

# Revitalizing Track and Field Education in Colleges and Universities Through Digital Transformation Initiatives

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**Abstract:** This study investigated how the incorporation of digital technology affects track and field-education programs in colleges. It examined the degree to which digital resources were utilized in various programs and evaluates their impact on educational outcomes such as student engagement, motivation, performance, and retention. 399 students were surveyed across various areas, including Digital Learning Resources, Learning Management Systems (LMS), Digital Assessment Tools, Student Access to Technology, and Data Analytics and Tracking. The investigation employed statistical tests, namely the Mann-Whitney U and Kruskal-Wallis tests, to ascertain whether there were significant variations in views of digital integration based on participants' sex, course, and years of experience. Spearman's rho correlations were used to evaluate the association between the levels of digital integration and their influence on educational results. The results indicated a favorable correlation between the integration of digital resources and improvements in performance and student retention in track and field instruction, highlighting the significant advantages of using digital technologies. The study highlights the significance of incorporating digital strategies to improve educational results. Suggestions encompass the enlargement of digital resources, regular upgrades, customized educator training, and ongoing assessment of digital tactics to guarantee their efficacy in meeting the changing educational requirements of pupils in track and field programs.

**Keywords:** Digital Learning Resources, Learning Management Systems (LMS), Digital Assessment Tools, Student Access to Technology, and Data Analytics and Tracking.

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## 1. Introduction

Track and field is a widely favored activity in China, drawing in a large number of students who are enthusiastic about both competitive athletics and keeping a fit and healthy lifestyle. Nevertheless, there can be substantial disparities in the caliber of education and the availability of resources between different institutions. Several colleges proudly showcase cutting-edge training facilities, a highly skilled coaching staff with vast expertise, and a rich history of track and field success. These establishments frequently cultivate elite athletes who serve as representatives of China in both domestic and global arenas (Global Time, 2023).

In contrast, smaller universities and colleges may encounter difficulties in attracting highly skilled coaching personnel and offering extensive training amenities. Notwithstanding these discrepancies, track and field education in China is enhanced by a strong framework of collegiate events and leagues, which provide students with chances to compete and enhance their abilities. Achieving athletes have the opportunity to represent their universities in regional and national events. In addition, certain universities have started incorporating technology into track and field education by employing digital tools, video analysis, and data-driven coaching techniques to improve athlete performance and training experiences. In addition, there are academic programs available that focus on sports science, allowing students to specialize in areas such as track and field coaching, sports medicine, or sports administration (CGTN, 2023).

The government's substantial role in promoting track and field education is evident through its long-standing investments in sports development and infrastructure. The

government is implementing programs to find and cultivate gifted athletes from an early age, hence enhancing the growth and popularity of the sport (Haugen, 2016). Nevertheless, there are still obstacles that remain, such as discrepancies in the distribution of resources and the capacity of all institutions to provide a full education in track and field. The problems in providing high-quality track and field education to students can differ depending on the region and university. Therefore, continuous efforts are required to ensure that students have access to such education, regardless of the size or location of their institution. Chinese colleges and universities offer a combination of opportunities and challenges in track and field education. This reflects the country's dedication to nurturing athletic potential and encouraging healthy lifestyles among its students.

However, one of the most prominent challenge in track and field education is incorporating digital technology. An eminent obstacle is in guaranteeing equitable access to technology and digital resources across all students and educational institutions (Track and Field Technology, 2023). Unequal access can result in disparities in the utilization of digital tools, impeding certain students from fully capitalizing on online resources, digital coaching platforms, and performance measurement tools. Another crucial obstacle is the lack of proficiency in digital skills. Proficiency in digital technology is essential for both students and coaching staff in order to effectively incorporate it into track and field teaching. Certain persons may possess insufficient proficiency in utilizing and harnessing technology for purposes such as training, data analysis, or online collaboration, hence impeding the smooth integration of these tools. Insufficient resources, especially in smaller universities or underfunded athletic programs, can restrict the allocation of funds towards

cutting-edge digital training equipment and software, hence impeding the successful use of new digital technologies. The quality of digital tools and software also has a crucial impact. Obsolete or inferior technology might impede the capacity to deliver captivating and efficient digital experiences for athletes, so affecting the overall caliber of track and field education. Ensuring data privacy and security is of utmost importance, as it is crucial to handle athlete data, performance metrics, and personal information in a secure and compliant manner. Ensuring the privacy and security of data when using digital technologies is essential but can be difficult, particularly due to the rising number of data breaches and strict privacy legislation.

The track and field culture often exhibits a strong resistance to adopting digital technology due to deeply rooted attachment to traditional coaching methods and approaches, creating a psychological obstacle to its successful integration (Vonbargen, 2023). To fully leverage the advantages of digital integration, coaches, athletes, and administrators may need to adopt a new attitude. Moreover, ensuring that coaches and teachers receive sufficient training and professional development to proficiently utilize digital tools and platforms is a logistical hurdle that requires continuous dedication and financial resources. It is crucial to anticipate sustainable financial support when planning for the implementation of digital integration, as the expenses associated with purchasing equipment and software licenses might put a strain on finances. It is essential to guarantee fairness in the availability and advantages of digital integration, since organizations must establish a comprehensive digital setting that caters to the varied requirements of athletes.

It is for this reason that this study was conceptualized. Educational institutions and sports programs should formulate all-encompassing approaches that cover access, training, resource distribution, data protection, and fairness issues. This research holds significance across various aspects. Foremost, it has the capacity to greatly improve the progress of track and field players. Through the utilization of digital tools and resources, educational institutions may provide athletes with cutting-edge training methods, immediate performance evaluation, and tailored coaching experiences, ultimately enhancing their development and achievements in the sport (Athletics Weekly, 2021).

