chen_2020_detecting_latent_topics_and_trends_in_educational_technologies_over_four_decades_using_structural_topic_modeling_a_retrospective_of_all_volumes_of_computers_and_education

Year

2020

Author(s)

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Title

Detecting latent topics and trends in educational technologies over four decades using structural topic modeling: A retrospective of all volumes of Computers & Education

Venue

Computers & Education

Topic labeling

Manual

Focus

Secondary

Type of contribution

Established approach

Underlying technique

Manual labeling assisted by associated documents

Topic labeling parameters

Nr of examined documents: 3

Label generation

The analyses of the model results included topics' interpretations … We first interpreted the statistical results into important topics relevant to the field of computer- or technology-enhanced education. We then obtained the most discriminating terms for each of the topics based on a distribution matrix of topics and terms

The label for each topic was identified and summarized by two domain experts. Specifically, the following steps were set for conducting the labeling task.

1. Interpretation of the discriminating terms within topics based on their semantic meanings;
2. Examination of a sample of representative articles for each of the topics;
3. Comparison of the labeling results of the two experts, with the inconsistent labels being discussed and unified.

Table 2
The comparison of the 23-, 24-, and 25-topic models.

Labels for the 23-topic model	Labels for the 24-topic model	Labels for the 25-topic model
Online/web-based learning	*Online/web-based learning*	*Online/web-based learning*
Blended learning	*Blended learning*	*Blended learning*
Technology acceptance model	*Technology acceptance model*	*Technology acceptance model*
Special education	*Special education*	*Special education*
Context learning and collaborative learning	*Context learning and collaborative learning*	*Context learning and collaborative learning*
Demographic issues	*Demographic issues*	*Demographic issues*
Program and curriculum	*Program and curriculum*	*Teaching methods*
Data mining	*Data mining*	*Data mining*
Assessment	*Assessment*	*Assessment*
Mobile learning and early childhood education	*Mobile learning and early childhood education*	*Mobile learning and early childhood education*
Massive open online courses	*Massive open online courses*	*Massive open online courses*
Social networks and communities	*Social networks and communities*	*Social networks and communities*
Science education	*Science education*	*Science education*
E-learning and Policy	*E-learning and policy*	*E-learning and policy*
Hardware	*Hardware*	*Hardware*
Teacher training	*Teacher training*	*Teacher training*
Language learning	*Language learning*	*Language learning*
Conceptual mapping	*Conceptual mapping*	*Conceptual mapping*
Multimedia and data-driven	*Multimedia and data-driven*	*Multimedia and data-driven*
Experiments and methodologies	*Experiments and methodologies*	*Experiments and methodologies*
Game-based learning	*Game-based learning*	*Game-based learning*
Human-computer interaction and Virtual reality	*Virtual reality*	*Virtual reality*
Programming language	*Programming language*	*Programming language*
	Human-computer interaction	*Evaluation and organization*
		Communication channels

Motivation

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Topic modeling

STM

Topic modeling parameters

weights 0.4, 0.4, and 0.2 to terms from keywords, titles, and abstracts, separately
Nr of topics: 20 to 35

Nr. of topics

23, 24 and 25

Label

Manually assigned single or multi word labels

Label selection

Step 3: Comparison of the labeling results of the two experts, with the inconsistent labels being discussed and unified.

Take the topic *Context learning & Collaborative learning* as an example. The two domain experts first examined the most repre- sentative terms such as “collaborative,” “cooperative,” “collaboration,” “context-aware,” and “computer-supported collaborative learning (CSCL)” and found that they were all context- or collaboration-related. Next, they examined the three most representative articles for this topic … The first and third articles were related to collaborative learning, while the second related to context learning. The two domain experts discussed with each other; based on the examination results of the representative terms and articles, and named the topic *Context learning & Collaborative learning*

For the topic *Online/web-based learning*, the two domain experts first inspected the discriminating terms such as “podcasting,” “distance,” “tele-learning,” “medium,” “podcast,” and “computer-mediated,” which pertained to online/web services, as well as terms such as “post-secondary,” “education,” “teachin- g-learning,” “higher,” “university,” and “institutional,” which were education- or learning-related. Then, they examined the top three representative articles of *Online/web-based learning* to verify the label … The aforementioned three all related to learning using cyber, podcasting, internet, and distance services, all of which could be considered as online/web-based learning. Thus, considering the representative terms and research work, we labelled the topic *Online/web-based learning*.

Label quality evaluation

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Assessors

two domain experts

Domain

Paper: Bibliometrics?
Dataset: Education

Problem statement

Computers & Education has been leading the field of computers in education for over 40 years, during which time it has developed into a well-known journal with significant influences on the educational technology research community. Questions such as “in what research topics were the academic community of Computers & Education interested?” “how did such research topics evolve over time?” and “what were the main research concerns of its major contributors?” are important to both the editorial board and readership of Computers & Education. To address these issues, this paper conducted a structural topic modeling analysis of 3963 articles published in Computers & Education between 1976 and 2018 bibliometrically. A structural topic model was used to profile the research hotspots. By further exploring annual topic proportion trends and topic correlations, potential future

research directions and inter-topic research areas were identified. The major research concerns of the publications in Computers & Education by prolific countries/regions were shown and compared. Thus, this work provided useful insights and implications, and it could be used as a guide for contributors to Computers & Education.

Corpus

Origin: Computers & Education

Nr. of documents: 3963 (3342 after processing)

Details:

- articles published in Computers & Education between 1976 and 2018

Document

Title, keywords, and abstract of each an article

Pre-processing

- articles without abstracts were excluded
- numbers, punctuation, symbols, and stop words (e.g., “me,” “I,” “or,” “him,” “a,” and “they”) were deleted
- terms with multiple spellings were consolidated (e.g., “behaviour” and “behaviour”)
- terms were converted to the singular form and lower case

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#Thesis/Papers/FS