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An Assessment of Online Learning Competency among Students of Higher Vocational and Technical School in China

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Abstract: Online learning has become a useful tool in education with the advancement of technology in higher learning institutes. It has gradually become a required ability for students in higher learning institutions to participate in online lessons where teaching and learning takes place virtually, following crucial changes in the current context with 21st century skill-set requirements within the educational sector. The purpose of this paper is to investigate the online learning competency among students at Henan Vocational College Institute of Art; to analyze if the factor of differences in gender and different majors of students' present differences in online learning competency. The questionnaire used for data collection is done with reference to the Likert scale with 19 items (4 of which are the demographic items, and 15 of which are the constructs of knowledge, skill, and attitude of competency), with anchor ranges from 1 to 5 in each item to probe for the 409 students' knowledge, skill and attitude regarding online learning competency. By using SPSS, students' online learning competency was analyzed with respect to the three mentioned aspects. The study found that students have high knowledge of online competency but only an intermediate level of skill and an intermediate level of attitude towards online learning. This study also found that there are no significant differences in gender and there are no significant differences between students' online learning competency in the aspects of students' majors. The study shows that higher learning institutions adopt online learning as a way to deliver learning content, it will not pose a challenge to students in terms of the knowledge and skill requirements to participate in online learning, and that it will be fair to the students as they have high knowledge, intermediate skills and intermediate attitude towards online learning. The implications of this study and direction for future studies are discussed.

Keywords: Assessment, online learning, competency, technical and vocational

1. Introduction

The advent of Industrial Revolution 4.0 has brought technological innovation. Information and intelligence are the main characteristics of this era (Wang & Gu, 2022). At the same time, many new technological concepts are added to the field of education. The low-cost Internet access and the widespread use of mobile devices were used to solve the problems of the increasing number of students, the changing needs of students and the increasing amount of information (Simsek et al., 2021). Online learning is being widely accepted around the world. Online learning has grown beyond smart acronyms

and is currently a mainstream education (Coates & Shi, 2020).

China's higher vocational education originated in the 1970s. After more than 40 years of development, it has now entered the stage of high-quality development (Shun, 2022). In order to improve learning quality, the new methods and learning forms are constantly updated in this field in China. Many new teaching models are being promoted, such as learning factories (Zhand & Chen, 2022), modern apprenticeships (Li, 2022), and distance learning (Feng et al., 2021). These models require students to have a certain online learning ability to achieve teaching quality.

As a subcategory of distance education (Bates, 2005), online learning is viewed using the Internet and the World Wide Web. Online learning in China dates back to 1994 and lags behind western developed countries. In 2010, higher vocational schools began to conduct distance learning through video recording and broadcasting (Miao et al., 2022). Since 2012, online learning has developed rapidly and a variety of learning platforms have been born. In response to the outbreak of COVID-19 in 2020, the Ministry of Education issued the policy call of "classes suspended but learning continues", and vocational schools began to make full use of their own online learning course platforms or social platforms to organize students for online learning (Cheng, 2020). Students' online learning competency becomes one of the important factors to realize the teaching effect.

1.1 Research Questions

There are three questions in this study:

- a. What are the online learning competencies level of Henan Vocational College students?
- b. Is there any difference in Henan Vocational College students' online learning competencies on the aspect of gender?
- c. Is there any difference in Henan Vocational College students' online learning competencies on the aspect of program major?

2. Literature Review

2.1 Online learning

While remote education has long been a feature of the American educational system, online learning has recently overtaken it as the most popular type of distance education (Barnum, 2020). A growing number of students are choosing online education as their primary mode for receiving distance education. Students' experiences with online learning and the advantages and disadvantages they face are examined in this study (Pratama et al., 2020). As explained in the Steam article, e-learning, or online learning, is a form of distant education in which both the teacher and the student can be located virtually anywhere. There are many sorts of distance learning available today, including correspondence courses, television broadcasts, CD ROMs, and web-based courses and more (Manoj et al., 2020).

