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Developing Computational thinking education though training among Chinese students

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Abstract

The 21st century is an era of 'Computing Technology' that has influenced every domain of human life. Such a high involvement and usage of Computing Technology have enhanced the need and requirement of computing education. There is a need to develop computational thinking skills of students aiming at students' psychological and behavioral transformation favorably towards 'Computing Technology'. The current research is carried out sampling 150 students from various universities in China. The objectives of this study include finding out how educational institutions and teachers can enhance the computational skills of students and what motivational strategies can significantly help students to undertake training programs and acquire advanced computational skills. This study also analyzes how to develop computing talent and computational thinking among university students. The study recommends that universities should make efforts to improve students' computational capabilities by taking training initiatives that would help students to improve their computational skills and prepare themselves for the need and demands of the world's job market.

Keywords: Computational thinking education, computing technology, training, motivational strategies

Computing technology in 21st century has grown so ubiquitously that it is being utilized in all type of gadgets and devices such as computers, tablets, smart phones as well as internet applications like cloud computing, emails, text messages, and social media. The growth and development of all sectors depend on computing technology. Universities have introduced such computational education curricula which aim at escalating students' capabilities and abilities. Universities are developing latest curriculum for computing technology courses to familiarize students with relevant computing technologies. Like other fields of human knowledge, technology has also changed criteria about how modern education should be provided to students (Leftwich et al., 2017). Technology requires the people everywhere to interact and perform different activities (Frezzo, 2017; Csonka et al., 2018; Primorac, 2018; Giraldo, 2019; Perez-Rodriguez et al., 2019; Indartono & Hamidy, 2019). Every individual's personal and professional life is greatly affected by modern technology (Elliote et al., 2018; Degirmenci, 2019). Students need to have useful information about technology to survive in the world.

Computers and computational devices along with a huge network of internet applications have become integral part of our lives. Business organizations and large institutions use networking systems to manage huge data. Similarly, learning institutions like universities also manage data by integrating their learning management with modern methods and technology (Saritepeci & Durak, 2017; Mwesigwa & Mubangizi, 2019; Muswaka, 2019; Antoni et al., 2019; Sanusi & Sanusi, 2019; Kos et al., 2019). Apart from that, a proper knowledge of computers has also become a primary requirement to perform everyday tasks. Individuals need to possess such computational skills and the ability to use tools and techniques that are required to manage multiple tasks in their personal and professional life. Such skills and abilities come by developing computational thinking. People have different perceptions about computational thinking. A group of people believes that computational thinking education should be an essential part of primary and higher education. In contrast, some people opine that computational thinking should not be part of primary school. Though at primary school, much emphasis should be given to the development of mathematical and linguistic knowledge and skills that would be helpful later in improving computational thinking skills.

Computational thinking is all about acquiring knowledge about the way how computers 'think' and 'behave' to perform different types of work and to achieve the desired goals (Tondeur et al., 2019). Computational Thinking can be defined as a term to represent students' knowledge and ability to design and develop computational solutions to complex problems. The term includes multiple operations such as practicing programming, developing algorithmic thinking, and enhancing qualities of problem solving, pattern recognition and logical reasoning (Angeli and Giannakos, 2020).

The importance of computational thinking in the effective use of 'Computing Technology' cannot be denied. To make 'Computing Technology' effective for students, educational institutions should work for the improvement of students' capabilities to use computers. The curriculum aiming at improving computer ability and students' computational thinking is a prerequisite in the growth of their career and the development of the country as well (Maciej et al., 2017; Gokcearslan & Baturay, 2017). Once computational thinking is cultivated, students are able to understand

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computer programs and perform different practical applications comfortably. They can minimize their workload by appropriately managing several operations. They can learn how to command various network applications, resolve problems, identify errors, as well as design and customize systems. Students with a good command of computer programs can easily manage complex problems (Nino, 2018). Students who have a proper command on computer programs directly influence computer outputs and transform complicated situations into simpler ones (Syslo et al., 2017).

