A Review Paper: Student Attitude towards Computer Science

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Abstract
The present review study is an attempt to examine the vast literature on student attitude towards computer science. Its main focus is to explore the introduction of student's attitude towards computer science. Hence, content analysis was performed and important measures vi.objectives, sources of data, major variables, research methodology, and significant findings have been reported. The study underlined the students' attitude towards computer science career. Learning difficulties in introductory programming courses are well known to teachers and students. While some types of causes for those complications can be pointed out. In this work we concentrated on student related issues, namely their study methods and attitudes towards learning programs. This study is surely going to help the young researchers who do research in student attitude towards computer science to make a tough theoretical structure through analyzing the descriptive studies from 1997-2015.
Keywords: Attitudes Survey – Computer science – Assessment – Learning difficulties

Section I
Introduction

In this modern world, technology has become a part of formal education and student's acceptance of technology is necessary for its success. It has been determined that user's attitude towards computer plays an important role in determining the effectiveness of acceptance of ICT. This study takes into consideration home and school environment and determines their influence on the user's attitude towards computers. Based on research this study concludes that home or school environment does not much influence students' attitude towards a computer. It has been determined that students' usage of computers to learn new things and their feeling of being in control while using computers have a positive influence on students' attitude towards computers [2002].

Today, in the 21st century, every home has a computer. The technology has reached to such a great extent, and which continues to expand; students are being frequent users of computers for school work and other independent purposes. According to New Zealand observation, students prefer computer-based learning and not class-based learning. Computer knowledge is very essentially these days, and computer knowledge gives an edge in the competitive world. Computer aided classrooms bring enhanced interest to students. Mere operations skills are not enough to satisfy this hunger, but the ability is expected to stand out in the competition [2004].

Computer Science is the world which demands a higher involvement for gaining a competitive edge, owing to which an enhanced inclination towards it has been observed in the recent trends. Many a few experience a rough edge in CS owing to a lag in their basics. Though the study may initially seem boring, demanded involvement in later stages provides an experience with lucrative problems and enthusiastic solutions creating a higher demand in the younger generations [2006].

E-learning has become one of the most advanced tools of the educational system, which has been found to replace the traditional paper-pen approach, making the educational exploration a worthy and enthusiastic experience. One of the most impressive features of E-learning is that it offers remote learning and a better graphic detail on contrast to traditional diagrams. E-learning enables students who are physically handicapped or are located at remote places to a quality education rarely at the reach for them. The internet has become the best aid to teachers recently, as it provides an organized detail of the information required [2008].

Confidence and hard work have always been the stepping stones for excellence. Though science is a mandatory and basic subject at different levels of education, a majority of the students have no special enthusiasm towards it, and rather slog to score a mark than exploring new things. This attitude has derailed the motive of making the science subject mandatory. To fuel it, science educators have supported a real-time approach where students build scientific knowledge by solving real-life problems scientifically, replacing micro-computer approach [2009].

The importance of ICT has increased drastically; Schools in some developing countries have embedded ICT into their curriculum. Information and communication Technologies helps students to improve their subjective knowledge. ICT plays a crucial role in the upcoming generations, who prefer to study using computers. In developing schools, not many teachers are equipped with communication skills. ICT acts as a bridge, enriching the teacher-student relationship. It not only enriches the trend but also encourages students to be explorative, who share a positive attitude towards the use of ICT. Developing ICT skills is essential for the students as well for the welfare of the Information Technology. Government interventions and training programs do not show the positive attitude towards the use of ICT in teaching [2010].

In Germany, there is very few computer science trained teachers, as a direct result of which a great lag in

the number of software engineers has been created. German schools have a low socio-economic status, maintenance of their computer network and ICT resources are done by the students who are also paid for it. The most common reason for a reduced number of female employees in ICT is due to a lack in role models. A proper initiative is required to bring a swing in these numbers [2010].

