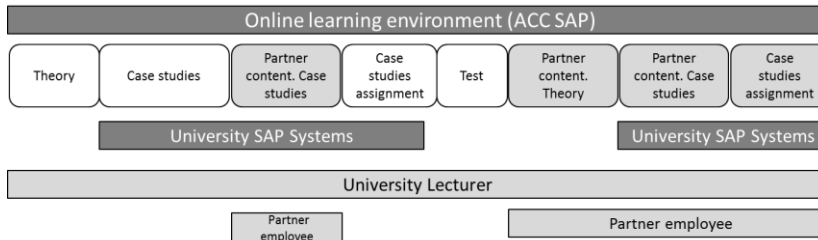
Fig. 4. Partner engagement model.

Conclusion

The first experience in implementing a hybrid educational program for teaching SAP-related technology should be evaluated as successful and the product is ready for export to other universities.

Given the scalability of the proposed hybrid approach to teach SAP-related technology, we can say about creating a new scheme for organising training on SAP products for universities and a mechanism for interacting with partners within the global ecosystem.

The implementation of the hybrid approach will solve a number of existing issues in the SAP ecosystem:

- lack of qualified lecturers;
- providing training opportunities on real systems for associate members of the UAP, who do not have access to SAP products;
- reduce the cost of training for small groups of students;
- provide mass training for the ecosystem;
- involve SAP partners in the educational process.

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