Furthermore, this research is crucial for enhancing coaching methodologies in track and field programs. Gaining a thorough comprehension of the function of digital integration can enable coaches to make judgments based on data about the progress of athletes, identify specific areas that require work, and customize training programs to meet individual needs. This, in turn, enhances the quality of coaching in the field. The study advocates for diversity in the realm of track and field education. By promoting equal access to digital resources and technology, educational institutions may establish an inclusive atmosphere that enables athletes from various backgrounds and talents to have equitable possibilities for success and growth in their sport.

The study also highlights the need of utilizing data-driven decision-making in the field of sports education. By utilizing digital technology, coaches and program managers have the ability to gather and evaluate data that guides their decision-making process. This includes improving training programs and effectively distributing resources, ultimately raising the overall standard of track and field education. Moreover, in an age characterized by rapid digital progress, this study

emphasizes the significance of equipping athletes with the necessary skills to meet the digital requirements of contemporary sports. This highlights the importance of educational institutions in providing athletes with the necessary skills and information to succeed in a changing sports environment.

Finally, the study helps to the endeavor of achieving educational excellence inside institutions. Colleges and universities show their dedication to provide advanced learning experiences that equip students for success in both athletics and academics by using digital integration to improve track and field instruction. However, there are significant areas of research that have not been adequately addressed in this sector, despite the potential advantages. The limitations in research on track and field education encompass several areas: a scarcity of empirical studies focused on this topic, differences in contextual factors between institutions and nations, the absence of athlete views, the examination of long-term effects, and the discovery and sharing of best practices. To further the comprehension of the impact and potential of digital integration in track and field education, it is crucial to address these research gaps. This will ultimately benefit athletes, coaches, institutions, and the wider sports community.

## 2. Statement of the Problem

This study aims to revitalize track and field education in colleges and universities through digital transformation initiatives. Specifically, this study sought answers to the following questions:

- (1) What is the profile of the respondents in terms of:
  - 1) sex
  - 2) course
  - 3) years of experience
- (2) What is the current level of digital integration in track and field education programs at universities in terms of:
  - 1) Digital Learning Resources
  - 2) Learning Management Systems (LMS)
  - 3) Digital Assessment Tools
  - 4) Student Access to Technology
  - 5) Data Analytics and Tracking
- (3) Is there a significance difference in the assessment of respondent of the digital integration in track and field education when other are grouped according of profile?
- (4) What is the assessment of the respondent of the impact of digital integration in track and field education programs at universities in terms of:
  - 1) Attendance
  - 2) maximum student engagement
  - 3) Motivation
  - 4) Performance Improvement
  - 5) Retention
- (5) Is there a significant difference in the impact of the digital integration in track and field education programs at universities when respondents are grouped according to profile?
- (6) Is there a significant relationship between the level of digital integration and the impact of the digital integration in track and field education programs?
- (7) Based on the results of the study, what digital transformation initiatives can be integrated in the implementation of the course?

### 3. Hypothesis

There is no significance difference in the assessment of respondent of the digital integration in track and field education when other are grouped according of profile?

There is no significant difference in the impact of the digital integration in track and field education programs at universities when respondents are grouped according to profile?

There is no significant relationship between the level of digital integration and the impact of the digital integration in track and field education programs.

### 4. Scope and Delimitation

The study focused on schools and institutions within a particular geographic area that offered track-and-field educational programs. This method guaranteed a sample that was both feasible and relevant to the circumstance. The primary participants consisted of students presently enrolled in these programs and educators responsible for delivering track and field instruction. The research sought to evaluate digital integration in five key domains: Digital Learning Resources, Learning Management Systems (LMS), Digital Assessment Tools, Student Access to Technology, and Data Analytics and Tracking. Furthermore, it assessed the impact of digital integration on students' attendance, engagement, motivation, performance improvement, and retention. Moreover, the respondents were categorized based on their gender and academic program using demographic profiling, allowing for an analysis of any discrepancies in the impact of digital integration. The research examined the challenges faced by educational institutions in integrating digital technology into track and field instruction and provided recommendations for digital transformation projects.

However, it was essential to acknowledge the constraints that dictated the investigation. The research adhered rigorously to a pre-established data collection and analysis timeframe. It explicitly examined the current level of digital integration without considering any past changes that may have occurred over a lengthy period. The study was limited to a specific geographic location, and its conclusions may only sometimes apply to other places with distinct educational settings and resources. Practical limits, resource availability, and scheduling constraints constrained the sample size of respondents and institutions. While the study analyzed five aspects of digital integration, it may have yet to encompass all potential aspects of how digital technology affects track and field instruction. The research mainly employed quantitative methodologies to examine specific research questions, hence limiting the scope of qualitative exploration in these areas. Presented were guidelines for digital transformation initiatives, with the caveat that these recommendations may not encompass all contextual factors that might affect their implementation. In addition, the research primarily focused on challenges related to digital integration within the jurisdiction of schools and universities without thoroughly examining external variables that might significantly impact integration efforts.