Information and Communications Technologies (ICT) is the most active field today. People prefer to join ICT for more pay and job security. Bookworms that enter this field with a wrong presumption face difficulty in solving complex problems, as complexity demands creativity and presence of mind. Students join IT companies out of an influence from their parents, peers or counselors, who are recruited owing to the demand of ICT, this phenomenon has killed the motive behind education and core interests [2011].

Information and communication technology tools make the TEACHING-LEARNING process effective. ICT as a tool has essential benefits over traditional teaching method. It can reduce the problem of lack of teachers in work, distance barrier, wastage of time and energy spent on teaching. Use of ICT tools like radio, T.V, mobile phones, laptops for learning creates an area of interest for the students to learn things quickly. It makes the complex things easily understandable. Replacing books with eBooks and ppts make it attractive for the students to learn the syllabus. Learning via ICT tools reduces the cost of traveling, materials like books, notes, overcome communication problem and also makes it convenient for the teachers to gain knowledge and convey it to the students in an improved manner [2012].

Green ICT is the study of environmentally sustainable IT, the environment is no longer Green, overpopulation and resource abuse have created a disturbance in the eco balance. Cloud computing implementations cost effective, efficient and accessible computation in contrast to the traditional techniques. In this paper, they discussed the role of Green ICT and Cloud Computing at higher technical education [2013].

In India, education has become compulsory for children. India is actively participating in the improvement of education facilities and also spreading awareness among the public about the importance of education. As per statistics, 28%of populations are illiterates. India also started to show interest on international collaborations for the improvement of school education. The grading system in India is effective, but every component for an examination should be followed correctly without skipping the other Many institutions in India have achieved the remarkable name for its best quality education. More efforts from the side of teachers like encouraging students to take up projects, experiment things that they learn theoretically, and students must also develop an interest in discovering new things out of what they learn. Facilities are provided, but the public has to utilize it essentially and make India an Educated Country [2013].

The future of India depends on young citizens. Students have the capability to change the country's fate by getting educated and improve their skill. The foundation of education is provided in school stage. So it is believed that IT could help out the education system in schools to improve teaching and learning in a better way. IT could help in focusing on improving the performance of the students, training of the teachers and quality of the instructions materials. Today India's education systems rely on teachers. Only well-qualified teachers can educate students. But teachers themselves are not well equipped. IT makes it convenient for the teachers to gain knowledge about the subject. IT system should be encouraged and implemented in all institution for better learning [2014].

Section II
Research Design
Status of the study
The importance of computer skills has long been a topic of concern for business firms, governments, schools, colleges and universities. Much of the concern arises because effective computer skill in business, industry and various professions has become increasingly important in recent years. The primary purpose of this paper is to determine student's attitudes toward computers in general, and to compare their attitudes toward computers with regard to computer anxiety, computer confidence, computer liking, and computer usefulness.

Objectives of the study
The main objectives of the study are:
1. To deliver combined and efficient review of student attitude towards computer science.
2. To assess the knowledge of computer science to frame their career.

Data source and Methodology
In order to review the related literature, information was gathered from research articles published in referred journals related to student's attitude, knowledge, and career viz. International Journal of physical and social sciences, Journal of SA- eDUC, International Education Journal, Journal of Information Technology Education, and International Journal of Advanced research in computer engineering and technology, International Journal of management, Journal of educational computing research, Journal of distance education, Journal of education technology etc.

