Final work- Virtual learning application in medical education

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Abstract

Virtual reality; medical education;

STATEMENT OF THE TOPIC

According to the research field of the author, the term "virtual learning environment" refers to "a Web-based platform for the digital aspects of courses of study, usually within educational institutions." They present resources, activities, and interactions within a course structure and provide for the different stages of assessment. Under this dialogue, didactic education in today's medical filed emerges innovation and making great achievements in innovative education. Based on these situations, the author defines ***"virtual learning environment"*** and ***"Medical education"*** as the main keywords.

"virtual learning environment" could also be addressed as "VLE".

"Medical education" could also be addressed as "Medical learning", "Medical teaching" or "medical didactic".

DATABASE SEARCH- KEYWORDS

The author searched the individual keywords in four databases:

According to the sample size and paper relevance, the author choose "virtual learning environment" and "medical education" to fullfill the search for next step:

As the resluts was not so abundant, the author also try to simplify " virtual learning environment" as ***"virtual learning"***, and tried again with ***"medical eudcation"***. The author defined some **sub-keywords** under the keyword "Virtual learning" such as: "virtual reality", "augmented reality" ,"mixed Reality". *Abbreviations(VR, AR, MR) for these terms are ambiguous in the search, therefore not considered.*

The author found that with sub-keywords "virtual reality", the amount of texts is richer, and the relevance of the papers is also high. So the author define the keywords for this research as: ***"virtual reality"*** and ***"medical education"***. According to the visual map from Wos, now the results seems more reliable. Since the concept of VR technics rely on the development of technology, the numbers of research was widely growing since 1993.

KEYWORDS	DATABASE			
	WEB OF SCIENCE	SCOPUS	SEMANTIC SCHOLAR	GOOGLE SCHOLAR
#1_"virtual learning environment"	12,579	17,360	322,000	3,020,000
#2_"VLE"	4,421	5,631	13,500	94,400
#3_"Medical education"	94,009	472,925	1,410,000	3,760,000
#4_"Medical teaching "	35,526	99,978	454,000	3,470,000
#5_"Medical learning"	43,201	89,699	808,000	430,000
#6_"medical didactic"	2,128	4,400	39,400	205,000

Figure 1: individual keywords

KEYWORDS	DATABASE			
	WEB OF SCIENCE	SCOPUS	SEMANTIC SCHOLAR	GOOGLE SCHOLAR
#1_"virtual learning environment" AND "Medical education"	34	75	762	3,480

Figure 2: choosen keywords

KEYWORDS	DATABASE			
	WEB OF SCIENCE	SCOPUS	SEMANTIC SCHOLAR	GOOGLE SCHOLAR
#1_"virtual learning" AND "Medical education"	73	114	1,100	7,500
#2_"virtual reality" AND "Medical education"	538	1,965	17,900	20,600
#3_"augmented reality" AND "Medical education"	64	135	875	5,120
#4_"mixed Reality" AND "Medical education"	13	29	247	1,470

Figure 3: redefine keywords

The State-of -the-Art

RELATED PROJECTS

According to the research within four websites, the author found out the main research areas rely on the topic was: **EDUCATION EDUCATIONAL RESEARCH; COMPUTER SCIENCE; HEALTH CARE SCIENCES SERVICES; GENERAL INTERNAL MEDICINE; MEDICAL INFORMATICS.**

The author also found a large number of Europen projects that may contribute to this problem, under the keywords "virtual learning" and "medical education", in total **37** programmes and projects (exclude "Results

