CONSTRUCTING AN ACADEMIC ADMINISTRATION APPROACH TO INTEGRATE INFORMATION TECHNOLOGY IN THE ARCHITECTURAL STRUCTURE AND DIAGRAM COURSE: A CASE STUDY OF DEPARTMENT OF ARCHITECTURE, GUANGXI VOCATIONAL COLLEGE OF SAFETY ENGINEERING

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ABSTRACT
This research addresses integrated IT needs in the Architectural Structure and Diagram Course, developing an academic administration approach. A stratified random sample of 355 students and 58 teachers provided quantitative data (percentages, means, standard deviations), revealing high demand for IT integration. Four strategies emerged: theory-practice integration, action-oriented teaching, resource enrichment, and IT utilization. Validated by expert assessment (score: 1.00), these approaches form a reliable guideline to improve course effectiveness and teaching skills at Guangxi Vocational College of Safety Engineering.
Keywords: Academic Administration, Integrate Information Technology, Architectural Structure and Diagram Course

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INTRODUCTION

China has prioritized educational informatization, driven by rapid advancements in information technology. The "Educational Informatization 2.0" initiative underscores the transformative role of technologies like "Internet+education" and "Artificial Intelligence+education" in modernizing pedagogy and bridging educational disparities (Ministry of Education of China). To achieve these goals, the government has increased investments in digital infrastructure, promoted online education platforms, and incentivized educators to integrate technology into curriculum reforms.

In the construction sector, technological innovation has elevated project quality and efficiency. Consequently, higher education institutions are adopting advanced tools like Building Information Modeling (BIM) and Virtual Reality (VR) to train students in architectural drafting, ensuring a skilled workforce for industry sustainability (Zhang & Lu, 2019). Courses such as Architectural Structure and Diagram, traditionally reliant on abstract two-dimensional instruction, now leverage blended learning models to enhance spatial thinking and student engagement. Ye Yalun (2021) highlights that blended learning improves teaching efficacy by combining theoretical rigor with interactive tools like BIM, which simplifies three-dimensional visualization and reduces learning barriers (Wang, 2021). Further integration of Revit software and VR via platforms like Fuzor enables dynamic, immersive learning experiences, addressing limitations of conventional methods (Yao, 2021).

The COVID-19 pandemic accelerated the adoption of online education globally, disrupting traditional face-to-face instruction. In China, institutions like Anhui International Economic Vocational College pioneered hybrid models for vocational courses like Architectural Drawing, utilizing platforms such as Tencent Classroom and BIM to maintain continuity during lockdowns. While online learning mitigated pandemic-related disruptions, it also exposed systemic challenges, including the digital divide and overreliance on technology, which risks undermining practical skill development.

Globally, the shift to remote learning sparked debates over educational quality. In South Korea, Generation Z students raised concerns about subpar online course delivery, prompting legal actions for tuition refunds (Kang & Park, 2023). These trends underscore the dual imperative for educators: harnessing technology to enhance accessibility and engagement while addressing its pitfalls, such as diminished hands-on training.

To navigate these challenges, educators must balance technological integration with pedagogical innovation. Shen et al. (2020) advocate competency-based assessments and competition-driven learning to align with "new engineering education" standards, emphasizing real-world application over rote memorization. Post-pandemic, hybrid models are poised to complement traditional methods, offering flexibility and scalability. However, sustained success requires addressing equity in resource access and fostering lifelong learning to meet evolving labor market demands.

In conclusion, China's educational reforms highlight the synergistic potential of policy, technology, and pedagogy. While advancements in BIM, VR, and online platforms have reshaped architectural education, systemic challenges persist. Future efforts must prioritize equitable access, teacher training, and balanced curricula to ensure technology enhances—rather than replaces—core educational values. This paradigm shift calls for continuous adaptation, positioning educators as catalysts for sustainable innovation in the digital age.

