

## Institutional Perspectives on Personalized Education: A Topic Modeling Analysis of Korean News Media

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This study aims to examine trends in personalized education in South Korea by analyzing major keywords from big news data using topic modeling techniques. To achieve this objective, we analyzed 19,874 news articles published in South Korea between January 2018 and October 2023. The keywords were categorized into three distinct time periods: January 2018 to December 2019 (Period 1), January 2020 to December 2021 (Period 2), and January 2022 to October 2023 (Period 3). The results reveal distinct keyword trends across the three periods. In Period 1, keywords such as “university,” “junior college,” “Seoul,” and “Samsung Electronics” were prominent. In Period 2, “Corona,” “Seoul,” and “AI” emerged as significant terms. In Period 3, “government,” “AI,” “region,” “students,” and “youth” were identified. These findings indicate a focus on personalized education and competency development at various levels, including local, national, and institutional (universities and colleges). We can confirm the increasing prevalence of personalized education in response to the growing demand for digital and AI technologies, with numerous colleges nationwide promoting these initiatives at a national level. Additionally, the application of personalized education was observed as a measure to support underachieving students, addressing issues such as educational gaps and foundational education. This suggests a blend of both universal and specific approaches to personalized education. Based on these findings, the study recommends that to properly progress this idea, an elaborate theoretical framework that creates a balance between the pedagogical objective of satisfying the requirements of particular learners and adaptive learning technology would be needed.

*Keywords : Personalized education, Customized education, Personalized learning, Topic modeling, Korean news articles*

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## Introduction

Education is a process aimed at deliberately transforming human behavior by considering numerous factors to achieve positive changes in knowledge, skills, and attitudes (C. H. Shin, 2019). Specifically, achieving educational goals requires not only changes at the school and instructional level but also within society, the educational system, policies, and institutional perspectives. The media plays a critical role in shaping how institutions and organizations perceive educational issues. It significantly affects institutional and societal viewpoints by openly discussing important systems, policies, and current events. In other words, the media has the power to influence and change how individuals in society perceive and assess issues related to education. Therefore, it is crucial to assess how the media currently covers education, identify its issues, and explore possible solutions (Sohn et al., 2011).

Previous research on media coverage of education has highlighted several problems, such as focusing only on fragmented functions and issues, particularly from the standpoint of government policy (Sohn et al., 2011), or concentrating solely on specific areas, like educational media (S. Choi, 2005). How educational issues are communicated is closely linked to how society understands those issues. Thus, it is essential to examine the values guiding the media's selection and presentation of educational topics (Sohn et al., 2011). This study aims to explore how the Korean media covers personalized education, one of the key recent issues in education.

One of the main focuses of the 2022 revised national curriculum is the establishment of teaching, learning, and evaluation systems aligned with digital and AI-based educational environments (Ministry of Education, 2021). By announcing the “Comprehensive Plan for Nurturing Digital Talent” in 2022, the South Korean government further emphasized the importance of personalized education (Government Ministries Joint Committee, 2022). As the government continues its efforts to implement personalized education using AI technologies (Ministry of Education, 2023, 2024), this concept has been consistently mentioned in the media.

Personalized education refers to instructional support that offers optimal learning opportunities tailored to each learner, considering factors such as academic achievement levels, psychological and cognitive characteristics, and other elements (Do et al., 2022). While the educational benefits of personalized education are widely acknowledged, the implementation and spread of policies without research-based understanding and in-depth discussion may cause confusion in educational settings (Basham et al., 2016).

However, in line with the government's direction, corporations and local governments have actively promoted personalized education, as evidenced by the increasing number of related news articles. Given this, it is necessary to examine how personalized education has been reported in the media. This study aims to offer key insights for promoting educational reviews and discussions by analyzing how the Korean media perceives and reports on this topic.

## **Theoretical Background**

### **Personalized Education**

Personalized education, often used interchangeably with “customized education,” refers to tailoring educational experiences to meet the unique needs of individual learners. Originally, the term “customization” or “personalization” was associated with services like custom-made suits and cakes, where products were designed to meet specific standards or demands. However, recently, this concept has been adopted in education, focusing on adapting learning experiences based on individual characteristics, such as learning objectives, interests, and learning styles (Do et al., 2022).

Several definitions describe personalized education as an instructional practice that considers the various differences among learners to enable effective learning (Y. I.

Choi et al., 2019). According to M. Kim et al. (2020), personalized education is designed to meet individual needs, interests, abilities, and learning styles, allowing students to reach their full potential. In other words, the key is to tailor educational approaches to each individual's unique characteristics to promote student growth and development (H. Y. Jung & Hong, 2021).

This pedagogical approach aims to enhance the quality of education by addressing the diverse needs of students, adjusting instructional pace, methods, and content accordingly (Shemshack & Spector, 2021). While the core principle remains the same, modern personalized education increasingly incorporates digital tools and artificial intelligence (AI) technologies, with a focus on aspects such as intelligent tutoring systems and adaptive learning (Yeom & Park, 2024).

### **Institutional Perspectives and Personalized Education**

The rise of AI and big data has significantly transformed personalized education, allowing for more sophisticated methods of tailoring educational content to individual learners. Technologies such as intelligent tutoring systems, learning analytics, and adaptive learning platforms enable a more customized approach to education, adjusting to the learner's pace and providing personalized feedback (Atikah & Jonathan, 2020; Zhang et al., 2023). These advancements have led to a shift from traditional teacher-centered models to more learner-centered approaches, which prioritize the needs and preferences of individual students over standardized instruction (Bayly-Castaneda et al., 2024; Haughey, 2020).

