The open educational resources in support of Primary School students' learning: A literature review

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Abstract: This paper is an attempt to review the studies that took place in the period 2010-2020 and focused on the use of open educational resources of the web to support Primary School students' learning. 79 studies related to the above topic were identified for the specific period. For the emergence of the research trends of the above studies, a grid of analysis was formed with categories and subcategories of demographic, methodological, thematic and internet trends. The results of the analysis highlighted various nuances in research trends as well as research gaps that should be filled in future research, in order to draw holistic conclusions about the use of open educational resources in Primary School.

Keywords: Open Educational Resources, Primary School, Analysis, Demographic trends, Methodology, Themes

Introduction

There are many attempts to define the concept of open educational resources (OER). Nevertheless, the revision of the literature on the definition of the concept proves that the definitions are relatively vague (Shaffert, 2010 · Jena, S. 2012). In 2004 it was clarified (Johnstone, 2005) that:

• OER should include learning material that focuses on the gradual improvement of learning performance but, also, on the service of educational practices.

• The above learning material may contain lessons from different cognitive areas, entire teaching units related to a cognitive area, individual learning objects of one or more cognitive areas, exercises for consolidation and extension of learning objects, assessments as well as learning collaborative forums.

• Also, through OER, tools with free access should be offered, which enable both teachers to create customized learning material, and students to respond to the assignments of learning activities by teachers.

Atkins, Brown & Hammond (2007) agree with the above and add that access to OER is possible with permission. OER is any material that is mainly offered digitally through the internet and supports education with direct access and at the same time can be reused, adapted to different learning requirements and levels and shared (Downes, 2011). Rossini (2011) claims that OER are anything offered for public use and by any means (internet, television,

radio, etc. free of charge for the purpose of teaching, learning, and research. Spinach & Cameas (2013) , giving a simplistic definition they conclude that OER are electronic materials provided through the internet for free use by trainees Papadimitriou, Lionarakis, Theologos, & Leontidou (2013) consider OER as freely available "social objects" offered openly and legally mainly to teachers, students and self-taught for use, adaptation, reuse for the ultimate purposes of learning, teaching and research. An open educational application is defined as any online educational resource available for use free of charge to teachers and students (UNESCO, 2015).These sources can be multimedia applications, digital manuals, interactive maps, live videos, video conferencing, educational games, course management platforms, lessons, learning activities, repositories and any other application that can support the learning process (UNESCO, 2015). According to the new UNESCO Recommendation (2019) "OER are learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, which permit no-cost access, re-use, re-purpose, adaptation and redistribution by others".

OER have grown and continue to grow in an open environment in which the wider global education community can improve and make them more important (Smith & Casserly, 2006). The open resources have the potential to stimulate educational innovation and introduce good practices for effective learning (Educause, 2010). Many times, the learning support or the improvement of the quality of the students' learning with conventional means requires a lot of resources in teaching staff and learning material. However, when learning support is provided through OER, the above resources are not required (Stacey, 2007 · Educause, 2010). OER facilitate students' collaboration, interaction and sociability (Komis, 2004·Kostis & Tzimogiannis, 2008· Sclater, 2010) and strengthen the motivation for learning with the idea that knowledge is a public good and that the World Wide Web offers opportunities for knowledge sharing (Smith & Casserly, 2006). Also, they ensure equal learning opportunities for all students (Hewlett Foundation, 2013). They are accessible regardless of place and time resulting in independent and self-regulated learning as well as continuous feedback (Stacey, 2007). According to Kostis & Tzimogiannis (2008) they provide opportunities for students to learn how to learn, promote differentiated learning, develop valuable skills, contribute to the transfer of real-life school experiences, enable communication (synchronous and asynchronous) and finally expand the types of learning profiles.OER, note Spanaka & Kameas (2013), can be open content or open access. The open content resources allow learners to add or modify (improve) resources such as Wikipedia. The open access ones allow them to have free or limited access and use them too,e.g. educational blogs.

In 2012, a literature review was conducted to identify research trends (postgraduate and doctoral dissertations) on mixed learning or blended learning in the ProQuest database by Drysdale, Graham, Spring, & Halverson (2013). One trend identified was the training contexts in which the mixed or hybrid or combined approach is used and consequently the OER. According to the study, 77% of the studies were conducted in the context of university education, 13% of the studies focused on the corporate environment and only 8% in primary

and secondary education. With the findings of the above research, it is clear that the percentage of the above postgraduate and doctoral dissertations that focused on primary education is much less than 8%, given that high school students have developed a better level of technological literacy due to their many years of study. It is concluded, therefore, that research on mixed learning in primary education is very limited.

This paper deals with the review of the 2010-2020 studies which focus on the use of open educational resources in Primary School. Specifically, it aims to detect trends emerging from research on the above theme which were searched in the Google Scholar academic literature index. It is, also, possible that research gaps related to the use of open resources in primary education will emerge and the present work will be the occasion to fill them.

1. Method

The finding of studies related to open educational resources of the webfor the improvement of the quality learning in primary school was conducted in Google Scholar.79 open access studies were found which were published in scientific educational journals or announced at conferences from 2010 to 2020.The detection was carried out by the researcher in three stages. During the first stage, an investigation was conducted combining the terms “blended learning”, “E-learning”, “elementary school”, “elementary education”, “primary school”, “primary education”, “open educational resources” in the titles or the summaries of the studies. In the first stage of the investigation, 129 studies were identified which contained the above terms. Afterwards a second investigation followed by the researcher with the aim of identifyingstudies, in which the researchers provided as learning material to the participating students, in addition to the traditional, open educational resources of the web, too. At the end of the second exploratory stage, an even more thorough investigation followed, which led to the final identification of 79 studies.The method of content analysis was used to highlight trends in the studies that were identified. The analysis framework was formed by the researcher into general categories and their subcategories, after careful reading of a random sample (5 researches) (Tzanis, 2005 · Elo & Kyngas, 2008), and the wording of the definitions.

The independent presumption was chosen as the unit of analysis, ie each study was an independent criterion, since within each research the general categories were identified (demographics, methodological approach trends, thematic trends, didactic approach trends and open internet application selection trends, type of devices) and the sub-categories too, elements that corresponded to the orientation of the analysis (Tzanis, 2005 · Elo & Kyngas, 2008). The sub-categories of demographic trends constituted the number of studies per year and their total number, the countries where then were conducted and their frequency per country, the frequency of participation of the Primary School grades, the organizational level within which the studies were implemented.The studies that took place in the context of various courses of subjects and learning activities, programs and various topics (not related to

the school curriculum) were characterized as subcategories of the organizational level. In order to present this work as a product of a comprehensive analysis, the following subcategories have been added to the subcategories of the courses and the activities: Language, Mathematics, Science, Computer Science, Art and Design, Foreign Language, Environmental Studies, and Social Sciences (Citizenship and History). As subcategories of the methodological approach in each study the types of methodological approaches and the sample size were defined. The learning outcomes, the learning engagement, the interaction, the comparison, the learning style, the motivation, the learning/teaching material, the teaching model and the technology composed the individual categories of the thematic trends.

The research questions which were set in order to identify trends in the above general categories in the present analysis were:

On demographics data:

1. What is the number of studies per year related to the implementation of the open educational resources in order to improve the learning performance in Primary School, in which countries the above researches were conducted and how often?

2. Which grades of students participated?

3. In whichorganizational level (project, learning subject, Various topics (not related to the school curriculum) were the researches applied?

4. In which subjects and learning activities were open educational resources used?

On the research methodology:

1. What methodological approaches were used?

2. What was the sample size in the studies?

On the topics of the research:

What topics and how often did research topics emerge from the analysis?

On the teaching methodology

What teaching models, teaching strategies or teaching practices did the researchers use?

On the choices of open educational resources

What resources were used and how often?

On the technological devices

What types of technological devices were used and how often?