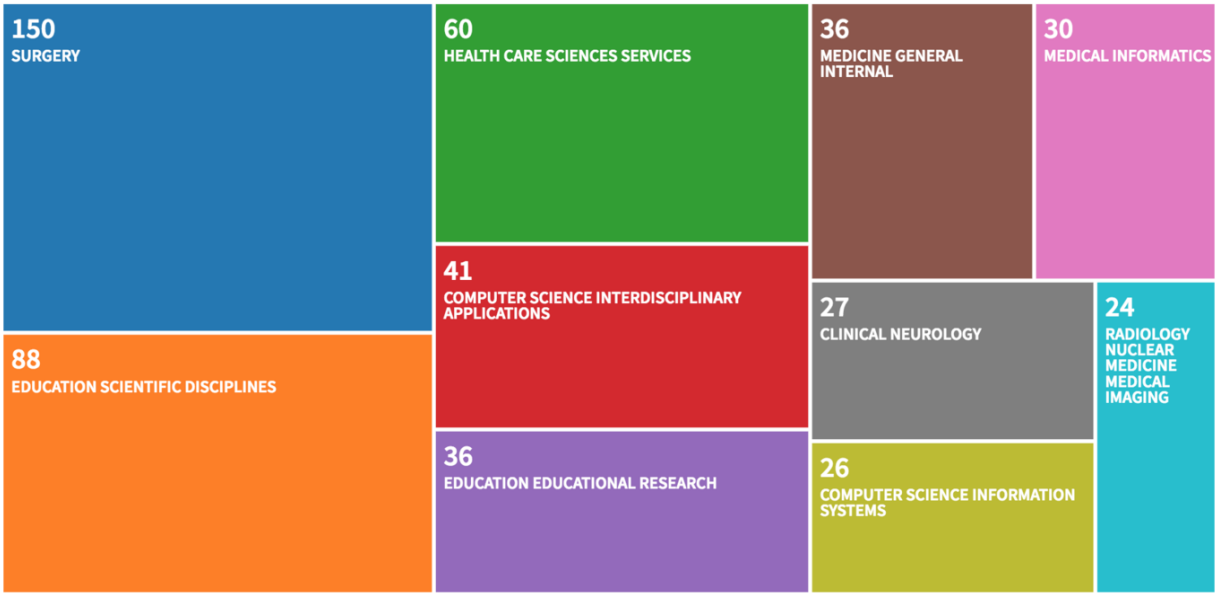

Figure 4: Map_ web of science

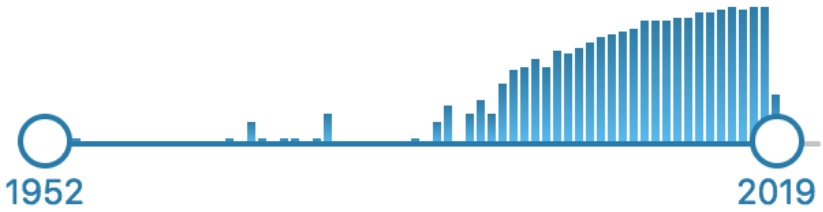

Figure 5: Timeline_ Semantic schalor

Packs").

Ongoing/ just-ended examples :

