Examining the Need for Digital Literacy Skills among ESL/EFL Malaysian and Chinese Postgraduates

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Abstract. In today's world, where there is a vast amount of information available, users must navigate through the ambiguity and evaluate viewpoints from multiple perspectives. Postgraduate students, in particular, require critical thinking skills, as merely knowing the content is inadequate. Additionally, international postgraduate students may face challenges in adapting and transferring digital skills when pursuing their studies in another country. Consequently, language learning in a digital environment has become increasingly challenging for postgraduate students who must apply their linguistic knowledge to solve problems encountered while navigating the internet. Therefore, this quantitative design study aims to determine the differences and similarities in determinant digital skills for online ESL/EFL postgraduate students in Malaysia and China. The 21st Century Skills Scale questionnaire was utilized to collect data from 207 postgraduate students of a university in Malaysia, comprising 96 Malaysian and 111 Chinese students. Using SPSS descriptive analysis and significance test, the results indicate that Creativity and Innovation has the lowest mean score among all the other determinants. This research highlights the need for these ESL/EFL postgraduate students to possess a range of digital skills to succeed in a digital world. By identifying the differences and common traits between ESL/EFL students in Malaysia and China, this study provides insights into the challenges and opportunities for digital skills development in different cultural contexts.

Keywords: Chinese postgraduates; Digital skills; EFL; ESL; Malaysian postgraduates; 21st Century Skills

1　Introduction

The notion of 21st Century competencies has been extensively deliberated in the academic arena. It encompasses a range of proficiencies, attributes, habits, and personal traits that educators, school reformists, professors, and employers deem essential for students to excel in today's society [1], [2], [3]. This skill refers to the ability to read, understand, and interpret data, which is becoming increasingly crucial in the field of social studies education due to the prevalence of data visualization and the availability of technological tools [4], [5]. This is particularly crucial for students who are entering

academic programmes be it undergraduate or even postgraduate programmes. Having said that, 21st century digital literacy is essential for students in Higher Education Institutions to complete their academic tasks. It is a valuable asset that enables them to access digital services and perform various activities and assignments. The idea behind competencies is that students should be taught highly valued and universally applicable skills [6]. Consequently, schools, universities, and colleges must prioritize effectively delivering these competencies to their students.

In language learning, especially English as a second language (ESL) or English as a foreign language (EFL), having the digital skills may help students since they are exposed to and use the language in context. Using technology appropriately creates a meaningful learning context where the acquisition of language and literacy skills is heightened by digital skills [7], [8]. A study by Rinekso et al. [9] showed that ESL learners with digital literacy perform the acts of searching, comprehending, evaluating, creating, and sharing information. It is highlighted that these learners used digital tools for academic research and general purposes. Essentially, ESL/EFL learners of this present day do rely on the Internet as a way to enhance their language skills. Having the digital skills and to use them effectively will enhance their linguistic abilities.

In recent years, Malaysia has become a favoured destination for higher education, especially among mainland Chinese students. The number of Chinese students in Malaysia grew to about 28,590 by 2021 [10]. In China, 1.051 billion, or 74.4% of the total population of China is using the Internet in their daily lives. These figures suggest that Chinese students may have a good understanding of digital technologies, however, they may face challenges when using them in other countries [11], [12]. Their digital platforms are usually in Mandarin. As EFL learners adapting to different digital tools and culture, such as those used in Malaysia, can be challenging since most platforms are in English. For example, students from China may be more familiar with social media applications such as WeChat, Weibo, Douyin, DingTalk, and Xiaohongshu, while Malaysian students may be more familiar with tools like Google Meet and Webex. According to Huang [13], more than 750 million Chinese citizens use WeChat to read posts on "Friends Circles" daily. WeChat is not widely used internationally. This shows that students' existing technology use patterns can limit and impede their academic progress in postgraduate study. However, there is also a growing concern regarding Malaysian university students to critically use digital contents to meet their information needs [14], [15], [16]. The ability to use technology effectively can greatly enhance, expand, and deepen learning [17]. Ryan et al. [18] and Enakrire [19] suggest that having data literacy skills is a valuable asset for researchers as it enables them to comprehend and connect different sets of data to transform it into meaningful insights for their own benefit. Therefore, postgraduate students require not only digital skills but also the ability to effectively apply these skills in order to complete their programmes in a timely manner.