Section III
Key Findings from the Literature
Summary of Table
The part of Table has been summarized below:

Variables Analyzed
The researchers have identified the major variables that determine the influence of student's attitude towards computer science students. Major variables like Media in Education, Multimedia/Hypermedia Systems, Evaluation of CAL Systems, Human-Computer Interface, e-Learning, Computer self-efficacy, Computer anxiety, Internet attitudes, Internet experience Computer, attitudes, gender differences. Science teacher, attitudes, ICT in education. Information and communication technology (ICT) education, perceptions of ICT careers, secondary school students, secondary school teachers, gender in ICT education, cross cultural comparison, German schools, Australian schools. Assessment, outreach, high school computing Social Competence, Attitude towards Computer

Research Methodology
In most of the research work, results have been revealed using Correlation, Regression, Chi-Square test, Factor analysis, t-test, Cronbanch's alpha, ANOVA, percentage analysis, mean score, Reliability test, Descriptive statistics can be viewed as a well technical approach. Since it is amongst those few procedures which finds and deals with the endogenous manners of student attitude towards computer science students.

Discussion and key observations
It has found in our review that majority of the students had positive attitude towards computer science subjects. They had good computer knowledge towards computer science and internet. They understand the importance of computer science to shape their career. Computer based training can be given to them to be more confident to use computer application in their day to day activities. Initiatives can be given by the government to the school administrators to make them use computer related tools to kindle their interest towards computer science career.

Section IV
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Table

Authors Name (Year)	Country	Objective	Source of data	Major variables	Research methodology	Significant findings
Lily shashaani (1997)	US	To study the gender gap in computer attitude and usage of computer	Data from 202 under graduate college students in Pittsburgh, Pennsylvania, U.S.	Computer attitudes, experience and demographic information (major variable)	t-test, chi-square test and Pearson correlation	The results showed that males scored higher than females in computer attitude and experience
Fred O. Ede and Bhagaban Panigrah (1998)	Africa	The purpose of this study is to determine Indian and Nigerian students attitudes toward computers in general, and to compare their attitudes toward computers with regard to computer anxiety, computer confidence, computer liking, and computer usefulness	Data from 229 Indian students who were enrolled in one of India's major south easternuniversities and 184 students of one of the major universities in Nigeria	Computer liking (CL), computer usefulness (CU), computer confidence (CC), anxiety and overall computer attitude (CAS)	ANOVA	The results showed that Indian students would like computers more, find computers more useful, have more confidence in computers, have less computer anxiety, and have a more general positive attitude toward computers than Nigerian students is understandable
Dr. Gulsen BAGCI KILIC (2001)	Turkish	To examine the affect of using telecommunication technologies on pre-service teachers' attitudes toward computers and their attitudes toward communicating on computers	Data from 43 telecommunication Technologies students and 42 non tele communication Technologies students in Indiana University between 1998-1999	Attitudes toward Computers, Attitudes toward Communicating on Computers, Telecommunication Technologies, Science Education	Descriptive Statistics	Findings indicated that students were already positive about computers and communicating on computers
Dr. Nina B. Eduljee (2002)	India	The purpose of the study was to investigate gender differences in computer training and computer efficacy for Indian college students	Data from 795 students in University of Bombay	computer training, computer efficacy	ANOVA, regression analysis	Computer training had a significant effect on computer efficacy. Males tended to have higher computer efficacy than females, even though more females had completed a computer training course. Regression analyses indicated that both gender and computer training were predictors of computer efficacy
Kian-Sam Hong et al (2003)	Malaysia	To analyze the students' attitudes toward using the information technologies, in particular, the Internet in their learning tasks	Data from 88 second-year undergraduate students in Universiti Malaysia Sarawak	Internet-based learning, Web-based course, Technology-based learning, Attitudes toward the Internet	Pearson Correlation	The results showed that generally students at Universiti Malaysia Sarawak had positive attitudes towards learning using the Internet
Salih USUN and Anafartalar Kampusu (2004)	Turkey	To examine the undergraduate students' attitudes on the use of computers in Education	Data from 156 undergraduate students in two departments in Canakkale Onsekiz Mart University during the fall 2003 semester	Computer; Higher Education; Student Attitudes	"t" test, One-way analysis of variance and Kruskal-Wallis test, Pearson correlation	The results of this study showed that in 9 attributions there was a statistically significant difference between the two student groups