1. https://cordis.europa.eu/project/rcn/205964/factsheet/en

2.https://cordis.europa.eu/project/rcn/71410/factsheet/en

3.https://cordis.europa.eu/project/rcn/196899/brief/en

4.https://cordis.europa.eu/project/rcn/64696/factsheet/en

5.https://cordis.europa.eu/project/rcn/60866/factsheet/en

BIBLIOMETRIC ANALYSIS

BIBLIOSHINY

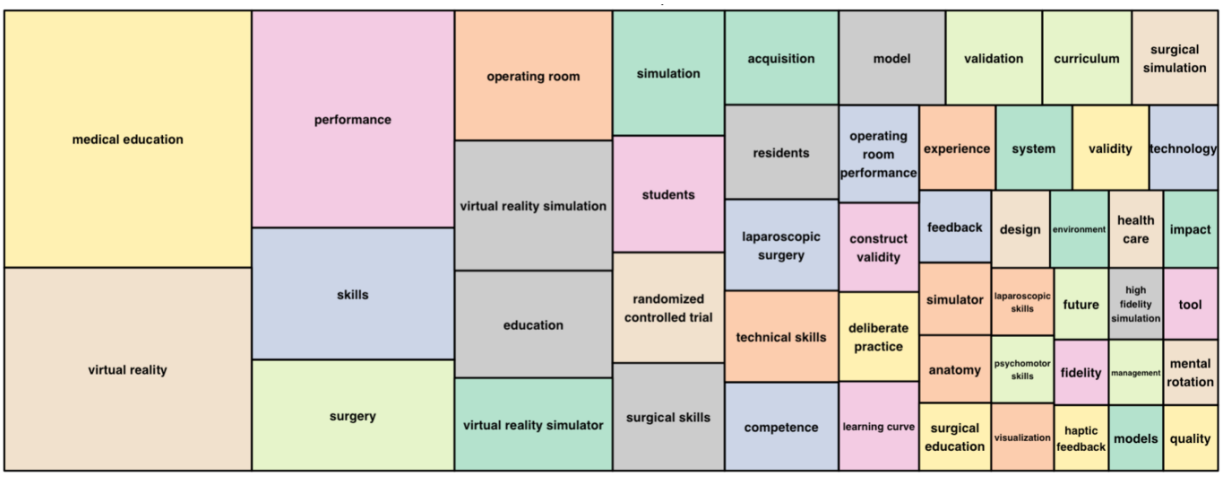

Figure 6: Word Treemap

Figure 7: Wordcloud

In 2017, the scientific production reachs a peak.

