OPEN ACCESS

Kashf Journal of Multidisciplinary Research
Vol: 03 - Issue 03 (2026)
P-ISSN: 3007-1992 E-ISSN: 3007-200X
https://kjmr.com.pk

LEARNING ANALYTICS, MOTIVATION, AND ACADEMIC PARTICIPATION IN HIGHER EDUCATION

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DOI: (*https://doi.org/10.71146/kjmr945*)

Article Info

Abstract

This study examined the relationship of learning analytics with students' motivation and academic participation in higher education. The study was quantitative in nature and employed a correlational research design. The population consisted of university teachers working in public sector universities of Punjab, Pakistan. A sample of 395 university teachers was selected to collect data through a structured questionnaire measuring learning analytics, students' motivation, and academic participation. The questionnaire covered key dimensions of learning analytics, including digital tools and dashboard integration, assessment rubrics, institutional vision, and institutional policy challenges. Data were analysed through descriptive statistics, Pearson correlation, and regression analysis. The findings revealed a significant positive relationship between learning analytics and students' motivation. Similarly, learning analytics was significantly associated with academic participation. Regression results further indicated that learning analytics significantly predicted both students' motivation and academic participation. These findings suggest that the effective use of learning analytics can support data-informed teaching, timely feedback, academic monitoring, and student engagement in higher education. The study concludes that learning analytics should not be treated merely as a technological or administrative tool; rather, it should be integrated as a pedagogical practice that supports motivation and participation. The study has important implications for university teachers, academic administrators, and policymakers seeking to improve student-centered learning through evidence-based educational practices.

Keywords: *Learning analytics, student motivation, academic participation, higher education, public universities, student engagement.*

Introduction:

Higher education is increasingly shaped by digital technologies that generate continuous information about students' learning behaviours, academic progress, participation patterns, and performance outcomes. The expansion of learning management systems, online assessment platforms, digital classrooms, and technology-supported feedback has changed how universities understand teaching and learning. In this context, learning analytics has emerged as an important field concerned with the collection, analysis, and interpretation of educational data for improving learning processes, instructional decision-making, and student support (Ferguson, 2012; Siemens, 2013). Rather than viewing student data only as administrative information, learning analytics allows universities to use evidence for identifying learning needs, monitoring progress, and supporting students through timely academic interventions. Learning analytics is not merely a technical process of collecting and reporting data; it is also a pedagogical practice that can influence how students understand their learning, regulate their academic behaviour, and respond to feedback. In higher education, learning analytics may include digital tools, dashboard integration, assessment rubrics, online participation records, performance indicators, and institutional mechanisms for monitoring academic progress. These tools can help instructors identify students who need support, provide feedback at appropriate stages, and improve the alignment between teaching practices and students' learning needs (Ifenthaler & Yau, 2020; Viberg et al., 2018). However, the educational value of learning analytics depends on how effectively data are translated into meaningful feedback, student support, and instructional improvement.

Students' motivation is a central factor in higher education because it influences effort, persistence, goal orientation, academic responsibility, and willingness to engage with learning tasks. Motivation enables students to continue learning despite academic challenges and supports their active involvement in both classroom and digital learning environments. From the perspective of self-determination theory, students are more likely to become motivated when learning environments support autonomy, competence, and relatedness (Ryan & Deci, 2020). Learning analytics may contribute to these motivational processes by helping students understand their progress, identify areas for improvement, and receive feedback that supports self-regulated learning. When students can monitor their performance and see clear evidence of their academic development, they may become more confident, goal-oriented, and responsible in their learning. Academic participation is another important dimension of student engagement in higher education. It includes students' involvement in classroom discussions, assignments, peer learning, online activities, practical tasks, and academic communication with instructors and classmates. Student engagement is commonly understood as a multidimensional construct involving behavioural, emotional, cognitive, and social dimensions of learning (Bond et al., 2020; Fredricks et al., 2004). In this sense, academic participation is not limited to physical attendance; rather, it reflects students' active contribution to the learning process. Learning analytics can support academic participation by making students' learning behaviours more visible and by enabling instructors to respond to disengagement, low participation, or delayed academic progress.