Problem statement

The world has entirely been transformed due to technological advancements. The personal and professional activities of individuals are highly dependent on computer systems. Without computer systems, the world can no longer move forward. The future growth and development of every individual in this digital world are closely associated with modern technology and techniques. It is therefore vague to believe that computer talent training and computational thinking are only associated with students of computer science. One school of thought believes that every individual must have good knowledge of computational thinking to survive in the world effectively and efficiently (Thorson, 2018). This requires providing adequate training in computer education and computational thinking, which is unfortunately lacking in educational institutions. Owing to the lack of training opportunities, it is also difficult to find any psychological inclination or behavioral change for developing the computer talent.

Training in computational thinking can develop computing talent and bring behavioral changes in students. Computational thinking can contribute to building up an advanced society. There is a great need to educate children at initial stages about computer technology. Training programs should be arranged to develop computing talent and to learn about modern computing systems and get multiple benefits (Zarkesh, 2018; Denning, 2017). The teachers and parents can also play a useful role in motivating students and children to learn the basics of 'Computing Technology' prior to they build capabilities and skills formally in educational institutions.

Research Objectives

This study analyzes the importance and effectiveness of computational thinking and computer training. The following objectives were framed for this study:

To determine the significance of computational thinking skills for the students.

To analyze the benefits of computational thinking education in the professional world.

To communicate the methods of learning computational thinking skills

Research Questions

How does computational thinking contribute to the career development of students?

What are the best techniques to improve computational thinking skills among students?

How does computer training for developing computer talent resolve complex problems?

Significance of the Study

The study plays an active role in creating awareness about the efficacy of computational thinking in this highly competitive world environment. Learners are encouraged to interpret a problem and think critically while learning computer skills. It helps them overcome the problems and foresee what will happen in the future. It allows them to analyze causes and consequences and examine how their attitudes and actions influence the situation in question. Moreover, the study also benefits researchers and students to understand that computational thinking is a stage which comes before programming for which computer training is necessary.

Literature review

Computational thinking is primarily associated with students pursuing computer programming but it is a skill that is required by any individual who wishes to design systems and programs to meet the behavioral needs of users around the world (Choi et al., 2020; McLean et al., 2017; Kallia et al., 2017). Computational thinking education is mostly used for solving and analyzing computer related issues such as software problems, application configurations, data compatibility and so on. However, it can also help to provide solutions to the problems and prevent errors in different disciplines. It is a wrong perception that only computer or IT professionals should learn computational thinking skills. Computational thinking skills rather help people of all fields to resolve their issues. Specifically, in the context of education, modern education curricula largely depend upon computational thinking. Educational institutions focus on providing to students knowledge of digital technology and computer science education (Hammood et al., 2019; Herayanti et al., 2017; Kim & Adler, 2017).

Developed countries including Taiwan, China, and Korea facilitate students to improve their logical thinking skills through computational thinking education. Universities and Higher education institutions in these countries have upgraded their curriculum to support the movement of computational thinking education. Taking the examples from these countries, a few Asian countries are also making efforts to improve students' technical skills by enhancing computational thinking skills (Mendes & Penalvo, 2017).

Researchers have also believed that computational thinking is a talent essential for everyone. A study conducted

by Liu et al. (2020) communicated the importance of computational thinking in a complicated and complex world environment. The study reiterated that technology has become one of the essential parts of society. Every business organization has significantly focused on modern techniques and technology to identify system errors or constraints and resolve them; how the ICT business developed at a wild speed while catering to the computational needs of the society as well as emphasized upon taking reforms in the form of bringing changes in curriculum in order to effectively use modern technology and resolving problems and issues. Teachers' training in computational thinking should also be given a top priority. The most well-known countries that launched these new reforms to spread computational thinking education include Korea, China, and Hong Kong. These countries have focused on teachers' training too and helped them develop computational skills of students.

Petropoulou et al. (2017) draw attention to the introduction of software education in computational education curriculum of universities. This step has been taken to expand students' capabilities and prepare them for the world's changing needs. Kim & Jeon (2017) state that software integrated education is in high demand in many countries. Students who are offered education through ICT skills based programs are more confident and motivated to learn modern knowledge and skills as compared to those conventional learning programs.

