SPOCs in University Education: European Experience

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Abstract. The study suggests broadening the taxonomy of MOOC models and provides evidence for the prevalence of Small Private Online Courses (SPOC) among open education models in the post-MOOC era. A systemic literature review[1] is performed to analyze research publications of 2013–2018 on using SPOCs in European university education. It has been found that SPOCs combine well with formal university education in European Bachelor's degree programs when using pedagogical models like blended learning, flipped classroom and collaborative learning. We recommend spreading SPOC practices in Russian higher education to improve the learning motivation of students.

Keywords: massive open online courses, taxonomy, small private online course, European university education, systematic literature review, blended learning, flipped classroom, learning motivation, collaborative learning.

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Over the past decade, open education has engendered a promising yet debatable model of *e*-learning, Massive Open Online Courses (MOOCs). As reported by MOOCWatch, over 2,800 MOOCs existed as of February 2015, being offered by 437 universities and colleges [Mutawa 2016:1652]. MOOC providers—Coursera and EdX—attracted 15 and 5 million users and 130 and 70 corporate partners in 2013–2016, respectively [Croft 2017:876]. The leading MOOC platforms provide courses in the English language. At the same time, the MOOC market is developing in other languages, too. In Europe, it is represented by EU-wide MOOC platforms (iversity and ECO MOOC Project), national projects, such as iMooX in Austria, FUN and MOOC Francophone in France, Miríada X, UNED COMA, COLMENIA and iMOOC in Spain, mooc.HOUSE, OpenHPI and openSAP in Germany, as well as independent university-based platforms.

Research interest in MOOCs and MOOC-related issues manifests itself in a great number of publications, which include books, articles in peer-reviewed journals, and reports at international scientif-

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[1] We would like to thank the authors of the selected studies who provided access to the full texts of their articles.

ic forums. This study uses a sample of studies containing the search terms "MOOC*" or "Massive* Open Online Course*" in their title, indexed in Scopus and Web of Science (WoS) or published in the digital libraries IEEE Xplore DL, ACM DL, Springer Link and Science Direct (accessed May 19, 2018). A total of 3,449 publications with unique titles was sampled. MOOC studies have been *synthesized* in a number of systematic literature reviews (SLR) focusing on the institutional [Sa'don, Alias, Ohshima 2014], psychological [Hakami, White, Chakaveh 2017] and technological [Sanchez-Gordon, Luján-Mora 2017] aspects of using MOOCs.

Metadata of 345 MOOC-related studies contained information on the pedagogical models used in MOOCs, namely adaptive learning, blended learning, collaborative learning, cooperative learning, hybrid learning, micro learning, mobile learning, problem-based learning, self-regulated learning, and flipped classroom. This information was indicated in the titles of 213 articles. Geographic distribution of the publications reflects the leading positions of European researchers in MOOC pedagogy, 73 studies (34.27%) coming from European universities, 64 (30.05%) from Asia, 57 (26.76%) from America, 11 (5.16%) from Australia, and 8 (3.76%) from Africa.

When MOOCs were enjoying a boom in popularity, educators used learning analytics to find solid evidence of MOOC disadvantages [Guo 2017:5965], the key one being the lack of learners' motivation to complete a course, which results in high dropout rates. Another MOOC disadvantage, from the perspective of organization of formal university education, is the difficulty (or, in most cases, impossibility) of incorporating MOOCs into university curricula [Kulik, Kidimova 2017:126].

The aim of this article is to identify and analyze a MOOC model that would counterbalance such disadvantages when being used in higher education.

Scope and Objectives of Research Problem

The focus of theoretical studies has begun to shift from MOOC to other open education models[2], such as LOOC (Little Open Online Course) [Chauhan 2014:10], SPOC (Small Private Online Course) [Datsun, Urazaeva 2016:196; Chauhan 2014:11; Fox 2013], SMOC (Synchronous Massive Open Online Course) [Chauhan 2014:11], and others—designed to reduce the negative effects of MOOCs.

The concept of Small Private Online Course was introduced in pedagogy in 2013 by Armando Fox "as a supplement to classroom teaching rather than <...> a replacement for it" [Fox 2013:38]. Although SPOCs inherit some of MOOC characteristics, they also have unique properties of their own. "SPOCs offer some solution in that students

[2] Regulations on the National Russian Competition of Open Online Courses. Edcrunch Award 2017 (Integrated nomination): http://2017.edcrunch.ru/files/rules_ed_crunch_award_2017–1.pdf?t=1512126099

are selected, which limits numbers of participants, and ensures they satisfy some entry requirements for the course"[3].

The scope of this study includes models of open university education in the post-MOOC era, and the subject is limited to SPOC as a model of open education with the characteristics necessary for integration into formal university education, which are more suitable than those of MOOCs and capable of increasing student motivation.

To analyze how widespread SPOCs are in the learning process, we carried out a systematic review of literature on the experience of using SPOCs in university education by the European academic community that was published between 2013 and 2018.