The relationship between learning analytics, motivation, and academic participation is particularly important in public universities, where large class sizes, delayed feedback, limited individual monitoring, and uneven access to digital learning resources may affect students' academic experiences. In such contexts, learning analytics can provide a structured way to understand students' learning patterns and support evidence-based educational decisions. However, previous research also suggests that learning analytics should not be reduced to prediction, surveillance, or institutional reporting; its main purpose should be to enhance learning, strengthen feedback, and support student success (Guzmán-Valenzuela et al., 2021; Viberg et al., 2018). Therefore, examining learning analytics in relation to motivation and academic participation can provide a more student-centred understanding of its role in higher education. In Pakistan's higher education context, the use of digital learning platforms, online assessment practices, and data-supported teaching is gradually increasing. Public universities are becoming more familiar with learning management systems, digital tools, and technology-mediated academic processes. However, there remains a need to examine whether learning analytics meaningfully contributes to students' motivation and academic participation. Much of the existing literature on learning analytics focuses on technological systems, academic performance, and institutional decision-making, while comparatively less attention has been given to students' motivational experiences and participatory behaviour, particularly in public university contexts. This gap is important because learning analytics can only improve education when it is connected with students' actual learning experiences.

Therefore, this study examines the relationship of learning analytics with students' motivation and academic participation in higher education. Using an explanatory sequential mixed-method design, the study first investigates the quantitative relationship among learning analytics, motivation, and academic participation, and then uses qualitative insights to explain how students and instructors perceive and experience learning analytics in academic settings. This design is appropriate because quantitative findings can identify the strength and direction of relationships, while qualitative findings can explain how and why these relationships occur in real educational contexts (Creswell & Plano Clark, 2018). By integrating both forms of evidence, the study contributes to the growing discussion on data-informed education and provides useful insights for improving student engagement in higher education.

Objectives

1. To examine the relationship between learning analytics and students' motivation.
2. To examine the relationship between learning analytics and students' academic participation.
3. To determine the predictive role of learning analytics in students' motivation.
4. To determine the predictive role of learning analytics in students' academic participation.

2. Theoretical Framework and Hypotheses Development

Learning analytics provides a useful theoretical basis for understanding how educational data can support students' learning processes, motivation, and participation in higher education. It is commonly understood as the measurement, collection, analysis, and reporting of data about learners and learning contexts for the

purpose of understanding and improving learning (Ferguson, 2012; Siemens, 2013). In higher education, learning analytics is often applied through learning management systems, dashboards, digital assessment records, feedback tools, participation tracking, and institutional data systems. These tools make students' learning behaviours more visible and allow teachers and institutions to identify learning needs, provide timely feedback, and support students through evidence-based academic decisions (Ifenthaler & Yau, 2020; Viberg et al., 2018).

The present study is theoretically informed by the idea that learning analytics can influence students' engagement when educational data are transformed into meaningful feedback, academic guidance, and learning support. This view connects learning analytics with self-regulated learning and student engagement perspectives. Self-regulated learning theory suggests that students become more effective learners when they can monitor their progress, evaluate their performance, and adjust their learning strategies (Zimmerman, 2002). Similarly, student engagement theory explains that meaningful learning depends on students' behavioural, emotional, cognitive, and social involvement in academic activities (Bond et al., 2020; Fredricks et al., 2004). From this perspective, learning analytics may strengthen engagement by helping students understand their progress, remain connected with learning tasks, and respond more actively to academic expectations.

2.1 Learning Analytics and Student Motivation

Student motivation is one of the most important psychological factors in higher education because it influences students' effort, persistence, academic confidence, goal orientation, and willingness to continue learning. Self-determination theory provides a strong theoretical explanation for this relationship. According to this theory, students are more likely to become motivated when the learning environment supports their autonomy, competence, and relatedness (Ryan & Deci, 2020). In the context of learning analytics, digital feedback, progress indicators, dashboards, and assessment-related information may support students' sense of competence by showing them where they stand academically and what they need to improve. When students receive timely and understandable feedback, they may become more confident, goal-focused, and responsible for their own learning.

Learning analytics can also support motivation by promoting self-regulated learning. When students are given access to information about their learning progress, attendance, assessment performance, and online participation, they can compare their current performance with expected learning goals and adjust their study strategies accordingly. Research on learning analytics in higher education suggests that analytics-based feedback can help students monitor their academic progress and support more informed learning decisions (Ifenthaler & Yau, 2020; Viberg et al., 2018). Student-facing dashboards may also encourage students to reflect on their learning behaviour, identify weaknesses, and take corrective actions, which are important elements of motivational regulation and academic persistence.