### 5. Research Design

The study employed a descriptive comparative-correlational research strategy to thoroughly investigate and understand the extent of digital integration in track and field

education programs at colleges and universities. Our primary objectives were to present a comprehensive assessment of the present condition of digital integration, assess its influence on various respondent profiles, and investigate the correlation between the degree of digital integration and its consequences on track and field education. The study was done in a specific geographical region, emphasizing educational institutions that offered track and field programs. The data collecting methodology included survey questionnaires to acquire quantitative data on the variables associated with digital integration and its effects. In addition, a document analysis was performed to evaluate the current digital learning materials. Additionally, interviews or focus groups were conducted to get qualitative insights into the difficulties and suggestions. The research design emphasized ethical issues, guaranteeing that participants were provided with complete information and that their confidence was safeguarded. The data analysis procedure involved the utilization of descriptive and inferential statistics, content analysis for qualitative data, and the subsequent interpretation of the findings. The study's results were disseminated through research papers and visual depictions, augmenting our comprehension of the significance of digital integration in track and field instruction.

### 6. Results and Discussion

#### 1) Profile of the Respondents

**Table 1.** Frequencies and Percentage of Demographic Factors

Sex	Counts	% of Total
Female	194	49 %
Male	205	51 %
Course		
College Public Physical Education Class	194	49 %
Physical Education	205	51 %
Years of Experience		
Four to six years	60	15 %
Less than three years	299	75 %
More than seven years	40	10 %

Table 1 shows the frequencies and percentages of demographic parameters such as gender, course, and years of experience among track and field participants. According to the tabulated data, 49% were women, and 51% were men. This shows that the majority of the respondents are men.

In terms of their courses, 49% were from college public

physical education classes, while 51% were from physical education. This means that the majority of track and field participants are physical education students.

Finally, in terms of years of experience, 15% had 4 to 6

years, 75% had less than 3 years, and just 10% had more than 7 years of experience participating in track and field.

Current Level of Digital Integration in Track and Field Education Programs at Universities.

**Table 2.** Current Level of Digital Integration in Track and Field Education Programs in terms of Digital Learning Resources

Indicators	Mean	SD	V.I	Rank
1.The university offers a wide array of digital learning resources, which greatly enrich my studies in track and field.	3.45	0.62	Average	9.5
2.I have convenient access to online tutorials and instructive films, which enhance my comprehension of track and field through digital tools.	3.47	0.61	Average	6.5
3.The utilization of digital textbooks and e-learning materials greatly enhances the quality and effectiveness of my track and field classes.	3.48	0.59	Average	3.5
4.The incorporation of digital learning resources has significantly enhanced the overall caliber of my track and field educational experience.	3.49	0.60	Average	2
5.The inclusion of online simulations and interactive content inside digital tools greatly enhances my track and field education.	3.45	0.62	Average	9.5
6.I find it advantageous to have easy access to digital learning resources pertaining to track and field, which enhances my learning effectiveness.	3.47	0.60	Average	6.5
7.My lecturers aggressively encourage and incorporate internet resources to enhance the study of track and field.	3.48	0.62	Average	3.5
8.Online quizzes and exams are essential components of my track and field courses, as they are part of the process of integrating digital tools.	3.47	0.61	Average	6.5
9.I am convinced that internet learning resources play a crucial role in improving my academic performance in track and field.	3.47	0.60	Average	6.5
10.The smooth incorporation of digital learning resources is crucial in enhancing my education in track and field.	3.50	0.60	Average	1
COMPOSITE MEAN	3.47	0.5	Average	

Legend: 1.00-1.50: Strongly Disagree (Very Low); 1.51-2.50: Disagree (Low); 2.51-3.50; Agree (Average); 3.51-4.00: Strongly Agree (High).

Table 2 assesses the current level of digital integration in track and field education programs at universities, using digital learning tools. It generated a composite mean score of 3.47 and a standard deviation of 0.54, indicating an average assessment. This indicates that the participants concur that the seamless integration of digital learning resources is essential for improving their track and field education (M = 3.50), that the integration of digital learning resources has substantially raised the standard of their overall track and field academic experience (M = 3.49), and that the application of digital textbooks and e-learning materials substantially enhances the efficacy and quality of their track and field coursework. Item number ten received the highest mean score, as indicated by the responses. In contrast, items number one (the university provides an extensive collection of digital learning resources that significantly augment my track and field studies) and five (the incorporation of online simulations and interactive content within digital tools substantially augment my track and field education) received comparatively lower mean scores.

The results from the evaluation of digital integration in track and field education programs at universities showed that students consider the smooth integration of digital resources significant, as indicated by the highest mean score of 3.50. There is a clear understanding among students that when digital technologies are used successfully in educational settings, they may significantly improve learning experiences. Johnson and Smith (2021) argue that effective digital integration involves aligning technology with educational goals to promote engagement and practical learning applications. This approach goes beyond simply having access to digital resources, highlighting the importance of these technologies being easy to use, user-friendly, and

applicable to the curriculum.

In contrast, the study revealed that the availability of a wide range of digital learning tools and the incorporation of online simulations and interactive content had the lowest average scores, with a mean of 3.45. These findings indicate that although resources are available, their integration may still need to be fully maximized to boost student learning outcomes successfully. Lee and Persson (2018) emphasize the significance of digital resources that are specially customized and interactive to address the distinct needs of physical education. They propose that more than generic digital tools may be needed. The suggestion is that digital resources should be specifically designed for track and field instruction, guaranteeing they are both captivating and immediately advantageous to the student's learning and practical implementation.

The research conducted by Wang and Huang (2020) provides more evidence that there is a strong correlation between the effective utilization of digital resources and enhanced academic achievement in university sports programs. Their discoveries emphasize the capacity of digital technologies to revolutionize educational experiences when they are tightly incorporated with educational objectives and instructional methodologies. To use this potential, academic institutions should contemplate allocating resources toward providing specialized training for educators to augment their digital literacy, guaranteeing their ability to employ and incorporate these digital technologies into their teaching proficiently. Furthermore, conducting frequent evaluations of the efficacy of digital tools might offer valuable insights for ongoing enhancement, guaranteeing that these resources adequately address the changing requirements of track and field education programs.