Prior to the use of technology in all fields of education, scholars and educators believed that computational thinking was significantly associated only with students of computer science. However, the advancement in technology has necessitated amending the educational curriculum for all courses from primary to high school levels. As a result, computer education has now become one of the vital parts of curriculum (Black et al., 2017). Lodi & Bell (2019) also agreed that computational thinking should not be solely associated with computer science students. Every student must learn computer skills to survive in the job market since technology has occupied every aspect of life, and to grow in every field, graduates must possess proper computer knowledge and skills. Ebner & Pollak (2019) draw attention to practical benefits. Computational thinking helps resolve different kinds of problems faced by various institutions. By integrating computational thinking with education, it not only helps students to succeed in the job market, but it also adds value to the economy of the country. The study also recommends to conduct more research on challenges that institutions face and how to integrate computational thinking with education more strongly. The study also suggests to use effective strategies and techniques to disseminate computational thinking education across the nation and worldwide.

Computational thinking is also associated with academic performance. Many researchers have examined the relationship between academic achievement and computational thinking education (Angeli & Jamani, 2017; Johnson et al., 2017). A study conducted by Basnet et al. (2017) communicates that computational thinking skills also influence academic performance. The study identifies the relationship by applying the structural model. It is found that there exists a significant bond between the performance of students in learning institutions and computational thinking. The results also show that learning modern computational skills helps to boost the career and enable people to survive in the advanced world.

Fernandez et al. (2017) asserts that computational thinking is essentially required in education for problem-solving skills.It makes use of different tools and techniques to provide solutions to issues that no other system can solve. It helps to identify errors and broaden the perspectives of knowledge, tools and approaches so that it is easier to resolve different range of problems. The study also states that the knowledge of computers greatly facilitates in the fields of social sciences and designing systems. Computational thinking education can also be used to analyze the difference between machine intelligence and human behavior (Danies et al., 2018). In this study with 1251 Spanish students as participants, students' knowledge about digital technology and software was studied.The result reveals that computational thinking does not only contribute to problem-solving skills but also it is necessary to survive in the contemporary world. With the ability to understand the digital language, along with the knowledge of computer sciences, students are provided with multiple opportunities in every field of life.

There are research studies that require learning institutions not to focus only on providing linguistic and arithmetical education but also on improving digital literacy. A study conducted by Penalvo (2018) argues that students can survive in the digital world only if universities upgrade their educational curricula. Many universities have taken the initiative to improve the curriculum by introducing computational thinking education. Teachers also motivate students to learn a digital language and develop high commands over tools and technology. For instance, a high command of programming or software knowledge can help students resolve several problems and design digital systems to improve society. It is also emphasized that students at the university level are responsible for developing such knowledge and skills that help towards the betterment of a country as they are imperative assets of a state. Their computer subject skills and abilities can help prepare productive human resources (Bicen & Ozuorcun, 2017; Saritepeci & Durak, 2017).

Such a trained and qualified labor is able to use modern techniques and technology and avail all opportunities in the job market. Universities must focus on allocating proper time for the acquisition of these skills for the larger benefits of the

society. Kerr & Popenici (2017) indicate that many learning institutions are investing in technology and development and integrating artificial intelligence to enhance the educational system. The study communicates that learning institutions adopt proper techniques and strategies to provide modern education. In the forthcoming period, the higher education arrangement in the world will significantly be influenced by technological advancement. Last, but not the least, it is also reiterated that universities should also invest good money and arrange training programs to improve students' capabilities and skills.

Methodology

Research Design

A 'Descriptive Research Design' is used for this study as it helps the researcher to get the information as per the requirements of research. The other advantage of using descriptive analysis is that it helps identify the problem and provide a suitable solution. The quantitative method is found appropriate for this research as it has helped to quantify the information and present it in an understandable manner (Roubtsova, 2015). A structured questionnaire has been utilized as tool to collect data. Its advantage lies in collecting data timely and effectively as compared to other data collection techniques. Above all, it is also economical to use a questionnaire to collect data.

Data Collection

The study utilized both primary and secondary data. The primary data was collected directly from the respondents of the questionnaire. The secondary data was collected from different online sources and books including journals, articles, and websites as per the requirement of the topic under study.