Empirical studies have increasingly shown that learning analytics is related to students' learning behaviour, self-regulation, and academic success. Viberg et al. (2018) reviewed the landscape of learning

analytics in higher education and reported that learning analytics has been widely used to support learning processes, although its effectiveness depends on how analytics are designed and implemented. Similarly, Ifenthaler and Yau (2020) found that learning analytics can support study success by identifying students' needs and enabling timely intervention. Recent studies also emphasise that learning analytics should not be limited to prediction or performance monitoring; rather, it should support students' learning awareness, motivation, and active involvement in their academic development (Bergdahl et al., 2024).

However, the relationship between learning analytics and motivation is not automatic. If analytics are used only for institutional monitoring or technical reporting, students may not experience them as motivationally useful. Learning analytics becomes educationally meaningful when students understand the feedback, trust the data, and receive support from instructors to interpret and act upon it. Therefore, learning analytics may influence motivation most strongly when it is connected with clear feedback, academic guidance, student autonomy, and supportive teacher-student interaction. Based on this theoretical and empirical foundation, the following hypothesis is proposed:

H1: Learning analytics is significantly related to students' motivation.

H3: Learning analytics significantly predicts students' motivation.

2.2 Learning Analytics and Academic Participation

Academic participation is a key dimension of student engagement in higher education. It refers to students' active involvement in academic activities, including classroom discussion, assignment completion, online learning tasks, peer interaction, practical application, communication with instructors, and participation in learning platforms. Student engagement literature explains that participation is not limited to physical attendance; rather, it reflects behavioural, cognitive, emotional, and social involvement in the learning process (Bond et al., 2020; Fredricks et al., 2004). In this sense, academic participation represents the observable and practical side of student engagement.

Learning analytics can support academic participation by making students' engagement patterns more visible to teachers, students, and institutions. Through digital tools and dashboards, instructors can identify students who are less active in class activities, online learning platforms, assessments, or peer learning tasks. This information can help teachers provide timely reminders, targeted support, and feedback-based interventions. In higher education, analytics may also help students become more aware of their own participation by showing them their learning activity, submission patterns, attendance, and interaction with course materials. Such visibility can encourage students to become more active and accountable in their academic work.

The theoretical connection between learning analytics and academic participation can also be explained through student engagement theory. Engagement is strengthened when students receive meaningful feedback, experience academic support, and perceive learning tasks as relevant and manageable (Bond et

al., 2020). Learning analytics can contribute to these conditions by helping instructors understand students' participation patterns and by enabling students to monitor their own learning involvement. For example, data from learning management systems may show whether students are accessing course materials, submitting assignments on time, participating in online discussions, or interacting with learning resources. These indicators can help institutions respond to disengagement before it leads to poor academic outcomes.

Empirical literature also supports the connection between learning analytics and student engagement. Bergdahl et al. (2024) reported that higher education learning analytics research frequently examines engagement through behavioural indicators such as participation, interaction, and activity traces, while also calling for broader attention to cognitive, emotional, and social dimensions of engagement. Similarly, Johar et al. (2023) highlighted that learning analytics can be used to understand different types of student engagement and improve learning performance in online and digitally supported environments. These findings suggest that analytics-based information can help institutions understand how students participate in learning and how such participation can be improved through feedback and academic support.

Nevertheless, learning analytics may not automatically increase academic participation unless it is integrated into teaching practices and institutional support systems. Students may ignore analytics-based feedback if they do not understand its meaning, if instructors do not use it for academic guidance, or if institutional systems are poorly integrated. Therefore, the educational value of learning analytics depends on how effectively data are transformed into actionable feedback, supportive teaching, and student-centred interventions. In public universities, where student monitoring and feedback may be limited due to large class sizes and resource constraints, learning analytics can provide an important mechanism for strengthening participation. Based on this discussion, the following hypothesis is proposed:

H2: Learning analytics is significantly related to students' academic participation.

H4: Learning analytics significantly predicts students' academic participation.

3. Methodology

This study used a quantitative correlational research design to examine the relationship of learning analytics with students' motivation and academic participation in higher education. Although the original dissertation followed a mixed-method design, the present article reports only the quantitative survey-based findings. The population consisted of university teachers working in public sector universities of Punjab, Pakistan. The final sample included 395 university teachers, selected from different regions of Punjab to ensure representation of public universities across the province.

Data were collected through a structured questionnaire developed to measure three main constructs: learning analytics, students' motivation, and academic participation. Learning analytics included dimensions such as digital tools and dashboard integration, assessment rubrics, institutional vision, and

institutional policy challenges. Students' motivation included dimensions such as collaborative peer learning, parental involvement, student well-being, and goal orientation. Academic participation included behavioural engagement, compliance, practical application, and system integration challenges.

