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A Literary Review on Personalized MOOC Design

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Abstract. When the new coronavirus continues to spread around the world, Online Courses have shifted education from real-life to the virtual world as a matter of expediency. This literature review will describe the developmental history and existing problems of MOOC and personalized learning, to make better MOOC design to catering the various learning needs.

Keywords: component; formatting; style; styling; insert

1. Introduction

1.1 Great Crisis Create Challenge on Personalized MOOC

At the beginning of 2020, affected by the pneumonia outbreak caused by COVID-19, the Ministry of Education of China (2020) advocated "stop going to school without stopping learning. “Enterprises and schools launched online classroom learning on a large scale. The expectation of using MOOCs as an educational learning model raised rapidly.

1.2 Rapid online learning popularization in COVID-19 Period

As of May 11, The Ministry of People’s Republic of China reported the number of visits to the national primary and secondary school network cloud platform had reached 2.073 billion and the number of visitors had reached 1.711 billion. China Education Television's air classroom ratings also soared, ranking in the top 10 of national satellite TV's attention (Ministry of education of People’s Republic of China, 2020. It can be seen from this phenomenon that the development of China's education needs to be transformed from offline to online formats, from large-scale to a personalized scale, and from knowledge-centred to learner-cantered. Chen et al. (2016) noted that the online education model brings new possibilities for the practice of personalized learning, it's free and allows learning activities which are more mobile, flexible, and diverse. On the one hand, these changes pose a greater challenge to traditional research on personalized learning. On the other hand, with the expansion of these types of individual learning activities, learners also put forward new demands for the personalized services they can provide.

1.3 The Big Space of Data drug for Personalized MOOC

With the application of information technology and products, a large amount of learning data is collected on students when they use these various learning systems. For example, MOOC platforms record the activities and behaviours of university students in learning subject courses. The online learning system and electronic terminal keep the learning records of knowledge points and exercises. Besides, the popularity of e-reading technology has also made available a large number of offline learning resources. Therefore, how to use these learning data to sort out valuable information and to reveal the natural law of educational learning, develop and practice personalized learning, and provide learners with customized learning content and methods has become one of the important research issues supporting the development of technology-related education (Liu et al., 2018).

2. The Research area and hotspot of personalized learning

This paper searched the database on the Web of Science Core Collection (WoSCC) in Nov.18th 2020 by using them searching of “Personalized learning” (from 1985-2020) and found a result of

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4814 articles. Figure1. was made in the searching tree metrics in WoSCC, it shows that personalized learning was most discussed in computer science (1623 articles founded), it also draws lots of attention in the area of education educational research with 838 articles funded.

2.1 MOOC design included as a hotspot of Personalized Learning in Education (2010-2020)

To find out the research hotspot of personalized learning in education, 838 articles were searched from Web of Science in the area of education educational research were selected as document type on Nov.18th 2020. secondly, the search records were arranged by times cited from the highest to the lowest. Finally, the records were exported first as a data source.

Citespace 5.6.R5 was utilized to carry out the visualized analysis on the data. Several Citespace options were selected in co-citation analysis, which includes the time range (2010–2020), years per slice (1 year). Finally, 335 nods and 971 links of the reference form the 838 articles were founded. In this study, co-citation network mapping (Fig.2) and co-citation timeline-view mapping (Fig.3) of the papers published in the WoSCC in the past 10 years have been conducted according to a comprehensive analysis of 838 articles.

From the parameter area at the upper left corner of the obtained network, we can see that the network modularity value Q=0.8089. The modularity value is the evaluation index that reflects the degree of network modularization. The value of modularity is between 0 and 1. A greater value indicates better modularity of clustering network (Emmons,2016). Meanwhile, the Silhouette value is S=0.3611. The Silhouette value is an index that measures network homogeneity, which is between−1and 1. A larger Silhouette value indicates a clearer theme for each cluster (Sheng,2015). A cluster of the co-reference with the title term was made and the top 5 labels were shown by using the LSI algorithm in Figure 2. Choose the fulfil the border to show the cluster border. Finally choose the timeline view in the control panel to get Figure 3 to find out the research trend by detecting the transfer of hotspot with the time research (Li,2015).

Figure 2 shows the Top 5 reference co-citation cluster form the 838 article's reference, which shows the research hotspot of personalized learning. The 5 hotspots are natural science courses, computer programming, MOOC design, learning and engagement. From the border, we can find the border of MOOC design overlaps with learning, engagement and computer programming which indicate the close relationship with those areas.

2.2 The Transfer of the Research hotspot: From computer programming to the MOOCs design and learning

The Research hotspot trend was shown on Timeline mapping (Figure 3). The darker the line is, the recently cited the article is. From Figure 3 we can see that during the 10 years development of personalized learning, natural science courses and computer programming was first discussed. Hwang et al. (2010) used learning systems to detect students' learning behaviours in the real world. By using the context-aware sensor technology which guides the student to observe or operate real-world objects with personalized support from the digital world. They also put this technology into an elementary school to depict the benefits of the innovative approach. Chu et al.(2010) use a knowledge engineering approach to develop Mindtools which has been applied to a learning activity of a natural science course in an elementary school. The experimental results show that the approach had a positive effect on learning motivation as well as on the learning achievements of the individual student. From 2010 the hotspot transferred to MOOC design, learning and engagement, which concentrate on more from the application of machine learning to the practice of course design.

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3. The MOOC design in the context of personalized learning

After Citespace introduced the general situation of the whole personalized learning research field, an in-depth reading of MOOC design in the context of personalized learning was conducted by including 21 citing articles in cluster explorer (9 articles in clust2 MOOC Design, 6 articles in cluster3 Learning and 6 articles in clust4 engagement).