Research Methodology

The methodology of systematic literature review suggests that sources are searched, selected and analyzed and the results are synthesized as a logical succession of procedures. Any preceding phase in this process serves as a source of inputs for any subsequent stage [Kitchenham 2007:6].

The first phase (planning the review) involved formulation of research hypotheses.

RH1: SPOC is the most widespread model in the post-MOOC era of university education.

RH2: European universities hold the leading position in using and studying SPOCs within the models of open learning in higher education.

Research questions were specified and a review protocol was developed to verify the hypotheses. The body of selected studies is used to evaluate the landscape of SPOC literature, i. e. geography of research teams, subject fields, and levels of educational attainment for which research was performed. Besides, a literature review allows identifying the pedagogical strategies pursued by the European academic community in using SPOC models.

A review protocol specifies the strategy that will be used to search for primary studies as well as study selection criteria. The search strategy for this SLR sets the publishing time frame from 2013 to 2018 (last accessed date May 19, 2018). The search for publications on producing and using SPOCs was performed in scientometric databases and digital libraries: Scopus, WoS, ACM DL, IEEE Xplore DL, Springer Link, Science Direct, and Google Scholar (GS). The search term to look for in the titles was "SPOC*" or "Small Private Online Course*". Studies in the subject field "education" are considered relevant in this review. Inclusion and exclusion criteria are applied to relevant studies

[3] Financial Times Lexicon: http://lexicon.ft.com/Term?term=small-private-online-course-SPOC

Table 1. **Numbers of Studies According to the Review Protocol**

Studies	WoS	Scopus	IEEE Xplore	Science Direct	Springer Link	ACM DL	GS	Total
Found	113	103	31	30	15	14	109	415
Unique	33	40	26	17	14	7	59	196
Relevant	48	23	23	1	11	5	38	149
Primary	3	6	2	1	4	1	10	27

to obtain a set of primary studies. The inclusion criteria suggest selecting the studies produced by European universities and published in scientific journals or proceedings of conferences on higher education. The exclusion criteria serve to exclude literature reviews, technical reports, theses, presentations, poster presentations, and publications of less than three pages.

Research Data

In the second phase (conducting the review), 415 studies are found using the search strategy. The distribution of the studies across digital data storages is shown in Table 1.

Next, 196 unique studies were selected from what was found, of which 149 were kept as relevant. After applying the inclusion and exclusion criteria, a list of 27 primary studies was obtained, which is presented in Table 2. Seventeen publications (63%) were selected from scientometric databases and digital libraries, which ensures a fairly high scientific level of the pool of primary studies.

Next step in this phase, data extraction was performed in accordance with the research questions.

Metadata of the primary studies (publication year and source, authors' countries and institutions) were analyzed to answer the research questions. Disciplines and levels of education programs supported by the SPOC model were identified in the abstracts and/or full texts of the articles. Clustering of pedagogical models was performed across the abstracts (keys: *learning, teaching, instruction*).

Results

This section presents the results of the third phase of SLR.

Table 3 shows the geographic distribution of relevant studies, including those on using SPOCs in university education and on the pedagogical models when using SPOC in higher education.

The distribution of relevant and primary studies by years of publication and publication channels is shown in Table 4.

Tables 5 and 6 systematize the publication channels and show the distribution of the primary studies among them.