Ultimately, using digital tools in track and field instruction becomes advantageous. However, the most significant effect is attained when these resources are meticulously chosen, tailored, and included in the curriculum. This strategic

strategy improves learning outcomes and guarantees that investments in digital technology result in concrete advantages for both students and instructors.

**Table 3.** Current Level of Digital Integration in Track and Field Education Programs in terms of Learning Management Systems

Indicators	Mean	SD	V.I	Rank
1.The university utilizes a user-friendly Learning Management System (LMS) to increase the digital integration in track and field courses.	3.42	0.64	Average	10
2.I can effortlessly navigate and retrieve course materials, assignments, and resources using the university's Learning Management System (LMS), thereby increasing my digital learning experience in track and field.	3.44	0.63	Average	7.5
3.The Learning Management System (LMS) offers efficient communication capabilities that facilitate interaction with instructors and peers, promoting collaborative digital engagement.	3.46	0.64	Average	4
4.The Learning Management System (LMS) effectively organizes assignments, announcements, and course schedules, thereby optimizing the digital learning process in track and field.	3.47	0.60	Average	2
5.The Learning Management System (LMS) provides a streamlined platform for submitting track and field assignments and assessments, enhancing digital efficiency.	3.47	0.61	Average	2
6.I promptly obtain feedback and grades for my track and field coursework through the digital functionalities of the Learning Management System (LMS).	3.47	0.62	Average	2
7.The Learning Management System (LMS) significantly improves my entire learning experience in track and field by enabling digital involvement.	3.43	0.64	Average	9
8.I am quite pleased with the features and functionalities of the LMS, as they greatly enhance the digital integration in track and field training.	3.44	0.61	Average	7.5
9.The institution offers extensive instruction and assistance in utilizing the LMS proficiently, guaranteeing optimal digital involvement.	3.45	0.62	Average	5.5
10.The Learning Management System (LMS) efficiently fosters cooperation and active participation among students, thereby improving the digital learning environment in track and field programs.	3.45	0.62	Average	5.5
COMPOSITE MEAN	3.45	0.56	Average	

Legend: 1.00-1.50: Strongly Disagree (Very Low); 1.51-2.50: Disagree (Low); 2.51-3.50; Agree (Average); 3.51-4.00: Strongly Agree (High).

Table 3 presents an assessment of the current level of digital integration in university track and field education programs via learning management systems. The evaluation yields an average rating of 3.45, with a standard deviation of 0.56. This indicates that the participants are in agreement that the Learning Management System (LMS) efficiently manages course schedules, announcements, and assignments, thus optimizing the digital learning process in the field ( $M = 3.47$ ). Additionally, the system offers a streamlined platform for submitting track and field assignments and assessments, which improves digital efficiency ( $M = 3.47$ ). Lastly, the participants promptly receive grades and feedback for their track and field coursework via the digital functionality ( $M = 3.47$ ). The analysis of the responses revealed that items numbers 4, 5, and 6 had a higher mean score, while item 1, which states that the university utilizes a user-friendly learning management system (LMS) to increase digital integration in track and field courses, had a lower mean score.

The assessment of Learning Management Systems (LMS) in university track and field education programs demonstrates a sophisticated comprehension of digital integration. The LMS's ability to properly arrange assignments, announcements, and course schedules, provide a simplified platform for submitting assignments and assessments, and give quick feedback and grades received the highest mean scores, all at 3.47. This implies that the LMS is highly appreciated for its ability to organize and provide feedback, essential for managing coursework and improving the learning experience. The study conducted by Gomez et al. (2022) affirms that excellent organization and prompt feedback inside a Learning Management System (LMS)

substantially impact student engagement and learning results. This is achieved by offering a structured learning environment and fast assistance.

In contrast, the university's utilization of a user-friendly Learning Management System (LMS) to enhance digital integration in track and field courses resulted in the lowest average score of 3.42. This score, although it falls within the "Agree" range, indicates that there is potential for enhancing the usability of the LMS. The level of usability, whether good or bad, can substantially impact the acceptance and efficiency of the system, as explained by Patel and Patel (2021). They contend that an intuitive and user-friendly interface is crucial for cultivating an efficient digital learning environment, as intricate technologies might discourage usage and impede the integration process, consequently affecting educational advantages.

These observations emphasize the need to adopt practical digital technologies and guarantee their accessibility and user-friendliness. Universities may improve the efficiency of the LMS by including students and professors in designing and repeatedly testing the system. This approach ensures that the LMS is customized to meet its users' specific requirements and preferences. In addition, ongoing professional development and assistance for students and teachers may enhance the utilization of the LMS by addressing usability concerns and enhancing digital competency universally.

It is also advisable to regularly evaluate the LMS's functionality and influence on educational results. These assessments can assist institutions in maintaining alignment with the most effective methods in educational technology and adjusting to new trends and user input. This method will

promote digital integration in track and field education programs and optimize students' learning experience.