LITERATURE REVIEWS

Academic Administration

Academic administration in Chinese higher education encompasses the systematic governance of academic affairs, emphasizing democratic processes and alignment with institutional missions. Bie Dunrong (2000) defines it as a framework for coordinating teaching, research,

faculty development, and quality assurance, guided by both internal policies and external regulations like those from the Ministry of Education. Key features include:
Content: Integration of curriculum design, research ethics, and admissions strategies to foster academic excellence. For instance, teaching reforms at Tongji University leverage virtual simulation tools to enhance practical training.
Methods: Democratic decision-making through interdisciplinary committees, ensuring inclusivity and scientific rigor.
Macro-Level Coordination: Collaboration with government bodies and industry partners to align academic programs with national priorities, such as green building initiatives.
The infusion of information technology (IT) has modernized academic governance. For example, hybrid learning models combining online and offline instruction, as seen in Ye Yalun's (2021) study, improve spatial reasoning in courses like Architectural Structure and Diagram. Similarly, Li Ning (2015) demonstrated how digital tools enhance engagement in drafting courses.
International academic administration focuses on quality assurance, curriculum planning, and faculty development. The National Education Act of 1999 in Thailand mandates internal and external quality audits to maintain educational standards. Academic development programs, prevalent in Anglophone countries, prioritize teaching innovation and research capacity, as highlighted by Parkinson et al. (2020).

Integration of Information Technology (IT) in Education

IT's role in education spans from computational tools to immersive technologies:
CAD Integration: Standardizes architectural drafting and enhances precision. Zhang Caifeng (2012) notes CAD's 40% efficiency gain in structural drawing tasks. Tang and Fu (2023) further emphasize its parametric design capabilities for iterative problem-solving.
BIM Adoption: Transforms pedagogy through 4D modeling and clash detection. Wang Jian (2021) cites a Chongqing Engineering College case where BIM identified 15% more design inconsistencies than traditional methods. Kong Yuqin (2021) outlines BIM's six pedagogical advantages, including sustainability analysis and collaborative workflows.
VR/AR/MR Technologies: Enable immersive learning, such as Jiangsu Architectural College's MR-based rebar placement exercises, reducing misinterpretations by 35%.
The pandemic accelerated IT adoption in education. Anhui International Economic Vocational College utilized platforms like Tencent Classroom and BIM for remote architectural drafting courses, achieving 22% higher engagement through flipped classrooms. Post-pandemic, AI-driven platforms like Blue Mo Cloud Class continue to offer personalized learning resources, bridging gaps in accessibility.

Architectural Structure and Diagram Course

This foundational course combines theoretical knowledge (e.g., projection principles) with practical skills in interpreting construction drawings. Challenges include abstract content and the transition from 2D to 3D visualization. Ye Yalun (2021) advocates blended learning to improve spatial thinking, citing a 30% boost in design conflict resolution during internships.
CAD and BIM: CAD bridges theoretical and practical drafting, while BIM's 3D simulations clarify complex structures like HVAC systems. For example, Chengdu University students reduced energy consumption by 20% using BIM for green building projects.
VR/AR: Tools like Microsoft HoloLens enable real-time adjustments in steel reinforcement detailing, enhancing accuracy.
From the literature review, the conceptual framework can be drawn as shown in Figure 1.