The researcher analyzed repeatedly the presumption separately. The above practice enhanced the reliability of the analysis results. The validity of the analysis was strengthened by the formulation of the definitions of each general category and each subcategory.

2. Results

2.1. Demographics

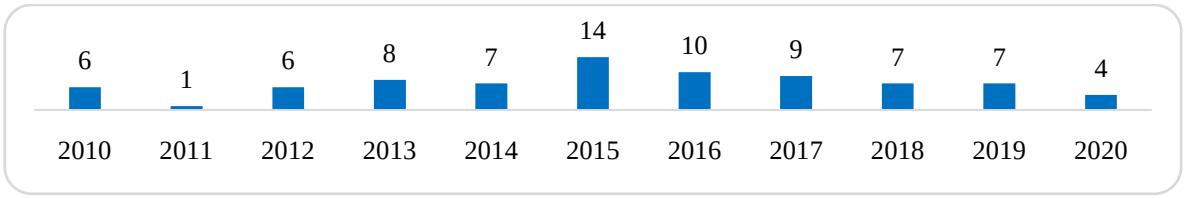
2.1.1. Number of studies per year from 2010 to 2020 and countries in which were conductedthe researches

Most studies (figure 1) were conducted in 2015 (14), then the studies in 2016 follow(10). In 2017, 9 studies were conducted, 8 in 2013, 7 in 2014,2018,2019, 5 in 2010, 2012, 2020 and 4 studies and 1more in 2011. The countries with the most studies (Figure 2) are Taiwan (14), subsequently the United States (9) follow, China, Indonesia (5), Greece, Spain, Australia, Malaysia and Korea (4). Turkey follows with 3 studies. Then Israel, Croatia, Iran and Singapore with 2. Finally, Thailand, Jordan, Mexico, Scotland, Brazil, Finland, Kenya, Japan, Portugal, Northern Macedonia, Czech, Netherlands, Saudi Arabia, Cyprus, Malta and Canadafollow with 1. It should be taken into account that more than half of the studies were conducted in Asian countries (43 researches) and especially in Southeast Asia, 18 in Europe, 13 in America, 4 in Australia and 1 in Africa.

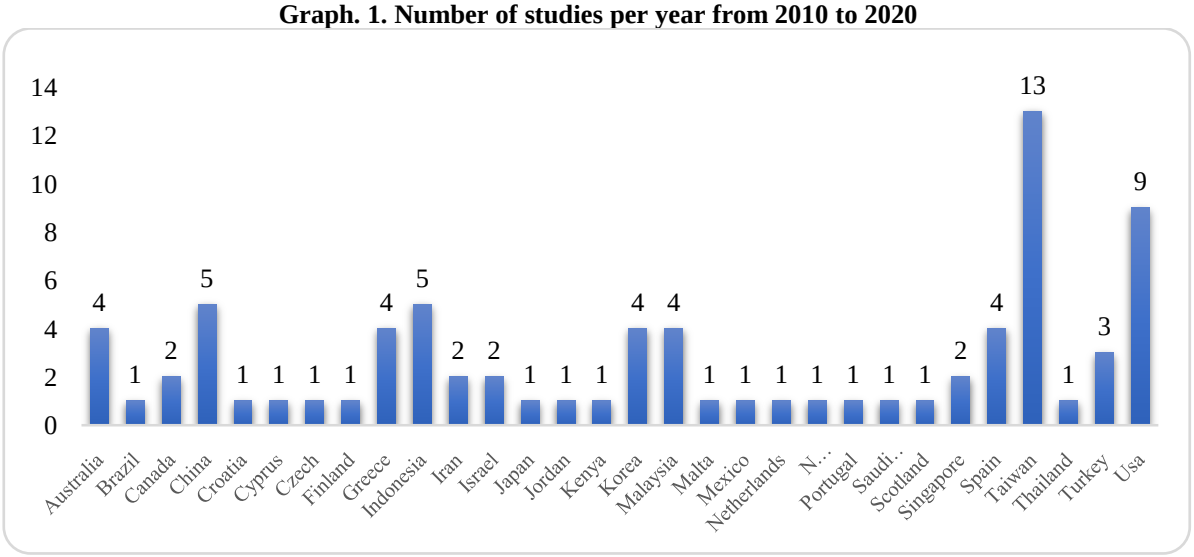
Table 1. Number of studies per year from 2010 to 2020 and country.

Year	Number of studies per year	Serial number of studies	Author(s)	Countries
2010	6	1	Anastasiades et al.	Greece
		2	Chen et al.	Singapore
		3	Fang et al	Taiwan
		4	Veletsianos & Doering	Usa
		5	Wang & Woodworth	Usa
		6	Zadok et al.	Israel
2011	1	7	Cheng et al.	Taiwan
2012	6	8	Diem & Novitasari	Indonesia
		9	Heredia & Icaza	Mexico
		10	Hew & Cheung	Singapore
		11	Li et al.	China
		12	Schaaf	Usa
		13	Shih et al.	Taiwan
2013	8	14	Chen et al.	Taiwan
		15	Erdem et al	Turkey
		16	Joo & Park	Korea
		17	Lou et al.	Taiwan
		18	Marinkovic & Tomas	Croatia
		19	Morgan	Australia
		20	Suzuki	Japan
		21	Tsoulis	Greece
2014	7	22	Filsecker & Hickey	Usa
		23	Hung et al	Taiwan
		24	Kim et al	Korea,
		25	Kumpulainen & Mikkola	Finland
		26	Lopez	Spain
		27	Onguko	Kenya
		28	Song	China

		29	Apergi et al.	Greece
		30	Cracraft	Usa,
		31	Fabian	Scotland
		32	Fong et al.	Canada
		33	Joo & Park	Corea
		34	Kalelioglu	Turkey
		35	Kokkinaki	Greece
		36	Llovet et al	Spain
		37	Mulqueeny et al.	Usa
		38	Nicolete et al.	Brazil
		39	Schechter et al.	Usa
		40	Symons & Pierce	Australia
		41	Thibaut et. al.	Australia
		42	U-Lan	Thailand
2016	10	43	Huang et al.	Taiwan
		44	Lai & Hwang	Taiwan
		45	Laine et al.	Korea
		46	Liu, Lu, Wu & Tsai	Taiwan
		47	Liu, Wang & Tai	Taiwan
		48	Sung et al.	Taiwan
		49	Yaghmour	Jordan,
		50	Oluk & Korkmaz	Turkey
		51	D'addato & Miller	Usa
		52	Inbal & Blau	Israel
2017	9	53	Ribeiro et al.	Portugal
		54	Zhen et al.	China
		55	Perez et al.	Spain
		56	Jafarhani et al.	Iran
		57	Jagust et al.	Croatia
		58	Song &Wen·	China
		59	Lee & Chang	Taiwan
		60	Ariani et al.·	Indonesia
		61	Bakan	Usa
2018	7	62	Astri et al.	Indonesia
		63	Hwa	Malaysia
		64	Videnovik & Dimova	N. Macedonia
		65	Lee & Chu	China,
		66	Zafarqandi·	Iran,
		67	Homanova & Prextova	Czech,
		68	Symons et al.	Australia
2019	7	69	Ismail et al.	Malaysia
		70	Rou et al.	Malaysia
		71	Coppens et al.	Netherlands
		72	Hwang et al.	Taiwan
		73	Aljraiwi	Saudi Arabia
		74	Yunus et al.	Malaysia
		75	Saez-Lopez et al.	Spain
2020	4	76	Loizou &Lee	Cyprus
		77	Rombot et al.	Indonesia
		78	Nurahman et al.	Indonesia
		79	Camillieri& Camilieri ·	Malta



Graph. 1. Number of studies per year from 2010 to 2020



Graph. 2. Countries and number of studies

2.1.2. Grades' participation

Table 2 shows the participation of the grades where the largest participation belongs to the 5th grade with 20 participations, followed by the 6th class with 17, the 4th grade with 11, the 3rd grade with 4, the 1st grade with 1 participation and the 2nd without participation. Then the participation of two grades at the same time follows as of the 6th and 5th grades with 5 presences, of the 4th and 5th with 2 presences, of the 2nd and 3rd with 2, of the 3rd and 4th with one and of 1st and 2ndgrades with 3 presences. Then, the triple participatory combination follows: of the 3rd, 4th and 5thgrades (3), 1st, 2nd, 3rdgrades (2), 4th, 5th, 6th with 1 presence, as well as the multiple participatory combination of 3rd, 4th, 5th and 6thgrades (2). In one study all grades participated and in 4 studies the participationof grades is not mentioned.