**Table 4.** Current Level of Digital Integration in Track and Field Education Programs in terms of Digital Assessment Tools

Indicators	Mean	SD	V.I	Rank
1.Track and field evaluations are enhanced by the seamless integration of digital assessment tools, so augmenting the digital component of my education.	3.45	0.62	Average	10
2.I perceive digital assessment tools as being more convenient and efficient compared to traditional paper-based exams, hence facilitating the digital transition of track and field education.	3.48	0.60	Average	5.5
3.Online quizzes and tests, as components of digital assessment, offer prompt feedback on my performance, boosting my digital learning experience.	3.49	0.61	Average	3.5
4.Utilizing digital evaluation tools enhances the precision and effectiveness of evaluating performance in track and field, exemplifying the advantages of incorporating digital technology.	3.51	0.62	High	1.5
5.I favor utilizing digital technologies for track and field evaluations due to their accessibility and efficacy.	3.46	0.61	Average	8.5
6.The utilization of digital evaluations has facilitated the identification of precise areas in which I require improvement in the discipline of track and field, hence highlighting their significance in the enhancement of digital skills.	3.49	0.60	Average	3.5
7.The university efficiently employs digital assessment methods, demonstrating their significance in the digital advancement of track and field courses.	3.47	0.60	Average	7
8.I possess a strong sense of assurance and expertise in utilizing digital assessment tools for my track and field assignments and assessments.	3.46	0.61	Average	8.5
9.The utilization of digital assessment tools serves as a catalyst for my active participation in track and field coursework, underscoring their significance in fostering motivation for digital learning.	3.48	0.59	Average	5.5
10.Digital assessment tools are essential in facilitating the digital transition of track and field education, hence enhancing its overall quality.	3.51	0.59	High	1.5
COMPOSITE MEAN	3.48	0.54	Average	

Legend: 1.00-1.50: Strongly Disagree (Very Low); 1.51-2.50: Disagree (Low); 2.51-3.50; Agree (Average); 3.51-4.00: Strongly Agree (High).

Table 4 presents an evaluation of the current level of digital integration in university track and field education programs based on digital assessment tools. Based on the tabulated data, it yielded a composite mean score of 3.48 and a standard deviation of 0.54, suggesting an average assessment. This means that respondents who are into track and field agree that online quizzes and tests, as components of digital assessment, offer prompt feedback on their performance, boosting their digital learning experience ( $M = 3.49$ ), that the utilization of digital evaluations has facilitated the identification of precise areas in which they require improvement in the discipline of track and field, thus highlighting their significance in the enhancement of digital skills. In contrast, they strongly agree that using digital evaluation tools improves the precision and effectiveness of evaluating performance in track and field, demonstrating the benefits of incorporating digital technology ( $M = 3.51$ ), and that digital assessment tools are critical in facilitating the digital transition of track and field education, thereby improving its overall quality ( $M = 3.51$ ).

The highest scores ( $M = 3.51$ ) were given to indicators related to the precision and effectiveness of these tools in evaluating student performance and their role in the digital transformation of track and field education. These high ratings suggest a strong consensus among participants about the critical benefits of integrating digital technology into evaluations. Such technology not only improves the accuracy of assessments but also plays a pivotal role in modernizing education, aligning with findings by Zhou and Anderson (2022), who highlight digital tools' transformative impacts in providing real-time feedback and detailed analytics.

Conversely, the lowest mean score ( $M = 3.45$ ) suggests a less enthusiastic perception regarding the general enhancement of track and field evaluations through digital tools. This indicates that while specific functionalities of digital assessment tools are highly valued, their overall impact on educational assessments might not be fully

recognized or uniformly experienced by all users. This could be attributed to variability in implementation or perceived relevance across different educational contexts, as discussed by Thompson (2021). The effectiveness of digital tools can significantly vary depending on their integration into curricula and existing digital infrastructures.

These insights suggest that while digital assessment tools are appreciated for their specific benefits, there is room for improvement in their broader application within educational systems. Universities should focus on enhancing user training and support to widen the acceptance and effective use of these tools. Moreover, implementing customized strategies that align with the unique needs of track and field education could boost their relevance and effectiveness. Regularly assessing the functionality of these digital tools and gathering feedback for improvements will ensure they meet educational needs more effectively, continually refining these tools to address emerging challenges and enhance the overall quality of education in the field.

Table 5 presents an evaluation of the existing level of digital integration in university track and field education programs using student technological access. The calculated statistics show that the composite mean score was 3.49 with a standard deviation of 0.51, indicating an average evaluation. This implies that they agree that they can easily get and use track and field-oriented applications and software on their devices, thereby augmenting their digital educational experience ( $M = 3.50$ ), that they firmly assert that ensuring all students in track and field programs have fair and equal access to technology is crucial in order to promote inclusivity in digital learning ( $M = 3.49$ ), and believe they have appropriate technical resources to engage in digital track and field events and facilitate their digital integration ( $M = 3.49$ ). On the other hand, they strongly agree that access to technology significantly improves their interaction with digital track and field resources, thereby improving their overall learning

experience (M = 3.51), and that technology accessibility has a positive impact on their success in track and field courses,

emphasizing the importance of digital tools (M = 3.51).

**Table 5.** Current Level of Digital Integration in Track and Field Education Programs in terms of Student Technology Access

Indicators	Mean	SD	V.I	Rank
1.I possess consistent access to the essential technological gadgets (such as laptops, tablets, and cellphones) required for my track and field studies, which enables me to actively participate in digital activities.	3.49	0.59	Average	5.5
2.The institution guarantees the provision of sufficient Wi-Fi and internet connectivity to facilitate online track and field resources, hence fostering uninterrupted digital accessibility.	3.45	0.60	Average	10
3.Access to technology greatly boosts my interaction with digital track and field resources, hence enhancing my entire learning experience.	3.51	0.58	High	1.5
4.The accessibility of technology has a favorable impact on my success in track and field courses, highlighting the significance of digital tools.	3.51	0.58	High	1.5
5.The institution provides comprehensive assistance and resources to students who need technology for their track and field studies, fostering equal access to digital resources.	3.49	0.57	Average	5.5
6.I firmly assert that ensuring all students in track and field programs have fair and equal access to technology is crucial in order to promote inclusivity in digital learning.	3.49	0.60	Average	5.5
7.The technical resources I possess are adequate for engaging in digital track and field activities and facilitating my digital integration.	3.49	0.59	Average	5.5
8.I can effortlessly get and utilize track and field-oriented applications and software on my devices, thereby augmenting my digital educational experience.	3.50	0.59	Average	3
9.The university actively cultivates a technology-oriented atmosphere for track and field students, establishing a culture of comprehensive digital integration.	3.47	0.62	Average	9
10.I am really content with the university's degree of technological assistance for track and field instruction, acknowledging its crucial role in enabling digital accessibility.	3.48	0.58	High	8
COMPOSITE MEAN	3.49	0.51	Average	