Table 2. **The List of Primary Studies Included in the Review**

ID	Bibliographic Details
W1	Alario-Hoyos C., Estévez-Ayres I., Kloos D. C., Villena-Román J. (2017) From MOOCs to SPOCs... and from SPOCs to flipped classroom / 12th European Conference on Technology Enhanced Learning (EC-TEL '17) (Tallinn, 12–15 September 2017). P. 347–354.
W2	Albó Pérez L., Gelpí Arroyo C. (2017) From a FutureLearn MOOC to a blended SPOC: The experience of a Catalan Sign Language course / HybridEd Workshop: Blended Learning (HybridEd '17) (Leganés, 24 May 2017). P. 1–4.
W3	Alvarez-Gil M. J., Montes-Sancho M. J., Tachizawa E. M. (2017) A first approximation to the SPOCs-FC in the context of the Supply Chain Management// WPOM-Working Papers on Operations Management. Vol. 8. Sp. Issue. P. 151–163.
W4	Balaguer R.C., García F. C., de Pinedo Echevarría N. F., González J. P.S. (2016) Aprendizaje autónomo a partir de SPOC's en las asignaturas de Historia Económica / M.A.B. Gutiérrez et al. (eds) Nuevas perspectivas en la investigación docente de la historia económica. Santander: Editorial de la Universidad de Cantabria. P. 197–211.
W5	Croft I. (2017) Using marginal gains to improve MOOCs and SPOCs / International Technology, Education and Development Conference (INTED '17) (Valencia, 6–8 March 2017). P. 876–879.
W6	Ferrari Golinelli G., Santiago Gómez G., Redondo Duarte S., Sánchez Mena A. A. (2015) Desarrollo de competencias transversales en estudiantes de postgrado de la Universidad Europea a través de un Small Private Online Course / XII Jornadas Internacionales de Innovación Universitaria Educar para transformar (JIIUE '15) (Villaviciosa de Odón, 20–21 July 2015). P. 497–505.
W7	Ferreira A. (2015) Du MOOC au SPOC: Classe inversée en langue de spécialité / Colloque Questions de Pédagogie dans l'Enseignement Supérieur (QPES '15) (Brest, 16–19 June 2015). P. 546–553.
W8	Filius R., Verdonk N. (2017) SPOCs in the Spotlight// Opleiding & Ontwikkeling (Op & On). Vol. 1. P. 12–17.
W9	Filius R.M., De Kleijn R. A.M., Uijl S. G., Prins F. J., Van Rijen H. V.M., Grobbee D. E. (2018) Challenges concerning deep learning in SPOCs// International Journal of Technology Enhanced Learning (IJTEL). Vol. 10. No 1–2. P. 111–127.
W10	Freitas A., Paredes J. (2018) Understanding the faculty perspectives influencing their innovative practices in MOOCs/SPOCs: A case study// International Journal of Educational Technology in Higher Education (IJETHE). Vol. 15. No 1. P. 1–1.
W11	García F., Martin D., de la Escalera A., Armingol J. M., Al-Kaff A.H. (2016) Enhancing engineering learning through SPOC courses// International Journal of Technologies in Learning (IJTL). Vol. 23. No 3. P. 15–20.
W12	Guillot C., Buisine E., Edouard J. (2015) Implementing a gamified SPOC: Feedbacks from a business school experience / International Conference on Education and New Learning Technologies (EDULEARN '15) (Barcelona, 6–8 July 2015). P. 5762–5769.
W13	Kany F., Louédoc B. (2017) A SPOC produced by sophomores for their junior counterparts / International Conference on Smart Education and e-Learning (SEEL '17) (Vilamoura, 21–23 June 2017). P. 120–128.
W14	Kaplan A.M., Haenlein M. (2016) Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster// Business Horizons (BH). Vol. 59. No 4. P. 441–450.
W15	Kloos C.D., Muñoz-Merino P.J., Muñoz-Organero M., Alario-Hoyos C., Perez-Sanagustín M., Parada H. A., Ruipérez-Valiente J.A., Sanz J. L. (2014) Experiences of running MOOCs and SPOCs at UC3M / Global Engineering Education Conference (EDUCON '14) (Istanbul, 3–5 April 2014). P. 884–891.
W16	López de la Serna A., Castaño Garrido C., Herrero Fernández D. (2018) Integración de los cursos SPOC en las asignaturas de grado. Una experiencia práctica// Pixel-Bit. No 52. P. 139–149.
W17	Martinez-Muñoz G., Pulido E. (2015) Using a SPOC to flip the classroom / Global Engineering Education Conference (EDUCON '15) (Tallinn, 18–20 March 2015). P. 431–436.
W18	Michou V., Bottin-Rousseau S., Rauzy A. (2017) Deploying a SPOC creation strategy at UPMC / 5th European MOOC Stakeholders Summit (EMOOCs '17) (Leganés, 22–26 May 2017). P. 16–21.
W19	Muñoz-Merino P.J., Méndez Rodríguez E. M., Delgado Kloos C. (2014) SPOCs for remedial education: Experiences at the Universidad Carlos III de Madrid / 2nd European MOOC Stakeholders Summit (EMOOCs '14) (Lausanne, 10–12 February 2014). P. 271–275.
W20	Muñoz-Merino P.J., Rodríguez E. M., Kloos C. D., Ruipérez-Valiente J.A. (2017) Design, implementation and evaluation of SPOCs at the Universidad Carlos III de Madrid// Journal of Universal Computer Science (J.USC). Vol. 23. No. 2. P. 167–186.
W21	Naert F. (2015) MOOCs, SPOCs, DOCCs and other bugs// SSRN Electronic Journal (SSRN Elect. J.). January. P. 1–7.
W22	Piccioni M., Estler C., Meyer B. (2014) SPOC-supported introduction to programming / Conference on Innovation & technology in computer science education (ITiCSE '14) (Uppsala, 21–25 June 2014). P. 3–8.
W23	Santiuste C., Pernas-Sánchez J., Artero-Guerrero J.A., Varas D. (2017) Diseño de Aprendizaje basado en Flipped Classroom utilizando SPOCs en una Asignatura de Ingeniería / 5th European MOOCs Stakeholders Summit (EMOOCs '17) (Leganés, 22–26 May 2017). P. 45–53.
W24	Santiuste C., Pernas-Sánchez J., Artero-Guerrero J.A., Varas D., Ruiz-Navas E., Segovia D. (2017) Design of a learning method based on Flipped-Classroom methodologies using SPOCs in an engineering course / 45th SEFI Annual Conference. Education Excellence for Sustainability (SEFI '17) (Azores, 18–21 September 2017). P. 407–413.
W25	Uijl S., Filius R., Ten Cate O. (2017) Student interaction in Small Private Online Courses// Medical Science Educator (Med. Sci. Educ.). Vol. 27. No 2. P. 237–242.
W26	Vaysse C., Chantalat E., Beyne-Rauzy O., Morineau L., Despas F., Bachaud J.-M., Caunes N., Poublanc M., Serrano E., Bugat R., Rougé Bugat M.-E., Fize A.-L. (2018) The impact of a Small Private Online Course as a new approach to teaching oncology: Development and evaluation// JMIR Medical Education (JMIR Med. Educ.). Vol. 4. No 1. Article e6.
W27	Ziebarth S., Hoppe H. U. (2014) Moodle4SPOC—A Resource-Intensive Blended Learning Course / 9th European Conference on Technology Enhanced Learning (EC-TEL '14) (Toledo, 15–18 September 2014). P. 359–372.