Table2. Gradesparticipation.

Grades	Numbered studiesaccording to table 1	Number of studies per grade
1st	5	1
3th	18,42,47,49,	4
4th	11,15,34,43,44,51,60,61,62,66,74	11
5th	2,3,8,10,13,14,16,17,22,30,36,40,45,48,50,52, 59,70,77,78	20
6th	1,4,20,21,23,24,28,29,31,33,35,37,38,41,46,54,58,75,	18
1st &2nd	39,79	2
2nd &3rd	56,57	2

3th & 4th	9	1
4th &5th	65,69	2
5th & 6th	7,19,25,27,32	5
1st, 2th & 3th	55,63	2
3th, 4th & 5th	12,26,76	3
4th, 5th, 6th	68	1
3th, 4th, 5th & 6th	6,72	2
All grades	53	1
It is not mentioned	64,67,71,73	4

2.1.3 Organization level

Mentioning the organizational level (table 3) as a research aspect of the present study means the context on which the studies under analysis were organized. That is, studies were conducted according to the school curriculum (32) and learning activities related to part of the curriculum (13). Studies organized for the implementation of projects with the participation of other schools with topics related to the school curriculum (18) and various studies (16) that were implemented in the same school but their topic had nothing to do with the school curriculum.

Table 3. Organization level

Organizational levels (researchers intervention framework)	Numbered studies according to table 1	Total studies per level
Subjects	2,5,7,8,15,16,17,23,30,31,33,42,43,44,45,46,49,50,51 ,53,54,55,56,57,58,60,62,63,68, 74,75,77	32
Projects	1,4,10,19,20,25,27,28,29,32,34,36,38,40,41,52,66,76	18
Various topics (not related to the school curriculum)	3,6,9,12,18,37,39,64,65,69,70,71,72,73,78,79	16
Activities	11,13,14,21,22,24,26,35,46,48,59,61,67	13

2.1.4. The learning subjects

Table 4 appears to show the cognitive areas in which the researchers focused. In Mathematics 13 studies were carried out, in Science 12 and in Informatics 8. In the National language 8 studies, in Foreign Language (mainly in English 8), in Social Sciences (mainly Citizenship) 4,not related to school subjects but to didactic objects of general interest. In two studies the courses are not mentioned. From the presentation of the findings, there is a preference of researchers in Mathematics, Science, Informatics, National Language and Foreign Languages. Finally, the vast majority of researches focused on a single course, one in four courses and three in two courses.

Table 4. The learning subjects

Learning subjects	Numbered studies according to table 1	Number ofstudies per subject
Art and design	1,25,75	3
Computing	9,12,21,22,24,33,34,50	8
Foreign language	8,29,42,43,47,56,74,77	8
Science	1,2,6,16,18,23,32,35,54,58,62,66,	12
Maths	5,16,30,31,49,45,44,51,55,57,60,63,68,71	14
National language	11,13,15,16,30,46,55,65	8
Citizenship	13,16,48,52	4
Geography	53	1
Environmental studies	17,41,55	3
Interdisciplinary intervention	3,4	2
It is not mentioned	37	2

2. 2. Methodological data

2.2.1. Methodological approaches

Table 5 shows the type of methodological approach that was most represented in the 79 studiesit was the quantitative approaches (37 studies). Most researchers of quantitative approaches come from southwest Asia. The following are the qualitative approaches (29 studies). Finally, in the remaining 13 studies, the researchers chose the mixed approach.

Table5. Methodological approaches

Research methodological approaches	Numbered studies according to table 1	Number of studies per approach
Quantitative researches	1,3,5,6,7,8,12,16,20,22,23,24,30,33,37,38,42,43,44,46,50,48 ,49,54,55,56,57,59,60,62,63,66,70,71,73,74,75	37
Quantitative researches	2,4,9,10,13,14,15,17,19,21,25,26,27,29,32,35,40,41,47,51,5 2,53,58,61,67,68,69,76,79	29
Mixed researches	11,18,28,31,34,36,39,45,53,64,65,77,78	13

2.2.2.Research sample size

Table 6 shows the sample size of students who participated in each study. In 23 studies from 31-50 studentsparticipated, in 21 51-100 students, in 20 more than 100 students took part and in 14 less than 30 students. A study does not mention the number of students who participated. From the above results, there is a relatively high preference of researchers to select a sample of participating students from 31 to 100 students.

Table 6. Research sample size

Sample size	Numbered studies according to table 1	Number of studies
15-30	4,14,15,17,19,25,28,35,41,47,51,58,61,63	14

31-50	1,2,7,8,10,13,18,20,26,27,29,31,32,34,36,38,44,46,50,52,60,70,74	23
51-100	11,16,23,30,39,40,42,43,45,48,49,56,57,59,66,67,68,73,75,76,79	21
100-	3,5,6,9,12,18,22,24,33,37,53,54,55,62,64,65,69,71,72,78	20
It is not mentioned	21	1

2.3. Research themes

The research questions shed light on the topics covered by the researchers and are illustrated in table 7. The topics that the researchers focus on most and emerged from their research questions are the learning outcomes (47 studies), which are related to students' performance, effectiveness, self-regulation, attitudes and self-esteem. Technology (23) follows which is related to issues such as its effectiveness in learning environments, its value, the students' attitude of students towards it, the effect it has on students, the understanding of its functions and tools, and its attractiveness. Researchers, then, focus on comparing (10) students' performance in relation to learning space, gender, age, teaching model, and collaboration. This is followed by the interaction of students (10) regarding their participation, cooperation and communication, the learning engagement (8), the motivation (7), the learning style, the learning material and the teaching model from 1 research. Many studies focus on more than one research questions.

Table 7. Research themes

Research themes	**Numbered studies according to table 1**	**Number of studies per theme**
Learning engagement	1,4,10,12,22,37,46,68 Example: This study uses an established quantitative field observation method to evaluate engagement during students' use of a new version of an online learning system (Reasoning Mind's Genie 3). (Mulqueeny et al., 2015)	8
Motivations	22,43,47,57,62,71,72 Example: Based on the FSVL strategy, can using the mobile learning tool in a situational English vocabulary learning environment enhance EFL students' motivation to learn English vocabulary? (Huang et al.,2016)	7
Learning results	2,5,6,7,8,10,11,12,13,14,16,17,20,21,22,23,25,27,28,31,37,40,42,43,44,46,47,48,49,51,53,54,55,56,58,69,61,62,65,66,71,72,73,74,75,77,79 Example: See the subcategories of learning results	47
Comparison	5,6,24,26,30,34,48,50,63,71 Example: See the subcategories of comparison	10
Technology	3,4,9,13,17,19,20,26,29,31,35,38,45,47,52,61,64,67,6	23

	9,70,75,78,79 Example: See the subcategories of technology	
Learning style	3 Hypothesis: After the implementation of digital learning divergent learning styles of elementary school children was no significant difference in academic achievement. (Fang et al., 2010)	1
learning material	18 Example: The attention of this paper is focused on the formation of educational content in the e-learning systems. (Marinkovic & Tomas, 2013)	2
Teaching model	76 What are the universal design principles for effective implementation of the IB-FC model in Cyprus primary school context across different subject matters? (Loizou & lee, 2020)	1
Interaction	1,2,21,25,27,28,47,48,51,61 Example: See the subcategories of interaction	10

2.4. Teaching models

Another research perspective of the present work was the teaching models applied by the researchers in conducting their research. Table 8 shows the teaching models used by the researchers in the 79 studies. The Blended Learning model dominates in 36 studies, then the E-Learning model in 12 studies, Mobile — Learning and Digital-game Learning in 7, Web-based Learning in 5, Project-Based Learning and Inquiry based learning in 3 and Adventure Learning, Technology-based Participatory Learning, Computer Supporting Collaborative learning (CSCL), Augmented reality learning in 1 study respectively.