From an educational perspective, there is a clear distinction between the concept of learning analytics, which analyzes learner data for instructional design, and the rationale for providing personalized services to individuals. However, in fact, when examining frequently presented keywords and media press releases, personalized education has been increasingly recognized as a concept closely tied to the convenience of individual learners (H. Y. Jung & Hong, 2021).

Personalized education (including related terms such as personalized instruction and customized learning) is, in fact, reported and discussed in the media much more frequently than it is explored in-depth in academic discussions. BIG KINDS, a news big data analysis system, allows for keyword trend analysis and related word analysis by applying big data technology to the largest reporting database in Korea (BIG KINDS, 2023). A search for “personalized education” in BIG KINDS reveals that the term was mentioned 5,825 times in the past three months as of October 2023. Naturally, given the time and effort required for academic research, such quantitative differences are inevitable. However, even among papers published in academic journals, there are studies on topics like “artificial intelligence-based customized education,” “AI education systems for personalized learning,” and “customized education content,” all of which confirm that the concept is largely focused on the convenience of individual learners (Sung, 2023; Joo, 2023). To sum up with, the term “personalized” in education emphasizes the individual learner, assuming that learners are capable of selecting their own learning goals and instructional strategies.

However, setting learning goals and choosing instructional strategies are traditionally responsibilities of the instructor (I. W. Park, 2015). This is because learners may not be able to plan for their appropriate learning process and load that could cause eventually meaningful effect on their own learning (Dick et al., 2015). Critics argue that an overemphasis on learner autonomy may overlook the crucial role of instructors in guiding and shaping the learning experience. Considering all these discusses, we need to establish clearer conceptual definitions that align with both social perceptions and educational goals.

## Research Objectives and Questions

The concept of personalized education has garnered significant attention in the media, particularly in the context of technological advancements in AI and digital learning. Studies suggest that institutional perspectives on personalized education

often emphasize its potential to enhance convenience and cater to individual learning needs (Seo & Shin, 2023). However, academic discussions have been relatively limited, there exists a gap between the literature reviews and news articles regarding institutional and societal perceptions of personalized education as shaped by media representations.

Given the media's role in shaping institutional viewpoints and disseminating information, it is crucial to analyze how personalized education is portrayed in news articles. This study utilizes the BIG KINDS (Korea Integrated News Database System) to analyze trends and themes related to personalized education in South Korean media from January 2018 to October 2023. By examining 19,874 news articles through topic modeling and keyword analysis, this study aims to provide insights into the evolving institutional discourse on personalized education. Specifically, this study seeks to answer the following research questions:

RQ1: How does personalized education appear in Korean media reports?

RQ2: What are the main topics for personalized education that appear in Korean media reports, and what is the relationship between the main keywords?

## **Method**

### **Data Collection**

This study aims to analyze the representation and trends of personalized education in Korean media by examining relevant articles. To achieve this, we used BIG KINDS (BIG KINDS, <https://www.bigkinds.or.kr>), a Korean news big data system that integrates big data analytic technologies with the largest reporting database in the Republic of Korea. BIG KINDS allows researchers to conduct keyword trend analysis, related word analysis, and keyword relationship network analysis.

Initially, the term “personalized education” was inputted into the search column

of BIG KINDS. We then extracted and reviewed keyword trends, related words, keyword relationships, and news articles from January 1, 2018, to October 21, 2023. Keyword trend analysis helped us identify the frequency and distribution of “personalized education” mentions over time, while related word analysis revealed the terms associated with personalized education in media reports. Furthermore, we used relationship diagram analysis to explore the connections and patterns among keywords that appeared in media coverage of personalized education.

The analysis focused on national daily newspapers to avoid bias towards a specific region or local characteristics. BIG KINDS provides search results in an Excel file format and optimizes keyword data through preprocessing and morpheme analysis for each noun in the news content. The refined keyword data was then utilized as the primary dataset for further analysis.

More specifically, the sample data was restricted to the period from 2018 to the present to align with the implementation and serious consideration of the 2015 revised curriculum. Initially, 22,290 news articles were collected. After removing duplicate entries, 19,874 unique cases were retained for analysis. The dataset was further refined by eliminating irrelevant content, such as URL addresses and nonsensical numerical data, to ensure both the quality and relevance of the data. These steps were taken to establish a structured and reliable dataset for the study.

## Analysis Method and Procedure

This study was conducted with topic modeling techniques. In this study, the LDA method was employed. LDA is commonly used in research to extract new information from unstructured text clusters and is particularly effective in identifying the meaning of documents and tracking their changes over time. This study applied the LDA technique to analyze how keywords shift in response to social interests and policy changes (J. Bae, 2023; Wallace, 2012).

To be more specifically, the Latent Dirichlet Allocation (LDA) technique, a

popular topic modeling algorithm, was employed to identify key themes within the text document data. LDA works by creating a matrix of words in a given text and probabilistically analyzing the co-occurrence of words within each document, based on the Dirichlet distribution, to extract the number of topics (Blei et al., 2003).

The parameters of the Dirichlet distribution in the LDA algorithm are used to compute the probabilities of specific words and documents belonging to particular topics. This calculation helps in identifying the terms and the information related to a specific subject within the text. Notably, LDA focuses on the presence of words rather than their order, making it a versatile tool applicable across various domains. Moreover, the algorithm can be extended into different forms, such as the double-potential Dirichlet model, hierarchical Dirichlet process, and hierarchical potential Dirichlet allocation (Hierarchical LDA).

For this study, the social network analysis tool Textom was utilized to perform the topic modeling analysis. The number of topics was iteratively analyzed, ranging from a minimum of three to a maximum of thirty. Prior research guided the determination of the optimal number of topics (Zhao et al., 2015).