The ability to use technology effectively has proven important for ESL/EFL postgraduate students. In order to ascertain the differences and shared characteristics, this research suggests the necessity for determining skills in the 21st century digitally for

ESL/EFL postgraduate students of a local university in Malaysia. Hence, the study seeks to answer the following the research questions:

1. What are the significant determinants of 21st-century (digital) skills among ESL/EFL postgraduates from Malaysia and China?

   a. Collaborative skills
   b. Critical thinking skills
   c. Creative and Innovative skills

2   Methodology

The investigation of postgraduate 21st century digital skills of Malaysia and China was the study's main goal. Kelly, Knowles and Euisuk Sung's [20] 21st Century Skills Scale questionnaire was used in this quantitative study to gather data. The scale is aligned with the Ministry of Higher Education (MOHE) curriculum development framework (2014) that consists of collaboration, critical thinking, creativity, and communication skills. However, for the purpose of investigating these ESL/EFL postgraduate students, communication skills determinant is omitted since students from both countries may use different platforms to communicate. For this study, the questionnaire was firstly pilot tested at a public university in Malaysia. The overall alpha coefficient was .902 which signifies high reliability.

A total of 207 ESL/EFL postgraduate students of a local university (96 Malaysian students and 111 Chinese students) volunteered to take part in the study. The questionnaire was distributed to the respondents using the online Survey Monkey platform. The 47 items of the 21st Century Skills Scale Survey were divided into two main categories. Six (6) items on the respondents' demographic information are included in the first part. Forty-one (41) statements about 21st Century skills are included in the second section and are rated on a Likert scale from Strongly Disagree to Strongly Agree. The collected data were analysed using SPSS descriptive statistics. The frequency, mean and standard deviation were calculated to determine the digital skill determinants. T-test was also used to identify the significance of the determinants.

3   Results and Discussion

The questionnaire is divided into two parts, which are the demographic data and the inventory of digital literacy skills. In the first part, the demographic data of the postgraduate students were identified where the majority of the respondents 53.8% are from China followed by Malaysia 41%. 56.7% of the respondents are from 18 to 24 years age group, followed by 20.7% from the 25 to 34 age group, 17.8% from 35 to 44 group, 3.8% from 45 to 54 group, and 2 respondents from the age group of 55 to 64. 36% of the respondents have limited access to the Internet while 63.9% do not have access problems. They used several types of devices to access the Internet such as laptops (54.6%), smartphones (26.8%), tablets (10.3%) and desktop (8.2%).   They mostly

access the Internet from home (84.5%), from work (13.4%) and 1% each from the library as well as from outside. The respondents mostly used the Internet for academic research (21.6%) followed by social networking (20.6%).

The next section presents the inventory of digital literacy of Malaysian and Chinese postgraduates of a local university. Three determinants were measured as follows: Critical Thinking (11 items), Collaboration (22 items), and Creativity & Innovation (8 items). The breakdown frequency of the Likert score used is 1 - Strong Disagree, 2 - Disagree, 3 Undecided, 4 Agree and 5 Strongly Agree.

3.1   Determinants of 21st Century skills among postgraduates from Malaysia and China

Critical thinking skills.

The scale percentage, distribution of the mean and standard deviation for each item on 21st-Century critical thinking skills among postgraduates from Malaysia and China is shown in Table 1. All the survey items under critical thinking skills have the highest percentage in the (4) Agree category except for items no 7, 8, and 9. It is important to note that item no 7 *Understand questions that lead to critical thinking* has the highest percentage (74%) in the (3) Undecided category. All 3 items (no 7, 8, and 9) have the highest percentage also for the Strongly Agree category (5). The analysis for each item under this category shows that item 8 *Gather relevant and sufficient information from different sources* and item 9 *Justify choices of evaluation criteria*, has the highest mean score which are 4.03 and 3.96 respectively. Item 4 has the lowest mean score (3.83) which is *Identify in detail what needs to be known to answer a science inquiry question.* However, the majority (65.4%) chose Agree (4).

The overall mean score and standard deviation for the critical thinking skills is 3.92 and 0.669, respectively. Hence, the postgraduate students in this study perceived critical thinking skills as familiar and important in their postgraduate programmes. Recent research by Mahmud et al. [3] indicates that students possess various skills, including strategic thinking and problem-solving skills, in the aftermath of the COVID-19 crisis. Such skills would allow them to solve problems critically and synthesize different information online. They must be able to make intelligent inquiries and justify choices made. Students must equip themselves with critical thinking skills in order to move forward in their academic inquiry [21], [21], [23].

