EDUCATIONAL MANAGEMENT OF PERSONALIZED LEARNING PATHS BASED ON BIG DATA IN YUNNAN

Jialu Xiang
Student of Master in Educational Administration, Suan Sunandha Rajabbat University
E mail: s67561802129@ssru.ac.th
Suttipong Boonphadung
Graduate School, Suan Sunandha Rajabhat University
E-mail: suttipong.bo@ssru.a

Abstract:

This paper examines the use of big data in managing personal learning paths in Yunnan. The study is set in a region with many ethnic groups and uneven development. Global research shows that real time data and adaptive systems can make learning more personalized for each student. Local practice in Yunnan still faces many challenges. The study identifies four key problems in universities: weak digital infrastructure, centralized governance, low teacher data skills, and limited culturally responsive design. Most systems do not reflect local culture. The findings suggest that effective management requires more than technology. It needs flexible governance, clear teacher training, basic rules for data use, and tools that match local needs. Insights from other countries offer useful guidance. Using these lessons, universities in Yunnan should develop a data plan that aligns with the local social and educational context.

Key words*:* educational management; personal learning paths; big data

Introduction

Global education reform views personalized chemistry learning as a key approach to promote equity (White et al., 2021). Big data analysis can provide clear diagnosis and adaptive teaching that meet the needs of each learner (Cantabella et al., 2019). The UNESCO and OECD frameworks say that personalized, data driven practice is essential to build an inclusive and future focused education system (UNESCO, 2023). This approach works well in regions with low resources and high diversity (OECD, 2022).

China's education information strategy prioritizes personalized learning (Li, Wang, & Zhang, 2020). There are twenty five ethnic minorities, complex terrain, and uneven resource distribution in Yunnan. The province is faced with special management problems (UNESCO, 2023). Existing literature show the technological advantages of personal learning, but lacks depth implementation analysis (OECD, 2022). In Yunnan, provincial data platforms are fragmented so that many teachers have low skills in using data. There are gaps between the Digital Yunnan 2025 plan and the way county level finance is carried out (Yunnan Provincial Department of Education, 2023).This article looks at two main questions. How can learning analytic find the cognitive, cultural, and motivational traits of minority students? How do governance structures, teacher training models, and ethics rules help or limit culturally

responsive personalized learning paths? The study will create a framework based on real data. This framework will give clear and practical guidance for education administrators and policymakers in Yunnan and other places with many channels and few resources.

Educational Management under Personal Learning Paths

Managing personal learning in schools requires more than just new tools. It also needs changes in school rules, teacher skills, and how staff work together. Many scholars argue that flexible school policies help teachers respond better to students' actual learning needs (Hills & Peacock, 2022). In practice, teachers with more autonomy often take stronger ownership of student progress.

Teaching methods are also important. Adjusting teaching based on student needs is not a new idea. This includes considering students' learning habits, cultural backgrounds, and motivation (Salili, Chiu, & Hong, 2001). Doing this effectively requires proper training. In many schools with limited resources, teachers still lack support to use data in simple and useful ways (Darling-Hammond et al., 2017).

The effectiveness of technology in schools depends largely on people. If teachers do not trust or understand a new system, they may not use it fully. This shows that beliefs and teamwork matter as much as the technology itself (Ertmer et al., 2012). In regions like Yunnan, with many languages and cultures, management must also respect local learning practices (Gay, 2000).

Personalized learning can succeed if schools support flexible teaching, build teacher capacity, and adapt tools to local needs. More research is needed to understand how these strategies work in diverse, low resource areas such as Yunnan (Li et al., 2022).

Educational Management of Personal Learning Paths under Big Data

The use of big data in education has changed how schools and universities are managed. In the past, many school systems followed fixed plans that rarely adjusted. Today, with more digital tools, schools can respond faster to students' needs. Big data allows schools to track how students learn, what they prefer, and where they struggle. This helps teachers and school leaders make faster and more accurate adjustments to teaching plans and interventions (Ifenthaler & Yau, 2020).

