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A Trend Study on the Evaluation Path of Learning Engagement in China

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Abstract: behavioral engagement is a crucial dimension of overall learning engagement and a key factor influencing learning performance. Although numerous researchers have examined behavioral engagement, existing evaluation approaches remain relatively uniform in form. It is therefore necessary to systematically review studies on the evaluation of behavioral engagement. Based on an analysis of 22 Chinese studies published between 2015 and 2025, this research identifies several key issues: inconsistency in evaluation indicators, limited diversity in data analysis methods, and a lack of studies focusing on behavioral engagement within actual learning processes. In the future, research on behavioral engagement in technology-enhanced learning environments and the adoption of multimodal evaluation approaches is expected to become a mainstream direction. Accordingly, future studies should establish a standardized indicator system for evaluating behavioral engagement and explore the use of multimodal data analysis methods.

Keywords: Behavioral Engagement; Evaluation Methods; Multimodal Assessment Approaches.

1. Introduction

In February 2023, the World Digital Education Conference emphasized the theme of "Digital Transformation and the Future of Education," highlighting the growing importance of digital empowerment in contemporary education. Against this background, research on learning behavioral engagement has attracted increasing attention from scholars. Behavioral engagement constitutes an essential dimension of overall learning engagement, which generally refers to students' participation and effort in the learning process, encompassing behavioral, cognitive, and emotional dimensions [1].

The study of learning behavioral engagement can be traced back to Taylor's Time-on-Task Theory in the 1930s, which focused on students' behaviors and emotions during learning[2]. Specifically, learning behavioral engagement refers to the behavioral manifestations of learners' interactions and information exchanges with learning resources and communities during the learning process, under the regulation of tools, learning modes, and learning tasks. It represents a more active, sustained, and effective behavioral state.

Timely assessment of learning behavioral engagement can enhance the quality of students' learning. First, behavioral engagement is closely associated with learning performance. Second, effective evaluation of students' learning engagement enables educators to better predict or intervene in students' behaviors during learning and to infer their emotional and cognitive engagement. Finally, the focus on learning analytics and measurement has become a major trend in the development of modern educational technology.

However, few comprehensive literature reviews have focused specifically on the evaluation of learning behavioral engagement. To date, only Wang Xiaoxia, Gao Ming and Li Jiansheng[3] have conducted a review of research progress on learning behavioral engagement between 2015 and 2019, without a systematic analysis of evaluation methods. Therefore, this study conducts a systematic review of evaluation methods of learning behavioral engagement in China from 2015 to 2025, comparing their strengths and limitations to provide insights for future research on learning behavioral engagement.

2. Research Method

This study adopts a literature review approach to systematically examine Chinese-language studies on the evaluation of learning behavioral engagement published between 2015 and 2025. The aim is to gain a clearer understanding of the current research status in this field and to provide references for future research on learning behavioral engagement.

2.1. Literature Retrieval

On November 6, 2025, the author used "learning behavioral engagement" as the keyword to search for relevant studies in the CNKI full-text database. The search was limited to papers published in core journals indexed by Peking University and CSSCI (Chinese Social Sciences Citation Index) from 2015 to 2025, yielding a total of 61 papers.

2.2. Literature Screening

Titles, abstracts, and keywords were reviewed, and the literature was filtered according to the following criteria. The second round of screening applied two conditions: (1) The research participants were students, and the study focused on learning engagement; (2) The paper clearly described methods for evaluating behavioral engagement, and the full text was available. Ten Chinese-language papers met these criteria. In the third round, a snowball sampling method was used to supplement relevant studies, resulting in a total of 22 selected papers.