Table 3. **The Geographic Distribution of Relevant Studies and Publications on University Education**

	Relevant studies			
		on university education		
			on pedagogical models	
	Total	Total	in metadata	in titles
Europe	22.15	20.30	21.54	17.86
Asia	70.47	72.93	73.85	75
America	5.37	5.26	3.08	3.57
Australia	0	0	0	0
Africa	2.01	1.50	1.54	3.57
Total	149	133	65	28

Table 4. **The Distribution of Relevant and Primary Studies by Publication Channels**

	Relevant studies				Primary studies			
Year	Journals	Conferences	Books	Total	Journals	Conferences	Books	Total
2013	1	1	0	2	0	0	0	0
2014	1	8	0	9	0	4[1]	0	4
2015	3	15	0	18	1[2]	4[3]	0	5
2016	11	26	0	37	2[4]	0	1[5]	3
2017	19	55	1	75	4[6]	7[7]	0	11
2018	8	1	0	9	4[8]	0	0	4
Всего	43	105	1	149	11	15	1	27

[1] W15, W19, W22, W27.
[2] W21.
[3] W6, W7, W12, W17.
[4] W11, W14.
[5] W4.
[6] W3, W8, W20, W25.
[7] W1, W2, W5, W13, W18, W23, W24.
[8] W9, W10, W16, W26.

Publications by authors from six European countries, presented in Table 7, were selected to make the list of primary studies.

The studies on using SPOCs were produced by authors from 18 European institutions of higher education (Table 8).

The subject fields in which the SPOC model is applied are specified explicitly in 24 studies (Table 9).

Information on the levels of education programs is specified explicitly in 22 primary studies, which account for 81.50% of the total list (Table 10).

Table 5. **Information on the Journals and the Distribution of Primary Studies among Them**

Journal	Subject Field "Education"	Based in Europe	SJR/ Quartile (2017)	N of Publications				
				Year				Total
				2015	2016	2017	2018	
BH	–	–	1.240/Q1	0	1	0	0	1
IJETHE	+	–	0.390/Q2	0	0	0	1	1
IJTL	+	–	0.111/Q4	0	1	0	0	1
IJTEL	+	+	0.229/Q3	0	0	0	1	1
JMIR Med. Educ.	+	–	–	0	0	0	1	1
J.USC	–	+	0.357/Q2	0	0	1	0	1
Med. Sci. Educ.	+	–	–	0	0	1	0	1
Op & On	+	+	–	0	0	1	0	1
Pixel–Bit	+	+	–	0	0	0	1	1
SSRN Elect. J.	–	–		1	0	0	0	1
WPOM	–	+	–	0	0	1	0	1
Total	7	5	–	1	2	4	4	11

Source: https://www.scimagojr.com

Table 6. **Information on the Scientific Events and the Distribution of Primary Studies among Them**

Scientific Event	Subject Field "Higher Education"	Held in Europe	Ranking / Source (2017)[1]	N of Publications			
				Year			Total
				2014	2015	2017	
EMOOCs	–	+	0.167 (12th percentile)[2]	1	0	2	3
EDUCON	+	–	B4/Qualis[1]	1	1	0	2
EC–TEL '14	–	+	B2/Qualis[1]	1	0	1	2
EDULEARN '15	–	–	–	0	1	0	1
HybridEd '17	–	–	–	0	0	1	1
INTED '17	–	–	B4/Qualis[1]	0	0	1	1
ITiCSE '14	–	–	B1/Qualis[1]	1	0	0	1
JIIUE '15	+	–	–	0	1	0	1
QPES '15	+	–	–	0	1	0	1
SEEL '17	–	–	0.173 (16th percentile)[2]	0	0	1	1
SEFI '17	–	–	–	0	0	1	1
Total	4	3	–	4	4	7	15

[1] http://www.conferenceranks.com/
[2] https://www.scopus.com

Table 7. **The Distribution of Numbers of Publications by European Countries**

Country	2014	2015	2016	2017	2018	Total
Spain	2	2	2	7	2	15
France		2	1	2	1	6
Netherlands				2	1	3
Belgium		1				1
Germany	1					1
Switzerland	1					1
Total	4	5	3	11	4	27