The validity of the questionnaire was ensured through expert review, while pilot testing was conducted with 30 university teachers who were not included in the final sample. Reliability was assessed through Cronbach's alpha, and the values were found to be within the acceptable range. Construct validity was further examined through exploratory factor analysis, including Principal Component Analysis with Varimax Rotation.

The collected data were analysed using descriptive and inferential statistics. Descriptive statistics were used to summarize respondents' demographic characteristics and variable trends. Pearson correlation was applied to examine the relationship between learning analytics, students' motivation, and academic participation. Regression analysis was used to determine the predictive role of learning analytics in students' motivation and academic participation. The level of significance was set at $p < .05$. Ethical considerations, including voluntary participation, confidentiality, and anonymity, were observed throughout the study.

4. Results

4.1 Descriptive Statistics

Descriptive statistics were calculated to examine the overall level of learning analytics, students' motivation, and academic participation. The results showed that all three constructs had high mean scores, indicating positive perceptions of learning analytics and its relationship with motivation and participation in higher education. The highest mean score was recorded for learning analytics ($M = 4.36$, $SD = 0.228$), followed by academic participation ($M = 4.29$, $SD = 0.268$) and students' motivation ($M = 4.25$, $SD = 0.323$). These findings indicate that university teachers perceived learning analytics as a useful educational practice for supporting students' motivation and academic participation.

Construct	**Mean**	**SD**
Learning Analytics	4.36	0.228
Students' Motivation	4.25	0.323
Academic Participation	4.29	0.268

4.2 Correlation Analysis

Pearson correlation analysis was applied to examine the relationship between learning analytics, students' motivation, and academic participation. The results revealed a strong positive and statistically significant relationship between learning analytics and students' motivation ($r = .761$, $p < .01$). Similarly, learning

analytics had a strong positive and statistically significant relationship with academic participation ($r = .794$, $p < .01$). The relationship between students' motivation and academic participation was also strong and significant ($r = .812$, $p < .01$). These results show that greater use of learning analytics is associated with higher student motivation and stronger academic participation.

Variables	r	Significance
Learning Analytics and Students' Motivation	.761	$p < .01$
Learning Analytics and Academic Participation	.794	$p < .01$
Students' Motivation and Academic Participation	.812	$p < .01$

Therefore, **H1** and **H2** were supported.

4.3 Regression Analysis

Regression analysis was used to determine the predictive role of learning analytics in students' motivation and academic participation. The results showed that learning analytics significantly predicted students' motivation ($\beta = .48$, $p < .01$) and explained 58% of the variance in students' motivation. Similarly, learning analytics significantly predicted academic participation ($\beta = .52$, $p < .01$) and explained 63% of the variance in academic participation. These findings indicate that learning analytics is not only related to motivation and participation but also serves as a significant predictor of both outcomes.

Dependent Variable	β	Variance Explained	Significance
Students' Motivation	.48	58%	$p < .01$
Academic Participation	.52	63%	$p < .01$

Therefore, **H3** and **H4** were supported.

5. Discussion

The purpose of this study was to examine the relationship of learning analytics with students' motivation and academic participation in higher education. The findings showed that learning analytics had a significant positive relationship with both students' motivation and academic participation. This indicates that when teachers use digital tools, dashboards, assessment data, feedback systems, and learning

management systems more effectively, students are more likely to demonstrate stronger motivation and greater participation in academic activities.

The positive relationship between learning analytics and students' motivation supports the view that analytics-based feedback can help students understand their learning progress, identify areas of improvement, and develop greater confidence in academic tasks. Learning analytics can provide timely information about performance, attendance, participation, and task completion, which may strengthen students' self-regulation and goal orientation. This finding is consistent with Self-Determination Theory, which suggests that motivation improves when learners experience competence, autonomy, and meaningful support in the learning environment (Ryan & Deci, 2020). When analytics are used as supportive feedback rather than as a monitoring tool, they can help students become more aware of their academic standing and more responsible for their learning.

The findings also showed a significant positive relationship between learning analytics and academic participation. This suggests that learning analytics can support students' active involvement in learning activities by making participation patterns more visible to teachers and institutions. Through learning management systems, online assessment records, dashboards, and participation tracking, teachers can identify students who are less engaged and provide timely academic support. This finding aligns with student engagement literature, which explains that participation involves behavioural, cognitive, emotional, and social involvement in learning activities (Bond et al., 2020; Fredricks et al., 2004). In this study, academic participation was understood as students' involvement in classroom activities, assignments, peer learning, practical work, and digital learning processes.