The Latent Dirichlet Allocation (LDA) method, proposed by Blei et al. (2003), is widely used to infer topic structures in topic modeling (S. Choi & Park, 2020; J. Kang & Lee, 2020). LDA is a probabilistic model that requires researchers to manually set parameters such as the number of topics, alpha ( $\alpha$ ), beta ( $\beta$ ), and iteration values (Yoon & Yoon, 2017). Various attempts have been made in previous studies to determine the optimal number of topics (S. Choi & Park, 2020, Y. Jung & Kim, 2020).

However, DiMaggio et al. (2013) noted that statistical methods solely could occasionally not be appropriate for selecting the ideal number of topics. Na et al. (2016) carried out two analyses: thirty topics with  $\alpha = 0.0001$ ,  $\beta = 0.001$ , and 20,000 iterations were utilized in the first; twenty themes with  $\alpha = 0.001$ ,  $\beta = 0.01$ , and 1,000 iterations were used in the second analysis. Similarly, J. Kang and Lee (2020) discovered 8 topics using  $\alpha = 6.25$ ,  $\beta = 0.01$ , and 1,000 iterations. While different researchers have set various alpha and topic numbers, the beta value is often fixed at



0.01, and the iteration count is frequently set at 1,000.

In this study, we set  $\alpha = 0.1$ ,  $\beta = 0.01$ , and iteration count at 1,000. The optimal number of topics was determined by analyzing the keywords extracted during the analysis. According to C. Nahm (2016), key criteria for selecting the number of topics include interpretability, validity, and relevance to the research questions. To evaluate internal validity, we checked whether the model adequately distinguished between the meanings of words and whether the resulting topics responded to external variables as expected. After discussions among researchers, we decided on 10 topics for viewpoint 1, 14 topics for viewpoint 2, and 7 topics for viewpoint 3. A summary of the analytical methods is provided in Table 1.

**Table 1**  
*Data collection and analysis procedure*

Stage	Details
Data Collection	<ul style="list-style-type: none"> <li>▫ Select news search keywords</li> <li>▫ Search for news keywords and create data files</li> <li>▫ Data refining: simple numbers, URL removal (* Analytical language: Korean, Analyzer: MeCab, refined into simple parts)</li> <li>▫ Selection of final analysis data</li> </ul>
↓	
Data Analysis	<ul style="list-style-type: none"> <li>▫ Analyzing word frequency</li> <li>▫ LDA analysis (Creating and Analyzing Keyword Matrix)</li> <li>▫ Analysis of the probability of keyword appearance by topic</li> <li>▫ Review decision and adequacy by topic</li> </ul>

## Research Results

### Keyword Analysis Results by Period

The news data collected for each period was analyzed to identify high-frequency keywords related to personalized education. The results are presented in Table 2 and

**Table 2**  
**Keywords by period**

	Time Point 1 (Jan. 2018 – Dec. 2019)		Time Point 2 (Jan. 2020 – Dec. 2021)		Time Point 3 (Jan. 2022 – Oct. 2023)	
	Keyword	Frequency (%)	Keyword	Frequency (%)	Keyword	Frequency (%)
1	junior college	63 (2.00)	COVID-19	145 (1.98)	Seoul city	66 (0.83)
2	Seoul	56 (1.88)	Seoul	68 (0.93)	government	52 (0.66)
3	HOT100	42 (1.34)	Seoul city	52 (0.71)	Seoul	51 (0.64)
4	university	37 (1.18)	AI	42 (0.57)	Busan	49 (0.62)
5	Daegu	35 (1.11)	education	40 (0.55)	Gyeonggi-do	49 (0.62)
6	Gyeonggi-do	34 (1.08)	youth	39 (0.53)	AI	47 (0.59)
7	education	32 (1.02)	Kyungbok University	38 (0.52)	education	41 (0.52)
8	Seoul city	32 (1.02)	Gyeonggi-do	38 (0.52)	area	40 (0.50)
9	Busan	31 (0.99)	Kyungbok University	35 (0.48)	student	38 (0.48)
10	school	30 (0.95)	president	34 (0.46)	youth	36 (0.45)
11	Samsung Electronics	29 (0.89)	Kyunggi	34 (0.46)	Busan city	33 (0.42)
12	Youth	28 (0.89)	Incheon	33 (0.45)	Jeollanam-do	32 (0.40)
13	industry	27 (0.86)	school	32 (0.44)	university	32 (0.40)
14	government	27 (0.86)	Busan	32 (0.44)	Gyeonggi-do	32 (0.40)
15	interview	26 (0.83)	Gyeongnam	32 (0.44)	Yeungnam University College	31 (0.39)
16	AI	25 (0.79)	Busan city	31 (0.42)	future	31 (0.39)
17	(republic of) Korea	24 (0.76)	notification	30 (0.41)	Daegu	31 (0.39)
18	Busan	24 (0.76)	future	30 (0.41)	Keimyung College University	30 (0.38)
19	student	22 (0.70)	Daegu	30 (0.41)	Gyeongsangnam-do	30 (0.38)
20	area	21 (0.67)	government	27 (0.37)	school	29 (0.37)

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Figure 1. Word cloud of major keywords by period

Figure 1, which illustrate the topic modeling of media reports on personalized education for this study.

### News Topic Modeling Result by Period

#### LDA Topic Modeling Result

In this study, news data on personalized education was analyzed using Latent Dirichlet Allocation (LDA) topic modeling to identify significant issues and trends. Determining the number of topics extracted from the source text is a critical step in the topic modeling analysis process. To estimate the optimal number of topics in this study, four evaluation indices were considered: Arun et al. (2010), Cao et al. (2009), Deveaud et al. (2014), and Griffiths & Steyvers (2004).