Paul G. Paris (2004)	Australia	To examine differences in attitudes between paper assisted learning and OWAL	Data from 52 students in Adelaide Public Secondary School	Media in Education, Multimedia/Hypermedia Systems, Evaluation of CAL Systems, Human-Computer Interface, e-Learning	t-test, Chi-square, Pearson Correlation	The study found a positive attitudes towards the use of Online Web-Assisted Learning
Hong Kian Sam et al (2005)	Malaysia	To investigate undergraduates' computer anxiety, computer self efficacy, and reported use of and attitudes toward the Internet	Data from 148 undergraduates at Universiti Malaysia Sarawak (Unimas)	Computer self-efficacy, Computer anxiety, Internet attitudes, Internet experience	frequencies, percentages, cross-tabulations and chi-square tests, t-tests, One-Way ANOVAs and Pearson's correlations	The study found that gender would not be a factor influencing undergraduates' attitudes toward computers, computer self-efficacy, and attitudes toward the internet
Dr Timothy Teo (2006)	Singapore	To empirically examine some of the factors that contribute to gender differences in the attitudes towards computers among students	Review article	Computer, attitudes, gender differences	Review article	The study found that male attitudes towards the computer tend to be more positive than females
Jana Fancovicova and Pavol Prokop (2008)	Slovakia, Europe	To investigate students attitudes to support creating electronic networks among elementary schools, support the preparation of teachers for using ICT, provide information about possibilities of using ICT, support the development of multimedia tools in education	Data from 214 secondary students (105 boys, 109 girls) aged 10 – 14 yrs from four different Slovak elementary schools.	Attitudes, Computer, ICT-use	Anova	The study found that gender and age related differences in ICT articipation were greatly influenced when comparing the home and school environment
Liisa von Hellens et al (2009)	German	To investigate the perceptions of information and communication technology (ICT) as a field of study and work in German secondary schools	Data from 160 students from five secondary schools in Lower Saxony in Northern Germany	ICT education, perceptions of ICT careers	Descriptive statistics	This study confirms the need to change the perception that ICT is not just about programming and the students' perceptions of ICT or computing careers should be that it is creative
Andrew Hoegh and Barbara M. Moskal (2009)	Colorado, US	To investigate undergraduate student perceptions of computer science as a field of study in a school of science and engineering	Data from 276 undergraduate students in Colorado School of Mines	Assessment, Attitudes Survey, Computer Science, First Year Students	Factor analysis and Cronbach's Alpha	This study found the initial research efforts that have been used in the development and validation of a computer science attitude survey
Kofi Ayebi-Arthur (2010)	Cape Coast	To investigate if a statistical relationship existed between academic achievement and achievement of students in ICT	Data from 11 female and 16 male undergraduate students offering B.Ed Health Science Education and 22 female and 33 male postgraduate students reading various M. Phil programmes in University of Cape Coast	Academic achievement and achievement of students in ICT	Spearman correlation, means, standard deviation and multiple regression analysis	This study found Both set of students showed positive attitudes toward ICT
Daniel Heersink and Barbara M. Moskal (2010)	US	This paper describes attitudes and beliefs about computer science; the other measures attitudes and beliefs about IT	Data from 77 high school students who participated in one of four workshops offered during the summer of 2008 in California and 63 high school students who participated in a workshop during the summer of 2008 in Indiana	Assessment, outreach, high school computing	factor analysis and Cronbach's Alpha	This study reports factor analysis of the first instrument provides evidence to support its validity; the factor analysis of the second instrument provides evidence to challenge its validity in the original survey form
Saroy Yadav and Shiv Veer Singh (2011)	Uttar Pradesh (UP)	To investigate the social competence and attitude towards computer among urban and rural undergraduate students	Data from 320 undergraduate students of the urban and rural areas of kanpur in Uttar Pradesh (UP)	Social Competence, Attitude towards Computer	Null Hypothesis, t-Test	The result showed that significant difference was found in attitude towards computer between urban and rural students but there was no significant difference between male and female students