As personalized learning becomes more common, schools also need stronger systems to manage how data is collected, used, and protected. These systems must include technical tools and teaching practices that respond to student feedback. Clear protocols for data privacy and use are also essential to ensure trust among students and families.In practice, data allows schools to spot problems early. If a student stops participating in class or fails to complete tasks, this can appear in a learning report. With appropriate tools, such as learning dashboards, schools can provide timely support before students fall too far behind (Siemens & Long, 2011). Using data in this way also changes how people work together in schools. It encourages teachers, technology teams, and leaders to share information and decisions rather than working in isolation, creating a more collaborative learning environment (Marsh & Farrell, 2015).

Practical Use and Ethical Considerations of Big Data

One major challenge is combining different types of data. Data comes from many sources, including online learning platforms, test systems, face scans, and school records. To better understand students, these sources must be integrated into a single system (Gonzalez-Sancho & Vincent-Lancrin, 2016). In Yunnan, city schools and rural schools have very different levels of digital access. This makes it harder to create one shared system without support from local governments or school networks.

Schools must also address data ethics. Students and families need to know what data is collected and how it is used. In regions with many cultures and languages, like Yunnan, this issue is especially important. School leaders must establish clear rules to protect student rights (Slade & Prinsloo, 2013). Big data is no longer just a tool. It guides how schools manage learning. To make it effective in areas with limited resources, schools need proper policies, trained teachers, and local systems that understand students' needs and cultures.

Challenges in Managing Personal Learning Paths in Yunnan

In Yunnan universities, managing personalized learning paths is not a simple task. Many schools face real limits in both structure and daily practice. These limits make it hard to apply big data tools in a way that truly supports learning.

One clear challenge is the uneven access to digital resources. In cities, some schools have learning systems and data tools. In rural areas, many campuses still do not have stable internet or useful digital platforms. Without these tools, collecting and using student data becomes very difficult (Kosar-Altinyelken, 2011). From my own visits to schools in different counties, I saw that some teachers still rely on paper based records because they lack digital access.Another issue is the skill level of teachers. Many educators have not received proper training in how to read data, use digital tools, or think about how technology can help teaching. This makes it hard for them to change lessons based on what students need (Darling-Hammond et al., 2017). If teachers do not feel confident with data, they are less likely to use it in class.

Concerns

The region's cultural and language diversity creates additional challenges. Many students belong to minority groups, and their learning styles or home languages may not fit the standard teaching model. Most systems are designed for one type of learner and do not account for local traditions or bilingual settings. Without careful design, personalized learning may leave some students behind rather than supporting them (Gay, 2000).School management also affects this work. In many cases, important decisions are made only at the top level. This prevents teachers from acting quickly on student data or adjusting lessons when needed (Daniel, 2015). This slows efforts to improve learning through data.A major concern is how data is handled. Many schools lack clear rules for using student information or obtaining proper consent. This is risky, particularly for students from groups that have historically faced unfair treatment (Slade & Prinsloo, 2013). Students and families may lose

trust if they believe their data is not secure.

Most research on this topic comes from wealthier countries with stronger digital systems. These approaches do not always match the real conditions in places like Yunnan, where schools face many local constraints (Li et al., 2022).

International Benchmarks

In different parts of the world, Several regions share the same difficulties that Yunnan is currently facing. These include poor infrastructure, many spoken languages, and big differences between city and village schools. Some international projects have tried to use big data to improve learning under these conditions. Their results give us useful ideas to think about.

In South Africa, the education department used a simple record system that works even when the internet is not stable. This system brings together learning data from mobile phones, test scores, and attendance records. The goal was to find students who were at risk of dropping out and help them early (Prinsloo & Slade, 2016). What made this system work was not high technology, but local thinking. The system used local languages and simple tools that teachers could use without much training.

India also gives a helpful model. In some rural areas, schools used large digital platforms to follow how students learn. These systems could check student progress and adjust test levels based on performance. More importantly, they were linked to training programs for teachers. The training helped teachers learn how to read student data and also showed them how to respect different cultures in their classrooms (Gay, 2000).

In Latin America, Colombia tried something different. Their "Education for Peace" program used both data and feedback from the local community. This helped schools in areas affected by conflict to change their lessons to fit students' needs. By including parents and local leaders in the process, the system made sure that learning respected local culture and knowledge (Arswimba et al., 2023).