2.3. Analysis of Publication Trends

Using the "academic trend" function of CNKI, the author examined publications with the theme "learning behavioral engagement" up to November 6, 2025. A total of 61 papers

were identified over the past decade. According to the publication trend chart exported from CNKI, the overall trend can be described as follows. 2015–2016: The number of publications was almost zero, indicating that research in this field was still in its infancy. 2017–2018: A slight increase was observed, with a preliminary peak in 2017, suggesting that the topic began to attract attention. 2019: A modest decline occurred, reflecting a temporary drop in research interest. 2020–2021: A significant surge appeared, reaching a peak of about 16 papers in 2021, suggesting that the topic entered a period of intensive exploration, possibly stimulated by policy initiatives or social developments. 2022–2023: The number of publications decreased but remained at a moderate level, showing a partial decline in attention while maintaining research continuity. 2024–2025: After reaching a low point in 2024, publication volume showed a mild rebound in 2025, implying renewed scholarly interest. Overall, from 2015 to 2025, the publication trend demonstrates a fluctuating pattern of "gradual rise – peak – decline – resurgence," reflecting the topic's progression from emergence and development to maturity and subsequent adjustment, indicating both cyclicality and sustained academic vitality.

3. Review of the Current Status of Research on Learning Behavioral Engagement

How to effectively evaluate learning behavioral engagement has long been a central concern among researchers in this field. At present, a well-established and unified evaluation system for learning behavioral engagement has not yet been formed. By reviewing and comparing the research frameworks proposed by different scholars, it becomes evident that various evaluation approaches possess distinct strengths and limitations, suggesting directions for refining assessment methodologies in future studies. Moreover, a close reading of the existing literature reveals several issues in current research on learning behavioral engagement evaluation, which are summarized as follows.

3.1. Lack of a Unified Indicator System for Evaluating Learning Behavioral Engagement

In terms of indicator systems, numerous researchers have adopted diverse measurement indicators, with many studies focusing on analyzing behavioral engagement within traditional educational contexts. Through a comparative analysis of relevant studies, the commonly used indicators of learning behavioral engagement can be summarized, and a more comprehensive indicator system can be proposed accordingly.

For instance, Wang Hongmei, Zhang Qi and Huang Zhinan[4] divided the evaluation indicators of behavioral engagement into several dimensions for analysis. Zhao Chun, Shu Hang and Gu Xiaoqing[5] directly coded students' classroom behaviors, such as whether they actively raised their hands to answer questions, made eye contact with teachers, and other observable actions by recording and analyzing classroom videos. Zhang Si, Liu Qingtang and Lei Shijie[6] measured engagement from four dimensions: participation, concentration, regularity, and interaction. Li Xin and Li Yanyan[7] applied multimodal assessment approaches, incorporating indicators such as physical actions, learning motivation, and self-regulation. Cai Minjun[8] classified students' engagement patterns into four types: regular, balanced, actively participatory, and relaxed. Li Yanyan, Peng Yu and Kang Jia[9] focused on students' online behaviors, such as posting and replying in discussion forums.

Overall, the evaluation indicators can be categorized into three major dimensions: firstly, classroom-based behaviors (including online classes), such as class participation, attendance, engagement in discussions, and raising hands to answer questions; Secondly, process-based behavioral states, such as concentration, thinking, effort, and reflection during the learning process; Thirdly, self-regulatory behaviors, which reflect learners' self-monitoring processes, including planning, persistence, and feedback.

3.2. Information Technology–Enhanced Learning Environments Facilitate Research on Learning Behavioral Engagement

Under the background of digital empowerment, traditional learning environments have been transformed into technology-assisted instructional settings. A content analysis of the collected literature reveals that the measurement of learning behavioral engagement increasingly involves the use of artificial intelligence, computer vision, and related technologies to capture students' facial expressions and body movements. Currently, information technology–enhanced learning environments play a supportive role in the study of learning behavioral engagement, and they are expected to remain a key focus for future research in behavioral engagement assessment.

Data serve as the cornerstone for research on learning behavioral engagement. Technology-assisted learning environments facilitate more efficient and sophisticated data collection and analysis. Their advantages include: firstly, improved efficiency: Compared with traditional methods relying on manual observation and coding, technology-assisted approaches significantly enhance data collection efficiency. Secondly, integration of multimodal data: These environments allow for comprehensive analysis of data across multiple modalities, enabling a multidimensional characterization of learners' behavioral engagement and visual representation of behavioral structures. Thirdly, attention to dynamic learning processes: The temporal and spatial dynamics of learners' behaviors can be captured, providing a more detailed understanding of how engagement evolves over time and across contexts.