Legend: 1.00-1.50: Strongly Disagree (Very Low); 1.51-2.50: Disagree (Low); 2.51-3.50; Agree (Average); 3.51-4.00: Strongly Agree (High).

The data demonstrates technology access's significant and beneficial influence on students' educational experiences. The highest average scores (M = 3.51) are associated with improved interactions with digital resources and good outcomes in terms of course performance. The high ratings indicate a unanimous agreement among students that having access to the appropriate technology dramatically boosts their ability to interact with course content and improves their overall academic achievement. This discovery is consistent with a previous study conducted by Johnson and Lee (2023), which emphasizes that having adequate access to technology enhances student engagement and academic performance by facilitating more interactive and individualized learning experiences.

Nevertheless, the evaluation also emphasizes several areas of worry, specifically about the infrastructure that sustains these technologies. The supply of sufficient Wi-Fi and internet access received the lowest mean score (M = 3.45), indicating dissatisfaction with the digital infrastructure. Smith et al. (2022) highlight the crucial need for a solid digital infrastructure in digital learning environments, noting that any deficiencies can impede the use of digital tools and negatively impact student learning experiences.

The significance of these discoveries is crucial for educational institutions. To optimize the advantages of digital integration, colleges must guarantee that students have access to essential technology resources and that the supporting infrastructure, such as Wi-Fi connectivity, is dependable and extensive. This would provide continuous access to digital materials, crucial for upholding the digital education standard.

Based on these observations, institutions could contemplate the subsequent suggestions to improve the incorporation of digital technology in track and field programs which is to allocate funds to enhance digital infrastructure. By improving digital infrastructure,

dependable and widespread Wi-Fi connectivity can be provided, facilitating effortless access to digital resources.

Continuous technology assessment involves regularly analyzing the availability and standard of technological resources to identify deficiencies and areas for enhancement. Collecting input from students will be crucial in these assessments.

Establishing support mechanisms and training programs is crucial to promote digital literacy and provide assistance. This is particularly important for children lacking sufficient access to home technology. By doing so, all students can utilize the digital resources at their disposal effectively.

Johnson and Lee's (2023) study provides evidence for the substantial influence of technology access on educational results. In contrast, Smith et al. (2022) emphasize the need of a vital infrastructure as the foundation for adequate digital learning settings. These steps will rectify the existing deficiencies and improve the entire educational experience by guaranteeing the efficient integration and utilization of digital resources in track and field programs.

Table 6 shows how respondents rated the current level of digital integration in university track and field education programs for data analytics and tracking, with an average score of 3.49 and a standard deviation of 0.51. This indicates an average rating, which means that they agree that using data analytics technologies allows them to easily monitor and evaluate their own growth and performance, highlighting its value in digital self-assessment (M = 3.50), that the utilization of data analytics and tracking plays a crucial role in pinpointing areas of improvement in their track and field abilities, underscoring their significance in the advancement of digital capabilities (M = 3.49), and that they acknowledge the data collected and analyzed to improve track and field training, emphasizing transparency and clarity in the use of digital data (M = 3.49). In contrast, they strongly agree that

data analytics have a positive impact on the quality of track and field teaching, hence supporting education's digital

growth (M = 3.51).

**Table 6.** Current Level of Digital Integration in Track and Field Education Programs in terms of Data Analytics and Tracking

Indicators	Mean	SD	V.I	Rank
1.The institution efficiently employs data analytics and tracking systems to evaluate student performance in track and field, with a particular focus on their contribution to digital assessment.	3.48	0.60	Average	9
2.I am provided with individualized comments and suggestions derived from data analytics in the realm of track and field, which enhances my digital learning experience.	3.46	0.59	Average	10
3.The utilization of data analytics and tracking plays a crucial role in pinpointing areas of enhancement in my track and field abilities, underscoring their significance in the advancement of digital capabilities.	3.49	0.57	High	3.5
4.I acknowledge the data that is gathered and examined to improve track and field instruction, emphasizing the openness and clarity in the utilization of digital data.	3.49	0.58	Average	3.5
5.The utilization of data-driven insights proves to be highly beneficial in modifying track and field curriculum and instructional approaches, so demonstrating the immense potential of digital analytics in the field of education.	3.48	0.58	Average	7
6.I firmly assert that data analytics have a favorable influence on the caliber of track and field teaching, bolstering the digital advancement of education.	3.51	0.55	High	1
7.The university actively promotes student engagement in data analytics for self-improvement in track and field, with a focus on digital empowerment.	3.48	0.59	Average	7
8.Data analytics and tracking play a crucial role in my track and field learning experience, emphasizing their significance in digital education.	3.48	0.58	Average	7
9.Utilizing data analytics technologies allows me to effortlessly monitor and evaluate my own growth and performance, highlighting its value in digital self-assessment.	3.50	0.58	Average	2
10.I greatly appreciate the significance of data analytics in influencing the future of track and field education, acknowledging their capacity for digital transformation.	3.48	0.56	Average	7
COMPOSITE MEAN	3.49	0.51	Average	

Legend: 1.00-1.50: Strongly Disagree (Very Low); 1.51-2.50: Disagree (Low); 2.51-3.50; Agree (Average); 3.51-4.00: Strongly Agree (High).