Regression results further indicated that learning analytics significantly predicted students' motivation and academic participation. This means that learning analytics is not only associated with these outcomes but also explains meaningful variation in them. This finding strengthens the argument that learning analytics should be viewed as a pedagogical tool, not merely as a technical or administrative system. The conceptual framework of the study also assumed that learning analytics provides teachers with information about students' learning behaviours, engagement patterns, and performance trends, which can help them provide feedback and adjust instructional strategies.

These findings are important in the context of public universities in Punjab, Pakistan, where digital learning systems are gradually becoming part of higher education. The results suggest that learning analytics can contribute to student-centred teaching if institutions use it for feedback, academic guidance, and instructional improvement. However, learning analytics should not be reduced to performance tracking alone. If analytics are used only to monitor students, their motivational value may become limited. Therefore, the effective use of learning analytics requires meaningful feedback, teacher training, institutional support, and ethical use of student data.

Overall, the findings support the argument that learning analytics can enhance higher education by connecting data-informed teaching with students' motivational and participatory behaviour. The study

contributes to the literature by showing that learning analytics is significantly related to both psychological and behavioural dimensions of student engagement. It also highlights the need for public universities to develop analytics practices that are pedagogically meaningful, student-centred, and supportive of academic improvement.

6. Conclusion

This study concluded that learning analytics has a significant positive relationship with students' motivation and academic participation in higher education. The findings showed that teachers' use of learning analytics, including digital tools, dashboards, assessment-related data, and feedback systems, is associated with higher levels of student motivation and stronger academic participation.

The study further concluded that learning analytics plays a predictive role in explaining students' motivation and academic participation. This means that analytics-based academic practices can help teachers understand students' learning patterns, provide timely feedback, and support students' involvement in academic activities. Learning analytics, therefore, should not be understood only as a technological system; it should be treated as an educational practice that supports teaching, learning, feedback, and student engagement.

In the context of public universities in Punjab, Pakistan, the study confirms the importance of integrating learning analytics into higher education practices. When used effectively, learning analytics can help universities move towards evidence-based teaching and student-centred learning. However, its success depends on institutional readiness, teacher training, ethical data use, and the meaningful transformation of student data into academic support.

7. Implications

7.1 Theoretical Implications

The study contributes to the theoretical understanding of learning analytics by linking it with students' motivation and academic participation. It supports the view that learning analytics should be examined not only from a technical or predictive perspective but also from motivational and engagement perspectives. The findings strengthen the relevance of Self-Determination Theory and student engagement theory in explaining how analytics-based feedback and monitoring can influence students' learning behaviour.

7.2 Practical Implications

The findings have practical implications for university teachers. Teachers can use learning analytics to identify students' learning needs, monitor participation, provide timely feedback, and support students who show signs of disengagement. Learning dashboards, assessment rubrics, LMS records, and

participation data can help teachers make better instructional decisions. However, teachers need proper training to interpret analytics data and use it for meaningful academic support.

7.3 Institutional Implications

Public universities should develop clear policies for the effective use of learning analytics. Institutions need to invest in learning management systems, integrated dashboards, digital assessment tools, and data-informed feedback mechanisms. Universities should also provide professional development opportunities so that teachers can use learning analytics confidently and ethically. Since the dissertation highlights institutional vision, digital tools, assessment rubrics, and policy challenges as important dimensions of learning analytics, universities should treat analytics implementation as an institutional priority rather than an individual teacher responsibility.

7.4 Policy Implications

At the policy level, higher education authorities should support the development of learning analytics frameworks for public universities. These frameworks should include guidelines for data privacy, ethical use of student information, teacher training, institutional accountability, and student support. Learning analytics policies should focus not only on performance prediction but also on improving motivation, participation, and learning experiences.

7.5 Implications for Future Research

Future researchers may extend this study by examining learning analytics from students' own perspectives. Further studies may also investigate the mediating or moderating role of self-regulated learning, digital literacy, teacher feedback, or institutional readiness. Longitudinal studies may provide deeper evidence about how learning analytics affects motivation and academic participation over time. Comparative studies between public and private universities may also provide useful insights into differences in digital readiness and analytics implementation.

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