The citing articles listed in the cluster explore usually considered as frontier research (Li,2015). Form these articles we can find the personalize MOOC design research was on the 3 categories as follows:

3.1 Learning Preference

Carlos et al. (2017) made an empirical study on the motivation and learning strategies of MOOC 6335 learners from 160 countries about the learning motivation and Strategies of a programming MOOC. The result indicated that a changing trend in learners' preferences, going from getting certificates of a course to acquiring new knowledge, which may partially explain the low completion rates in MOOCs. The study also emphasizes the importance of designing MOOCs that are rich in exercises and assignments for learners to practice and better understand the contents of the course.

June et al. (2018) pointed out that the language proficiency and the complexity of the video are significantly related to student learning outcomes. Scholars and practitioners concerned with retention rates for a wide spectrum of audiences may include subtitles to accommodate worldwide MOOC learners (Van der Zee, Paas, Saab, & Giesbers, 2017).

3.2 Time Management

Zhang et al. (2018) found that the students' online learning time allocation was unbalanced and unreasonable. Therefore, a forcibly set the minimum online learning time for students to increase their participation in the course could be set if necessary. Carlos et al. (2017) point out that MOOCs shall be designed to facilitate time management to learners, including early precise estimations of the weekly workload and the individual workload of each assignment, detailed specifications of mandatory and optional tasks, and analyses of average times devoted by learners based on their previous backgrounds, can help to better manage time among MOOC learners.

3.3 Learning Feedback

Bonk et al. (2018) noticed an issue of the lack of learner monitoring and feedback in his study that learner progress was left to self-monitoring or was ignored altogether. Zhang et al. (2018) pointed out the two function of individual learning diagnosis report: one is to provide teachers with a better understanding of individual students' learning situations to provide personalized learning intervention for those students who are at risk. The other is to provide personalized learning feedback so that students could obtain personal learning experience.

3.4 Learning support

Kazakoff et al. (2018) fond the blended learning approach was particularly beneficial for at-risk students because, through the use of the online component, scripted lessons, and paper-pencil activities, teachers could more effectively administer personalized instruction and provides scripted offline lessons tied to the digital content, allows students who struggle in the online program to receive individual or small group instruction on specific skills that can be delivered by a trained staff member.

Prain et al. (2018) proposed a framework for teacher supporting students personalized learning and suggested that any attempt to support students in personalized learning needs to be contextualized within broader curricular goals. Mccarthy et al. (2020) described a strengths-based blended personalized learning model, which identifies and builds upon students' strengths,

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supporting their ability to make informed decisions when setting goals and choosing and implementing learning experiences. The findings suggest that the strengths-based blended personalized learning model is effective in supporting student learning in the academic areas of mathematics, reading, and language usage.

4. Conclusion and Inspiration

The literary review analysis the development history of MOOC and personalized learning. By using Citespace to find the current research hotspot of personalized MOOC design which include learning preference, time management, learning feedback and learning support. The literature review indicated that during the process of personalized MOOC design we shall put a human-centred principle into consideration. Though some of the pioneering AI technology had been put into MOOC so far, the impact is quite limited (Zhang et al.,2020). Even if AI technology was more prominent in MOOCs, automated alerts, reminders, and feedback do not offer MOOC participants "a sense of being treated as an individual, and, therefore," such forms of course automation fall "short in providing personalized learning" (Fournier & Kopp, 2015). Therefore, the cognition style of the human being (such as learning style, information acceptance and interactive behaviour) and the difference between they interact with the real world and the virtual world remains a further exploration.

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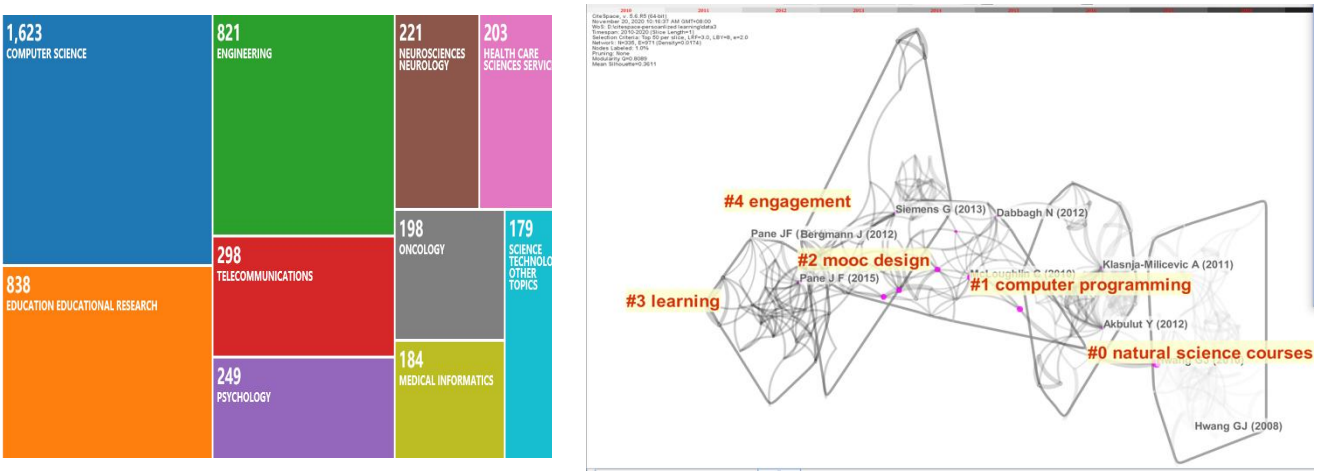

Figure 1. Example of a TWO-COLUMN figure caption: (a) this is the format for referencing parts of a figure.