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# Research on Academic Assessment Indicators for Information Technology Courses in Higher Vocational Horticultural Technology Major

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**Abstract:** Modern horticultural techniques rely heavily on the support of information technology. Information technology has profoundly transformed the way horticulture operates, bringing unprecedented convenience and benefits to agriculture and horticulture. In this study, the researcher observed and analyzed the curriculum of information technology courses in horticultural technology majors at vocational colleges in the Xuchang area. The researcher conducted a questionnaire survey among local vocational education experts, information technology educators in vocational schools, professionals in the horticultural technology industry, and vocational college students majoring in horticultural technology. The researcher collected relevant data and course content, investigated the issues present in teaching activities, and proposed effective methods for assessing the effectiveness of information technology course learning for horticultural technology majors.

**Keywords:** Vocational education, Horticultural technology, Information technology, Curriculum design, Student information technology assessment.

## 1. Introduction

(1) Research Background:

Information technology (IT) is rapidly driving innovation and transformation on a global scale. In the fields of agriculture and horticulture, IT has become an indispensable tool for enhancing production efficiency, resource management, crop protection, market preparation, scientific research, and education. This is because information technology provides the capability for real-time monitoring, digital mapping, intelligent decision support, and global information exchange. The application of information technology in horticultural technology encompasses various areas, including resource management, precision agriculture, market readiness, research innovation, and more.

(2) Literature Review:

In line with the demand for vocational education in training professionals, experts in vocational education have delved into research on information processing, outcome-based education, and effective teaching management methods. They have also adopted new curriculum models to seamlessly align with and manage rapidly changing information in evolving educational environments. Research teams in this domain have introduced interdisciplinary educational approaches aimed at empowering information technology researchers to lead Instructional Design and Technology (IDT) research. For example, Fetter (2009) elaborated on a project that utilized curriculum strategies to enhance IT outcomes output, resulting in 20 downloadable components created by five universities through the National Training and Dissemination Center (NTDC) website. Mohan et al. (2013) constructed an information platform for assessing the quality of classroom teaching in a 5G environment by evaluating course materials within the anticipated audience of educators, which has become a key research topic covering information architecture and financial operations of educational institutions. In a similar vein, Cheng et al. (2021) conducted research on the quality assessment system for classroom teaching in a 5G environment at the university level.

(3) Theoretical Framework:

According to Liu (2019), the significance of teaching quality in schools lies in its pivotal role in preparing capable students. In terms of assessing students, there has been a transition from exclusively prioritizing academic achievements to conducting a thorough evaluation of their overall learning capacities. As society develops, the acquisition of knowledge and skills alone can no longer meet the multifaceted demands of growth. This highlights the limitations of solely relying on academic performance as the assessment metric. While academic performance remains crucial, attention has broadened to encompass other aspects of personal development, including cultivating a proactive learning disposition, fostering innovative thinking, enhancing problem-solving skills, and nurturing a holistic perspective on life and values. This shift is from assessing the absorption of content to evaluating whether students have mastered the skills of learning, adaptation, collaboration, flourishing, and making a positive contribution to society while acknowledging the intrinsic value of diverse and unique personal development. Chen (2020) asserted that the innovation of experimental teaching content, the exploration of novel experimental teaching methods, the refreshment of experimental teaching approaches, and the establishment and enhancement of the quality assurance mechanism for evaluating experimental teaching are essential endeavors. This necessitates the introduction of diverse assessment indicators to meet the various talent demands of society. This theoretical framework draws from instructional theories such as constructivism and experiential learning to guide the evolution of teaching quality indicators. Furthermore, the framework seamlessly integrates industry-relevant competencies and skills to ensure alignment with real-world information technology requirements.

## 2. Design and Methodology

(1) Research Paradigm:

The primary objective of this study is to enhance the level of information technology education in vocational colleges and establish a robust set of academic assessment indicators. This will enable educators, administrators, and policymakers to make informed decisions, bridging the gap between education and industry. The research process involves three main steps.

First, Maraveas (2023) thought that advanced artificial intelligence technology plays an important role in the development of agriculture and also determines the upgrading of horticultural technology. Curriculum design involves studying course standards and integrating horticultural technology-related examples into the information technology course expansion module, tailored to the characteristics of horticultural technology.

Second, Xu (2019) contended that the integration of blended learning is progressively implemented in the instruction of economics and management courses, with outcomes demonstrating its efficacy in significantly enhancing both the efficiency and quality of teaching. This is also a key way to realize quality-oriented education of students and improve their comprehensive ability under the background of educational system reform in China. Pedagogical reform combines information technology with horticultural specialties in practical training, flipped classrooms, group collaboration, and more. This incorporation includes the use of office software, information retrieval, big data, the Internet of Things, and other content, thus aligning information technology with the development of horticultural expertise.