Sampling Design

This research is conducted with students of different universities in China as population for the study. A total of 150 respondents from various universities are taken as a sample of the study. The non-probability sampling techniques are used to choose a model and the convenience sampling technique is preferred. This method is a quick and convenient way of setting examples and it does not require any complicated procedure (Datta, 2018). It is easier for me to quickly collect data as per my convenience and the availability of participants of the research.

Research Instrument

The main objective of distributing questionnaires among respondents was that a large amount of data could be collected economically and effectively (Apuke, 2017). The questionnaire used as a research instrument in this study comprised 10 questions and followed the Likert scale. The questionnaire was constructed in the English language and it was ensured that the respondents understood each question clearly. The questionnaire also communicated ethical considerations and the purpose of the study. It was ensured that all the data delivered by respondents would be kept confidential. All the questions included in the questionnaire were closed-ended. The questionnaire was divided into two sections viz., A and B. Section A comprised demographic questions while section B dealt with questions about the variables of the research study.

Data Analysis Technique

The Cronbach's alpha value (Table 1) of the research tool that comprised 10 items is 0.921. This shows that data is reliable for the study.

Table 1

Cronbach's alpha value

Reliability Statistics	
Cronbach's Alpha	N of Items
.921	10

Table 2. *Descriptive statistics indicating the values of the variables of the study*

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Q1	150	1	5	4.10	1.048
Q2	150	1	5	3.94	.991
Q3	150	1	5	4.22	1.067
Q4	150	1	5	4.26	1.019
Q5	150	1	5	4.06	1.031
Q6	150	1	5	3.88	1.036
Q7	150	1	5	4.08	1.096
Q8	150	1	5	4.00	1.043
Q9	150	1	5	4.16	1.106
Q10	150	1	5	4.28	.984
Valid N (listwise)	150				

Table 2 exhibits descriptive statistics indicating the values of the variables of the study. The data reveals that 4.28 is the highest and 3.94 is the lowest mean value. Moreover, the standard deviation value of variable 9 is 1.10 6, which is the highest possible value and the minimum amount is 0. 991which is the lowest potential value.

Demographic Characteristics

The following table 3 and figure 1 show the frequency and percentage of the sample respondents in terms of Gender, Age and Education.

In terms of Gender characteristics, the sample constitutes 86% of male participants while there are 14% female participants in the research.

Table 3.

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	129	86.0	86.0	86.0
	Female	21	14.0	14.0	100.0
	Total	150	100.0	100.0	

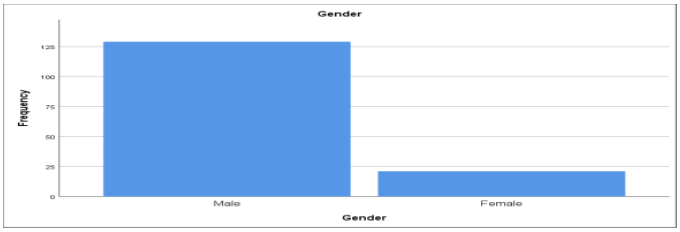

Figure 1.

In terms of age characteristics, the following table 4 and figure 2 show that a majority of participants (64%) belong to the age group of 25 to 35 and 36 to 45 years. In terms of education characteristics, the largest group is of participants with a bachelor's degree (40%) followed by 18% Ph.D doctorates. The table 5 and figure 3 represent the educational qualifications of participants.

Table 4.

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 25	27	18.0	18.0	18.0
	25-35	48	32.0	32.0	50.0
	36-45	48	32.0	32.0	82.0
	More than 45	27	18.0	18.0	100.0
	Total	150	100.0	100.0	

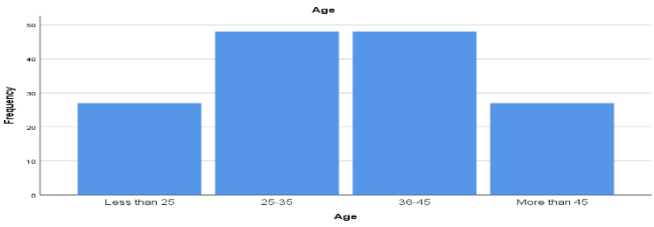

Figure 2.

Table 5.