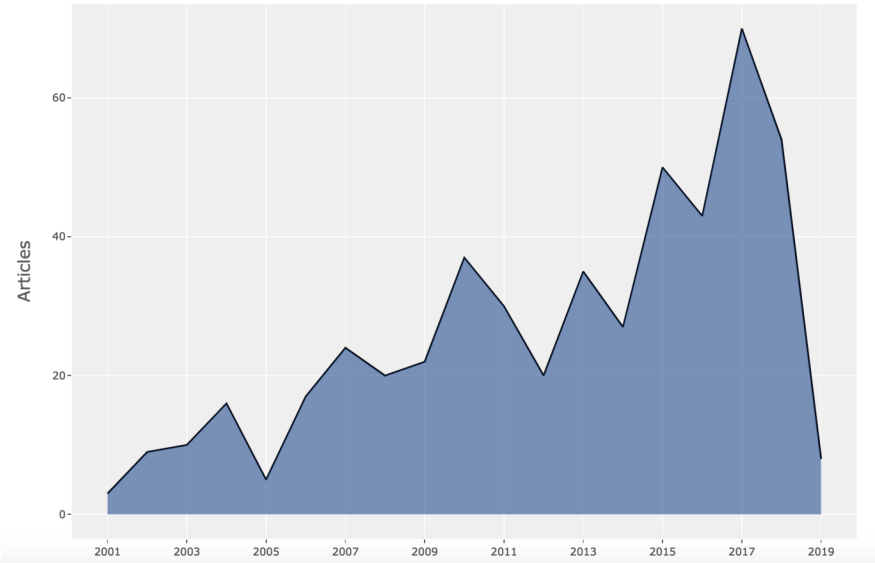

Figure 8: Annual scientific production

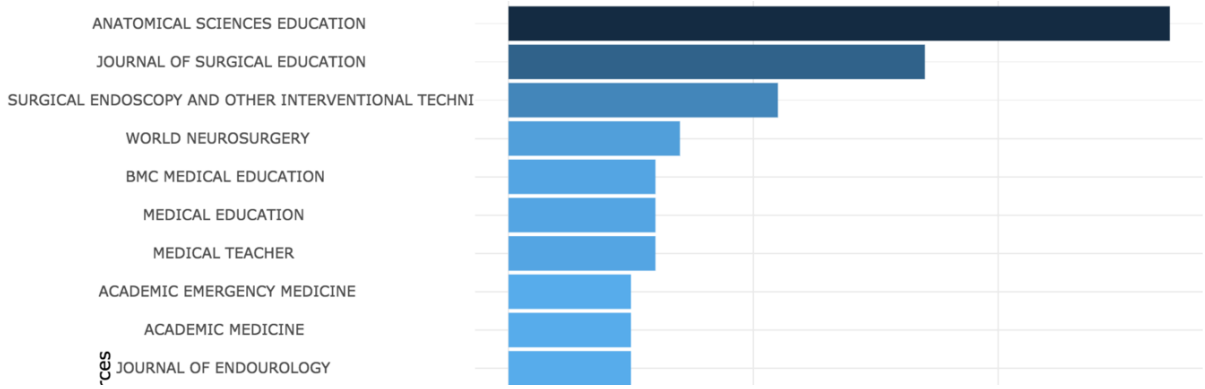

Figure 9: Most relavent sourses_ top ten

MOST RELATED PAPERS_updated

1. Vozenilek, J., Huff, J. S., Reznek, M., & Gordon, J. A. (2004). See one, do one, teach one: advanced technology in medical education. *Academic Emergency Medicine*, *11*(11), 1149-1154.

2. Liu, A., Tendick, F., Cleary, K., & Kaufmann, C. (2003). A survey of surgical simulation: applications, technology, and education. *Presence: Teleoperators & virtual environments*, *12*(6), 599-614.

3. Tavakol, M., Mohagheghi, M. A., & Dennick, R. (2008). Assessing the skills of surgical residents using simulation. *Journal of surgical education*, *65*(2), 77-83.

4. Huang, H. M., Rauch, U., & Liaw, S. S. (2010). Investigating learners' attitudes toward virtual reality learning environments: Based on a constructivist approach. *Computers & Education*, *55*(3), 1171-1182.

5. Ward, J. P., Gordon, J., Field, M. J., & Lehmann, H. P. (2001). Communication and information technology in medical education. *The Lancet*, *357*(9258), 792-796.