Finally, comprehensive academic assessments are conducted to evaluate students' overall capabilities and performance, ultimately producing accomplished and knowledgeable graduates.

(2) Design and Methods:

This study employed a mixed research approach that combined both qualitative and quantitative methods. A comprehensive review of existing literature formed the foundation for developing preliminary indicators. Educators, industry experts, and students participated in surveys and focus group discussions to refine and validate these indicators.

First, objectives and an outline for the curriculum are established, specifying the primary learning goals, including both technical and horticultural aspects. The outline should encompass the themes and teaching content for each learning unit. Xiao (2019) advocated harnessing the benefits of instructional resources and promoting information-based teaching, expediting the transformation of information-based teaching approaches in higher vocational colleges, and elevating the caliber of training for professional and technical personnel. Appropriate teaching materials and resources, such as textbooks, online tutorials, video materials, and laboratory equipment, are selected to ensure alignment with the latest trends and developments in horticultural information technology.

Second, various teaching methods are employed, including lectures, hands-on training, case studies, group discussions, and projects. Practical horticultural projects and the application of information technology are integrated to reinforce students' practical skills. Practical training courses, in particular, provide students with hands-on experience and application of acquired skills. This may involve the use of horticultural software, sensor technology, and other modern tools, teaching students how to use various information technology tools and software, such as data analysis tools, Geographic Information Systems (GIS), and Computer-Aided Design (CAD) software.

Finally, Das et al. (2023) opined that leveraging the capabilities of the Internet of Things (IOT) and Artificial Intelligence (AI) is essential for the rapid advancement of emerging technologies evident across various industries, notably in the realm of intelligent agriculture. Students are encouraged to engage in projects and practical experiences, such as designing a virtual horticultural project, developing an agricultural information system, or participating in community horticultural initiatives. Clear assessment criteria, including examinations, assignments, projects, and lab reports, are established. Timely feedback is provided to help students continuously improve their skills. Ongoing monitoring of developments in horticultural information technology ensures that course content and methods align with industry trends and are updated and improved as necessary. Collaboration with professionals in the horticultural and information technology fields is established, inviting them as guest lecturers or providing practical case studies to enhance the practical applicability of the curriculum.

Study Population—The study involved 10 vocational education research experts, 36 vocational school information technology educators, 100 horticultural technology industry professionals, and a selected group of 65 vocational college students majoring in horticultural technology.

Data Collection Tools—Data collection is conducted through semi-structured Delphi surveys, focus group discussions, and document analysis. Delphi surveys involve formulating a series of questionnaires to solicit opinions on proposed indicators from vocational education experts, industry technicians, and students. Focus group discussions invite vocational education experts and industry technicians to provide qualitative insights into the practical application of these indicators. Document analysis involves systematic review and analysis of curriculum documents, industry reports, and existing assessment frameworks to identify key insights and draw relevant conclusions.

Data Collection Process—Participants were invited to take part in Delphi surveys and focus group discussions. Surveys were conducted over multiple rounds to ensure consensus among experts. Focus group discussions were conducted face-to-face or virtually to provide diverse perspectives. Online surveys were used, and participants had to be specific to ensure scientific and accurate data. Document analysis involved a thorough review and summary of relevant materials to determine the alignment of proposed indicators with current practices.

Data Processing—Quantitative data from the Delphi surveys were analyzed using descriptive statistics and consensus measurements, which involve measures of central tendency, dispersion, distribution shape, and consensus. The qualitative data from focus group discussions undergo thematic analysis to extract key insights and trends, which are then summarized and generalized into corresponding indicators and conclusions. The results from document analysis are integrated with the above processes to formulate and refine the indicators.

Ethical Considerations—This study adheres to ethical guidelines, ensuring informed consent, participant confidentiality, and respect for the perspectives of participants and researchers. Additionally, it respects the independence and creativity of the researchers in the reference literature.