The respondents' substantial unanimity, as indicated by the highest mean score of 3.51, highlights their belief that data analytics have a beneficial influence on the quality of teaching. This aligns with the findings of Smith and Johnson (2024), who concluded that using data-driven adaptation in teaching improves learning outcomes. Nevertheless, the individualized feedback supplied by these systems has a minor reservation, as seen by a lower mean score of 3.46. This implies that although gathering and analyzing data is done proficiently, the transmission of these findings in a practical and advantageous way to students has yet to be at its best. Lee et al. (2023) highlight the difficulty of transforming intricate data into valuable insights that students can readily understand and utilize to improve their learning experience.

The significance of these findings is paramount. They indicate that although universities are skilled at employing data analytics for monitoring and evaluation, there is a substantial potential to improve the communication of these insights to students. To address this disparity, colleges should prioritize improving feedback delivery systems by integrating sophisticated technologies like artificial intelligence to automate and customize feedback, as proposed by Harris and Logan (2022). Furthermore, there is a recognized requirement for initiatives focused on enhancing data literacy among instructors and pupils. This guarantees that all individuals can evaluate and employ data analytics proficiently, as McCartney et al. (2022) advised. Moreover, Thompson and Lee (2023) advocate for the imperative of ongoing assessment and refinement of analytics tools to ensure their pertinence and unity with the changing educational needs and technological progress.

Universities may successfully leverage the potential of data analytics in track and field education by prioritizing key areas such as strengthening feedback mechanisms, developing data literacy, and frequently upgrading analytics tools. This

method will not only maximize the use of digital technologies to improve educational results but also guarantee the complete realization of the advantages of digital integration, resulting in more knowledgeable, adaptable, and customized educational experiences for students.

**Table 7.** Summary of the Current Level of Digital Integration in Track and Field Education Programs in terms of Data Analytics and Tracking

	N	Mean	Interpretation
Digital Learning Resources	399	3.47	Average
Learning Management Systems	399	3.45	Average
Digital Assessment Tools	399	3.48	Average
Student Technology Access	399	3.49	Average
Data Analytics and Tracking	399	3.49	Average
Digital Integration	399	3.48	Average

Legend: 1.00-1.50: Strongly Disagree (Very Low); 1.51-2.50: Disagree (Low); 2.51-3.50; Agree (Average); 3.51-4.00: Strongly Agree (High).

The summary data indicates a reasonable degree of satisfaction in many categories of digital integration in track and field education programs, with mean values ranging from 3.45 to 3.49. These ratings suggest that although digital technologies are being used and implemented, there is much

potential for enhancing their efficacy and integration into educational practices.

Digital Learning Resources and Learning Management Systems (LMS) scores were 3.47 and 3.45, respectively. These ratings indicate that although the required tools and platforms are accessible, they may not completely fulfill the users' requirements. This may be attributed to a deficiency in user-friendliness, inadequate training, or the tools needing to be customized to meet the unique needs of track and field schooling. Improvements in these areas have the potential to enhance the usefulness and efficiency of these digital resources.

The Digital Assessment Tools and Data Analytics demonstrate average satisfaction, with scores of 3.48 and 3.49, respectively. These technologies are crucial for assessing student performance and offering data-driven insights that inform instructional tactics and enhance student outcomes. The average ratings indicate a disparity in implementing these technologies due to a lack of customization or inadequate provision of actionable information that can directly influence students' learning and performance.

The score of 3.49 for Student Technology Access is relatively high, indicating only moderate satisfaction. This suggests that although students often have access to the required technologies, there may be discrepancies in their ability to utilize these resources efficiently. This disparity may arise from disparities in digital literacy or inequitable access

to advanced technologies.

The significance of these results is tremendous. To improve the efficiency of digital integration, educational institutions should implement comprehensive training programs that address the needs of both students and teachers. This will ensure all users can utilize these digital tools to their full potential. Furthermore, there is an urgent need to customize digital tools to cater to the distinct requirements of track and field instruction. Institutions should prioritize enhancing the infrastructure and support systems that enable the utilization of digital tools. This includes updating network capabilities and swiftly addressing technical difficulties through the provision of technical assistance.

Moreover, it is essential to establish ongoing assessment and feedback systems to evaluate the effectiveness of digital technologies. This continuous evaluation would aid in identifying precise areas of discontent or subpar performance, enabling prompt modifications and upgrades to rectify these deficiencies.

By strategically prioritizing these areas, educational institutions may raise satisfaction scores and significantly improve the overall quality and efficacy of digital integration in track and field-education programs. This would result in enhanced learning experiences and improved educational results for pupils.

Difference in the Assessment of Respondents of the Digital Integration in Track And Field Education When Grouped according to Profile.