3.3. Multimodal Assessment Approaches as the Future Mainstream

A review of the literature reveals that current methods for evaluating learning behavioral engagement include self-reports, coding analysis, log analysis, observational evaluation, intelligent measurement, and multimodal assessment approaches.

First, self-reports typically involve learners actively reporting their attention and engagement during the learning process through written surveys or questionnaires. This method is widely used due to its ease of administration and operational feasibility. However, it is strongly influenced by subjective factors and provides limited access to process-oriented data.

Second, coding analysis refers to qualitative analysis of students' videos, audio recordings, or content. Traditional

evaluation methods often rely on a single measurement, with very few studies combining three or more methods. For example, Cai Minjun[8] designed scoring criteria (low, medium, high) for both explicit and implicit behavioral dimensions. Compared with self-reports, coding analysis can capture process-oriented data, but its scalability is limited, restricting large-scale application.

Third, log analysis involves recording learners' behaviors on online platforms, including login frequency, time spent online, and forum participation. This approach is advantageous for tracking students' behavior before, during, and after classes.

Fourth, observational evaluation assesses learning behavioral engagement by observing student behavior in the classroom, often in combination with rating scales. Its advantages include high intuitiveness and immediacy, but it requires substantial time and human resources, as well as professional expertise of the observers.

Fifth, intelligent measurement employs computer technologies to capture and record students' learning behaviors in real time, facilitating observation by researchers. This method significantly improves efficiency but is generally limited to skeleton-based body movement information or the recognition of specific, isolated behaviors.

Sixth, multimodal assessment refers to the evaluation of engagement using multimodal data, which include both subjective and objective sources. Subjective data consist of self-reports, learning logs, and video or audio coding, whereas objective data include physiological measurements such as EEG and eye-tracking records. When combined, these data form a multimodal dataset.

Several Chinese researchers have proposed structured processes for multimodal assessment. For instance, Mou Zhijia[10] constructed a multimodal learning analytics workflow encompassing data collection, storage, annotation, processing, and extraction. Wang Weifu and Mao Meijuan[11] designed a similar multimodal analysis procedure. Generally, multimodal assessment involves four key stages: data collection, data processing, data integration, and data application. Accordingly, the multimodal evaluation of learning behavioral engagement can be summarized in three steps: first, constructing a representation framework for multimodal data; second, conducting exploratory analysis based on this framework; and third, evaluating students' learning behavioral engagement.

Regarding data collection in multimodal assessment, researchers have employed diverse devices, including questionnaires, video recordings, online learning platforms, computer vision technologies, and physiological sensors. These tools allow for the collection of behavioral, physiological, and psychological data during the learning process. After collection, data undergo preliminary processing and subsequent integration. This integration step is particularly critical, as it enables more comprehensive analysis than single-modality approaches and potentially enhances measurement accuracy. However, it also poses challenges, requiring consideration of temporal and spatial factors.

In summary, multimodal assessment mitigates the limitations of single-method evaluations by providing process-oriented data on student engagement. Although it is inherently complex and difficult to integrate logically, future research is expected to increasingly combine multimodal data with learners' behavioral, cognitive, and emotional dimensions, enabling more detailed and accurate assessments of learning behavioral engagement.

3.4. Limited Diversity in Data Analysis Methods for Learning Behavioral Engagement

In research on learning behavioral engagement, the data collected are predominantly analyzed using descriptive statistical methods, reflecting a relatively limited range of analytical approaches. In the future, more sophisticated analyses, such as correlation analysis and cluster analysis, could be applied to learning behavioral engagement data. Such approaches would allow researchers to explore engagement from multiple perspectives, providing comprehensive feedback for improving instructional effectiveness and offering students targeted guidance for self-improvement.

3.5. Limited Research on Learning Behavioral Engagement Based on the Learning Process

A simple tally of the evaluation methods in the collected studies indicates the following distribution: coding (7 studies), observation (4 studies), questionnaire surveys (4 studies), video analysis (1 study), content analysis (2 studies), computer vision technology (1 study), and other methods (mostly 1 study each). It is evident that most researchers tend to adopt outcome-based measures of learning behavioral engagement, such as coding and questionnaires. Previous studies have also noted that the majority of learning engagement research relies on questionnaire-based assessments. These approaches primarily evaluate students' learning behaviors after the learning activity has taken place, for example, through responses in post-learning surveys, which makes it difficult to avoid the influence of subjective factors.