Education		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	24	16.0	16.0	16.0
	Bachelor's	60	40.0	40.0	56.0
	Master	21	14.0	14.0	70.0
	Doctorate	27	18.0	18.0	88.0
	Others	18	12.0	12.0	100.0
	Total	150	100.0	100.0	

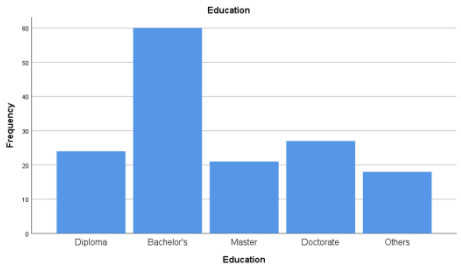

Figure 3.

Questionnaire Results

This section presents the frequency and percentage of the responses of the participants for each of the ten statements in the questionnaire. The responses are collected on 5-point Likert scale showing the levels: Strongly disagree (SD), Disagree (D), Neutral (N), and Agree (A) and strongly agree (SA).

Q 1. I believe that learning institutions must focus on enhancing the computational thinking skills of students

Table 6.

Q1 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly disagree	9	6.0	6.0	8.0
	Disagree	3	2.0	2.0	2.0
	Neutral	30	20.0	20.0	28.0
	Agree	36	24.0	24.0	52.0
	Strongly agree	72	48.0	48.0	100.0
	Total	150	100.0	100.0	

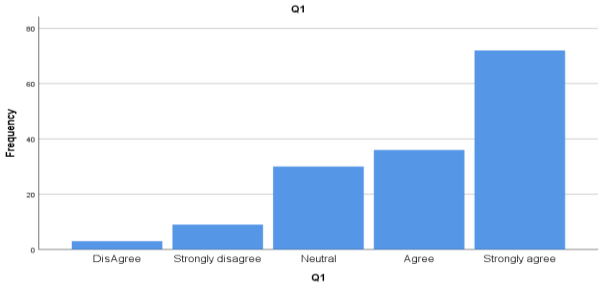

Figure 4.

In response to a question as in table 6 and figure 4, the level of strongly agree is high as compare to the strongly disagree and disagree. The x-exsis shows that frequency level and represent the response of participant with the help of graph and toolbars lines.

Q 2. Computational thinking education should be an essential part of primary and higher education.

Table 7.

Q2 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly disagree	9	6.0	6.0	10.0
	Disagree	6	4.0	4.0	4.0
	Neutral	15	10.0	10.0	20.0
	Agree	78	52.0	52.0	72.0
	Strongly agree	42	28.0	28.0	100.0
	Total	150	100.0	100.0	

The table 7 and figure 5 represent that Computational thinking education should be an essential part of primary and higher education. The graph shows that ratio of agree respondent is high as compare to the disagree respondent. The level of strongly agree is 40 to 45% also that the response of participant level of strongly disagree is very low which

shows that the significant relationship between computational thinking education and primary and higher education parts.

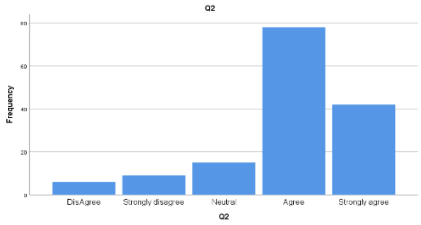

Figure 5.

Q 3. The students must have useful information about modern tools and Technology

Table 8.

Q3 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	9	6.0	6.0	6.0
	Strongly disagree	3	2.0	2.0	8.0
	Neutral	9	6.0	6.0	14.0
	Agree	54	36.0	36.0	50.0
	Strongly agree	75	50.0	50.0	100.0
	Total	150	100.0	100.0	

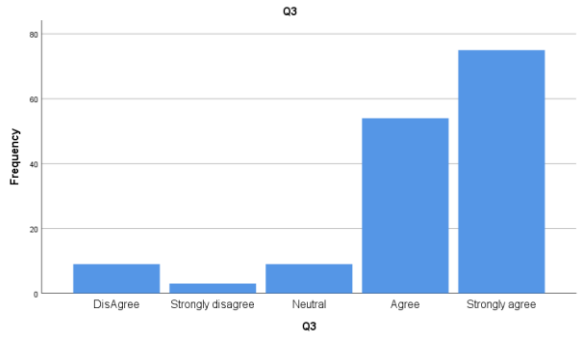

Figure 6.