Griffiths' index (2004) is based on the log-likelihood of the LDA model, while Deveaud's index (2014) uses Jensen-Shannon divergence. Additionally, Cao's index (2009) is related to the cosine similarity between topics extracted from the LDA model, and Arun's index (2010) is based on the symmetric Kullback-Leibler divergence of the singular value distribution of the topic-word matrix. Among these four indices, Griffiths (2004) and Deveaud (2014) determine the appropriate number of topics when the index approaches one, whereas Cao (2009) and Arun (2010)

consider the appropriate number of topics when the index approaches zero (M. J. Kang & Baek, 2022; J. Y. Yang & Koo, 2021; Y. S. Lim, 2023).

The most suitable number of topics for the model was determined by evaluating all index values when the number of topics was reduced to two or more. The topic names were then selected by carefully considering the context and meaning, reviewing the keywords, and analyzing the original data categorized by time period. Figure 2 illustrates this process.

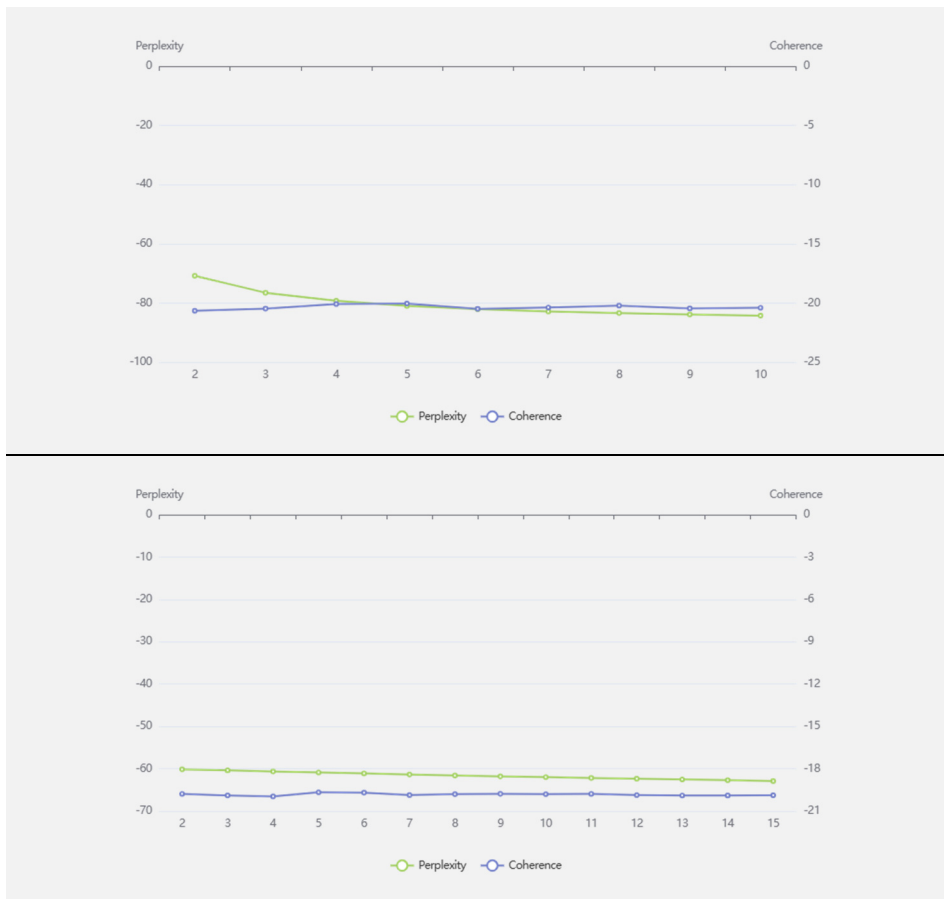
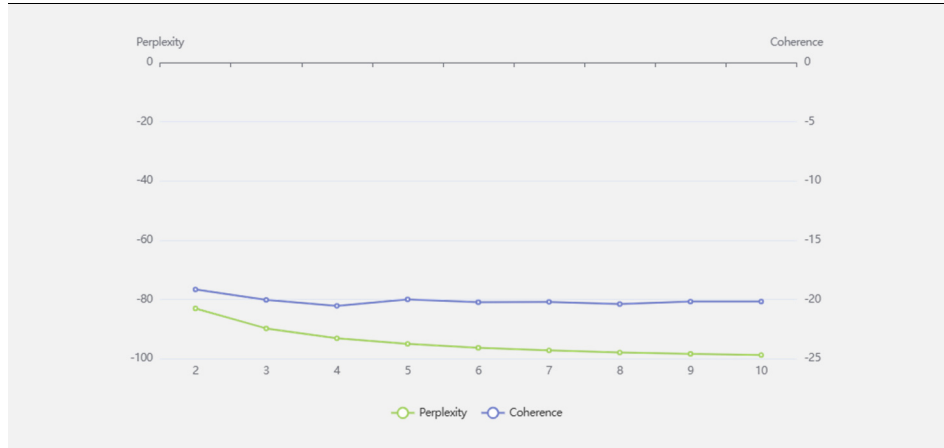


Figure 2. Process for Decision and Four determination indices

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*Figure 2. Process for Decision and Four determination indices*  
(continued)

**Time Point 1 (January 2018-December 2019) Topic Modeling Analysis Results**

The following results were obtained as keywords for each topic after performing a topic modeling analysis using the LDA technique on the “personalized education” news included in Time Point 1 (see Table 3). For Topic 1, the top five keywords were “Seoul Business Association,” “Korea,” “Samsung Electronics,” “training,” and “Hyundai Motor Group.” Table 4 presents an article related to the representative term with the highest frequency, along with an example of the original data.