As the price of post-secondary education rises, the effectiveness of online learning in students, providing professional development opportunities for educators, and providing credit equivalency for educators are all important advantages. Another advantage of online learning is that it can be accessible to anyone via the Internet who wants it (Gautam et al., 2020). Kharb et al. (2013) indicate that e-learning has become the preferred technique of teaching teachers in the educational sphere, and the following are some advantages of e-learning over traditional methods : As it doesn't require paper or pencil, e-learning is less expensive than traditional methods of teaching; e-learning is more flexible for students because the training equipment e-learning is not chosen by the teacher or some organization; and personalization means that e-learning can help learners gain their own necessity of knowledge (Alexson, 2017).

2.2 Competencies

Teaching competencies are divided into three-stage frameworks. First, prepare, plan, and design before instructing. Teaching requires facilitation, interaction, and feedback. Online instructors must reflect lessons learnt. Online teaching competences into seven categories: active learning, administration and leadership, active teaching and response, multimedia technology, classroom decorum, technological competence, and policy enforcement (Albrahim, 2022). Maryland Online (MOL) created COAT in 2008 for online faculty professional development. COAT develops online teaching competencies, including; a) orienting students to online learning; b) digital skills; c) LMS skills; d) basic instructional design principles; e) pedagogical and pedagogical approach; f) social process and presence; g) Internet safety; h) managing assessment, and legal and establishment policy and procedure (MOL, 2021) Maryland isn't the first college to use this approach to educate instructors for online teaching.

2.3 Knowledge

Students are able to better learn and revise subjects while at home thanks to online resources. Additional benefits include the availability of a never-ending supply of opportunities to try out new ways of acquiring information and learning (Singh & Alexander, 2022). Many nations, including the United States, Taiwan, and others, require college students to take at least one computer science course as a requirement for graduation (Cheng & Tsai, 2013). The ability to digest

information and self-organize learning is enhanced by online teaching. Today's reality necessitates that everyone uses a PC on a regular basis, which is why online training can teach people the fundamental skills they need to do so. Learning how to handle information more effectively can be greatly facilitated by using online training. Because of hectic schedules, students choose to take online courses because they are able to learn at their own pace and manage their time more effectively. Distance learning students that succeed include-disciplined, self-motivated, prepared, strong readers, good organizers, and adept at managing their time (Riyanto, Kuant, & Tentama, 2020). In order to be a successful student, you need to get enough sleep, eat, drink plenty of water, and exercise often. First and foremost, your physical and emotional health are of the utmost concern.

2.4 Skills

The abilities of an online learner A number of studies have highlighted the characteristics of successful online students. Findings from Barrot et al. (2021) show that students who take distance courses must be able to focus, manage their time well, as well as work independently and in groups. There is evidence to support the idea that online students are motivated by their own desire to succeed, as well as their sense of self-control and independence. Students, instructors, and institutions all want students to be able to learn on their own terms. In order for e-learning to incorporate formal, casual, planned, and unscheduled learning, this is required. A company's tacit knowledge can be more easily disseminated through self-directed learning. Self-directed learning is the norm in all corporate training. These talents can only be utilized in a positive and rewarding learning environment. Asha (2018) stated, students in large groups, small groups, and one-on-one settings should have complete access to course objectives, teaching methods, and synchronous and asynchronous communication options. Students should be able to voice their opinions on the teaching methods and course materials they're using. As a result, both the learning environment and student commitment are improved.

2.5 Attitudes

Student prior attitudes included their prior attitudes regarding ICT, the topic area, and online education. Makura (2014) found, students' earlier views regarding ICT use may have an impact on their attitudes toward online learning. When students completed an online course, Zhu et al. (2011) found a substantial correlation between their subjects' attitudes and their online learning attitudes. Researchers observed that those students who selected an online learning technique had a much greater degree of course satisfaction than those who favored traditional methods. On the other hand, Roberts & Dyer (2005) discovered that participants' pre-course trust in online learning could not predict their post-course attitude toward online learning.