The table 8 and figure 6 explain the response of students regarding tools and technology of useful information according to this test analysis About 50% of the participants strongly agree, the 36% student shows that response is agree, 6% neutral, 2% strongly disagree, and only 6% students participant represent response as disagree.

Q 4. Learning institutions can play a useful role in training computer talent

Table 9.

Q4		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	4.0	4.0	4.0
	Strongly disagree	3	2.0	2.0	6.0
	Neutral	18	12.0	12.0	18.0
	Agree	42	28.0	28.0	46.0
	Strongly agree	81	54.0	54.0	100.0
	Total	150	100.0	100.0	

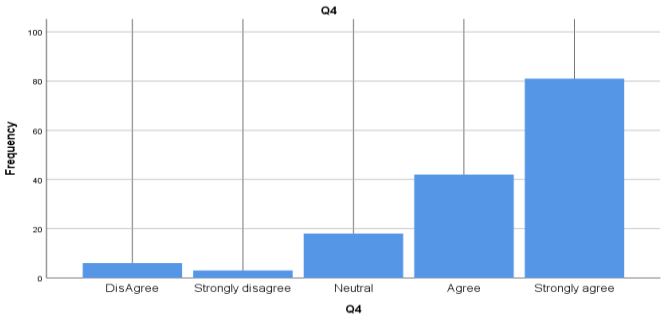

Figure 7.

The consequences of the reading illustrate that there are the right amount of participants who believe so.

Q 5. Every individual needs to learn Computational thinking skills for further growth and development in a career.

Table 10.

Q5 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	6	4.0	4.0	4.0
	Strongly disagree	6	4.0	4.0	8.0
	Neutral	21	14.0	14.0	22.0
	Agree	57	38.0	38.0	60.0
	Strongly agree	60	40.0	40.0	100.0
	Total	150	100.0	100.0	

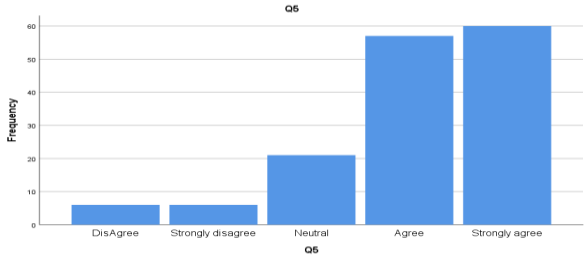

Figure 8.

It is determined that there are few respondents who disagree and strongly disagree. The rest of the participants show agreement with the statement.

Q 6. Good command of Computational thinking skills helps an individual to achieve its goals by using modern tools and techniques.

Table 11.

Q6 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	6	4.0	4.0	4.0
	Strongly disagree	9	6.0	6.0	10.0
	Neutral	27	18.0	18.0	28.0
	Agree	63	42.0	42.0	70.0
	Strongly agree	45	30.0	30.0	100.0
	Total	150	100.0	100.0	

The above table 11 and figure 9 indicate that most participants have a positive response to the statement while few have provided negative responses.

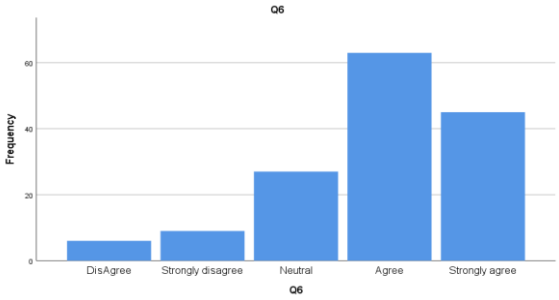

Figure 9.

Q 7. A person with an excellent command of Computational thinking skills can easily manage complicated problems

Table 12.