Indonesia gives another experience. In the eastern provinces, where land and internet access are big problems like in Yunnan, schools used cloud systems that were small and flexible. These systems helped remote schools report data easily. At the same time, the government allowed local officers to make their own decisions using the data, without waiting for orders from the top level (GOV.UK, 2012), which helped schools respond faster to student problems.

From these cases, we can learn four things. First, tools must match local needs, not just be high tech. Second, teachers must be trained in ways that link directly to their teaching work. Third, personalization needs to respect local languages, habits, and ways of learning. Last, schools must be open about how data is used. When people feel their voices are heard, they are more likely to trust new systems.

Big Data to Address the Challenges

Yunnan universities face many challenges in building personalized learning paths. These challenges arise from large differences between urban and rural areas, the level of

teacher training, the variety of cultures and languages in classrooms, strong top down control in decision making, and rising concerns about how data is used (Daniel, 2015; Darling-Hammond et al., 2017; Slade & Prinsloo, 2013). Despite these issues, big data still provides an opportunity to improve school management. Success will depend on how well the tools match local needs.

The digital tools available in schools vary greatly. In cities, universities often have better internet and more equipment. In rural areas, some schools still rely on outdated or broken systems. Big data tools that can collect information offline, operate on mobile devices, and update through cloud systems later could help close this gap. This setup allows schools to track student learning even in areas with limited internet access (Johnson et al., 2013).

Another key issue is teacher preparation. Many teachers are still new to using data. They are not trained to read reports or adjust teaching based on what they find. Big data tools can show which skills teachers are missing. These findings can then be used to design training that is practical and fits their daily work (Drigas & Leliopoulos, 2014).

Yunnan's cultural and language diversity is also important. In one classroom, students may speak more than one language or follow different local customs. Big data systems can be made to notice patterns in how students from different groups learn. This helps schools avoid standard models and instead build teaching that respects local ways of thinking (Gay, 2000).

Policy has a strong influence on school management. It sets the rules and priorities that guide how schools operate. In many cases, all important decisions are made by top level offices. This slows down action at the local level because teachers and school leaders must wait for approval. Using data dashboards that provide feedback to both local leaders and teachers helps schools respond faster. These dashboards show key information about student learning and progress. With timely data, schools can make better decisions, adjust teaching strategies, and support students more effectively (Herman, 2016). Schools that combine clear policies with practical data tools can improve learning outcomes and make management more efficient.

Privacy is another important concern in educational management. In regions with many cultural groups, students and families often worry about how their personal data is collected, stored, and used. Schools and data systems must clearly explain what types of data are gathered, how the information is kept safe, and who has access to it. Clear and simple rules help build trust between schools, students, and families. Schools should not adopt systems from wealthier areas without making adjustments. Plans must consider the local context. Local data, the voices of the community, and local cultural practices should guide the design of big data systems. This ensures that the data plans are relevant, effective, and respectful of the students' needs and traditions (Brunotte et al., 2022; Viberg et al., 2022).

Conclusion

Using big data to manage personal learning paths can bring real change to education in places like Yunnan, where schools face limited resources and high diversity. For this approach to succeed, it must fit the local context. Schools need to align technology plans with teaching needs, leadership structures, ethical standards, and cultural practices.

Yunnan's universities face multiple challenges. Internet access is not stable across the province. Many teachers need support to understand and use data in class. Decisions often come from higher offices, which slows down responses. Schools must also address the needs of students from many ethnic groups.

To address these challenges, big data must be part of systems that are local and fair. This includes using learning records that reflect each school's situation, simple analysis tools that identify student needs, and content that adapts to how students learn. Experience from countries such as South Africa, India, and Indonesia show that local control, cultural respect, and shared decision making improve the usefulness of big data.

For Yunnan, the next steps are clear. Schools should strengthen infrastructure, support teacher development, establish fair rules for data use, and conduct research grounded in local schools. Big data is more than a tool. It is a strategic resource to make education more fair and flexible across regions and groups.

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