For Topic 1, the primary focus was on developing human resources at the corporate level with an emphasis on personalized education. Based on this, the topic was named “company.” The top five keywords for Topic 2 were “Korea University,” “Gijang-gun,” “Inha University,” “Incheon University,” and “Daegu.” This analysis highlights a trend towards the promotion of personalized education at local, provincial, and school levels. For instance, the Daegu Metropolitan Office of Education prioritized and suggested personalized education to enhance fundamental academic skills in 2019. As a result, “cities/provinces and schools” was designated as the topic name.

A key element of the Korean government's 2019 policies revolved around personalized education. As a result, both enterprises and the government sought to develop specific skills using AI technology, leading to the launch of AI-based personalized education services. In particular, programs for personalized vocational education were strengthened, and businesses and academic institutions collaborated to tailor students' skills for job readiness. News articles and public perspectives appear to have been influenced by the government's efforts to introduce personalized education (Korea IT News, 2019).

**Table 3**  
*Major keywords per topic at Time Point 1 (Jan. 2018 – Dec. 2019)*

Topic	Keyword 1	Keyword 2	Keyword 3	Keyword 4	Keyword 5
Topic 1	SBA	Training	Samsung Electronics	(Republic of) Korea	Hyundai Motor Group
Topic 2	Daegu	Inha University	Incheon National University	Gijang-gun	Korea University
Topic 3	AI	Seoul	nationwide	custom	contribution
Topic 4	Yeungjin University	society	the Ministry of Education	start-up	Busan city
Topic 5	youth	big data	Icheon	Gyeonggi-do	smart
Topic 6	Ulsan	teenager	talent training	Gyeongsangbuk-do	Seoul
Topic 7	happiness	Gyeongsangnam-do	Gyeongsangbuk-do	CESCO	Seoul
Topic 8	notification	Samsung Electronics	Seoul city	region	global
Topic 9	resident	Hyundai Motor Group	scholastic ability test (SAT)	risk	support
Topic 10	global	Cyber Hankuk University of Foreign Studies	era	Seoul	Daegu

**Table 4**  
***News representing a topic at Time Point 1 (Jan. 2018-Dec.2019)***

Topic	Topic Name (the number of cases, %)	Representing News Article
Topic 1	Companies (11, 0.17%)	SBA, “Customized technical talent training program based on corporate demand” Recruitment of operating institutions (I. Kim, 20190430)
Topic 2	Cities and Schools (45, 0.22%)	Daegu Metropolitan Office of Education promotes expansion of basic academic ability improvement project next year (D. Kim, 20191203)
Topic 3	EduTech (113, 1.74%)	“AI teaches people” EduTech market grows rapidly (M. K. Hwang, 20191208)
Topic 4	on-the job training (54, 0.83%)	Yeongjin University breaks through barriers to employment through national technology project (J. Shin, 20190422)
Topic 5	Customized employment (238, 3.66%)	Youth employment through customized employment and start-up know-how Breaking through (J. M. Park, 20191218)
Topic 6	Educational Innovation (59, 0.91%)	Ulsan Innovative Education in full operation “Creating a school that people want to go to” (J. R. Jeong, 20191026)
Topic 7	Resolving Society Issues (87, 1.34%)	Creating a happy world together, nurturing future talent and taking the lead in resolving social issues (The JungAng, 20180213)
Topic 8	Personalized Financial Education (19, 0.29%)	Winners selected for the 14th Kyunghyang Financial Education Awards (Kyunghyang Newspaper, 20191202)
Topic 9	Customized Administration	[My Neighborhood Luxury Administration] Let’s play together with children, natives and immigrants Barriers have disappeared (M. S. Lim, 20191028)
Topic 10	Global Personalized Talent Education	Nurturing globally customized talent through university specialization and educational innovation (D. R. Lee, 20191212)





## **Time Point 2 (January 2020-December 2021) Topic Modeling Analysis**

### **Results**

As a result of topic modeling using the LDA technique on news articles related to “personalized education” from Time Point 2, the following topics were identified (see Table 5). For Topic 1, the top keywords included “teenagers,” “governments,” “regions,” “students,” and “youths.” In Topic 2, the key terms were “government,” “youth,” “Kakao Corporation,” “regions,” and “students.”

Since the keywords for each topic are derived directly from the text, it is crucial to review the original data to fully interpret their meanings. Table 6 provides examples of the original data, based on the most representative keyword (keyword 1) with the highest probability, confirming that EduTech, distance education, and customized robots were used to deliver personalized education to youth.

During this period, digital technology and artificial intelligence (AI) gained particular prominence due to the COVID-19 pandemic, which prompted shifts in both educational methods and content to adapt to the new environment. To foster future competencies, the Korean Ministry of Education advocated for a “High-Touch” approach—integrating digital technology with innovative teaching and learning strategies. The Ministry also recommended that all teachers incorporate EduTech to achieve the goal of “personalized education for all” in the digital age.

Additionally, Topics 4, 5, 8, and 11 highlighted educational disparities and the need for governments and schools to address gaps in academic competencies. This underscored the importance of creating personalized learning systems and developing diagnostic tools. Conversely, Topics 9 and 12 focused on distance education, outlining the criteria for managing remote learning programs as part of a broader personalized learning support plan.

To provide further context, in 2020, in response to COVID-19, remote education and online learning platforms became central to the Korean Ministry of Education's policies. To support online learning, the government implemented measures to bridge the digital divide by expanding platforms like EBS online classes and

distributing free digital devices to low-income students. Policies were also introduced to promote self-directed learning through real-time interactive classes, content-based lessons, and task-oriented activities (Ministry of Education, 2023). These initiatives closely align with the online learning platforms and customized matching systems discussed in the second period. The pandemic accelerated the adoption of digital technology and AI, driving innovation in educational content delivery. In response, the government expanded the infrastructure for remote education and introduced various systems for personalized learning support (Ministry of Education, 2020).