Table8. Teaching models

Teaching models	Numbered studies according to table 1	Number of studies
Blended Learning	2,5,7,8,10,15,17,18,24,25,30,32,33,34,36,37,39,41,42,44,46,47,49,51,52,56,60,61,63,64,66,68,71,72,74,77	36
E-Learning	1,3,6,20,21,27,35,45,53,59,67,70	12
Mobile – Learning	22,23,38,31,43,48,79	7
Digital Game Learning	12,14,55,57,62,63,69	7
Ubiquitous learning	13,16	2
Web-based Learning	19,50,71,73,78	5

Wiki-based collaborative process writing pedagogy (WCPWP)	65	1
Adventure Learning	4	1
Project-Based Learning	26,29,54	3
Technology-based Participatory Learning	9	1
Inquiry based learning	28,58,76	3
Computer Supporting Collaborative learning (CSCL)	40	1
Augmented reality learning	75	1

2.5. Types of open educational resources

The open educational resources used were divided into 8 axes (table 9): applications of educational tools to support learning (16), learning resources (17), educational games (11), educational programs (10), course management systems and social learning platforms (14), programming applications (2), synchronous and asynchronous communication applications (9), collaborative applications (5). Finally, 3 studies were identified in which no reference to the type of open applications used. The use of Web.2 applications like Lms, Wiki, blog, Google apps, educational games, Edmodo etc. is remarkable.

Table9. Types of open educational resources

Types of open educational resources	Numbered studies according to table 1	Types of open applications
Tools (16)	3	Computer academic achievement tests on-line
	7	Interactive on-line imitation learning tools
	11	Google Docs
	13	GPS
	18	Colab tutor systems
	24	QR code
	28	Evernote
	29	Google Drive
	32	WallCology inquiry tool
	41	Google Power Point, Prezi, Google SketchUp
	43	Mobile learning tool
	52	Google apps for Education, Google Drive
	46	Storytelling Tool
	47	Storytelling Tool
	48	QR code
	53	Google Earth, Google Maps Flight Radar
Learning resources (17)	5	Dream box
	6	E-Book
	15	Web sites

	17	Blog
	19	Kid blog
	21	Web sites
	20	Web sites
	24	Global resources
	26	Blog
	41	Web sites
	49	E-Book
	54	Web sites
	61	Blogs
	66	Electronic content, videos
	72	YouTube
	73	Webpages of ClassDojo
	77	Online reading texts
Educational Programmes (10)	4	Go North! Arctic National Wildlife Refuge 2006 and Go North! Chukotka 2007
	6	Ofekhub.org
	9	Sugar Educational Platform
	30	I Ready, Dream box, Lexia
	37	Reasoning Mind's Genie 3
	39	Lead21
	40	Online Educational Program
	51	Read 180, On – site Reading Recovery
	57	SCOLAm
	71	Qualtrics
Games (11)	14,22,32,38,42,45,55,62,63,69,79	Online pedagogical games
	1	Video Conferencing
	21	Skype
	24	Communication SNS)
	26	Skype
	27	E-mail, Skype
	56	WhatsApp web
	70	Facebook, WhatsApp, Instagram and WeChat
	74	Social media
	78	Various online communicative applications
Programming applications (2)	34	Code.org
	50	Scratch
Collaborative applications (5)	7	Group Scribbles
	11	Wiki
	25	VisciPad
	35	Wiki
	65	Wiki
Learning management systems (Lms) and Social learning network (Sln) (14)	10	Blackboard
	16	Lms (without name)
	18	Moodle, Colab tutor system
	19	Edmodo
	20	Edmodo, Blackboard
	26	Edmodo
	28	Edmodo
	58	Edmodo
	59	Edmodo
	60	Edmodo
	64	Edmodo
	67	Edmodo
	68	Edmodo
It is not mentioned (3)	33,36,76	

2.6. Type of devices

Finally, table 10 shows the types of technological devices used by students during the research. The devices used were desktops in 10, laptops in 10 and handle devices in 23 studies. In 41 studies the type ofdeviceis not mentioned.

Table 10. Type of devices

Type of device	Numbered studies according to table 1	Number of studies
Desktops	3,4,11,21,25,38,39,49,53,74,	10
Laptops	2,9,16,25,27,30,41,51,60,74	10
Handle devices	13,20,23,24,25,28,31,32,38,43,44,45,46,47,48,52,56,57,58,61,74,75,78	23
It's not mentioned	1,5,6,7,8,10,12,14,15,17,18,19,22,26,29,33,34,35,36,37,40,42,50,54,55,59,62,63,64,65,66,67,68,69,70,71,72,73,76,77,79	41

3. Conclusions – Suggestions

After the presentation of the results of the present work and although the number of identified studies for the period 2010-2020 is limited, the following conclusions can be drawn.

On the demographic data

There is a limited number of studies related to the use of open educational resources in Primary School with an average of approximately 7.2 per year from the period 2010-2020. The limited number can be due to many factors such as: limited internet access in many countries, not only in the school but also in the students' houses, the lack of computer literacy of students and teachers and the lack of technological infrastructure in schools, the non-integration of ICT in the curricula either as an individual field of knowledge or as a mixed presence with the courses, etc. However, the above are only conjectures. There is, also, a slight upward trend in relevant studies since 2010, culminating in the middle of the period 2010-2020 and a corresponding gradual decrease in studies from the middle of the period until 2020.The answer to finding the factors that contribute to the limited number of studies related to open educational resources could be given through research. More research could highlight more categories andsubcategories of trends focused in the use of open educational resources in primary school and perhaps fewer research gaps.

Taiwan and Asian countries, in general, are the ones where most research was conducted. It is a fact that the access to the internet of the school units and especially of the students' private spaces is an important factor of carrying out or not research of the subjects that we examine, let alone of the daily application of the open educational resources. On this field, we present the results of the Internet World Stats survey (March 3, 2020) which show that the geographical distribution of Internet users worldwide is as follows: Asia 50.3%, Europe 15.9%, Africa 11.5 %, Latin America 10.1%, North America 7.6%, Middle East 3.9% and

Oceania 0.6%. In addition, the International Monetary Fund ranks Taiwan, South Korea and Singapore in the top 31 developed countries in the world (Wikipedia, 2020).

Students of the two oldergrades participated in the research. It is known that the ICT literacy of the students of the older grades is improved compared to that of the students of the smaller grades due to the accumulated knowledge and experience. Also, in the two oldergrades a larger number of courses are taught, which requires a larger quantitative and qualitative volume of information and skills related to OER. The above reasoning may lead the researchers to select the older primary school grades to conduct their research. However, it should be explored how more research could be conducted in youngergrades as well.