The main reason for the prevalence of outcome-based methods is their simplicity, feasibility, and efficiency in data collection. In contrast, process-based assessment of learning behavioral engagement involves capturing and measuring students' behaviors during the learning process. Examples include recording classroom behaviors using video software or measuring eye movements with computer vision technology. However, conducting research based on process-oriented data requires careful consideration of multiple factors and demands a high level of expertise from researchers.

4. Conclusion

Effective evaluation of learning behavioral engagement enables more timely and accurate prediction of students' learning outcomes and constitutes a key factor influencing learning performance. This study employed a systematic literature review to examine research on the evaluation of students' learning behavioral engagement from 2015 to 2025. The analysis reveals that research in this field has shown a gradually increasing trend over the past decade. While researchers have employed various assessment methods, there remains a lack of a unified measurement framework and standardized research methodologies. Looking ahead, multimodal assessment approaches are expected to be a major focus, and several directions can be pursued to advance the field.

First, the development of a unified indicator system for evaluating learning behavioral engagement is essential. Core behavioral indicators typically include concentration, initiative, persistence, agency, and reflectiveness. Establishing a standardized evaluation framework would facilitate more effective research, enabling consistency and comparability across studies. In the current context of digitally empowered learning environments, designing scientifically grounded and consistent indicators can further enhance the accuracy and reliability of behavioral engagement assessments.

Second, the application of multimodal data analysis methods should be explored. With the advancement of data science, reliance on single-source descriptive statistical analyses has become insufficient. Integrating diverse data analysis techniques, such as cluster analysis and correlation analysis, can improve the comprehensiveness, relevance, and accuracy of insights derived from learning behavioral engagement data.

In conclusion, methods for effectively assessing learning behavioral engagement remain in an exploratory stage. Future research should continue to conduct empirical studies on multimodal assessment approaches to advance both methodological rigor and practical applicability.

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References

[1] Fredricks, J. A., Blumenfeld, P. C., Paris, A. H. School engagement: potential of the concept, state of the evidence[J]. Review of educational research, 2004, 74(1): 59-109.

[2] Patrick, B. C., Skinner, E. A., Connell, J. P. What motivates children's behavior and motion? Join the effects of perceived control and autonomy in the academic[J]. Journal of personality& Social Psychology, 1993, 65(4): 781-790.

[3] Wang, X., Gao, M., & Li, J. Research progress on learning behavioral engagement in China from the perspective of learning analytics[J]. Journal of Shangrao Normal University, 2021, 41(01), 115–120.

[4] Wang, H., Zhang, Q., & Huang, Z. An empirical study of learning behavioral and cognitive engagement in open learning environments[J]. Modern Educational Technology, 2019, 29(12), 48–54.

[5] Zhao, C., Shu, H., & Gu, X. Measurement and analysis of students' classroom learning behavioral engagement based on computer vision technology[J]. Modern Educational Technology, 2021, 31(06), 96–103.

[6] Zhang, S., Liu, Q., & Lei, S., et al. Research on learners' engagement in online learning spaces: Big data analysis of online learning behaviors[J]. China Educational Technology, 2017, (04), 24–30+40.

[7] Li, X., & Li, Y. Construction and application of a digital representation model of learning engagement in collaborative learning scenarios[J]. Chinese Distance Education, 2022, (08), 70–77.

[8] Cai, M. New explorations of learners' online learning behavioral engagement: Construction of an assessment model based on point-line-plane methods[J]. China Educational Technology, 2023, (08), 84–93.

[9] Li, Y., Peng, Y., Kang, J., et al. Construction and application of an analytical model of group learning engagement in online collaborative learning[J]. Chinese Distance Education, 2020, (2), 40–48+77.

[10] Mou, Z. Multimodal learning analytics: A new growth point in learning analytics research[J]. Research in Educational Technology, 2020, 41(5), 27–32+51.

[11] Wang, W., & Mao, M. Multimodal learning analytics: New approaches to understanding and evaluating authentic learning[J]. Research in Educational Technology, 2021, 42(2), 25–32.