**Table 5**  
*Major keywords per topic at Time Point 2 (Jan. 2020-Dec. 2021)*

Topic	Keyword 1	Keyword 2	Keyword 3	Keyword 4	Keyword 5
Topic 1	teenager	government	region	student	youth
Topic 2	government	youth	Kakao Corporation	region	student
Topic 3	government	student	youth	COVID-19	region
Topic 4	government	youth	student	COVID-19	region
Topic 5	youth	region	student	government	Jo Hee-yeon
Topic 6	government	student	school	region	COVID-19
Topic 7	food	government	student	youth	region
Topic 8	government	school	region	youth	student
Topic 9	government	youth	student	region	COVID-19
Topic 10	government	region	Jo Hee-yeon	Kakao Corporation	school
Topic 11	government	youth	region	Jo Hee-yeon	student
Topic 12	government	student	region	Jo Hee-yeon	school
Topic 13	government	student	region	youth	COVID-19
Topic 14	region	government	school	student	youth

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**Table 6**  
**News representing a topic at Time Point 2 (Jan. 2020-Dec. 2021)**

Topic	Topic Name (the number of cases, %)	Representing News Article
Topic 1	Medical EduTech (101, 0.01%)	Our Children's Medical Foundation starts "Medical Edutech" for children and adolescents (H. S. Park, 20211015)
Topic 2	Personalized Digital Education Robot (13, 0.00%)	"Add friends on KakaoTalk like this" Personalized digital education robot Rico is popular (H. Kim, 20201110)
Topic 3	Personalized Financial Design Program (302, 0.04%)	Incheon City operates "Youth Personalized Financial Planning Program" (S. B. Gong, 20211229)
Topic 4	Personalized Learning and Emotional Support Program (116, 0.02%)	7,200 students from "Teacher Long Legs" program at middle and high schools in Seoul learning about COVID-19 through personalized learning support close mentoring for emotionally deficient student (H. J. Lee, 20211024)
Topic 5	Mitigating Educational Background Gap (19, 0.00%)	Hee-yeon Jo, "Improved basic academic skills after being a cooperative teacher in elementary and middle school" (G. Park, 20210105)
Topic 6	AI-based Personalized Talent Education (250, 0.03%)	"High-Touch High-Tech" education opens the future Standing tall as a regional innovative university (D. Lee, 20211215)
Topic 7	Competency Structure and Personalized Training (11, 0.00%)	CJ Freshway fosters food service experts. Establishment of a customized education system (W. Yun, 20211221)
Topic 8	Lack of Basic Academic Ability (117, 0.02%)	Within a year of Corona, the number of middle school and high school students doubled...government "Serious learning deficit" (Y. J. Lee, 20210602)
Topic 9	Distance Education (300, 0.04%)	Personalized education that reflects student characteristics... Establishment of distance education operation standards (K. Kim, 20211123)
Topic 10	Online Learning Platform (646, 0.09%)	Non-face-to-face learning platform "On-school" achieves great results... Tailored to follow your dreams and aptitude Education (S. Bae, 20211223)
Topic 11	Educational Gap (117, 0.02%)	After neglecting the gap in academic achievement for 4 years... belatedly "school tutoring" (S. Park, 20210730)
Topic 12	Distance Education (300, 0.04%)	Personalized education reflecting the characteristics of students... Establishment of standards for operation of remote education (K. Kim, 20211123)
Topic 13	High School Credit System (250, 0.03%)	Incheon University, Incheon Metropolitan Office of Education and local high school credit system Education Cooperation Agreement (J. Lim, 20210902)
Topic 14	Personalized Matching System (302, 0.04%)	"Personalized matching for education and employment"... Differentiating youth policy (J. Cho, 20211028)

The analysis of the relationship between keywords associated with personalized education for Time Point 2 revealed the following findings (see Figure 4). At Time Point 2, Yu Eun-hye was the only individual identified, along with two locations (Gyeonggi-do and Busan), three organizations and domains (career, Gyeonggi-do Office of Education, and the Ministry of Education), and other items (COVID-19, parents, systems, YouTube, etc.). The subjects and keywords discussed at Time Point 2 were generally similar, and the network between terms was relatively simple, with several related keywords, subjects, and articles sharing similar directions and content.

The Ministry of Education's declaration of digital-based education innovation plans and EduTech promotion initiatives, along with the impact of COVID-19 on society, is shaping the identity and direction of “personalized education” through digital technology-based education.

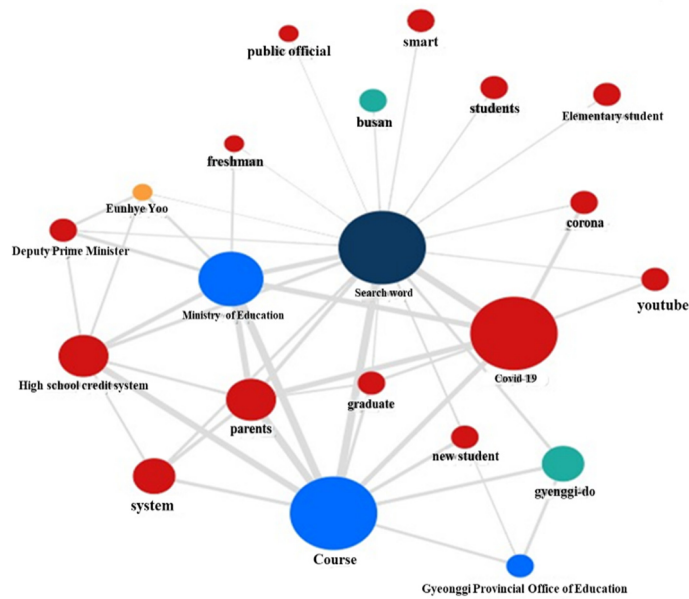


Figure 4. Relationship diagram about personalized education (2020-2021)

### Time Point 3 (January 2022-October 2023) Topic Modeling Analysis Results

The following findings were obtained for each topic after applying the LDA technique to the “personalized education” news included in Time Point 3 (see Table 7). The most frequent keywords in Topic 1 were “teenagers,” “regions,” “governments,” “students,” and “schools.” For Topic 2, the keywords included “Kakao Corporation,” “government,” “content,” “region,” and “youth.” Topic 3 featured keywords such as “youth,” “COVID-19,” “students,” “Korea,” and “government.”