2.6 Higher Vocational and Technical School Students

Now at present time, one type of education is available: Technical and Vocational Education (TVET). This program was designed to suit the industry's needs for scientific and technology-inclined pupils. Various programs have been developed and offered in order to implement technical education programs. The secondary and tertiary levels of education have all adopted this training model. All of these initiatives will allow students to be trained in diverse technological and engineering sectors to become professionals and semi-professionals in the workforce. Researchers in the television and video game industry (TVE) study a wide range of intriguing questions. The impact of the current flow on the system must be well grasped. An examination of global trends in terms of technological, economic, and social developments is necessary to understand the tremendous impact on this system's creation of new trends (Fleming et al., 2021).

The summation of findings from several studies Career Journal and Technical Education and Industrial Teacher Education studies conducted in the last three years (2002-2004) in the United States Blazar & Kraft (2016) as evidence that TVE trends have not been thoroughly examined. Because of this, the TVE analysis results don't reflect the broader worldwide scenario. As a result, a meta-analysis of papers from a variety of reputable international publications is needed to gain a worldwide perspective on TVE trends and issues.

3. Methodology

3.1 Instrument

This research adopts an anonymous questionnaire to analyze the online learning competencies of contemporary college students. A total of 19 questions are included in the questionnaire, 4 of which is the demographic information of students, and their online learning competencies are evaluated through three different dimensions: knowledge, skills and attitude.

3.2 Participants

The questionnaire was only issued to the students of Henan Vocational Institute of Arts. The students volunteered to participate in the survey, and finally received 409 valid questionnaires. The questionnaire questions are based on the criteria from strongly disagree to strongly agree, with a score of 1-5. Participants choose the corresponding number according to their current situation.

4. Results

4.1 Reliability

The instrument's content validity has been assessed by experts at the Universiti Tun Hussein Onn Malaysia. It shows a result of good validity. There's another essential element, which is reliability, which needs to be measured by Statistical Package for Social Science (SPSS) before the instrument is used to collect data from the target students at Henan Vocational Institute of arts. From the study, it was suggested that 0.7 is a standard for acceptable value in terms of a reliable construct (Fornel & Larcker, 1981). In Table 1 below, a value of composite reliability for Online Learning Competency is 0.87, which means that it is an acceptable value with good reliability.

Table 1: Reliability

Measures	Items	Composite reliability
Online Learning Competency	15	0.87

4.2 Frequencies and Descriptive Statistics of Students' Demographic

Table 2 shows the frequencies and descriptive statistics of students' demographic (N=409). It also shows that, 409 respondents are from Henan Vocational College. Among these students, there are 161 (39.4%) male students and 248 (60.6%) female students. The majority of the respondents are from first year, specifically, 379 (92.7%) from first year in their studies, 23 (5.6%) from second year, 6 (1.5%) from third year and 1 (0.2%) from fourth year. The respondents are students of various majors, specifically, there are 57 (13.9%) from ICT major, 108 (26.4%) from Broadcast Host major, 96 (23.5%) from News Media major, 55 (13.4%) from User Interface (UI) major, 53 (13.0%) from Planner major, and 40 (9.8%) from Dance major. Among these respondents, most of them, 376 (91.9%) respondents, have experience with online learning, and a minority of 33 respondents have no experience with online learning.

Table 2: Frequencies and descriptive statistics of students' demographic (N=409)

Demographic	Item	Frequency	Percent %
Gender	Male	161	39.4
	Female	248	60.6
Class	First year	379	92.7
	Second year	23	5.6
	Third year	6	1.5
	Fourth year	1	0.2
Major	ICT	57	13.9
	Broadcast Host	108	26.4
	News Media	96	23.5
	UI	55	13.4
	Planner	53	13.0
	Dance	40	9.8
Experience on online learning	Yes	376	91.9
	No	33	8.1

4.3 Descriptive Statistics of Online Learning Competency

Table 3 shows the Descriptive statistics of Online Learning Competency. The respondents, the majority of both male and female students have intermediate competency in online learning, 107 and 185 respectively. Among the first-year students, the majority of the students in first year (276), second year (13) and third year (3) have intermediate level of competency, whereas the only student respondent in fourth year has high competency. The competency of students who study various majors are at an intermediate level-which prevails despite differences in majors.