Md. Abdullah Al Mahmud (2011)	Bangladesh	This study investigated the attitude of private university students in Bangladesh towards internet	Data from 1022 graduate and post graduate students taking courses during 2010-2011 in selected private universities, bangladesh	Students attitudes, Internet use	Frequencies, t-test, and ANOVA	Results from the study indicated that students had positive attitudes toward using the Internet as a learning tool
Anabela Gomes, et al (2012)	Portugal	To investigate the study methods used by students in Polytechnic, Coimbra	Data from 166 Students in Informatics Engineering course and also 175 students in Superior Institute of Engineering of the Polytechnic, Coimbra	Programming learning, Learning difficulties, Study Methods and Attitudes	t-test, ANOVA and correlation	The results found a strong correlation between students' results and their personal perceptions of competence during the course
Dr. Ranjna Bhan, and Dr. Si ta Negi (2013)	Himachal Pradesh	To investigate the attitude of Senior Secondary School Students Towards Computer	Data from 200 students of 12th class selected from govt. senior secondary schools in Shimla, Himachal Pradesh	Gender, academic stream and locality	t-test	The results found that female senior secondary students possess more favorable attitude towards computer use
Mark Ciampa (2013)		This study investigate the computer knowledge of the students to see themselves possessing, with the purpose of determining if there are any associations between the perceived knowledge	Data from 479 students were surveyed at an accredited mid-south regional university	Student perceived computer knowledge, computer literacy	Chi-Square	The results of the study seem to indicate that there are no significant associations found betweenfamiliarity /unfamiliarity and age, current employment status, and use/knowledge of technology
Mustafa Ba er (2013)	Turkiye	This paper describes to explore the relationship among students' attitudes toward programming, gender and academic achievement in programming	Data from 179 sophomore students in introductory programming course in the Department of Computer Education and Instructional Technology (CEIT) at Turkiye	Computer programming, Programming attitude scale, gender difference, achievement	t-test, Correlation	The results found that there was a significant positive correlation between students' attitudes and their achievements in programming. The results showed that male students had more positive attitudes toward programming than female students
Dr. Nabeel Abedalaziz, et al (2013)	MALAYSIA	To investigate and measure postgraduate students' attitudes toward the Internet and computer use	Data from 289 postgraduate students enrolled in four educational Master Degree Programs at University of Malaya	Affective, Behavioral Intention, Perceived Control, Emotional Response, Usefulness	Descriptive Statistics, MANOVA	The results found postgraduate students showed positive attitudes toward computer and Internet usage
Opoku and Kuranchie (2014)	Ghana	This paper describes to explore students' dispositions and attitudes toward computer education	Data from 340 students made up of 170 boys and girls respectively were selected from the schools to participate in the study at Catholic University College of Ghana	ICT education, attitudes toward computer education, gender difference in attitudes, and teacher behaviours	Descriptive Statistics, t-test	The results found that the female students were found to demonstrate more positive attitudes toward the learning of ICT than their male counterparts contrary to the findings of many studies
Amal Rhema,, et al (2014)	Libya	To investigate e-learning experiences and perceptions of engineering students at two typical public Libyan universities	Data from 348 were undergraduate engineering students from the departments of Electrical Engineering and Petroleum Engineering at each of the universities in Libya	developing country, e-learning, engineering students, ICT, student attitudes, technology-supported learning.	Cronbach's Alpha, multiple regression analysis	The results indicated that the participating students in the urban and regional areas were positively disposed towards e-learning and believed in its benefits
L George Stephen (2015)	Pondicherry	To investigate students attitude towards computer	Data from 324 XI standard students in pondicherry region, India	Attitude, computer	Descriptive Analysis, Differential Analysis	The results indicated that there is a significant difference between male and female attitude