Table **8. The Distribution of Numbers of Primary Studies among European Institutions of Higher Education**

	Studies	Institution	Studies
Universidad Carlos III de Madrid	8 (W1, W3, W11, W15, W19, W20, W23, W24)	Institut Supérieur d'Electonique et du Numérique	1 (W13)
Utrecht University	3 (W8, W9, W25)	Institut Universitaire du Cancer de Toulouse-Oncopole и Université Paul Sabatier Toulouse III	1 (W26)
Universidad Autónoma de Madrid	3 (W4, W10, W17)	Instituto de Empresa Madrid	1 (W5)
École Navale	1 (W7)	Universidad del País Vasco	1 (W16)
École supérieure de commerce de Paris Europe	1 (W14)	Universidad Europea de Madrid и UEV Universidad Europea de Valencia	1 (W6)
Eidgenössische Technische Hochschule Zürich	1 (W22)	Universität Duisburg-Essen	1 (W27)
Ghent University	1 (W21)	Universitat Pompeu Fabra	1 (W2)
Institut d'Economie Scientifique et de Gestion	1 (W12)	Université Pierre et Marie Curie	1 (W18)

Table 9. **The Distribution of Numbers of Publications by Subject Fields**

Subject Field	Primary Studies	Relevant Studies
STEM (Science, Technology, Engineering and Mathematics)	7[1]	27
Social Sciences	5[2]	21
Information Technology	4[3]	40
Medicine	3[4]	7
Linguistics	2[5]	21
Pedagogy & Education Technology	2[6]	7
Natural Science & Other Sciences	1[7]	2
Total	24	125

[1] W13, W15, W18, W19, W20, W23, W24.
[2] W3, W4, W5, W12, W14.
[3] W1, W11, W17, W22.
[4] W9, W25, W26.
[5] W2, W7.
[6] W16, W27.
[7] W10.

Table 10. **The Distribution of Numbers of Primary Studies by Levels of Education Programs**

Level of Education Program	Primary studies	Relevant studies
Bachelor's degree	13[1]	114
Master's degree	4[2]	11
Post-graduate studies	1[3]	1
Business school	3[4]	3
Professional military education	1[5]	1
Total	22	130

[1] W1, W4, W9, W13, W15, W16, W17. W18, W19, W20, W22, W23, W24.
[2] W5, W11, W25, W27.
[3] W6.
[4] W3, W12, W14.
[5] W7.

Table 11. **The Distribution of Studies across the Pedagogical Models Discussed in SPOC-Related Studies**

Pedagogical Model	Первичные публикации	Релевантные публикации
Flipped classroom	10[1]	42
Blended learning	8[2]	43
Collaborative learning	7[3]	17
Cooperative learning	2[4]	8
Hybrid learning	0	14
Mobile learning	0	7
Self-regulated learning	0	4
Deep learning	0	3
Model-based learning	0	1
Problem-based learning	0	1
Total	27	140

[1] W1, W3, W7, W14, W15, W17, W18, W19, W23, W24.
[2] W2, W3, W4, W5, W14, W18, W19, W27.
[3] W5, W13, W14, W23, W25, W26, W27.
[4] W14, W27.

In order to identify the pedagogical strategies that the European academic community applies in using the SPOC model, four clusters of pedagogical models discussed in SPOC-related studies were constructed using a word cloud generator[4] and SEO

[4] https://tagcrowd.com/

analysis[5]: blended learning, collaborative learning, cooperative learning, and flipped classroom. The distribution of studies among the identified clusters is shown in Table 11.

Discussion

This systematic literature review has found 149 relevant studies on Small Private Online Courses. In order to compare the contribution of SPOC-related studies to the overall stream of publications on open education models, additional search was performed for studies on other models of the post-MOOC era published in 2013–2018, which yielded 47 papers. The distribution of those papers with due regard to the two dimensions used in taxonomy [Pilli, Admiraal 2016:226] is presented in Figure 1, numbers of publications being parenthesized. This review adds five more models to the above taxonomy:

- SOOC (Strategic Open Online Course) [Raza 2014] as integration of SPOC and MOOC-Eds;
- sMOOC (Social MOOC [Frau-Meigs, Bossu 2017] or Social participatory MOOC [Gil-Quintana, Camarero-Cano 2017]);
- ahMOOC (Adaptive Hybrid MOOC) [García-Peñalvo, Fidalgo-Blanco, Sein-Echaluce 2018] as integration of hybrid [Perez-Sanagustin et al. 2017] and adaptive MOOC [Ewais, Samra 2017];
- professional MOOC [Granow, Dörich, Steinert 2014], which should be regarded as a generalized model of MOOC-Eds [Kellogg, Edelmann 2015]; and
- MOOE (Massive Open Online Experiments) [Wenai 2015].