# 3. Results and Discussions

Here are the responses from experts in the field of horticultural technology based on the questionnaire

Primary Objectives: The survey reveals that a majority of respondents (60%) believe that the primary goal of information technology education is to nurture interest and information literacy to assist individuals in thriving in an information-centric society. Importance of Information Technology Courses: An overwhelming majority of respondents (74%) consider information technology courses to be highly important, indicating their strong appreciation of the value of such courses. Significance of Information Technology in the Horticultural Technology Industry: Most respondents (71%) deem information technology as exceptionally significant in the horticultural technology industry. This suggests their recognition of the widespread application of information technology in horticultural practices. Utilization of Advanced Technologies: A substantial portion of respondents (46%) stated that they frequently employ technologies such as artificial intelligence, sensors, the Internet of Things, big data, and cloud computing. Importance of Data Handling: The majority of respondents (68%) believe that mastering data collection, storage, and analysis methods, as well as being familiar with data formats and databases relevant to horticulture, is highly crucial for learning in the field of horticultural technology. Role of Information Technology Courses in Communication and Collaboration: A majority of respondents (71%) consider information technology courses as instrumental in fostering communication skills, bridging the gap between students and professionals, and promoting effective collaboration.

Assessment of Information Technology Courses: A significant majority of respondents (44%) advocate for a comprehensive assessment approach for information technology courses, encompassing written examinations, practical tests, and project assignments, which they view as appropriate. Based on the questionnaire responses, the following results and implications emerge. These responses reflect the importance attributed to information technology in the field of horticultural technology and strong support for information technology education. Respondents recognize that information technology plays a crucial role in horticultural technology, improving work efficiency and professional standards. They emphasize the need for practical skills and knowledge in information technology education. The respondents also acknowledge the critical role of information technology courses in fostering communication, collaboration, and traditional horticultural practices. They suggest that information technology education prioritizes practical skills and knowledge while enhancing self-learning abilities and innovative thinking. Conclusion: Information technology benefits not only students majoring in horticultural technology but also positively impacts the entire horticultural agriculture industry. Cultivating future horticultural professionals with information technology expertise will contribute to increased sustainability, resource efficiency, and innovation in agriculture and horticulture. The design of the curriculum, teaching methods, and assessment are critical to ensuring that students acquire these essential skills. Preparing future horticultural professionals proficient in information technology will be instrumental in achieving more sustainable, efficient, and innovative agricultural and horticultural practices.

The following summarizes the responses from information technology professionals, horticultural technology professionals, horticultural technology students, and vocational education experts based on the questionnaire.

Primary Objectives: A vast majority of respondents (70%) believe that the primary goal of information technology education should be nurturing interest and information literacy to help individuals thrive in an information-centric society. Satisfaction with Information Technology Course Materials: The survey indicates that a majority of respondents (66.25%) are not very satisfied with the current information technology course materials, reflecting an urgent need for improvements in terms of quality and suitability of teaching materials. Importance of Information Technology Courses: An overwhelming majority of respondents (82.5%) consider information technology courses to be of very high importance in horticultural technology programs. Importance of Advanced Technologies: The survey results show that respondents highly acknowledge the critical roles of sensors, the Internet of Things, big data, cloud computing, and artificial intelligence in the field of horticultural technology. Importance of Data Handling: A large majority of respondents (87.5%) believe that mastering data collection, storage, and analysis methods and being familiar with data formats and databases relevant to horticulture is extremely important for learning in the field of horticultural technology. Integration of Information Technology and Horticultural Technology: Information technology education is considered highly important for assisting horticultural technology professionals in applying technology to traditional horticultural practices. Education and Career Prospects: The vast majority of respondents (73.75%) believe that achieving excellent grades in information technology courses significantly improves the employment prospects of horticultural technology students.

Based on the questionnaire responses, the following results and implications emerge: These responses underscore the growing importance of information technology in horticultural technology and the strong support for information technology education. Respondents recognize that information technology plays a pivotal role in horticultural technology, enhancing work efficiency and professional standards. They highlight the need for practical skills and knowledge in information technology education. Respondents also acknowledge the critical role of information technology courses in fostering communication, collaboration, and traditional horticultural practices. They suggest that information technology education prioritizes practical skills and knowledge while enhancing self-learning abilities and innovative thinking. Information technology is integral to horticultural technology, and its significance continues to grow. It serves as a foundational subject in horticultural technology, with emerging technologies playing essential roles in the field. Educational institutions must address challenges in course materials and methods to meet the evolving needs of students in the rapidly changing information technology landscape. The data revolution is reshaping horticultural practices, and information security is paramount. Education in information technology enhances students' confidence in applying their skills to horticultural contexts and fosters innovation through interdisciplinary learning. Ultimately, information technology is key to innovation and sustainability in horticultural technology.