Table 3: Descriptive statistics of Online Learning Competency

Demographic	Items	Low	Intermediate	High	Total
Gender	Male	10	107	44	161
	Female	15	185	48	248
Class	First Year	23	276	80	379
	Second Year	1	13	9	23
	Third Year	1	3	2	6
	Fourth Year	0	0	1	1
Major	ICT	6	44	7	57

Broadcast Host	4	73	31	108
News Media	5	68	23	96
UI	2	40	13	55
Planner	2	43	8	53
Dancer	6	24	10	40

4.4 Frequencies and Descriptive Statistics of Students’ Knowledge About Online Learning

Table 4 shows the Descriptive for items on the Online Learning Knowledge (N=409). The first dimension of Online Learning Competency is students’ knowledge about Online Learning. From the respondents, it was gathered that, in terms of the knowledge that online learning needs an internet connection, there is a mean of 3.14 from the respondents, meaning that their awareness towards this aspect is at an intermediate level. In terms of the awareness towards online learning as another method to acquire knowledge, the respondents are at an intermediate level of awareness with a mean of 3.59. In terms of awareness towards online learning as a learning conducted in an online learning classroom, the level of awareness has a mean of 3.56, meaning the students have intermediate level of awareness in this aspect. In terms of the aspect of online learning, in which materials can be learned repeatedly, there is a higher mean, 4.23, which means the students have a high awareness towards this aspect. Also, students have a high level of awareness towards the aspect of online learning, in which time or place is flexible for learning.

Table 4: Descriptive for items on the Online Learning Knowledge (N=409)

Item	Mean	Standard Deviation
A1. Online learning needs internet	3.14 (Intermediate)	1.07
A2. Online learning is another method to acquire knowledge	3.59 (Intermediate)	0.89
A3. Online learning is in an online virtual classroom	3.56 (Intermediate)	0.83
A4. Online learning materials can be learned repeatedly	4.23 (High)	0.77
A5. Time or place is flexible when I am learning online	3.97 (High)	0.85
Dimension A: Online learning knowledge	3.70 (High)	0.55

Note. Scale ranging from 1 (Highly unaware) to 5 (Highly aware)

4.5 Frequencies and Descriptive Statistics of Students’ Skill with Online Learning

Table 5 Shows the Descriptive for items on the Online Learning Skills (N=409). From the student respondents, it is shown for the aspect of students’ skill with learning online, that there is an intermediate level of awareness among them, 3.03, that they are able to search for learning materials online. For the aspect of accessing and working with basic functions of Microsoft Office’s programs (Word, Excel, PowerPoint) in online class, the students have a skill level that is intermediate with a mean of 2.69. In the aspect of being able to record an online class, the respondents have a skill level of intermediate with a mean of 3.47. In terms of being able to interact with the teacher in an online class, the respondents have an intermediate skill, with a mean of 3.22. Regarding the ability to take notes in an online virtual classroom, the respondents reflect that they have an intermediate skill, with a mean of 2.74.

Table 5: Descriptive for items on the Online Learning Skills (N=409)

Item	Mean	Standard Deviation
B1. I know how to search learning materials online	3.03 (Intermediate)	1.22
B2. I know basic functions of Microsoft Office’s programs (word, excel, power point) in online class	2.69 (Intermediate)	1.20
B3. I know how to record an online class	3.47 (Intermediate)	1.01
B4. I know how to interact with my teacher in an online class	3.22 (Intermediate)	1.27
B5. I know how to take notes in an online virtual classroom	2.74 (Intermediate)	1.23
Dimension B: Online learning skills	3.03 (Intermediate)	0.87

Note. Scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree)