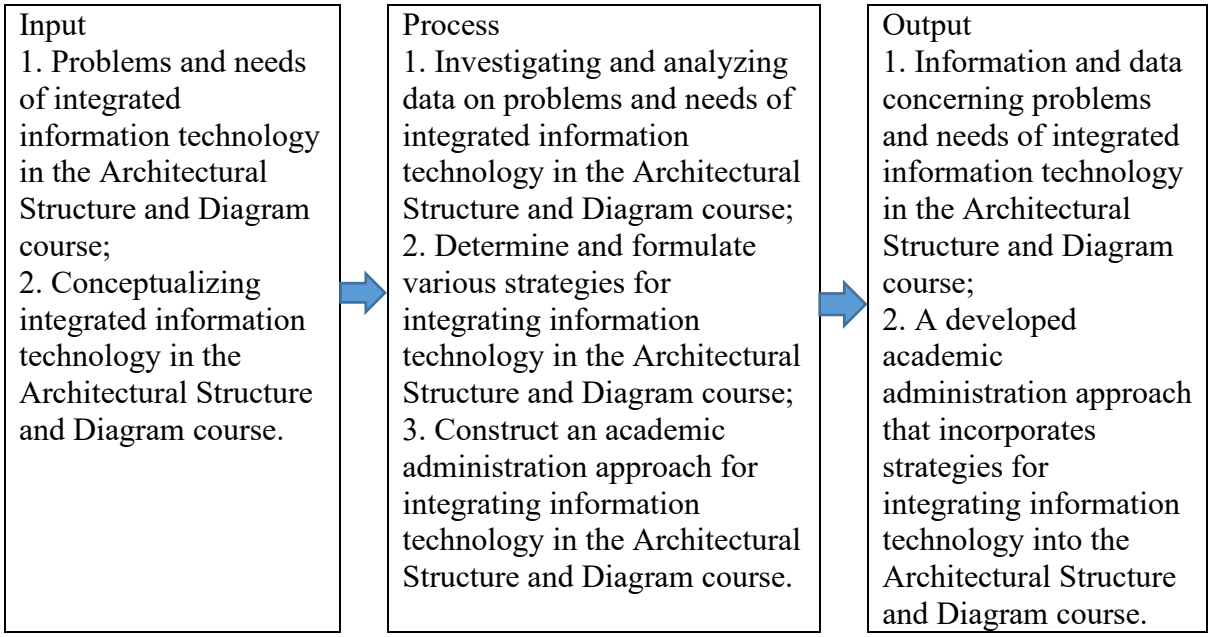

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

This study employed a quantitative approach to investigate the integration of information technology (IT) in the Architectural Structure and Diagram course at Guangxi Vocational College of Safety Engineering. The population comprised 3,136 students and 67 teachers from the Architecture Department. Using stratified random sampling, 355 students and 58 teachers were selected to ensure representation across academic grades (students) and professional titles (teachers). Purposive sampling further refined the sample to align with the research objectives. Data collection utilized two tailored questionnaires—one for students and another for teachers—each divided into two sections: general demographics and challenges/needs related to IT integration (e.g., BIM/CAD tools). The instruments drew from Davis' (1989) technology acceptance model (assessing perceived usefulness and ease of use) and Lattuca and Stark's (2009) curriculum framework (evaluating policy impacts on IT adoption). Three experts validated the questionnaires via Item-Objective Congruence (IOC), yielding scores between 0.66 and 1.00. Reliability tests showed Cronbach's alpha coefficients of 0.785 (students) and 0.895 (teachers), confirming internal consistency. Additionally, a focus group discussion with three experts assessed IT integration strategies using IOC to ensure alignment with pedagogical goals.

Data collection commenced after securing approval from the department dean, with participants informed of the study's purpose. Responses were analyzed using descriptive statistics—frequency, percentage, mean, and standard deviation (SD)—based on a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). Mean scores were calculated by aggregating responses per item and dividing by respondent count, while SD measured data dispersion. Focus group feedback underwent thematic analysis to refine management strategies. Statistical metrics included content validity (IOC), reliability (Cronbach's alpha), and Srisa-ard's (2002) criteria for interpreting mean score ranges. This methodological rigor ensured robust insights into IT integration challenges and opportunities, fostering actionable recommendations for curriculum enhancement.

RESEARCH RESULTS

The questionnaire survey of this study was conducted with 355 out of 380 distributed questionnaires, resulting in a response rate of 93.42%.

Table 1 General information of students

General information		**Total** (n=355)	
		Frequency	**Percentage**
Gender	Male	226	63.67
	Female	129	36.33
Total		**355**	**100**
Ages	Under 18	17	4.79
	19 to 23	332	93.52
	Over 23	6	1.69
Total		**355**	**100**
Grade	First-year of College	120	33.80
	Second-year of College	120	33.80
	Third-year of College	115	32.40
Total		**355**	**100**
Ways to get into university	college entrance examination	96	27.04
	“2+ 3 ”system	211	59.44
	Special Examination	48	13.52
Total		**355**	**100**

In the student sample group, there were 226 males (63.67%) and 129 females (36.33%), mainly males. The majority of the samples were aged between 19-23 years old (93.52%), indicating that most students are in their prime age with high levels of memory, comprehension, and intelligence. Each student took this course in their first year of enrollment. To ensure the representativeness of the sample, a stratified sampling method was adopted, and the number of participants selected from each grade was roughly equal, thereby avoiding potential biases due to grade differences and making the survey results more objective and fair. The main source of students in the sample was from the "2+3 system", accounting for 59.44% of the total sample. Compared to students who took the regular examination and those who took the special examination, students from the "2+3 system" had a certain level of professional foundation, which gave them an advantage when receiving further professional education.