Q7 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	6	4.0	4.0	4.0
	Strongly disagree	6	4.0	4.0	8.0
	Neutral	30	20.0	20.0	28.0
	Agree	36	24.0	24.0	52.0
	Strongly agree	72	48.0	48.0	100.0
	Total	150	100.0	100.0	

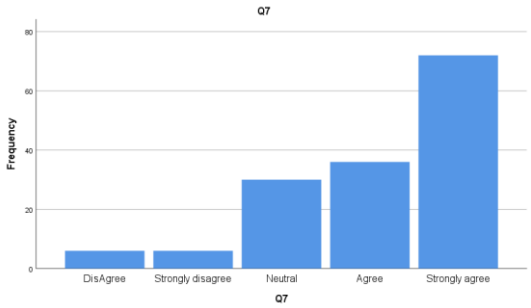

Figure 10.

It is demonstrated by the results that there are a good number of students who support the statement. However, there are only a few who have opposed the declaration.

Q 8. The teachers are responsible for encouraging students to learn advanced skills and knowledge.

In response to a question, most participants have responded positively, and few react positively to some extent. However, a few respondents have disagreed and strongly disagreed.

Table 13.

Q8 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	6	4.0	4.0	4.0
	Strongly disagree	9	6.0	6.0	10.0
	Neutral	18	12.0	12.0	22.0
	Agree	63	42.0	42.0	64.0
	Strongly agree	54	36.0	36.0	100.0
	Total	150	100.0	100.0	

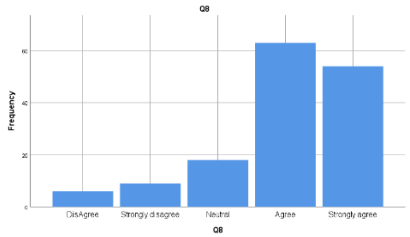

Figure 11.

Q 9. A student with excellent Computational thinking skills can generate multiple benefits in his job career.

Table 14.

Q9 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	9	6.0	6.0	6.0
	Strongly disagree	3	2.0	2.0	8.0
	Neutral	18	12.0	12.0	20.0
	Agree	45	30.0	30.0	50.0
	Strongly agree	75	50.0	50.0	100.0
	Total	150	100.0	100.0	

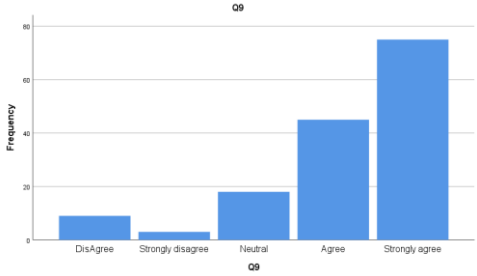

Figure 12.

It has shown that 50% of the participant strongly agree, 30% agree, 12% neutral, and only 2% strongly disagree. Moreover, 6% of participants have also disagreed.

Q 10. Students should also learn the ways computers think and perform different functions.

There are a good number of students who strongly support the statement.

Table 15.

Q10 Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	6	4.0	4.0	4.0
	Strongly disagree	3	2.0	2.0	6.0
	Neutral	12	8.0	8.0	14.0
	Agree	51	34.0	34.0	48.0
	Strongly agree	78	52.0	52.0	100.0
	Total	150	100.0	100.0	

10% students have disagreed, and 8% students strongly reject the report. However, there are 15% student between agree and disagree. 75 % student shows strongly agree response.

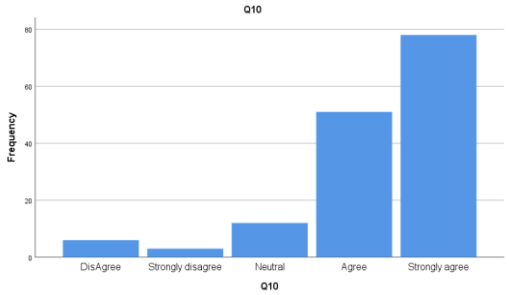

Figure 13.