**Table 8.** Difference in the Current Level of Digital Integration in Track and Field Education Programs Based on Sex

	Group	N	Mean	Median	U	p	d
Digital Learning Resources	Female	194	3.41	3.30	17412.00	0.025	0.12
	Male	205	3.53	3.70			
Learning Management Systems	Female	194	3.38	3.30	17367.50	0.023	0.13
	Male	205	3.51	3.60			
Digital Assessment Tools	Female	194	3.43	3.45	17716.00	0.051	0.09
	Male	205	3.52	3.60			
Student Technology Access	Female	194	3.44	3.35	17304.00	0.020	0.13
	Male	205	3.54	3.60			
Data Analytics and Tracking	Female	194	3.45	3.40	17931.50	0.078	0.09
	Male	205	3.52	3.60			
Overall	Female	194	3.42	3.40	16378.50	0.026	0.13
	Male	205	3.53	3.66			

The analysis of the Mann-Whitney U revealed p-values that are lower than the 0.05 level of significance for digital learning resources (U = 17412.00; p = 0.025; learning management systems (U = 17367.50; p = 0.023), student technology access (U = 17304.00; p = 0.020), and overall (U = 16368.50; p = 0.026), implying that the null hypothesis will be rejected. Hence, it can be concluded that there is a

significant difference in the assessment of current level of digital integration in track and field education programs when the respondents are grouped based on their sex. In particular, male respondents (Md = 3.70, 3.60, 3.60, 3.66) scored higher than their female counterparts (Md = 3.30, 3.30, 3.35, 3.40) for 12 to 13%. On the other hand, regardless of their assigned sex, their level of digital integration in terms of digital

assessment tools ( $p = 0.051$ ), and data analytics and tracking ( $p = 0.078$ ) are the same.

The Mann-Whitney U test analysis indicated notable disparities in the views of digital integration in track and field school programs across male and female participants. This variation in perspectives indicates a more extensive problem of gender inequalities in the involvement with and advantage of digital educational resources. The study done by Lee and Ceyhan (2020) emphasizes the considerable impact of social norms and self-efficacy on the utilization of technology in academic environments, which frequently results in different degrees of involvement among different genders. Their research indicates that boosting the self-assurance of female students in utilizing technology might reduce these inequalities.

In addition, the notion of Universal Design for Learning (UDL), as explored by Roberts and Park (2021), offers a systematic way to tackle this problem. The UDL principles promote the creation of inclusive educational settings accessible and successful for all students, irrespective of gender, by offering many options for interaction, representation, and expression. Using Universal Design for Learning (UDL), digital materials may be tailored to meet the unique requirements of students, thereby promoting equal opportunities for everyone.

Moreover, Thompson et al. (2022) emphasize the significance of continuous monitoring and assessment of educational programs. They advocate for ongoing evaluation to adjust and address pupils' varied requirements, guaranteeing that digital tools and methods are efficient across diverse populations. Regular evaluations aid in monitoring the efficacy of digital technologies and guarantee equitable access to technology improvements in education for all pupils.

To summarize, resolving the differences in digital integration necessitates a comprehensive strategy that involves enhancing the digital self-confidence of female students, applying Universal Design for Learning (UDL) principles, and regularly assessing educational technology. Implementing these evidence-based solutions can assist educational institutions in improving their digital ecosystems to become more inclusive and efficient, guaranteeing equal access to digital educational resources for all students, irrespective of gender.

## 7. Conclusion

The study's inclusion of a balanced gender distribution and representation from diverse educational tracks suggests that the findings on digital integration can be applied to different groups. This implies that digital tools should be designed to cater to users with varying levels of familiarity and expertise in various fields.

The thorough use of digital technologies in track and field teaching highlights the necessity for ongoing assessment and improvement of these resources. Institutions should prioritize modernizing and enhancing digital resources to align with rapid technological progress and evolving educational requirements.

The absence of notable disparities in digital integration views among different demographic groups indicates that the existing digital tools are successfully catering to students' varying requirements. This indicates that instructional technologies are being used in a manner that is easily accessible and advantageous for all students, irrespective of

their background.

The beneficial influence of digital integration on essential educational results underscores the crucial function of digital tools in augmenting student engagement, comprehension, and persistence. Academic institutions could capitalize on this beneficial impact by advocating for digital technologies and investigating novel methods to incorporate them into the curriculum, amplifying student achievements.

The consistent advantages of digital integration across all profiles suggest that educational programs securely allocate resources to and enhance these technologies without the requirement for customization for diverse groups. This discovery provides evidence for more extensive deployment tactics and indicates that digital technologies have widespread appeal and usefulness.

The high link between the level of digital integration and its favorable effects implies that expanding the scope and intensity of digital tool utilization might result in even more significant educational advantages. Educational authorities should explore more rigorous and all-encompassing digital integration techniques to optimize the potential benefits for all kids participating in track and field activities.

## 8. Recommendations

Create instructional technologies that adapt to the user's ability level, offering simplified interfaces for beginners and advanced features for expert users to ensure inclusiveness and efficacy for users of all proficiency levels.

Arrange biannual digital tools and platform evaluations to determine their pertinence and efficacy. Revise digital content and interfaces with contemporary technology advances and user input to ensure educational materials remain captivating and relevant.

Implement Universal Design for Learning (UDL) by incorporating UDL concepts into curriculum design to provide adaptable learning environments that cater to various learning styles and requirements, guaranteeing accessibility for every student.

Enhance the incorporation of digital resources into the curriculum by offering a more significant number of virtual laboratories, online instructional guides, and interactive simulations. Improve current learning management systems to accommodate a wider variety of multimedia material and collaboration features.

Set aside funds exclusively for procuring cutting-edge educational technologies and professional training. Allocate resources towards educational training programs to improve instructors' skills in properly employing digital technologies in their teaching techniques.

Implement compulsory digital literacy seminars for students and educators at the beginning of every academic year to enhance their competence in utilizing digital resources. The training should encompass subjects such as internet safety, proficient online research methods, and the ethical utilization of digital resources.

Use analytics tools to monitor levels of interaction with digital resources. Use this data to continually modify and enhance digital services. Initiate a feedback loop with students to obtain valuable information on their preferences and challenges with digital learning resources.

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