**Table 7**  
*Major keywords per topic at Time Point 3 (Jan. 2022-Oct. 2023)*

Topic	Keyword 1	Keyword 2	Keyword 3	Keyword 4	Keyword 5
Topic 1	youth	region	government	student	school
Topic 2	government	content	region	youth	Kakao Corporation
Topic 3	government	student	COVID-19	(Republic of) Korea	youth
Topic 4	government	COVID-19	student	youth	region
Topic 5	region	youth	Jo Hee-yeon	student	school
Topic 6	government	school	student	region	COVID-19
Topic 7	government	food	student	region	youth

Table 8 presents the original data, focusing on the representative keywords (Keyword 1) with the highest probability of occurrence. This table helps us understand the trend toward utilizing personalized education to support the learning of specific groups of students, such as those with learning disabilities or difficulties. Additionally, it has been suggested to integrate AI in general school settings to promote digital literacy.

In Korea's education policy from 2022 to 2023, a broader digital-based education innovation plan is key initiatives regarding AI learning platforms and personalized education. This policy promotes personalized education by leveraging artificial

**Table 8**  
**News representing a topic at Time Point 3 (Jan. 2022-Oct. 2023)**

Topic	Topic Name (number of cases, %)	Representing News Article
Topic 1	Digital Talent (146, 0.02%)	Gangnam, leading the future 4th industry... Leading the way in nurturing youth digital talent (J. H. Park, 20231012)
Topic 2	AI Digital Textbook (58, 0.01%)	Identify student knowledge level with AI and provide personalized content... 2025 “Mathematics, English, and Information” introduced first (J. G. Park, 20230322)
Topic 3	Migration Background Student (including multicultural families) (188, 0.02%)	Now, even students with immigrant backgrounds are Korean talent... government prepares various support measures (N. Kim, 20230926)
Topic 4	Personalized Coding Education (342, 0.04%)	KT Daegu Gyeongbuk Headquarters, personalized coding education for students with disabilities (J. Kim, 20230920)
Topic 5	Learning and Emotion Deficit (14, 0.00%)	“Let’s prevent COVID-19 learning and emotion deficit”... Ministry of Education, provincial and provincial offices of education, investing KRW 9.4 trillion this year (H. Lee, 20220113)
Topic 6	AI Learning Platform (615, 0.08%)	Gyeonggi-do Office of Education, pilot introduction of ‘AI platform’ to help school classes... “Expansion across the board next year” (J. W. Myeong, 20230913)
Topic 7	Resolving Educational Imbalance	Innovation in local education... Inducing employment and settlement of excellent talent (Y. Kim, 20230914)

intelligence (AI) technology, including the introduction of AI-based digital textbooks tailored to students' individual learning levels. Additionally, it supports the operation of leading digital learning schools. These AI learning platforms also aim to address educational imbalances and provide support to students facing learning challenges, such as those with disabilities and those from immigrant backgrounds (Ministry of

Education, 2023).

These initiatives, launched in 2022, are designed to support personalized learning for diverse student groups, accelerate the digital transformation of education, and strengthen tailored approaches, particularly for students with learning difficulties. Consequently, the topics discussed in the third period-such as AI learning platforms, personalized coding education, efforts to reduce educational disparities, and support for students from immigrant backgrounds-are believed to stem from this policy framework.

The analysis of the correlations between keywords related to personalized education at Time Point 3 reveals the following findings regarding their relationships (see Figure 5). At Time Point 3, 18 institutions and fields were identified, including the Ministry of Education, Ministry of Science and ICT, Korea Institute of Education and Development, Ministry of Environment, Seoul Metropolitan Office of Education, Hunet Corporation, Seoul National University, Ewha Womans University, Chungbuk National University, and Hanseong University. Additionally, eight locations were noted (Korea, the metropolitan area, Seongnam City, Suwon City, Gyeonggi-do, the United States, the Philippines, and Japan), along with other elements such as “COVID-19,” “parents,” “micro,” and “local education financial grants.”

The analysis suggests that cities, provinces, and schools (including universities) are adjusting their approaches as the government emphasizes personalized learning support and the development of customized content to cultivate digital literacy, ensure foundational academic skills, and bridge the educational gap. Moreover, given the focus on individualized education for competency development, Korean junior colleges and lifelong learning institutions are actively working to create and develop personalized learning materials and systems.





institutional needs. This indicates a growing interest in personalized education as a strategy for local development and skill-building that aligns with corporate or governmental goals. In contrast, Period 2 (January 2020–December 2021), which saw the emergence of keywords like “Corona” and “AI,” points to a pivot toward technological solutions, likely driven by the COVID-19 pandemic’s impact on education. Finally, in Period 3 (January 2022–October 2023), terms such as “government,” “AI,” and “students” illustrate a renewed focus on policy-driven efforts to integrate AI in education, particularly at the national level, aimed at fostering innovation and addressing educational inequalities.

These shifts in media focus reflect broader societal changes, including the increasing reliance on AI and digital technologies, which have become integral to discussions around personalized education. The emphasis on AI-based solutions in Periods 2 and 3 aligns with global trends in education that prioritize technology as a means of delivering individualized learning experiences. However, this reliance on technology raises questions about how personalized education is conceptualized—whether it is seen as a tool for addressing individual needs across diverse learner populations or merely as a mechanism for skill development aligned with industry demands.