From the exposition of the results in terms of the courses used, it is concluded that the researchers follow the hierarchy of the courses that appear in the curricula of the countries in which the studies were conducted. An exception to the above hierarchy is the IT course, however, it is the course that is fully related to the open educational resources. Mathematics, Sciences, Informatics, National Language, Foreign Languages are the cognitive fields that are most represented in the studies that were analyzed. The field of Citizenship with a smaller appearance follows which is part of the Social Sciences, the Environmental Studies, Geography and the Art and Design. After an investigation on Opensourse.com it seems that there is no learning resource that is not used in the above courses, which facilitates the choices of researchers. However, there is no research focusing on Geography (1 study) and History (no study). But many applications and tools related to Geography and History appear on the internet, such as: Google Earth, Google Map, interactive maps, the National Geographic site, Google Online presentation applications, Prezi, etc. and timeline applications. In addition, there is a lack of research focusing on more than one subject and especially the basic subjects of the Primary School. Specifically, there is a lack of research aimed at results of the use of OER in all the basic subjects of the Primary school. The research then may have had richer findings and possibly more holistic conclusions about the implementation of the use of internet educational resources in Primary School.

On the methodological data

Most studies are quantitative (quasi-experimental, experimental and descriptive), thenthe qualitative studies follow and finally the combined or mixed. The combined use of the qualitative and quantitative approach may be an excellent tactic in a research, because it combines the advantages and covers the weaknesses of each approach and therefore the conditions of validity and reliability of a research are more satisfied (Cohen, Manion & Morrison, 2005 · Creswell & Plano Clark, 2011). The combination according to Cohen, Manion & Morrison (2005) is a technique that many researchers embrace, but few researchers use it. However, mixed surveys are the least common.

In terms of sample size, the researchers tend to select a relatively medium sample of students (from 31-50). A quasi-experimental research to perform, logically requires an experimental group (a grade) and a group, two groups or even three control groups (Robson, 2007 ·

Creswell, J. W., & Plano Clark, 2011). Therefore, the sample number chosen by the researchers is within reasonable limits. On the other hand, the case studies, also, require a small number of samples, but it depends on the goals of the researcher (Robson, 2007).

On the research themes

The majority of researchers are interested in learning outcomes, technology, interaction, engagement, comparison, motivation, teaching/ learning material, teaching model effectiveness and learning style. It was reasonable and legitimate that 47 out of 79 studies focus on learning outcomes with the use of open educational resources. However, from the present review of the themes, few studies focus on the learning quality and validity of OERs, the effectiveness of the teaching models applied using OERs and the suitability of environments on the learning styles. There are, also, a few research questions about motivation, which are, perhaps, the most important keys to achieving not only learning performance, but also student interaction and mood, elements that lead to improved learning quality (Passey et al., 2003). Also,missing elementsare: the evaluation of open learning environments and tools, the difficulties faced by students when using open educational resources, the use of open resources in special education, themes of student safety and trust in open educational resources, attractiveness of open educational resources etc.

On the teaching approach

About half of the researchers tend to apply the Blended Learning which is feasible in Primary School as young students also need the live instructional guidance and they are followed by the researchers who apply E-Learning. However, there are researchers who sporadically use relatively new types of online learning such as: Mobile - Learning, Digital Game Learning, Ubiquitous learning and Situated Learning & Personalized Learning. There is a lack of research that use the model of differentiated teaching. Perhaps in the future researchers will be able to focus their research attention more on the above types of teaching models, but also on new types of teaching models that will be developed in the near future to emerge all aspects that contribute to improving the quality of learning students', as well as the evaluation of the above models.

On the open educational resources

The researchers of the 79 studies used several, varied and interesting types of open educational resources (mainly Web.2) and the students responded very well to the challenges with very good learning outcomes, mainly, in terms of performance. After all, the technology excites and motivates young students. In the present studies, the researchers used Web tools and created their own open educational resources. The advantage of the resources which are created with various Web tools is that their creator (researcher) obviously knows the learning style and capabilities of the sample and therefore he does not need to adapt them as a learning resource whose creator is another one. The learning platforms have been used in several studies, such as the Edmodo's social learning platform which is widely used in primary school and is very useful for students (Tsetsos & Prentzas, 2020). The researchers, also, used

various online certified learning programs from organizations and universities, too. One in 7 researchers and especially those of the last five years (2016-2020) occupied the students with educational games that seem to be very attractive to students. According to researchers who used educational games, for example the studies of Schaaf (2012), Chen et al. (2013), Filsecker & Hickey (2014), Mokhtar, Lehat, Basir & Sokman (2015) and Laine, Nygren, Dirin & Suk (2016), the learning outcomes were extremely encouraging. The educational games may constitute an important open educational resource for supportingPrimary School students’ learning in the future. To the students were, also, offered a variety of learning resources from different sites without, however, (in their vast majority) to show the way and sources of their evaluation. In addition, it is noteworthy that in the present studies there are very few researchers who use open collaborative resources. Also, a variety of learning resources from different sites was offered to the students without (in their vast majority) showing the way and the sources of their evaluation. In addition, it is noteworthy that in the present studies there are very few researchers who use open educational there is no studywhich to use open resources for the students with special needs and studies where their researchers use open educational resources that they are addressed todifferent learning levels. Finally, it is worth mentioning that the present studies show the absence of use of certified government resources.

On the type of technological devices, most researchers seem to consider that the type of device used in their research is not an important element since many types of devices are circulating and used nowadays. In the studies where the devices are mentioned, the handle devices prevail.

Finally, it should be noted once again that the number of studies conducted in the period 2010-2020 related to the support of students' learning through OER is relatively small. This limits the emergence of more trends in research and the drawing of holistic conclusions about the contribution of OER to improving the quality of primary school students' learning.

References

Aljraiwi, S. (2019). Effectiveness of Gamification of Web-Based Learning in Improving Academic Achievement and Creative Thinking among Primary School Students. International Journal of Education and Practice, 7(3), 242-257. Retrieved from https://files.eric.ed.gov/fulltext/EJ1239163.pdf

Anastasiades, P., Philippoussis, G., Karvunis, E., Siakas, S., Tomazinakis, A., Giza, P., & Mastoraki H. (2010). Interactive Videoconferencing for collaborative learning at a distance in the school of 21st century: A case study in elementary schools in Greece. Computers & Education, 54,321-339. https://doi.org/10.1016/j.compedu.2009.08.016

Apergi, A., Anagnostopoulou, A., & Athanasiou, A. (2015). E-Learning for Elementary Students: The Web 2.0 Tool Google Drive as Teaching and Learning Practice. World Journal of Education, 5 (3). Retrieved from https://files.eric.ed.gov/fulltext/EJ1158425.pdf

Astri, T. P. Y., Gunarhadi, G., & Riyadi, R. (2018). Numbered-Board Quiz with TGT to Improve Students' Science Achievement based on Learning Motivation. International Journal of Educational Research Review, 3(4), 68-76. https://doi.org/10.24331/ijere.452982

Atkins, D.E., Brown, J.S. & Hammond, A.L. (2007). A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities. Report to the William and Flora Hewlett Foundation. Retrieved from https://hewlett.org/wp-content/uploads/2016/08/ReviewoftheOERMovement.pdf

Ben-Zadoc, G., Leiba, M., & Nachmias, R. (2010).Comparison of Online Learning Behaviors in School vs. at Home in Terms of Age and Gender Based on Log File Analysis. Interdisciplinary Journal of E-Learning and Learning Objects, 6.Retrieved fromhttp://goo.gl/XruAoW

Camilleri, M. A., & Camilleri, A. C. (2020). The Use of Mobile Learning Technologies in Primary Education. In Cognitive and Affective Perspectives on Immersive Technology in Education (pp. 250-266). IGI Global. https://doi.org/10.4018/978-1-7998-3250-8.ch013

Chen, W., Kit Looi, C., & Tan, S. (2010). What do Students do in a F2F CSCL Classroom? The Optimization of Multiple Communications Modes. Computers & Education, 55, 1159–1170.https://doi.org/10.1016/j.compedu.2010.05.013

Chen, Z., Lu, C., Chou, C., Chen, L., Chiang, C., & Wan, C. (2013). My-investment: using digital games to help children learn financial management. Research and Practice in Technology Enhanced Learning, 8 (2), 277-290. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.593.4002&rep=rep1&type=pdf

Chen, Z., Zhang, Y., Bai, Q., Chen, B., Zhu, Y., & Xiong, Y. (2017, December). A PBL Teaching Model Based on Mobile Devices to Improve Primary School Students' Meta-Cognitive Awareness and Learning Achievement. In 2017 International Conference of Educational Innovation through Technology (EITT) (pp. 81-86). IEEE. https://doi.org/10.1109/EITT.2017.27

Cheng, H. C., Liao, W.W., & Wei, S.Y. (2011). A Web.2 Imitation (Copy a Painting) Learning Project of Art Education via e-Learning in Taiwan. 13th International Conference on Advanced Communication Technology (ICACT), 13-16 February, 2011(pp.1574-1578). Gangwon-Do, South Korea: IEEE. Retrieved from http://icact.org/upload/2011/0333/20110333_finalpaper.pdf

Cohen, L., Manion, L., & Morrison, K. (2005). Research methods in education (5th Edition). Routledge: New York and London.

