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WP3 Curriculum design and accreditation

Responsible university ITMO, Russia

3.2.2 Report of the completed need's analysis

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Content

Introduction.....	3
1. SWM MOOCs' requirements from the point of view internal stakeholders.....	5
2. SWM MOOCs' requirements from the point of view external stakeholders.....	8
Conclusion.....	11

Introduction

This report is based on the discussions of internal and external stakeholders at the six local workshops organized by partner universities in the framework of the EduEnvi project and held in St. Petersburg, Yekaterinburg, Tyumen (Russia) and Alma-Aty, Kokshetau and Shymkent (Kazakhstan) in February-April, 2018. The program of the discussion meetings, as well as the preliminary list of the courses, materials and templates for the discussions were elaborated by the expert group of WP3 consisting of ITMO representatives and its associated partners – external stakeholders.

The purpose of the need's analysis was to check the list of the courses to be developed within the EduEnvi project according to the assessment of the current gaps in sustainable waste management (SWM) and in the field of SWM education in Russia and Kazakhstan.

The importance of development of educational programs, modules and courses for sustainable waste management was also resulting from a series of national professional standards prepared by the Ministry of Labour of the Russian Federation recently, where the role of SWM specialists and required competences were emphasized.

Initiated about ten years ago the Massive Open Online Courses (MOOCS) has become very actual both in Russian and Kazakh universities, especially after establishment of so-called national educational online platforms. At the same time lack of experience in online pedagogics and use of Information and Communication Technology (ICT) tools led to an additional task of creating open flexible learning and teaching methods and courses with a view to offering the courses online in SWM not only for the partner universities' students, but also for anyone, to study free of charge.

Importance of the need's analysis in the field of SWM is difficult to overestimate because the partner universities must play a significant role in greening and socializing the modern society. They bring together academic experts, prospective employers and potential employees and provide them important information on waste management, treatment and prevention.

At the starting point of the EduEnvi project the partner universities had to solve the great challenges that national higher education systems are currently facing, such as

- 1). Lack of comprehensive agenda for the SWM courses development, their structure and content;
- 2). Lack of experience in MOOCs development and ICT tools use by the teachers; and
- 3). Lack of university-industry cooperation and weak links of universities with the companies-employers in the field of waste management.

Solving these challenges requires considering the needs of the interested parties (table 1).

Table 1. The Logical matrix for defining stakeholders of SWM and the need's analysis

Needs	Internal stakeholders	External stakeholders
Content of the online courses/modules	Students	Employers (local companies)
Required competences	Universities' teachers	Local environmental authorities
Commitment to binding obligations/ programs	Universities' administration	Municipal authorities
Development of new digital learning methods, MOOCs and its ICT tools	Universities' representatives of open education departments	Local citizens
Information of the populace	Universities' press centres	Local mass media

Results of the need's analysis were discussed during the International Workshop in St. Petersburg on curriculum/module design, structure and quality assurance on April 16-20, 2018, and especially during the workshop with participation of real work life representatives on April 18, 2018.

During the following development of the courses the series of webinars devoted to content and online pedagogics were conducted in December, 2018 – January, 2019, and after that the peer reviews of the courses and modules were organized in April-May, 2019. Introduction of the developed curricula to the companies' experts is planned to conduct in October-December, 2019. The "end products" will be evaluated at the piloting stage in February-April, 2020, when the broader range of stakeholders will be surveyed.

The next chapters of the report reflect comments of the participants of six local workshops on needs for SWM online education and final list of modules, courses and competences that were adopted in the project.

1. SWM MOOCs' requirements from the point of view internal stakeholders

At six partner universities the internal stakeholders for the development of the MOOCs were defined and their needs are summarized in the table 2.