Studies on SPOCs account for 76.02 percent of the total number of publications on post-MOOC era models, and studies on using SPOCs in higher education account for 67.86 percent. It can be concluded that SPOC is the most widespread model of the post-MOOC era in university education, which confirms the first hypothesis of this study.

Analysis of the geographic distribution of the authors of relevant studies found a high prevalence of Asian researchers in publications on SPOCs and their use in university education. Most relevant studies (96 papers, or 64.43%) are authored by Chinese scholars, which indicates indirectly that the quality of higher education is a priority in China. The Chinese government is implementing the Ten-Year Development Plan for Education Informatization (2011–2020) [Zhang, Zhang 2016], which envisaged expanding the infrastructure of education informatization and integrating information resources into the learning process by 2015. This plan became the basis for subsequent

[5] https://miratext.ru/seo_analiz_text

Figure **1. The Distribution of Studies on MOOC Models**

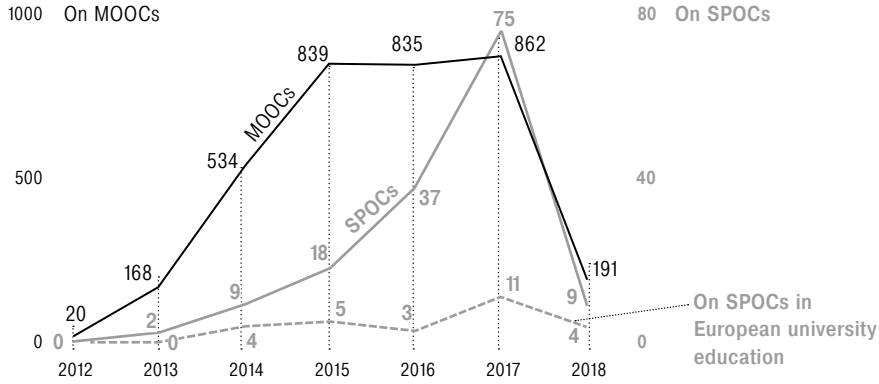
Massiveness	Openness	
	Less open	More open
Small scale	SSOC (1) SPOCs (149) groupMOOCs (1) task-based MOOCs (1) SOOC (1)	BOOCs (2) COOCs (1) DOCCs (1) gMOOCs (2) / GBL MOOCs (1) pMOOCs (1) network-based MOOCs (1) sMOOCs (2) adaptiveMOOCs (3)
	ahMOOC (1)	
Large scale	HOOCs (6) / BOOC (3) mini-MOOCs (2) VOOCs (1) SMOOCs /SynchMOOCs (2) POOCs (Personalized OOC) (1)	madeMOOCs (1) Self-Paced Online Course (3) Content-based MOOCs (1) flex-MOOCs (1) iMOOC (2) MOOC-Eds (1) MOORs (2) professional MOOC (1) MOOE (1)

governmental decisions on incentivizing educational institutions to use *e*-learning models within the frameworks of Concept of Internet + (2015) and the Education Informatization Thirteenth Five-year Plan (2016) [Zhang et al. 2017]. *The 2017 Education Informatization Work Points* (2017) issued by the Ministry of Education of China and designed to advance education informatization and improve the quality of higher education [Ibid.] determine the directions for reforming the whole Chinese university system, including the SPOC-based learning model [Sui 2017], flipped classroom [Sun, Zhang, Jing 2017], mobile learning and gamification [Cao 2016]. Therefore, the second hypothesis has not been confirmed by this systematic literature review, as the leading role in using and studying SPOC in open university education models belongs to Chinese universities. European publications are interesting from the perspective of using new open education models integrated into formal university education—not at the national but at the institutional and cross-national levels.

The number of studies on using SPOCs in European university education increased from four in 2014 to eleven in 2017 after slumping to three in 2016. The same period witnessed an increase in the number of publications devoted to both MOOCs and SPOCs in general (Fig. 2).

Systematization of the publication channels by two dimensions, "subject field" and "based in Europe", reveals that only three articles (W8, W9, W16) are represented in European education research journals, while the rest are published in periodicals that focus on more

Figure 2. **The Distribution of Studies on MOOCs and SPOCs Published in 2012–2018** (Number of Studies)



SPOC-related subject fields, which means that such studies are more applied in nature. The studies on the topic of this SLR (and SPOCs in general) are not found in the high-ranking journals where most findings on MOOCs are represented, namely *The International Review of Research in Open and Distributed Learning*, *British Journal of Educational Technology*, *Computers & Education*, *Computers in Human Behavior*, *Educational Media International*, and *Journal of E-Learning and Knowledge Society*; the same is true for the journals on university education.