Coppens, L. C., Hoogerheide, V., Snippe, E. M., Flunger, B., & van Gog, T. (2019). Effects of problem–example and example–problem pairs on gifted and nongifted primary school students' learning. Instructional Science, 47(3), 279-297. Retrieved from https://link.springer.com/article/10.1007/s11251-019-09484-3

Cracraft, L. (2015).Effect of Blending Learning on Student's Percent Increase in Assessment Scores. Research paper, Department of Educational Leadership: University Missouri. Google Scholar. Retrieved from https://www.nwmissouri.edu/library/researchpapers/2015/Cracraft,%20Lyndsey.pdf

Creswell, J. W., & Plano Clark, V. L. (2011).Designing and conducting mixed methods research (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

D' addato, T., & Miller, R.L. (2016). An inquiry into flipped learning in fourth grade math instruction.Canadian Journal of Action Research, 17(2), 33-55. https://doi.org/10.33524/cjar.v17i2.261

Diem, D.C., & Novitasari, R. (2012). Exploring online resources for/with fifth graders to cultivate reading habits and increase English literacy achievement. Basic Research Journal of Education Research and Review, 1(3), 38-4. Retrieved from https://repository.unsri.ac.id/16452/1/Chuzaimah%20and%20Ravi.pdf

Downes, S. (2011). "Open Educational Resources: A Definition." (Weblog comments). Retrieved from https://www.downes.ca/post/57915

Drysdale, S.J., Graham, R. C., Spring, J.K., & Halverson, R. L. (2013). An analysis of research trends in dissertations and theses studying blended learning. Internet and Higher Education, 17, 90-100. https://doi.org/10.1016/j.iheduc.2012.11.003

Educause (2010). 7 things you should know about… educational resources. Retrieved from http://net.educause.edu/ir/library/pdf/ELi7061.pdf

Elo, S., & Kyngas H. (2008).The qualitative content analysis process. Journal of Advanced Nursing 62(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

Erdem, A., Erdem, M., & Pala, F. k (2013). An Example of constructivist blended learning environment for developing language skills. Ankara University, Faculty of Educational Sciences, 46 (1), 365-394. Retrieved fromhttps://goo.gl/Gk3WV6

Fabian, K. (2015). Maths and Mobile Technologies: Student Attitudes and Perceptions. In A. Jefferies & M. Cubric (Eds),14th European Conference on e-Learning, 29-30 October. Hatfield: UK. Retrieved fromhttps://goo.gl/wDdIyw

Fang, R.G., Kuan, H.W., Tsai, H.L., & Lee, C.J. (2010). E-Learning enhances the learning effect for primary School. In S. Chen & Q. Guan (Ed.), Proceedings of the 10th WSEAS international conference on Multimedia systems & signal processing, 11-13 April 2010, pp.84-91.Hangzhou, China: Wseas. Retrieved from https://goo.gl/m9X1VS

Filsecker, M., & Hickey, T. D. (2014). A multilevel Analysis of the Effects of External Rewards on Elementary Students' Motivation, Engagement and Learning in an Educational Game. Computers & Education,75, 136–148.https://doi.org/10.1016/j.compedu.2014.02.008

Fong, C., Cober, R., Messina, R., Moher, T., Murray, J., Peebles, B., & Slotta, J. (2015). The 3R Orchestration Cycle: Fostering Inquiry Discourse in a CSCL Classroom. In E. Mercier (Eds), Researching and Designing for the Orchestration of Learning in the CSCL Classroom, Symposium conducted at the 11th International Conference on Computer Supported Collaborative Learning (CSCL),7-11 June. Gothenburg: Sweden. Retrieved from https://goo.gl/vVeKtF

Heredia, Y., & Icaza, J. I. (2012). Technology-Based Participatory Learning for Indigenous Children in Chiapas Schools, Mexico. Journal of Information Technology Education: Innovations in Practice, 11, 251-270. Retrieved from http://www.jite.org/documents/Vol11/JITEv11IIPp251-270Heredia1118.pdf

Hew, F.K., & Cheung, S.W. (2012).Citizenship Education via an Online Peer Discussion Blended Learning Approach: Lessons Learned. Research Paper, National Institute of Education, Singapore.https://doi.org/10.1007/978-3-642-31398-1_14

Hewlett Foundation (2013, November). White Paper: Open Educational Resources. Breaking the lockbox of Education. Retrieved fromhttp://goo.gl/y0ZX2P

Hong Kim, S. Hun Park, N., & Hong Joo, k. (2014). Effects of Flipped Classroom based on Smart Learning on Self-directed and Collaborative Learning.International Journal of Control and Automation 7, (12), 69-80. http://dx.doi.org/10.14257/ijca.2014.7.12.07

Huang, C. S. J., Yang, S. J. H., Chiang, T. H. C., & Su, A. Y. S. (2016). Effects of Situated Mobile Learning Approach on Learning Motivation and Performance of EFL Students. Educational Technology & Society, 19 (1), 263–276.Retrieved from https://pdfs.semanticscholar.org/909a/4727e82c3a9963750065f4572ffc7d7ecc8d.pdf

Hung, M.C., Hwang, J.G., & Wang, Y.S. (2014).Effects of an integrated mind-mapping and problem posing approach on students' in-field mobile learning performance in a

natural science course. Int. J. Mobile Learning and Organisation,8, 187-200. https://doi.org/10.1504/IJMLO.2014.067019

Hwa, S. P. (2018). Pedagogical change in mathematics learning: Harnessing the power of digital game-based learning. Journal of Educational Technology & Society, 21(4), 259-276.

Hwang, R. H., Lin, H. T., Sun, J. C. Y., & Wu, J. J. (2019). Improving learning achievement in science education for elementary school students via blended learning. International Journal of Online Pedagogy and Course Design (IJOPCD), 9(2), 44-62. https://doi.org/10.1504/IJMLO.2014.06701910.4018/IJOPCD.2019040104

Inbal, S.T., & Blau, I. (2016). Developing Digital Wisdom by Students and Teachers: The Impact of Integrating Tablet Computers on Learning and Pedagogy in an Elementary School. Journal of Educational Computing Research, 0(0), 1-30. https://doi.org/10.1177/0735633116649375

Ismail, R., Ibrahim, R., &Yaacob, S. (2019). student’s habits and preferences in digital game: a case of designing an educational game for primary schools’ student. Jurnal Kemanusiaan, 17(1-S). Retrieved from https://jurnalkemanusiaan.utm.my/index.php/kemanusiaan/article/viewFile/326/263

Jafarkhani, F., Jamebozorg, Z., & Brahman, M. (2017). Application of Social Networks to Support Students' Language Learning Skills in a Blended Approach. World Family Medicine Journal: Incorporating the Middle East Journal of Family Medicine, 99(5480), 1-7. Retrieved from https://pdfs.semanticscholar.org/9cca/a7c1fe043e84fd83b6bc7ee543a4f650b5f1.pdf

Jagušt, T., Boticki, I., Mornar, V., & So, H. J. (2017, July). Gamified digital math lessons for lower primary school students. In 2017 6th IIAI International Congress on Advanced Applied Informatics (IIAI-AAI) (pp. 691-694). IEEE. Retrieved from https://bib.irb.hr/datoteka/888977.Jagust_Boticki_Mornar_So_-_Gamified.pdf

Jani, M. (2005). Notes for the course "Social science research methodology". National Kapodistrian University of Athens, Department of Primary Education.