Saleh [24] argued that the acquisition of critical thinking skills by ESL/EFL learners is vital. This is due to the inherent nature of language learning, which encompasses activities like analysis, synthesis, reflection and problem solving. Moreover, the presence of social, cultural and administrative obstacles further underscores the significance of integrating critical thinking into the teaching and learning of English. By developing digital skills and critical thinking abilities, post-graduates can not only triumph in their academic and professional endeavors, but also evolve into lifelong learners who can adapt to new challenges and opportunities in the digital era.

Table 1. Critical Thinking Skill Survey Output

Critical Thinking	SCALE					Mean	SD
Survey Item	1 (n,%)	2 (n, %)	3(n, %)	4 (n, %)	5(n, %)		
1. Revise drafts and justify revisions with evidence.	3(1.4%)	1(.5%)	33(16%)	137(66%)	34(16%)	3.95	.686
2. Develop follow-up questions that focus or broaden the in-quiry	4(1.9%)	2(1%)	39(18.8%)	138(66.3%)	25(12%)	3.86	.708
3. Understand how knowledge or in-sights might transfer to other situations or contexts	5(2.4%)	3(1.4%)	28(13.5%)	138(66.3%)	34(16.3%)	3.93	.755
4. Identify in detail what needs to be known to answer a science inquiry question.	3(1.4%)	4(1.9%)	41(19.7%)	136(65.4%)	23(11%)	3.83	.700
5. Evaluate reasoning and evidence that support an argu-ment.	3(1.4%)	2(1%)	33(16%)	145(69.7%)	25(12%)	3.90	.663
6. Develop follow-up questions to gain understanding of the wants and needs	3(1.4%)	1(.5%)	39(19%)	134(64.4%)	31(15%)	3.91	.692
7. Understand ques-tions that lead to critical thinking	5(2.4%)	28(13.5%)	154(74%)	20(9.6%)	207(99%)	3.91	.568
8. Gather relevant and sufficient infor-mation from differ-ent sources	2(1%)	24(11.5%)	143(69%)	37(17.8%)	206(99%)	4.03	.620
9. Justify choices of evaluation criteria	2(1%)	32(15.4%)	144(69%)	28(13.5%)	206(99%)	3.95	.615
10.Thoroughly assess the quality of infor-mation.	3(1.4%)	1(.5%)	27(13%)	146(70%)	29(14%)	3.96	.650
11.Recognize the limita-tions of our design and know when to consider alterna-tives	3(1.4%)	2(1%)	31(15%)	141(67.8%)	30(14.4%)	3.93	.679
TOTAL						**3.92**	**.669**

Collaboration Skills

Collaboration determinant in Table 2 shows the highest percentage of respondents input is in the Agree (4) category for all items followed by Strongly Agree (5) category. However, items no 18 and no 22 show the percentage in Uncertain (3) category is higher than Strongly Agree category.

The analysis for each item under this category shows that item *Be polite and kind to course-mates*, has the highest mean score which is 4.37. This indicates that the postgraduates value the camaraderie among peers. Effective collaboration skills are crucial for postgraduate students during their research projects, dissertations, and other academic endeavors. These skills enable students to work harmoniously with others, exchange thoughts and concepts, and leverage each other's abilities to generate top-notch outputs [23].

Nonetheless, the item with the lowest mean score (3.43) is *Help resolve issues without asking the lecturers for help.* With the prevalence of digital tools, assistance from lecturers is still deemed important to these postgraduate students. In order to collaborate effectively with fellow students and even academic staff located in different areas, postgraduate students may find it necessary to utilize digital tools and technologies, such as project management software, online document sharing, and video conferencing. Through development of these skills, postgraduates can not only work with others effectively in academic endeavors but also acquire abilities that are sought after in the professional world [25]. The overall mean score and standard deviation for the collaboration skills is 4.02 and 0.760, respectively (Table 2).