Discussion

It is evident by the results of this study that a majority of participants hold a positive opinion about the effectiveness and importance of computational thinking skills and education. It is consistent with Tondeur et al. (2019) who pointed out that primary and higher education systems should include computational thinking education in their curriculum. The study also reveals that students' growth and development highly depend on adequate information about modern methods and technology. Therefore, there is a great need to enhance the young generation's skills as per the digital world's needs. For this purpose, training computer talent is the main requirement. Several researchers support this statement (Zarkesh, 2018; Denning, 2017; Petropoulou et al., 2017). Besides, the study also finds a positive relationship of computational thinking skills with career development and growth. This is consistent with research studies (Maciej et Al., 2017, Gokcearslan & Buturay, 2017; Kim & Adler) that have discussed the most influential Association of Computer training and skills with future growth and development. Many participants have believed that colleges and universities must play a role in improving the computational thinking skills among young people. It is also evident from the results that computer training and computational thinking education should be an integral part of education at each level.

The current study also identifies the importance of computational thinking in resolving several problems. The study observes the need of teachers and learning institutions to enhance advanced skills among students. Students should also show interest in learningadvanced knowledge for a successful career. It is in line with (Syslo et al., 2017; Kallia et al., 2017) who also assert that computational thinking is mainly used to resolve issues and design different systems and techniques to achieve goals and objectives. It is also evident from this study that computer skills can help identify problems and provide suitable and alternative solutions. Moreover, the study confirms that computer training and learning of city skills are beneficial for students and society.

Recommendations

Technology has become an integral part of society, and it is impossible for any individual to think about progress and development without the active use of technology. Like other sectors of the economy, technology has also influenced the educational industry. It is therefore required to introduce modern trends in learning institutions and prepare students for the changing need and demands of world's job market. The students should learn new skills such as computational skills to have a bright future. Learning institutions should build such modern techniques and technology to provide computational thinking education to students. Teachers should also motivate students by communicating the importance and effectiveness of computational thinking education and skills in the digital world. By preparing future generations as per the need and demand of the modern world, society can generate multiple profits in the long run.

Conclusion

In conclusion, the study has discussed the effectiveness and importance of computational thinking skills for individuals, especially students. The research mainly highlights that technology can bring several benefits and contribute to victory and development worldwide. A close linkage with technology and its adoption is essential for every field of life, including the educational sector. Higher education institutions must integrate with modern technology to achieve their future goals and objectives and contribute to fulfilling society's demands and needs. The study has found evidence showing that computational thinking skills could play a fundamental part in providing extra benefits to students. The study therefore emphasizes the adoption of computational thinking education in educational institutions to help students identify and remove systemic errors and problems. The study asserts that students can easily design new systems and achieve their goals by having a good command of computational thinking skills. It adds that too much dependency on computational thinking skills is essential because every field of life greatly depends on modern technology and computer systems. By application of computational thinking skills, students can enjoy opportunities and benefits in the job market by providing valuable services. In short, a good command of computer programs, tools, and techniques can help student's better contribute to the business world.

The study has used a quantitative research approach and gathered data by using a questionnaire. The study has been carried out in China and collected data from 150 participants

of different universities in China. The data is analyzed by using SPSS software. The results of the study are inconsistent with many previous studies. The study provides recommendations for both students and teachers. Students should learn computational thinking skills because it helps to boost their career. Teachers should motivate students and facilitate the enhancement of their computer and computational skills. Learning institutions such as universities must come forward and facilitate improvement of students' and teachers' computational capabilities.

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APPENDIX

Questionnaire

Gender

a) mal b) Female

Age

a) less than 25 b)25-35 c) 36-45 d) More than 45

Education

a) Diploma b) Bachelor c) Masters d) Doctorate e) Others

s.n	Details	Disagree	Strongly disagree	Neutral	Agree	Strongly agree
	I believe, that learning institution must focus to enhance computational thinking skills of students. Computational thinking education should be an important part of primary and higher education.					
	The students must have good information about modern tools and Technology.					
	Learning institutions can play an effective role by training computer talent.					
	It is essential for every individual to learn Computational thinking skills for further growth and development in a career.					
	Good command on Computational thinking skills helps an individual to achieve its goals by using modern tools and techniques.					
	A person with good command of Computational thinking skills can easily manage complicated problems.					

s.n	Details	Disagree	Strongly disagree	Neutral	Agree	Strongly agree
	The teachers are responsible to encourage students to learn modern skills and knowledge.					
	A student with good Computational thinking skills can generate multiple benefits in his job career.					
	Students should also learn the ways computers think and perform different functions.					