Jena, S. (2012). Open Educational Recourses for empowerment of Open Schools. In Regional Symposium on OER: An Asian Perspective on Policy and Practice, 19-21 September. Retrieved from https://goo.gl/woSxqt

Johnstone, S. (2005). Open Educational Resources Serve the World. 2005. Educause Review. Retrieved from https://er.educause.edu/articles/2005/1/open-educational-resources-serve-the-world

Joo, k. H, & Park, N. P. (2015). E-PBL Model Development for Computer Learning System. International Journal of Multimedia and Ubiquitous Engineering, 10 (3), 323-332.Retrieved fromhttps://goo.gl/ll2Ak4

Kalelioglu, F. (2015). A new way of teaching programming skills to K-12 students: Code.org.Computers in Human Behavior, 52,200–210. https://doi.org/10.1016/j.chb.2015.05.047

Kim, H.S., Park, N.H., & Joo, K.H. (2014). Effects of Flipped Classroom based on smart Learning on Self-directed and Collaborative Learning. International Journal Of Control and Automation, 7(12), 69-80. Retrieved fromhttps://goo.gl/n5utXI

Kokkinaki, A. (2015). Collaboration between Primary Students and the Use of an Online Learning Environment: The Previous Collaborative Work Experiences Factor.Conference Proceedings Ascilite 2015, Australasian Society for Computers in Learning and Tertiary Education Curtin University, 30 November-3 December. Perth: Australia. Retrieved from http://goo.gl/5cFyz0

Komis, B.I. (2004). Introduction to educational applications of information and communication technologies. Athens: New Technologies Publications.

Kostis, N., & Tzimogiannis, A. (2008). The internet as a means of communication and learning. The example of SEP networks in educational units of N. Dodecanese. In Ch. Angelis & N. Valanidis (eds.), Proceedings of the 6th Panhellenic Conference with International Participation "Information and Communication Technologies in Education", Volume II, 303-310, Cyprus. Retrieved from https://goo.gl/lxtpsH

Kumpulainen, K., & Mikkola, A. (2014). Researching learning across space and time in extended learning Environments. In M. Kuuskopri (Eds), Perspectives from Finland – Towards new Learning Environments. Finish National Board of Education. Google Scholar. Ανακτήθηκε 27 Ιουλίου, 2016 απόhttp://goo.gl/iyUi4c

Lai, L.C., & Hwang, J.G. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course.Computers & Education, 100, 126-140. https://doi.org/10.1016/j.compedu.2016.05.006

Laine, T., Nygren, E., Dirin, A., & Suk, G.H. (2016). Science Spots AR: a platform for science learning games with augmented reality.Educational Technology Research and Development, 64(3), 507-531. https://doi.org/10.1007/s11423-015-9419-0

Li, X., & Chu, S. K. (2018). Using design-based research methodology to develop a pedagogy for teaching and learning of Chinese writing with wiki among Chinese upper primary school students. Computers & Education, 126, 359-375. https://doi.org/10.1016/j.compedu.2018.06.009

Li, X., Chu, S.K.W., Ki, W.W., & Woo, M. (2012). Using a wiki-based collaborative process writing pedagogy to facilitate collaborative writing among Chinese primary school students.Australasian Journal of Educational Technology, 28(1), 159-181. https://doi.org/10.14742/ajet.889

Liu, C. C., Lu, K. H., Wu, L. Y., & Tsai, C. C. (2016). The Impact of Peer Review on Creative Self-efficacy and Learning Performance in Web 2.0 Learning Activities.

Educational Technology & Society, 19 (2), 286–297. Retrieved from http://www.jstor.org/stable/jeductechsoci.19.2.286

Liu, C.C., Wang, C.P., & Tai, D.J.S (2016).An analysis of student engagement patterns in language learning facilitated by Web 2.0 technologies.ReCall, 1-19.https://doi.org/10.1017/S095834401600001X

Llovet, S.J., Pons, O.S.E., Garcia, G.L., Fernandez, P.A.M., Morera, A.X., & Bosh, M.A. (2015). Project of flipped classroom's incorporation: an experience between primary schools and university.Faculty of psychology, education and sport sciences. Ramon Llull University: Spain.Retrieved from http://goo.gl/UN1FSI

Loizou, M., & Lee, K. (2020). A flipped classroom model for inquiry-based learning in primary education context. Research in Learning Technology, 28. https://doi.org/10.25304/rlt.v28.2287

Lou, G.C., Kao, C.M., Yen, L.H., & Shih, C.R. (2013). Effects of applying blogs to assist life education instruction for elementary school students. The Turkish Online Journal of Educational Technology, 12(4). Retrieved from https://goo.gl/az8OS2

Marincovic, R., & Tomas, S. (2013). Instructional Design in E-learning for Primary Education.Scientific and Academic publishing, 3(3), 185-195. https://doi.org/10.5923/j.edu.20130303.07

Morgan, L. (2013). Enhancing Learning in the Primary School through. In proceedings at International Conference on Information Communication Technologies in Education, 4-6 July 2013 (pp. 385-384). Crete: Greece

Mulqueeny, K., Mingle, L., Kostyuk, V., Baker, R., & Ocumpaugh, J. (2015). Improving Engagement in an E-Learning Environment. Incorporating Effective e-Learning Principles to Improve Student Engagement in Middle-School Mathematics. International Journal of STEM Education, 2 (15). https://doi.org/10.1007/978-3-319-19773-9_103

Nurahman, N. I., Isnaeni, W., & Ellianawati, E. (2019). Analysis of Communication Skills and Empathy of Fifth-Grade Students of Elementary Schools through ICT-based Learning. Journal of Primary Education, 8(6), 321-327. Retrieved from https://journal.unnes.ac.id/sju/index.php/jpe/article/view/33227

Oluk, A., & Korkmaz, Ö. (2016). Comparing Students' Scratch Skills with Their Computational Thinking Skills in Terms of Different Variables. Online Submission, 8(11), 1-7. https://doi.org/10.5815/ijmecs.2016.11.01

Onguko, B.B. (2014). Will our children learn? Learning environments, teachers and teaching approaches should matter to their learning.10th Annual International Conference. Retrieved fromhttps://goo.gl/FtdTTf

Papadimitriou S., Lionarakis A., Theologou, & Leontidou L. (2013). Developing the support mechanism of the teachers-advisors of the Thematic Unit "Geography, Human

Geography and Material Culture of Europe" of EAP. In A. Lionarakis (Ed.), 7th Conference on Open and Distance Education "Learning Methodologies", 8-10 November 2013 (pp.119-142). Athens: Hellenic Network of Open & Distance Education. Retrieved from https://goo.gl/8jpMie

Passey, D., Roger C., Machell, J., McHugh, G., & Allaway D. (2003). Research Paper.The Motivational Effect of ICT on Pupils. Department of Educational Research Lancaster University. Retrieved fromhttp://goo.gl/YV8byi

Perez, M. D. M., Duque, A. G., & Garca, L. F. (2018). Game-based learning: Increasing the logical-mathematical, naturalistic, and linguistic learning levels of primary school students. Journal of New Approaches in Educational Research (NAER Journal), 7(1), 31-39.https://doi.org/10.7821/naer.2018.1.248

Ribeiro, V., Azevedo, L., & Osório, A. (2017). Teaching and learning with geotechnologies on primary education: Students’ perceptions. EAI Endorsed Transactions on e-Learning 17 (16): e4. Retrieved from http://repositorio.esepf.pt/bitstream/20.500.11796/2586/1/eai.19-12-2017.154461%20%281%29.pdf

Robson, C. (2007).Real World Research: a tool for social scientists and professional researchers. Athens: Gutenberg.