Table 2. Collaboration Skill Survey Output

COLLABORATION	SCALE					Mean	SD
Survey Item	1 (n, %)	2 (n, %)	3 (n, %)	4 (n, %)	5 (n, %)		
1. Be polite and kind to course-mates	3(1.4%)	-	13(6.3%)	93(45%)	98(47%)	4.37	.731
2. Acknowledge and respect other perspectives.	3(1.4%)	1(.5%)	14(6.7%)	114(54.8%)	76(36.5%)	4.25	.724
3. Follow the rules for team meetings.	3(1.4%)	2(1%)	16(7.7%)	135(65%)	49(23.6%)	4.10	.693
4. Make sure all course-mates' ideas are equally valued.	2(1%))	2(1%)	27(13%)	123(59%)	52(25%)	4.07	.712
5. Offer assistance to others in their work when needed.	3(1.4%)	-	23(11%)	133(64%	44(21.2%)	4.06	.680
6. Improve my own work when given feedback.	3(1.4%)	-	18(8.7%)	127(61%)	58(28%)	4.15	.693
7. Use appropriate body language when presenting.	3(1.4%)	4(1.9%)	26(12.5%)	126(60.6%)	49(23.6%)	4.03	.754
8. Come physically and mentally prepared each day.	3(1.4%)	3(1.4%)	37(17.8%)	127(61%)	36((17.3%)	3.92	.735
9. Follow rules for course mates making.	3(1.4%)	3(1.4%)	29(13.9%)	123(59%)	49((23.6%)	4.02	.753
10. Make detailed plans about the use of technology.	3(1.4%)	8(3.8%)	34(16.3%)	125(60%)	36(17.3%)	3.89	.785
11. Make detailed plans about how to work together.	3(1.4%)	4(1.9%)	30(14.4%)	124(59.6%)	45(21.6%)	3.99	.759

12. Use the time, and run meetings, efficiently.	3(1.4%)	4(1.9%)	36(17.3%)	120(57.7%)	43(20.7%)	3.95	.770
13. Consistently use technology as agreed upon by the course mates to manage project tasks.	3(1.4%)	3(1.4%)	29(13.9%)	121(58.2%)	49((23.6%)	4.02	.757
14. Complete research to contribute to the course mates.	3(1.4%)	-	20(9.6%)	128(61.5%)	56(26.9%)	4.13	.695
15. Involve all course mates in tasks.	3(1.4%)	-	21(10%)	123(59%)	59(28.4%)	4.14	.709
16. Interact with course mates effectively.	3(1.4%)	1(.5%)	21(10%)	137(65.9%)	45(21.6%)	4.06	.683
17. Assign roles as needed, based on course mates' strength.	2(1%)	4(1.9%)	31(14.9%)	128(61.5%)	41(19.7%)	3.98	.719
18. Help resolve issues without asking the lecturers for help.	8(3.8%)	25(12%)	64(30.8%)	91(43.8%)	20(9.6%)	3.43	.956
19. Provide feedback useful to course mates and lecturers	4(1.9%)	1(.5%)	29(13.9%	131(63%)	43(20.7%)	4.00	.736
20. Create a task list that divides group work reasonably among course mates	3(1.4%)	9(4.3%)	33(16%)	112(53.8%)	51(24.5%)	3.96	.842
21. Help the course-mates to solve problems and manage conflicts.	3(1.4%)	2(1%)	30(14.4%)	127(61.1%)	46(22%)	4.01	.732
22. Track my progress toward goals and deadlines.	3(1.4%)	6(2.9%)	26(12.5%)	158(76%)	15(7.2%)	3.85	.649
TOTAL						**4.02**	**.760**

Creativity and Innovation Skills

Creativity and Innovation determinants in Table 3 also have the highest percentage (54.3%-65.4%) in the Agree (4) category compared to the other categories. Meanwhile, the second highest category is the Undecided (3) category followed by the Strongly Agree (5) category except for item 1 *Find sources of information and inspiration when others do not*, item 4 *Elaborate and improve on ideas*, item 5 *Use brainstorming to generate original ideas* and item 6 *Use creativity and imagination*.

It is important to highlight that Creativity and Innovation also has the lowest mean (3.88) of all the other determinants. Creative thinking skills allow people to be more competitive at the workplace when providing constructive and innovative ideas to solve problems [26], [27]. Lacking this skill means the students may not be able to go beyond solutions that they have at hand. Digital tools and technologies such as ideation software, prototyping tools, and social media may be utilised by postgraduate students to increase their creativity and innovation skills [23]. Being innovative is the next level of critical thinking as students may not just evaluate information but also create new knowledge or explore multidisciplinary fields [28]. These competencies are greatly

valued in the professional world and can enable students to distinguish themselves and excel in their careers [29].

In this digital era, these postgraduate students have to venture into new fields of interests as information is easily available to everybody. This finding shows that these postgraduates may be restricted to the field that they are focusing on as they do not rank the items very high compared to other skills.