Table 2 Needs of existing in Integrated Information Technology in the Architectural Structure and Diagram Course for students for students

Questions	**n=355**		**Level of needs**
	$\bar{X}$	**S.D.**	
Needs			
1) I think it's essential to be interested in the course.	3.13	0.90	Middle
2) I believe that the existence of this course is indispensable.	3.06	0.92	Middle
3) I think the course needs to have more teaching resources.	3.46	1.04	Middle
4) I believe that the course needs to arrange the teaching time reasonably.	2.93	1.07	Middle
5) I think classroom teachers need to teach happily.	3.45	0.80	Middle
6) I hope that teachers can treat us objectively and fairly.	3.50	0.99	Middle
7) I hope that there will be new learning modes that can improve learning efficiency, time, and flexibility.	4.28	0.84	High
8) I hope to use information technology to solve difficulties in learning and meet my own individualized learning needs.	4.51	0.71	High
9) I believe that teachers' teaching methods need to be action-oriented.	3.76	0.96	High
10) I think teachers' teaching methods need to combine theory with practice.	3.63	0.83	High
11) I hope teachers can provide me with both online and offline suggestions to help me solve problems in my studies.	3.10	0.95	Middle
12) I hope I can know about my learning achievements and shortcomings in time through online exercises, tests, and other forms.	3.41	1.00	Middle
Total	**3.52**	**0.92**	**High**

The study concluded that students have a "high" level of demand for integrated information technology in the Architectural Structure and Diagram course, especially in terms of personalized and technology-driven learning solutions, innovative and flexible learning modes, as well as practical and action-oriented teaching methods.

There were 58 engineering cost teachers who participated in and completed the questionnaire survey, achieving a 100% response rate.

Table 3 General information of teacher

General information		**Total** (n=58)	
		Frequency	**Percentage**
Gender	Male	26	44.83
	Female	32	55.17
Total		**58**	**100**
Ages	Under 25	2	3.45
	25 to 30	16	27.59
	31 to 40	31	53.45
	41 to 45	6	10.34
	Over 45	3	5.17
Total		**58**	**100**
Education (latest)	Bachelor's Degree	41	70.69
	Master's Degree	16	27.59
	Doctor's Degree	1	1.72
Total		**58**	**100**
Years of being a teacher	1 to 5	12	20.69
	6 to 10	32	55.17
	11 to 15	9	15.52
	16 to 20	4	6.90
	Over 20	1	1.72
Total		**58**	**100**

The data reveals that the sample is predominantly female, with 32 women (55.17%) compared to 26 men (44.83%). Age-wise, the sample is largely composed of mid-career professionals: 53.45% fall within the 31 to 40 age range, while 27.59% are aged 25 to 30. Smaller percentages include those under 25 (3.45%), aged 41 to 45 (10.34%), and over 45 (5.17%). Educationally, the majority of teachers hold a Bachelor's Degree (70.69%), followed by those with a Master's Degree (27.59%), and a mere 1.72% possessing a Doctorate. Regarding teaching experience, the largest group (55.17%) has 6 to 10 years of experience, followed by those with 1 to 5 years (20.69%). Smaller percentages include those with 11 to 15 years (15.52%), 16 to 20 years (6.90%), and over 20 years (1.72%). In this sample, characterized by a predominance of female teachers in their 30s, who are mostly in the mid-stages of their careers. They are highly educated, predominantly holding Bachelor's Degrees, with a significant minority having pursued advanced degrees. These insights offer valuable information for further analysis and decision-making in educational contexts, providing a clear picture of the demographic and professional landscape of the teachers involved.

Table 4 Needs of existing in Integrated Information Technology in the Architectural Structure and Diagram Course for students for teachers

Questions	n=58		Level of needs
	$\bar{X}$	S.D.	
Needs			
1) I think it's essential to be interested in the course.	3.21	1.00	Middle
2) I believe that the existence of this course is indispensable.	3.47	1.05	Middle
3) I think the course needs to have more teaching resources.	3.31	0.98	Middle
4) I believe that the course needs to arrange the teaching time reasonably.	3.09	1.01	Middle
5) I think classroom teachers need to teach happily.	3.50	1.10	Middle
6) I need a lot of time to build up course resources and provide students with richer learning materials.	3.67	1.03	High
7) I can share resources and communicate with other teachers.	3.07	1.01	Middle
8) I think teachers' teaching methods need to be action-oriented.	4.34	0.98	High
9) I think teachers' teaching styles need to combine theory with practice.	3.79	0.83	High
10) I can use the course platform or other online collaboration tools to organize and manage the classroom.	3.47	0.88	Middle
11) I need to teach students how to evaluate, select, and use effective teaching resources and learning tools (IT), and get them involved in the process.	4.14	1.00	High
12) I am able to use data (qualitative or quantitative) tools to understand students' strengths, interests, weaknesses, etc., and provide them with personalized guidance.	3.45	1.14	Middle
Total	**3.54**	**1.00**	**High**

This study highlights the "high" level of demand for teachers in integrating information technology into the Architectural Structure and Diagram course, especially in terms of enabling students to master IT skills and integrate theory with practice. Teachers believe that hands-on approaches and incorporating technology into the curriculum are crucial for course learning. Therefore, the Architectural Structure and Diagram course should be action-oriented, and it is necessary to teach students to effectively use IT tools for learning. Additionally, more time is needed to develop resources, highlighting the challenges teachers face in creating engaging integrated learning materials.