6. Satava, R. M. (2001). Accomplishments and challenges of surgical simulation. *Surgical endoscopy*, *15*(3),

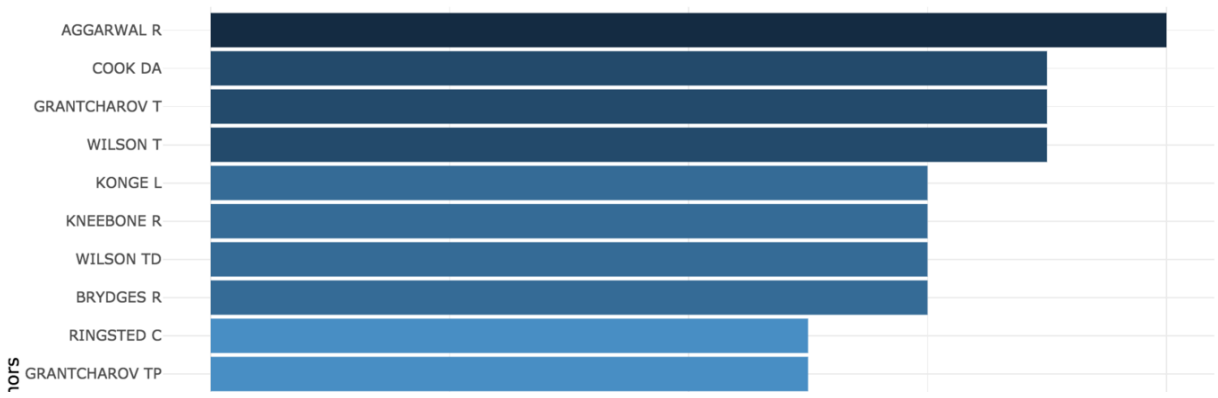

Figure 10: Author impact_ top ten

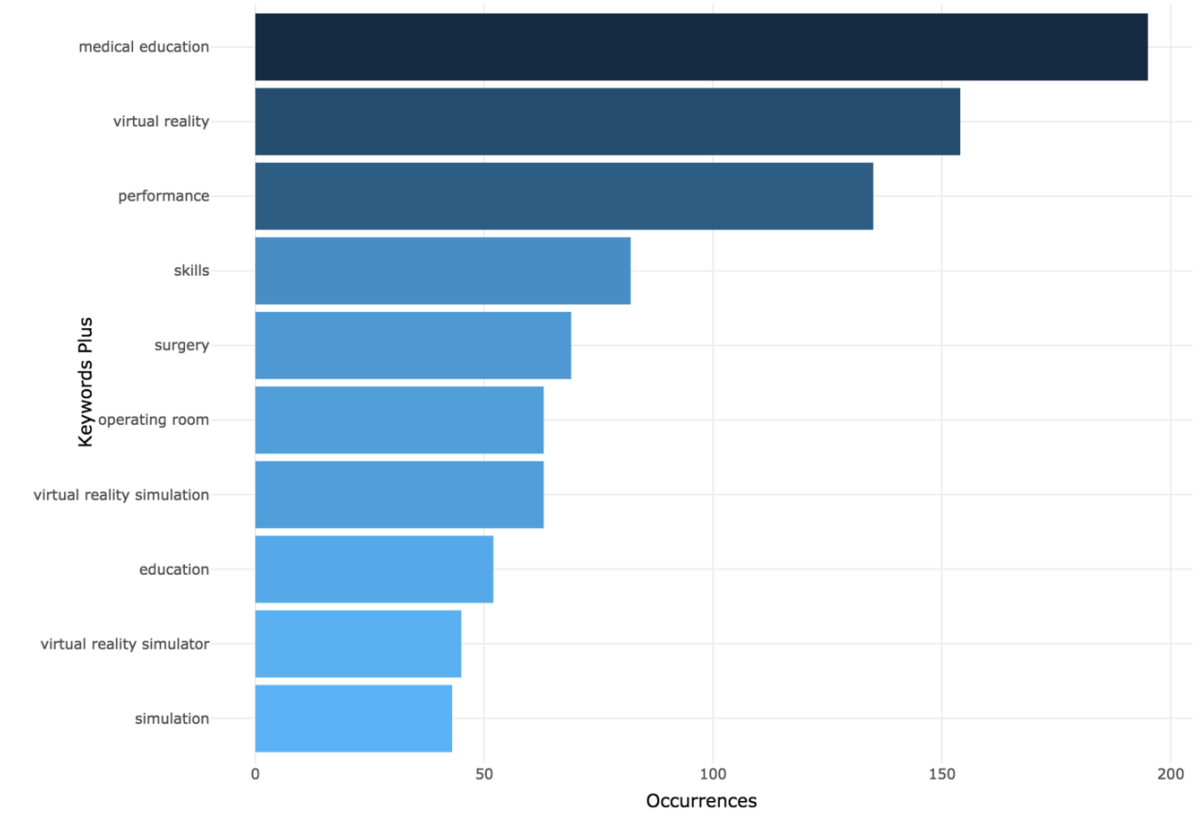

Figure 11: Most relatived keywords

232-241.

7. Engum, S. A., Jeffries, P., & Fisher, L. (2003). Intravenous catheter training system: computer-based education versus traditional learning methods. *The American journal of surgery*, *186*(1), 67-74.

8. Wulf, G., Shea, C., & Lewthwaite, R. (2010). Motor skill learning and performance: a review of influential factors. *Medical education*, *44*(1), 75-84.