Table 2. Internal stakeholders and their needs

Internal stakeholders	Amount of people	The needs			
		Content of the online courses/modules	Required competences	Commitment to binding obligations/programs	Development of MOOCs and its ICT tools
Students	8	Knowledge and professional skills will be beneficial for the career seek			Development of their capabilities in use ICT, digital environment
Universities' teachers	35	To be discussed with companies and environmental authorities Each partner university determines the modules and disciplines according to their interests and competences and creates the detailed structure of the selected module and its disciplines	According to professional standards, to meet the society needs	The courses should meet the universities' requirements and requirements of open education departments	Personal involvement, increase of the capabilities in use ICT

		Creation of new master's program and use of the courses within the existing courses			
Universities' administration	7			Internal requirements of educational department should be taken into account and accreditation procedure should be fulfilled	Online courses are required for the vocational education Experience of EU partners in MOOCs development is needed to learn
Universities' representatives of open education departments	1				Use new pedagogical tools to support collaborative learning
Universities' press centres	-				



Photo 1. Discussion of the needs by the expert group at ITMO University



Photo 2. ITMO students and teachers during the discussion

2. SWM MOOCs' requirements from the point of view external stakeholders

The external stakeholders and their needs are shown in the table 3.

Table 3. External stakeholders and their needs

External stakeholders	Amount of people	The needs			
		Content of the online courses/modules	Required competences	Commitment to binding obligations/programs	Development of MOOCs and its IC tools
Employers (local companies)	9	<p>Legislative issues and licensing in waste management are highly actual topic</p> <p>Best available techniques in waste management</p> <p>Best practices, environmental management systems</p>	<p>Students must have practical work skills, know how to work with the environmental documents, obtain permits and licenses</p> <p>Environmental specialists practicing at enterprises, as well as ecologists-technologists are in high demand in the labour market</p> <p>Entrepreneurial skills are to be developed</p>	<p>Have to check the requirements for the development of master's disciplines</p>	<p>There is a need to obtain the requirements for the design of online courses</p> <p>Use of the online courses for vocational education of the adults, employees</p>
Local environmental authorities	1	<p>Design issues are especially important, including the design of landfills and their recultivation</p>		<p>Have to follow to a rapid change in the waste management legislation</p>	
Municipal authorities	-				

Local citizens	-				
Local mass media	-				

Associated partners proposed to introduce disciplines on environmental law of the Russian Federation and permits for waste. Some of the materials in the form of lectures on equipment for the collection, transportation, processing, shipment and sorting of municipal solid waste (MSW), as well as on the separate collection of waste, use of biological products can be illustrated with video materials in coordination with the management of the local companies.

Conclusion

As the conclusion of the need's analysis the preliminary list of the courses, modules and competences was created:

Module 1: Environmental risks related to waste management

Course 1 Introduction to environmental risks
Course 2 Environmental, social and economic risks
Course 3 Solid wastes and environmental risks

Module 2: Biotechnologies for waste utilization

Course 1 Basics of ecological biotechnologies
Course 2 The applied aspects of using biotechnological methods for waste utilization

Module 3: Non- energy technologies for waste utilization

Course 1 Basics of waste utilization
Course 2 Reuse of side products and outputs
Course 3 Physico-chemical treatment methods in waste management

Module 4: Energy technologies for waste utilization

Course 1 Waste-to-energy plants and technologies
Course 2 Energy efficient technologies in waste treatment

Module 5: Business and entrepreneurship

Course 1 Modeling of business processes in the field of waste management
Course 2 Business planning for sustainable waste management

Module 6: Public administration policy and municipal waste management

Course 1 Institutional approach to SWM decision-making
Course 2 Public and municipal governance in SWM
Course 3 Budget and financial base of SWM

Module 7: Environmental management and waste prevention

Course 1 Methods, models and tools for waste prevention
Course 2 Application of ISO 14001 for waste prevention
Course 3 Theory and practice of waste management in companies

Module 8: Life cycle analysis and life cycle costing

Course 1 Introduction to LCA based on ISO 14040 series

Course 2 Application of LCA for waste prevention

The detailed description of the courses and modules, responsible universities can be found from <http://eduenvi.tamk.fi/modules-courses/> .