All the reports on SPOCs were presented at scientific events dedicated to open education and *e*-learning issues, so the dimension "subject field" was reduced to "university education" when the scientific events were systematized. No reports on SPOCs were found in the proceedings of European conferences on university education. Most reports are dispersed among conferences with more general topics (*e*-learning) and highly specialized scientific forums (engineering or linguistic education). No reports on the topic of this systematic review (or SPOCs in general) were found in the proceedings of major MOOC conferences: *ACM Conference on Learning at Scale (L@S)*, *IEEE International Conference on MOOC, Innovation and Technology in Education (MITE)*, *Learning with MOOCs (LWMOOCS)*, and the European conferences under the auspices of Erasmus+: *MOOC–Maker* and *International Conference MOOCs, Informal Language Learning, and Mobility.*

Of all the studies found, 55.56 percent were produced by Spanish researchers. Spanish universities dominate the European MOOC market, offering their courses through Iberian platform *Miríada X*. The studies by Spanish and French authors have two important characteristics in common: (i) they do not come from metropolitan universities

alone, and (ii) both countries feature collaboration between two higher education institutions. There are examples of successful trans-continental collaboration aiming at creating and using SPOCs in lifelong learning with the participation of European universities [Mazzardo, Nobre, Mallmann 2016; Yamba-Yugsi et al. 2017], yet no international higher education projects were found in the European region.

Universidad Carlos III de Madrid is the hands-down leader by the number of publications. Four of them (50%) were created by a research team led by Carlos Delgado Kloos (W1, W15, W19, W20), who has many years' experience of integrating the SPOC model into the learning process in university education, from design through implementation to evaluation.

As for the subject fields in which SPOCs are offered, 33.33 percent of the primary studies are devoted to courses in natural and engineering science (the proportion being 10 percent lower in the relevant studies). Such prevalence of these subject fields in SPOC-related studies is due in no small part to the difficulties associated with enrolling students to engineering degrees in European universities and the need to bring their skills into compliance with the higher school requirements (W10, W12, W19, W20).

Judging by the fact that the sample largely consists of studies focusing on Bachelor's degree programs (59.09 percent of primary and 89.23 percent of relevant studies), SPOC is indeed a better choice than MOOC for students with weak ability to control themselves [Guo 2017:5961]. Further analysis demonstrates that 61.54 percent of the studies on Bachelor's degree programs in Europe (W1, W13, W15, W17, W18, W19, W20, W22) have freshmen as their target group, for whom remedial courses in mathematics, physics and chemistry are offered to prepare them for university study (W19, W20).

As we can see, the results obtained basically support the belief that "MOOC well adapts for basic theory education, while SPOC applies to professional skills education" [Guo 2017:5961].

By comparing the shares of studies on using SPOCs in various learning contexts, inferences can be made about the pedagogical models in which European authors have experience of using SPOCs.

Equal shares of publications on using SPOCs in blended learning [Graham 2006:3] are found in the primary (29.63%) and relevant (30.00%) studies, and the flipped classroom model as a special case of blended learning is also discussed with pretty much similar incidence [Bergmann, Sams 2012:13]—37.04 and 30.71 percent, respectively.

In blended learning, student activities are divided into three components: pre-classroom activities, classroom activities, and post-classroom activities. The SPOC model redefines the roles of those learning process components (W27):

- Classroom lectures give the basic definitions and a limited number of characteristic examples presented as themed videos through

an online platform, shifting the focus of classroom activity from teacher to student-centered learning;
- Out-of-class activities may take the form of online assignments extending the concepts given in classroom lectures;
- Classroom activities may include discussion forums where results of virtual exercise activities.

Whatever the version, blended learning is always more effective than either face-to-face or fully online learning approaches [Cheng et al. 2017]. Syllabi are redesigned to allow the use of SPOCs, and blended learning changes into transformative learning (W27), which transforms the pedagogical model. Instead of being passive receivers of information, students interact actively to generate knowledge (W1, W5, W9, W12, W13).

The modification of blended learning into flipped classroom consists in that traditional knowledge is disseminated outside the classroom (SPOC-supported online materials (W14)), while classroom time is used for discussion. This systematic review has identified the objectives that prompted European universities to use the SPOC-based flipped classroom model in the learning process:

- Bring high school graduates' skills in the basic academic disciplines into compliance with university requirements (W15);
- Reallocate younger students' classroom time in favor of teacher-directed practical activities, reducing time allotted for theory in IT (W1, W17) and complex STEM disciplines (W12);
- Attract senior students into specific disciplines in the context of high competition among department courses by integrating innovative technologies (W5).

The systematic review also allowed describing the features of the life cycle of SPOCs designed for flipped classrooms:

- Video materials are improved to meet the needs of the target audience (W5, W18);
- Students use SPOCs outside the classroom to study independently the whole course (W15) or some selected topics (W1, W5, W15, W17, W18) and do their home assignments online (W1); normally, students are recommended to move through SPOC materials in keeping with the course structure;
- Time for teacher-student interactions in the classroom is allocated with due regard to the learning objectives in SPOC environments (W1, W5, W15, W17).