Table 3. Creativity & Innovation Determinant

CREATIVITY & INNOVATION SKILL	SCALE					Mean	SD
Survey Item	1 (n, %)	2 (n, %)	3 (n, %)	4 (n, %)	5 (n, %)		
1. Find sources of information and inspiration when others do not.	3(1.4%)	4(1.9%)	48(23.1%)	113(54.3%)	40(19.2%)	3.88	.786
2. Create ideas geared to the research/projects.	3(1.4%)	4(1.9%)	41(19.8%)	134(64.7%)	25(12.1%)	3.84	.710
3. Create new, unique, surprising research/projects.	2(1.0%)	8(3.9%)	57(27.5%)	114(55.1%)	26(12.6%)	3.74	.761
4. Elaborate and improve on ideas.	3(1.4%)	3(1.4%)	30(14.4%)	136(65.4%)	36(17.3%)	3.96	.711
5. Use brainstorming to generate original ideas.	2(1%)	6(2.9%)	32(15.5%)	126(60.9%)	41(19.8%)	3.96	.746
6. Use creativity and imagination.	3(1.4%)	5(2.4%)	37(17.9%)	121(58.5%)	41(19.8%)	3.93	.776
7. Promote a variety of creative perspectives.	2(1.%)	2(1%)	45(21.8%)	128(62.1%)	29(14.1%)	3.87	.687
8. Combine different elements into a complete research/projects.	1(0.5%)	5(2.5%)	47(23.0%)	119(58.3%)	32(15.7%)	3.86	.716
TOTAL						**3.88**	**.74**

3.2 Significance of Malaysian and Chinese Postgraduates' 21st Century Skills

This study aims at determining the differences of determinants of 21st-Century (digital) skills among postgraduates from Malaysia and China. Besides the differences, the study also aims to determine the significance of the 3 determinants selected in the research. In achieving this, the mean, standard deviation was calculated and T test was conducted.

As shown in Table 4, Malaysian postgraduates have the higher means in 3 determinants as compared to postgraduates from China. The highest mean is in Collaboration skills in both countries and the lowest is in Creativity and Innovation skill. Digital literacy is in percentage and is the mean of all three determinants.

Table 4. Difference of Determinants between Malaysia and China

Skills	Malaysia	China
	Mean, Std Dev	Mean, Std Dev
Critical Thinking	.80, .098	.77, .103
Collaboration	.83, .089	.79, .109
Creativity & Innovation	.79, .117	.76, .114
Digital literacy	.81, .092	.77, .099

The mean scores are tested using t-test in order to identify their significance (Table 8). Critical thinking and Collaboration are the 2 determinants of 21st Century (digital) skills found to be significant in comparing between Malaysian and Chinese postgraduates. As presented in Table 5, these 2 determinants recorded p value of <0.05.

Table 5. Hypothesis testing and Result

Determinants	T test	P value (2 tailed)	Result	Outcome
Critical Thinking	2.289	.023	Significant	There is difference in the means of Critical Thinking between Malaysia and China
Collaboration	2.799	.006	Significant	There is difference in the means of Collaboration between Malaysia and China
Creativity & Innovation	1.565	.119	Not significant	There is no difference in the means between Malaysia and China
Digital Literacy	2.337	.002	Significant	There is difference in the means of Digital Literacy between Malaysia and China

Creativity and Innovation is found to be the non-significant determinant of the 21st Century (digital) skill between these two groups with p value of >0.05. This finding echoed a qualitative study done by Fong, Sidhu and Chan [15] that revealed that there is a lack of critical and creative thinking among postgraduates in public and private universities in Malaysia. Furthermore, based on this finding, the hypothesis as appears in Table 5 that relates to Creativity and Innovation is rejected.

In a final analysis, both Malaysian and Chinese postgraduates have similar digital skills. The similarity, in this case, is based on the pattern of the highs and lows, the mean and standard deviation of the determinants (see Table 5). Even though various components of digital skills have been theoretically defined [30], [31], [32], [33], it is unclear which of these skills are influenced by what variables. Besides, there is little accompanying data provided in most articles on 21st-Century and digital skills and descriptions are mostly on conceptual level [32]. The best approach in searching and understanding the cause of differences in the level of 21st-Century digital skills among postgraduates is through synthesizing existing knowledge. This calls for more research to be carried out to determine the factors that cause differences in the level of 21st -Century digital skills among postgraduates as well as factors or variables that affect postgraduates' digital skills.

4   Conclusion

The findings in this study can shed some light on the skills that these postgraduates need support. Digital skills are crucial for ESL/EFL learners as they provide access to a wide range of learning resources, enable effective communication, promote collaboration and cultural exchange, enhance employability, and develop digital literacy. Integrating digital skills into English language learning can significantly enhance the overall language acquisition process and prepare learners for success in today's digital world.

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