4.6 Frequencies and Descriptive Statistics of Students’ Attitude on Online Learning

Table 6 shows the Descriptive for items on the Online Learning Attitude (N=409). In observing the respondents’ attitude towards Online learning, it can be seen that the students’ attitude towards time management while learning online is at

an intermediate level with a mean of 3.04. In terms of their attitude in improving previous mistakes with the help of online learning, the students have an intermediate level with a mean of 3.10. Regarding the students' attitude towards their own expectation for their own learning performance, they have an intermediate level in this aspect with a mean of 3.46. In terms of their attitude of preferring online class in comparison to physical class, the students have an intermediate level with a mean of 2.61. In terms of the students' attitude towards believing physical classes in the future to be taken over by online learning, they have an intermediate level with a mean of 2.40.

Table 6: Descriptive for items on the Online Learning Attitude (N=409)

Item	Mean	Standard Deviation
C1. I manage my time well while learning online	3.04 (Intermediate)	1.20
C2. While learning online, I improve from my previous mistakes	3.10 (Intermediate)	1.17
C3. I have a high expectation for my learning performance	3.46 (Intermediate)	1.15
C4. I prefer online class than physical class	2.61 (Intermediate)	1.23
C5. I think online learning will replace physical class in the future	2.40 (Intermediate)	1.27
Dimension C: Online learning attitude	2.92 (Intermediate)	0.90

Note. Scale ranging from 1 (Highly Disagree) to 5 (Highly Agree)

4.7 Students Online Learning Competency

The first research objective is to analyze the online learning competency of Henan vocational college students. Table 7 shows that the mean of online learning competency of Henan vocational college is 2.92, which is determined as intermediate level. And the result indicates that Henan vocational college students have an intermediate level of online learning competency.

Table 7: Mean of online learning competency (N=409)

Structures	Mean
Online learning knowledge	3.22 (Intermediate)
Online learning skill	3.70 (High)
Online learning attitude	3.03 (Intermediate)
Online learning competency	2.92 (Intermediate)

4.8 Differences Between Students' Gender and Their Online Learning Competency

Ho1: There is no significant difference between students' gender and their online learning competencies.

Based on Table 8, one of the objectives of this paper is to investigate if there were any differences between gender in their competency for online learning. An independent t-test was conducted and the results showed that there are no significant differences in this aspect of gender.

Table 8: T-test between students' Gender and their online learning competency

	Male		Female		Sig.	df
	M	SD	M	SD		
Online Learning Competency	3.27	0.73	3.18	0.60	0.22	295.70

4.9 Differences Between Students' Major and Their Online Learning Competency

Ho2: There is no significant difference between students' major and their online learning competencies.

Based on Table 9, another objective of this paper is to investigate if there were any differences among majors in the competency for online learning of the student respondents. A compare mean analysis one-way ANOVA test was conducted and the results showed that there were no significant differences in this aspect of the students' major.

Table 9: Compare mean analysis one-way ANOVA test between students' Major and their online learning competency

	Major		Broadcast Host News Media				UI		Planner		Dancer		F	sig.
	ICTM	SD	M	SD	M	SD	M	SD	M	SD	M	SD		
Online Learning Competency	3.08	0.61	3.34	0.67	3.25	0.61	3.25	0.69	3.11	0.59	3.09	0.77	1.97	0.08

5. Discussion and Conclusion

The main aim of this study is to investigate the online learning competency among students at Henan Vocational College; to analyze if the factor of differences in gender, and different majors of students' present differences in online learning competency. The findings have shown that students have high knowledge of online competency but only at an intermediate level of skill and an intermediate level of attitude towards online learning. Also, this study found that there are no significant differences in the aspect of gender and also no significant differences between students' online learning competency in the aspect of students' majors.