Overall, these responses reflect the respondents' recognition of the importance of information technology in the field of horticultural technology and their strong support for information technology education. They believe that information technology plays a pivotal role in horticultural technology, enabling improved work efficiency and raising professional standards. The respondents consider information technology to be of paramount importance for the advancement of horticultural technology, and they hope that information technology education emphasizes practical skills and knowledge. Furthermore, they also perceive the crucial role of information technology courses in nurturing communication, collaboration, and traditional practices. They highlight the vital significance of information technology for students' career development and the sustainable progress of the industry. The respondents widely concur that information technology education should focus on cultivating students' practical skills and knowledge while underscoring the role of information technology in enhancing self-learning abilities and fostering innovative thinking.

# 4. Conclusion

Based on survey results, literature analysis, and in-person discussions with vocational college teachers and students, I have identified several key aspects for evaluating the teaching of information technology courses: Assessing the curriculum content to ensure it remains aligned with the latest trends in the field of information technology. This includes areas such as database management, data analysis, computer programming, and information system management, all within the context of horticultural technology. Evaluating the teaching methods employed within the curriculum, which may include traditional lectures, laboratory practices, online learning, and project work. Assessing students' information technology skills through examinations, project assignments, and practical exercises. Evaluating the information technology proficiency of teachers and identifying areas where teachers may require additional training to enhance their ability to impart relevant skills effectively. Collecting feedback and suggestions from students for continuous improvement of course content and teaching methods. Examining the depth and breadth of the curriculum to ensure it covers both fundamental knowledge and practical application skills.

The assessment of horticultural technology major students' learning in information technology courses includes evaluating whether students Have a basic understanding of office software applications. Possess the ability to collect, store, and analyze data related to agriculture and horticulture. Are familiar with digital mapping, Geographic Information Systems (GIS), and other digital mapping tools used for land planning and crop management. Understand the use of sensors and remote monitoring technology to track plant health, soil conditions, and weather. Are knowledgeable about agricultural and horticultural software tools, such as agricultural management systems, weather applications, and data analysis tools. Understand how to market and promote agricultural products on online platforms. Recognize the importance of protecting the security and privacy of agricultural and horticultural data. Furthermore, in conjunction with expert advice, data collection, precision agriculture, data analysis, and practical experience are of paramount importance for students. Continuous knowledge updates, real-world application, and collaboration with industry experts are key to ensuring the relevance and effectiveness of horticultural technology information technology courses.

In conclusion, information technology benefits not only students majoring in horticultural technology but also has a positive impact on the entire horticultural agriculture industry. Cultivating future horticultural professionals proficient in information technology will contribute to the sustainability of agriculture and horticulture. Information technology can reduce resource wastage, improve product quality, and lessen environmental impact. It provides new opportunities for agricultural and horticultural research and innovation, from breeding new varieties to agricultural automation. Information technology has become an indispensable component of horticultural technology education, playing a crucial role in enhancing production efficiency, resource management, precision agriculture, market readiness, research, and innovation. Course design, teaching methods, and assessment are key factors in ensuring that students acquire these essential skills. Nurturing future horticultural professionals who are proficient in information technology is crucial for promoting a more sustainable, efficient, and innovative agricultural and horticultural sector.

# 5. Recommendation

Based on the above conclusions, here are some recommendations to help teachers, students, and schools better cope with information technology courses in the field of horticulture:

For Teachers: Teachers should actively participate in training courses to enhance their expertise in the field of information technology and teaching skills. This will help them effectively impart relevant skills. Periodically review and update course content to ensure its alignment with the latest trends in the information technology field, with a focus on areas such as database management, data analysis, computer programming, and information systems management. Innovate teaching methods, including traditional lectures, hands-on labs, online learning, and project work, to cater to the diverse learning needs of students. Ignite students' interest in information technology by introducing intriguing real-world cases and projects that encourage active learning. Collect regular feedback and suggestions from students to understand their perspectives on the course, thereby continuously improving curriculum content and teaching methods.

For Students: Students should actively engage in information technology courses and strive to acquire relevant knowledge and skills, recognizing the importance of IT as a key competency that can enhance employment opportunities. Dedicate effort to mastering office software applications like Microsoft Office, as they improve daily work and study efficiency. Focus on developing data analysis skills, which are crucial for research and decision-making in the horticulture field. Learn how to use digital maps and Geographic Information System (GIS) tools to assist in land planning and crop management. Engage in practical projects and experiments to apply the knowledge learned and refine practical skills.

For Schools: Schools should offer resources and support to assist teachers in undergoing training in the field of information technology. Ensure that campus facilities and technology equipment align with the needs of information technology education, enabling students to gain practical experience. Encourage interdisciplinary collaboration to drive the application of information technology in the horticulture field. Periodically assess the quality of information technology courses to ensure they meet the needs of students and the industry. Provide career development support to help students apply their acquired skills in real-world work and enhance their employment prospects.

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