Second, the topic modeling analysis highlights recurring themes across the time periods. In Period 1, topics such as personalized employment, EduTech, and corporate involvement indicate that personalized education was largely framed in terms of workforce preparation. This suggests that media portrayals during this time focused on aligning educational initiatives with the needs of the labor market, reinforcing the idea that personalized education serves economic and corporate interests. In Period 2, with the rise of online learning platforms and AI-based systems, the narrative shifts toward more individualized learning solutions. However, it is important to consider how these technological advancements may narrow the concept of personalized education, reducing it to algorithmic content delivery rather than fostering a holistic approach to learner development.

By Period 3, the focus on AI learning platforms and efforts to address educational imbalances signals a growing recognition of the need for personalized education to be more inclusive. This shift in focus suggests that while personalized education has historically been associated with preparing learners for the workforce, there is now a stronger emphasis on equity and support for marginalized groups. This finding aligns with recent literature that highlights the importance of addressing diverse learner needs, particularly in the context of digital and AI-driven education (H. G. Lee et al., 2022; Tang & Wang, 2018). However, the persistent framing of personalized education through the lens of technological solutions raises critical questions about the balance between human-led and machine-driven approaches to education.

### **Implications and Future Directions**

The findings of this study carry several important implications for both the theory and practice of personalized education.

First, the results suggest that a more nuanced theoretical framework for personalized education is needed—one that goes beyond technology-driven solutions and encompasses a broader pedagogical vision. While the media frequently portrays personalized education as a tool for individualizing learning experiences through AI and adaptive systems, this framing may overlook the more complex needs of diverse learners, particularly those from marginalized backgrounds. As H. G. Lee et al. (2022) argue, personalized education should prioritize not only technological adaptability but also the social, emotional, and cognitive development of learners. This implies that future research and policy initiatives must move beyond a focus on skill alignment and instead emphasize educational equity and inclusion.

Second, the increasing emphasis on AI and digital technologies in media discussions of personalized education underscores the need for a critical assessment of these tools. While technologies such as AI-based platforms and adaptive learning systems hold great potential for enhancing personalized learning, their

implementation must be carefully evaluated within a broader pedagogical context. If personalized education is reduced to algorithmic processes, there is a risk of failing to account for diverse learner needs and limiting opportunities for deeper cognitive and emotional engagement. As previous research suggests, the most effective personalized education systems are those that integrate human instructors into the learning process, ensuring that technology complements rather than replaces the role of educators (H. Y. Jeong & Hong, 2021).

Finally, this study highlights the importance of developing a more comprehensive approach to personalized education that integrates diverse teaching and learning processes. Personalized education must address not only academic performance but also the holistic development of learners, taking into account their cultural, social, and emotional contexts. To achieve this, educators and policymakers must adopt a flexible and inclusive pedagogical framework that leverages both technology and human-led instruction to meet the diverse needs of students.

In conclusion, while personalized education holds promise as a tool for addressing unique learning needs, its proper and educational potential would be realized when it provides tailored support to low-achieving students and those in need of academic assistance, without compromising the core goals and values of education. The key is to strike a balance between technological innovation and the human elements of teaching, ensuring that technology enhances, rather than diminishes, the depth and breadth of personalized educational experiences. The study's conclusions offer insightful information on how personalized education is currently represented in the media and crucial aspects to take into account when forming future practices and policies.

### **Limitations and Areas for Future Research**

This study has several limitations that suggest avenues for future research. First, the findings may have limited generalizability due to the focus on Korean media

reports, which limits international applicability. Additionally, different criteria for data collection and cleaning, such as representative concepts, synonyms, exclusion codes, and word choices, require more in-depth theoretical discussions. In future studies, international analyses should be conducted with a focus on overseas data, or more in-depth analyses should be pursued using representative literature selected through systematic methods, such as systematic literature reviews. Additionally, cross-national comparative studies could provide valuable insights into how different educational systems and media landscapes influence institutional discourse on personalized education.

Second, the rationale for segmenting the research periods and selecting topics for topic modeling needs further justification. More objective criteria, such as time series regression models, should be used for period segmentation, and a broader range of subjects should be analyzed to enhance the reliability and validity of the findings. To address the limitations of this study, future research could employ mixed-method approaches that combine topic modeling with in-depth qualitative content analysis. This would allow for a more nuanced interpretation of the data, balancing large-scale trends with detailed insights from specific articles. In addition, another aspect to consider for generalization and segmentation is conducting an additional empirical review (e.g., polls) to assess how closely the characteristics of personalized education presented in the media align with institutional perspectives.

Third, while “personalized education” was the primary keyword in this study, it encompasses various related terms. Future research should incorporate a broader range of data by including terms such as “customized learning” and “data-driven personalized education” to provide a more comprehensive understanding of personalized education practices.

Despite its limitations, this study is significant for its use of topic modeling to analyze a large volume of data, contributing to the understanding and application of the increasingly emphasized concept of personalized education. Institutional perspectives on personalized education in news media are often associated with

unique educational initiatives of businesses and academic institutions, or it is understood universally accessible AI-based services that all individuals could use. However, it additionally appears to be a concept related to a prescribed educational approach, one that makes learning possible for specific populations, such those with difficulties. A more sophisticated theoretical framework that achieves a balance between adaptive learning technology and the pedagogical task of meeting the needs of various learners will be required in order to effectively advance this idea.

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*Proceedings of the 12th Annual MCBIOS Conference.* <https://doi.org/10.1186/1471-2105-16-S13-S8>



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Received: August 30, 2024 / Peer review completed: October 18, 2024 / Accepted: October 21, 2024