DISCUSSION & CONCLUSION

Students' Perspective

Some students feel that current information technology (IT) tools do not fully meet their learning needs, often preferring traditional methods like books and notes due to familiarity. They rarely utilize online platforms or professional software, overlooking their potential benefits. However, when encountering learning challenges, their attitude shifts, and they actively seek IT solutions, such as 3D modeling software, to better understand complex topics like architectural structures.

Students also express strong interest in innovative learning modes enabled by IT. They value the flexibility and efficiency of online resources, which allow self-paced learning beyond traditional classroom constraints. This reflects their desire for diverse and modern educational experiences.

In terms of teaching methods, students emphasize the importance of practical instruction that combines theory with real-world applications. They prefer lessons that integrate case studies

and hands-on projects, alongside the use of multimedia and virtual simulations to create engaging, interactive learning environments. These approaches, they believe, can significantly enhance understanding and improve educational outcomes. Overall, students see IT as a valuable tool for overcoming learning challenges and enriching their educational experiences, but its potential remains underutilized in current teaching practices.

Teachers' Perspective

The teaching community is concerned about the inadequate integration of information technology (IT) in the architecture structure and drawing interpretation course, which they believe significantly hinders student learning. Key issues include outdated IT equipment, insufficient technical support, and limited innovation in teaching methods. Teachers recognize the potential of IT but face challenges in effectively utilizing online platforms due to functional limitations and low student engagement, as highlighted by Li Zhen (2021).

Teachers advocate for a more practice-oriented approach, emphasizing the course's practical nature. They seek to increase hands-on opportunities and integrate theory with practice to enhance student understanding and application of knowledge. However, they struggle with developing comprehensive course resources, which require significant effort to ensure accuracy, timeliness, and diversity in formats like text, images, and videos.

Both students and teachers have high expectations for IT integration, but current realities fall short. Students' lack of emphasis on the course and limited understanding of IT further impede its effective application. To address these challenges, it is essential to enhance students' appreciation for the course, promote IT literacy, and increase institutional investment in IT infrastructure. Teachers also need ongoing training to improve their IT skills and innovate teaching methods, ensuring IT is effectively integrated to improve learning outcomes.

Recommendations

1) Strengthen Student Education and Guidance

Through course orientation sessions, special lectures, and other methods, introduce students to the importance of the Architectural Structure and Drawing Interpretation course and the application value of information technology in this course. This will enhance students' appreciation and interest in the course. At the same time, establish relevant incentive mechanisms, such as rewarding outstanding students and selecting advanced individuals in information technology application, to encourage students to actively use information technology to assist their learning.

2) Enhance Teachers' Information Technology Literacy

Schools should regularly organize teachers to participate in information technology training courses and seminars, invite experts for guidance and exchanges, and help teachers master the latest information technology knowledge and application skills. Additionally, encourage collaboration and experience sharing among teachers to explore together the application modes and methods of information technology in course teaching.

3) Increase Investment in Information Technology

Schools and educational institutions should increase the procurement and updating of information technology equipment to ensure that classrooms are equipped with advanced computers, projectors, and other devices. At the same time, purchase professional architectural structure design and analysis software, virtual simulation platforms, and other teaching software to provide a good information technology application environment for teachers and students.

4) Optimize Course Resource Construction

Establish a dedicated course resource development team responsible for collecting, organizing, and producing high-quality course resources. Strengthen cooperation with enterprises and scientific research institutions within the industry to obtain the latest practical cases and project

materials, enriching the course content. Meanwhile, use information technology tools to categorize and share course resources, making it convenient for teachers and students to use.

5) Promote Teaching Method Innovation

Encourage teachers to actively explore new teaching methods based on information technology, such as flipped classrooms and project-driven teaching. In the teaching process, make full use of multimedia, virtual simulation, and other technical means to create a more vivid and intuitive learning experience for students. In addition, strengthen the research and evaluation of teaching method innovation, summarize experiences and lessons in a timely manner, and continuously improve the teaching mode.

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