Rombot, O., Boeriswati, E., & Suparman, M. A. (2020). Improving Reading Comprehension Skills of International Elementary School Students through Blended Learning. Al Ibtida: Jurnal Pendidikan Guru MI, 7(1), 56-68. Retrieved from http://www.syekhnurjati.ac.id/jurnal/index.php/ibtida/article/view/6045/2983

Rossini, C. (2011). Comment in “OER definition = open IP + open formats.” Open Educational Resources – An Online Discussion Forum (13 July 2011). Retrieved fromhttps://goo.gl/AfJVAG

Rou, L. Y., Yunus, M. M., & Sulimanc, A. (2019). The Influence of Social Media on Spelling Skills among Primary School Students.International Journal of Innovation, Creativity and Change, 7(6). Retrieved from https://www.ijicc.net/images/vol7iss6/7619_Rou_2019_E_R.pdf

Sáez-López, J. M. S. L., Sevillano-García, M. L. S. G., Pascual-Sevillano, M. Á. P. S., Sáez-López, J. M., Sevillano-García-García, M. L., & de los Ángeles Pascual-Sevillano, M. (2019). Application of the ubiquitous game with augmented reality in Primary Education. Comunicar. Media Education Research Journal, 27(2). Retrieved from https://www.scipedia.com/public/Saez-Lopez_et_al_2019a

Sarafidou, O-G. (2011). Articulation of Qualitative and Quantitative approaches. Empirical Research. Athens: Gutenberg.

Schaaf, R. (2012).Does digital game-based learning improve student time-on-task behavior and engagement in comparison to alternative instructional strategies?Canadian Journal of Action Research, 13, (1), 50-64.https://doi.org/10.33524/cjar.v13i1.30

Schechter, R., Macaruso, P., Kazakoff, E., & Brooke, E. (2015). Exploration of a Blended Learning Approach to Reading Instruction for Low SES Students in Early Elementary Grades. Computers in the Schools, 32(3-4), 183-200. https://doi.org/10.1080/07380569.2015

Sclater, N. (2010). 'Open Educational Resources: Motivations, Logistics and Sustainability'. In Ferrer, N. F. & Alonso, J. M. (Eds) Content Management for E-Learning. New York: Springer.

Shaffert, S. (2010). Strategic integration of Open Educational Resources in Higher Education. Objectives, Case Studies, and the impact of Web 2.0 on Universities. Changing Cultures in Higher Education-Moving Ahead to Future Learning (pp. 119-132). Heidelberg: Springer.

Shih, C.W., Tseng, S.S., Yang, C.C., Lin, Y.C & Liang, T. (2012).A Folksonomy-based Guidance Mechanism for Context-aware Ubiquitous Learning: A Case Study of Chinese Scenic Poetry Appreciation Activities. Educational Technology & Society, 15 (1), 90–101. Retrieved from https://www.jstor.org/stable/pdf/jeductechsoci.15.1.90.pdf

Smith, M. S., & Casserly, C. M. (2006). The Promise of Open Educational Resources. Change: The Magazine of Higher Learning, 38 (5), 8-17.

Spanaka A., & Kameas, A. (2013). How open can Open Education Resources (GNP) be? Examples of application and utilization 7th International Conference in Open and Distance Learning (ICODL 2013), 7-8 November, Athens.

Stacey, P. (2007). Open Educational Resources in a Global Context. First Monday, 12 (4).

Sung, H.Y., Hwang, G.Y., & Chang, Y.C. (2016). Development of mobile Learning system based a collaborative problem-posing strategy. Interactive Learning Environments, 24 (3), 456-471. https://doi.org/10.1080/10494820.2013.867889

Symons, D., & Pierce, R. (2015). Mathematical Language Development and Talk Types in Computer Supported Collaborative Learning Environments. Mathematics Education Research Group of Australasia. Retrieved from https://files.eric.ed.gov/fulltext/ED572524.pdf

Thibaut, P., Curwood, S.J., Carvalho, L., & Simpson, A. (2015). Moving across physical and online spaces: a case study in a blended primary classroom. Learning, Media and Technology, 40 (4), 458-479.https://doi.org/10.1080/17439884.2014.959971

Tsetsos, S., & Prentzas, J. (2020). A Survey on Recent Learning Approaches in School Education Using Edmodo. In Open Educational Resources (OER) Pedagogy and Practices (pp. 91-111). IGI Global.https://doi.org/10.4018/978-1-7998-3476-2.ch014

Tsoulis, M., Tsolakidis, C., & Mitkas. K. (2013). Interactive Collaborative Learning (ICL), 2013 International Conference on, 577-582, Kazan. https://doi.org/10.1109/ICL.2013.6644658

U-Lan, V. P. (2015). Teaching English with Augmented Reality Technology: Evaluative Feedback of Elementary School Students. International Conference on e-Commerce, e-Administration, e-Society, e-Education, and e-Technology, 1-3 April, Kuala Lumpur, Malaysia. Retrieved from http://goo.gl/KNTEIC

UNESCO (1996). Report of the International Commission on Education in the 210th Century, chaired by Jacques Delors, Education: The Treasure Behind It. Paris: UNESCO: UNESCO.

UNESCO (2015). A Basic Guide to Open Educational Resources (OER). Paris: UNESCO. Retrieved from https://goo.gl/o3Gm7t

UNESCO (2019). New UNESCO recommendation on Open Educational Resources. Retrieved from https://en.unesco.org/news/new-unesco-recommendation-will-promote- access-educational-resources-all

Veletsianos, G. & Doering, A. (2010). Long-term student experiences in a hybrid, open-ended and problem-based Adventure Learning program. Australasian Journal of Educational Technology, 26(2), 280-296. Google Scholar. https://doi.org/10.14742/ajet.1096

Videnovik, M., & Dimova, G. (2018). Can a Blended Learning Environment Increase the Quality of Learning? In N. Ilievska (Ed.), 15th International Conference on Informatics and Information Technologies, CIIT 2018At, 20-22 April 2018. Mavrovo: Macedonia. Retrieved from https://www.researchgate.net/profile/Maja_Videnovik2/publication/327871500_Can_a_Blended_Learning_Environment_Increase_the_Quality_of_Learning/links/5baa8d8692851ca9ed25d7dc/Can-a-Blended-Learning-Environment-Increase-the-Quality-of-Learning.pdf

Wang, H., & Woodworth, K. (2011). Evaluation of Rocketship Education's use of DreamBox Learning's online mathematics program. Center for Education Policy. Retrieved from http://go.dreambox.com/rs/715-ORW-647/images/ef-2011-08-SRI_Rocketship_Evaluation.pdf

Yaghmour, S. K. (2016). Effectiveness of Blended Teaching Strategy on the Achievement of Third Grade Students in Mathematics.Journal of Education and Practice, 7(5). Retrieved fromhttps://goo.gl/chS8XP

Yunus, M. M., Zakaria, S., & Suliman, A. (2019). The Potential Use of Social Media on Malaysian Primary Students to Improve Writing. International Journal of Education and Practice, 7(4), 450-458. Retrieved from https://files.eric.ed.gov/fulltext/EJ1239155.pdf

Zadok, B.G., Leiba, M., & Nachmias, R. (2010). Comparison of Online Learning Behaviors in School on Log File Analysis. Interdisciplinary Journal of E-Learning and Learning Objects,6. Retrieved from https://goo.gl/GPz8D6

Zafarghandi, S. M. (2018). The Effect of Flip Learning on Students' Self-Efficacy and Academic Achievement. Organization for Educational Research and Planning (OERP). Tehran. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3154001