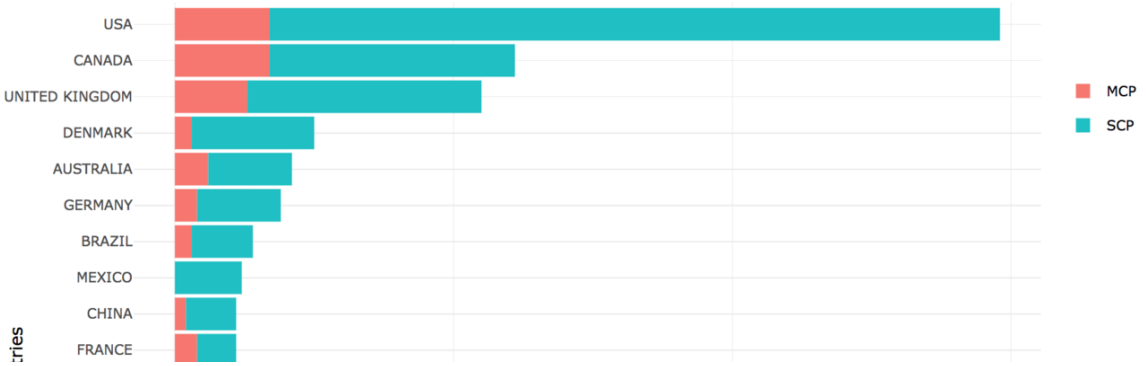

Figure 12: Correspounding authors' country

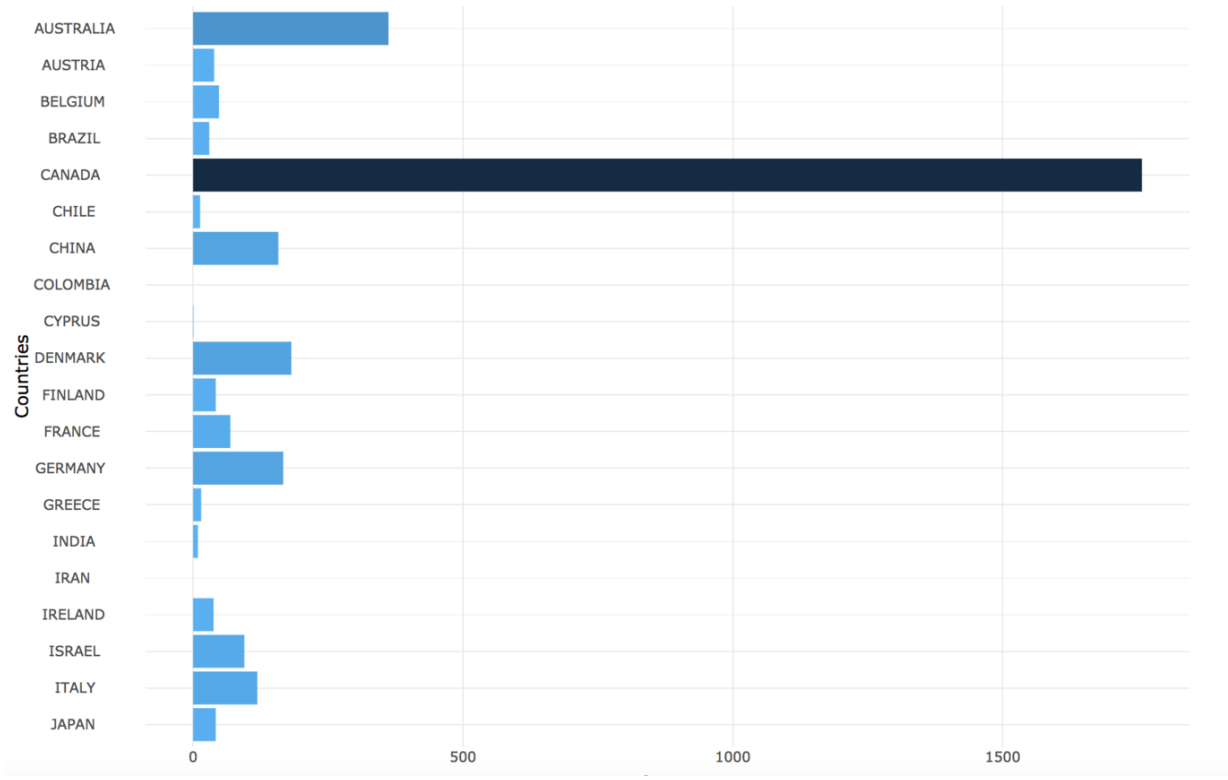

Figure 13: Most cited countries

9. John, N. W. (2007). The impact of Web3D technologies on medical education and training. *Computers & Education*, *49*(1), 19-31.

10. Lu, J., Pan, Z., Lin, H., Zhang, M., & Shi, J. (2005). Virtual learning environment for medical education based on VRML and VTK. *Computers & Graphics*, *29*(2), 283-288.