A niche has thus been found for using SPOCs in university education: "Using multimedia contents and features, such as auto-grader, from a MOOC and pedagogies such as blended learning, a SPOC organ-

ically integrates MOOC into traditional on-campus classrooms." [Xu et al. 2014]

SPOCs are more suitable than MOOCs for students with low motivation for learning, yet they also use student motivation tools, such as collaborative and cooperative learning techniques. Publications on using collaborative learning account for 25.93 percent in the primary studies and 8.15 percent in the relevant ones, and those on using cooperative learning strategies account for 7.41 and 6.71 percent, respectively.

Two types of MOOC are commonly distinguished, (i) cMOOC (connectivist MOOC) based on connectivism theory where knowledge is constructed through social interactions, and (ii) xMOOC (MOOC as eXtension) which uses cognitive behavioral theory and a more traditional course structure [Kaplan, Haenlein 2016:448]. In collaborative learning, students set shared goals and accomplish the learning mission together [Kuo, Young 2016:169]. The findings of this systematic review show that:

- Classification by this dimension can also be applied to SPOCs, as the primary studies feature both xSPOC (W1, W2, W3, W11, W12, W14, W15, W17, W18, W19, W20, W22, W23, W24, W26) and cSPOC (W13, W25, W27);
- cSPOC is less widespread than xSPOC, the same being true for MOOC.

When assessing the efficiency of SPOCs and SPOC-supported pedagogical models, European scholars use objective measures of learning analytics (W5, W12, W11, W17, W18, W15, W20, W22, W25) as well as subjective student perceptions, i. e. student feedback (W1, W18, W22, W27) and student participation in course evaluation (W5). Objective measures confirm that SPOCs reduce unpredictability which is typical of MOOCs, and combining classroom and out-of-class activities in SPOC environments allows more effective control over the learning process, thus improving academic performance (W11, W17, W18, W22, W25). Although SPOC, unlike MOOC, implies face-to-face student-teacher interactions, analysis of student activities shows growing use of forums for online interactions (W18, W25). Students report an increase in their learning motivation (W1, W22) which results in enhanced participation in the SPOC-supported class (W12, W17, W18, W22, W25). Course developers focus on encouraging extrinsic motivation [Datsun, Urazaeva 2017:16] by crediting additional points to the final course grade for successful completion of SPOCs (W11) or by gamifying SPOCs (W22).

Conclusion

This study suggests broadening the two-dimensional taxonomy of MOOC models. Analysis and systematic review of literature on using

Small Private Online Courses (SPOCs) in university education confirms the research hypothesis about the prevalence of SPOCs among open education models in the post-MOOC era of higher education. The systematic review also proves this new area of research to be common in Europe but does not support the hypothesis that Europe is the leader in SPOC research, the leading positions being held by Chinese universities.

Using the selected search strategy, a systematic review of studies published in Scopus, Web of Science, ACM DL, IEEE Xplore, Springer Link, Science Direct and Google Scholar in 2013–2018 revealed 415 publications. After duplicate studies had been removed and the inclusion and exclusion criteria had been applied, the final list of 27 studies was obtained.

Fluctuations in the number of studies on SPOCs are substantially similar to those in the number of MOOC-related publications (account taken of a time lag of 12–18 months and expected stabilization after 2018). Publication activity of European authors increased from four studies in 2014 to eleven in 2017 (slumping to three in 2016). Scholars published their findings in eleven European and international journals, of which none, however, belonged to the high-ranking journals where most studies on MOOCs are represented. Even though European SPOC researchers presented their papers at eleven scientific events, those papers did not receive attention from the European conferences on higher education or the leading conferences on MOOCs.

Studies on using SPOCs in university education came from six European countries. Leadership in SPOC integration practices in Europe belongs to Universidad Carlos III de Madrid, the experience of which deserves in-depth examination and dissemination. The systematic review revealed some cooperative projects on the production and promotion of SPOCs initiated by Spanish and French universities. However, the benefits of international cooperation in SPOC production with support for the Erasmus+ Program have largely been unused in European university education so far.

Most often, European universities integrate SPOCs into natural science and engineering courses. Over half of the SPOCs are used in Bachelor's degree programs, mostly during the freshman year. Results of the systematic review are consistent with earlier findings, showing that SPOCs are effective in teaching students with motivation levels lower than those of MOOC learners.

SPOCs and MOOCs have different target audiences, SPOC learners being represented by on-campus students. However, universities have to redesign their learning process and all of its components when using SPOCs in order to enhance student motivation. European scholars demonstrated successful experience of using SPOCs in some student-centered pedagogical models. Most often, universities use SPOCs as the basis for blended learning, flipped classroom (as a special case of blended learning), and collaborative learning. These

results confirm the previous findings that SPOCs combine with formal university education better than MOOCs.

Redesign of pedagogical, content and technology aspects of university courses to integrate SPOCs is found to have increased the motivation and learning satisfaction of European students, enhanced their transversal competencies, and provided opportunity for social construction of knowledge. In addition, the publications reviewed show that using SPOCs in European university education creates conditions for improving academic achievement and facilitating the use of blended learning.

Based on the results obtained in this study, SPOCs can be recommended for use in Russian higher education under the blended learning paradigm to increase student motivation.

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