5.1 Aspects of Online Learning Competency

The first research question aims to find out the competency of students in China Vocational and technical schools with a reference to Henan Vocational College. Their online learning competency as a whole is derived from their knowledge, skill and attitude in regards to online learning, and findings show that they have an intermediate level of competency in regards to online learning. This is due to the many efforts of the educational system in China that emphasizes the advancement of educational technology and Henan Vocational College adopting Learning pass platform to conduct virtual learning (Yang & Sheikh Khairuddin, 2022). The research questions are answered through analysis of the data received from a survey which also looks into the question if student gender and major become a factor that affects their online learning competency.

5.2 Gender and Major of Students

There were 248 females and 161 male respondents who contributed towards the data for the survey, and it was found that there is no significant difference in the aspect of gender, when it comes to their online learning competency. This is due to the equal chance of education and exposure for male and female students at Henan Vocational College. Therefore, if the college organizes more online learning sessions, both male and female students can benefit equally.

The data for this study shows that among the six majors of the respondents, there are no significant differences in the aspects of student majors. This is due to the equal requirement across majors for the students to adapt towards online learning and the classes conducted in each major have no significant differences between them in the case that they all consist of using the online learning platform Learning pass in Henan Vocational College. Therefore, if the college organizes more online learning sessions, students of all 6 majors can benefit equally.

5.3 Students' Knowledge, Skills, and Attitude Towards Online Learning

The students' knowledge of Online Learning has a mean score of 3.70, showing that they have high competency in terms of being aware and knowing the functions and benefits of online learning. This section probes for the students' awareness of the basic requirement of online learning, which is an internet connection, and a mean score of 3.14 was derived. This shows an intermediate level of awareness towards this aspect which could have been higher due to the basic level of this knowledge. The items that have high scores in this section are awareness towards the nature of online learning, whereas materials can be learned repeatedly, and that time and place can fit to the students' individual situation, which is true due to Henan Vocational College's use of hybrid learning where students not only have traditional classes but also have to be capable to use learning pass online learning platform (Wu, 2022).

The students' skills in Online Learning have a mean score of 3.03, showing that they have an intermediate level of competency in terms of being capable of navigating through functions of online learning platforms and making use of programs for online classes. The findings are true in the case that students these days are generally proficient in using technology due to their exposure to technology-rich environments (Jones, 2012). Skills involved in this section include searching for information online, performing basic functions on MS Excel, MS PowerPoint and MS Word, as well as managing online learning software. These are important skills to be had to enhance students' readiness for online learning (Hung et al., 2010). Evidently, when students at Henan Vocational Colleges refer to materials and produce their own work, they have to work with word-processing software and be able to submit their work online. Also, an item with a high score is the skill of students to record online classes, which is common for students to do when they need reference to a lecture after it has been conducted, which is useful for students regardless of their majors or seniority.

For the attitude of students towards Online Learning, it has a mean score of 2.92, showing that they have an intermediate level of competency in terms of realizing how they need to act as a learner who is involved in online learning. This reflects that even though they are aware of the benefits and expectations of online learning, due to the fact that they still face from time-to-time challenges when it comes to adapting towards online learning such as learning the functions and navigation of a new platform whenever a new one replaces the old, or the transition of students in Henan Vocational College from traditional classes to virtual.

6. Implications and Suggestions

From the findings and discussions above, there are suggestions that can be taken into action-lecturers need to encourage students to fully employ the functions of online learning platforms to increase their skills in an online learning

environment for more productivity and effectiveness. Also, to enhance online learning, lecturers may provide some sort of reward system of positive reinforcement for the use of online learning platforms, done in such a way that the students are assessed from their usage of forums in learning pass to be involved in discussions in a virtual space. The more students are exposed and open to online environment for learning, the more adapted they will become.

7. Recommendations

This study has limitations which should be explored further in future research. Firstly, this study involves only less than 500 students and six majors in Henan Vocational College, future research could look into seeking more respondents so that the findings are results that can be holistic and generalized to the wider community in the college. Secondly, this study contained only five items for each of the three aspects-knowledge, skill and attitude towards online learning. Future research should be into adding more items for a more accurate result that could reveal more of these aspects. Thirdly, future studies could look into students' academic achievement while using online learning compared to the traditional face to face learning.

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