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Abstract

Across the globe, educational institutions are adopting e-learning tools into their curricula to cater to the ever-growing demand for technology inside the classrooms. Where traditional blackboards have been replaced by virtual whiteboards and library books by online resources, teachers are trying hard to cope with the growing competition from technology outside the classroom that has captured their students' attention and imagination, with more technology, perhaps increasing student dependency. However, the author's previous research has shown that engaging e-learning tools to enhance student learning experience is not enough as it has negative impact on students' attitude towards e-cheating, disillusioning their awareness to cyber ethics. So, how do teachers ensure that the methods of teaching and the tools therewith truly enhance student learning and not affect their sense of ethics? As a part of an on-going research, this paper highlights the exponential usage of calculators in the classrooms and their impact on student' attitude towards e-cheating, and recommends further studies to measure the correlation of calculator dependency in the classroom to student attitude towards e-cheating and professionalism at workplaces.

Keywords

cheating, calculator, technology, preliminary, study, into, casual, implications, calculator, technology, usage, students, attitude, toward, cheating

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e-cheating and calculator-technology

a preliminary study into casual implications of calculator-technology usage on students' attitude towards e-cheating

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Across the globe, educational institutions are adopting e-learning tools into their curricula to cater to the ever-growing demand for technology inside the classrooms. Where traditional blackboards have been replaced by virtual whiteboards and library books by online resources, teachers are trying hard to cope with the growing competition from technology outside the classroom that has captured their students' attention and imagination, with more technology, perhaps increasing student dependency.

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As a part of an on-going research, this paper highlights the exponential usage of calculators in the classrooms and their impact on student' attitude towards e-cheating, and recommends further studies to measure the correlation of calculator dependency in the classroom to student attitude towards e-cheating and professionalism at workplaces. .

I. INTRODUCTION

Technology in education is not a new phenomenon. It has been around for decades and has become a vital part of teaching and learning in the twenty-first century. Inside and out of classrooms, technology usage has gained popularity to feverish heights. Almost any and every technology is now used as a part of e-learning in order to enhance the overall experience for students and teachers [6]. Calculators are one such technology that users have taken for granted as a part of daily life, yet a technology that has increased student ability in all science fields, in and out of classrooms, and into offices.

This paper has been written as a subsequent resultant of an on-going research that is being carried out by the author on the casual implications of readily-available technologies on students' attitude towards e-cheating. At the start of the study, it looked as though enough research had been conducted on various aspects of e-cheating. However, as the literature review has highlighted, distinct gaps seem to exist in the literature that highlight the absence of studies showing the impact of certain technologies besides the Internet on students' attitude towards e-cheating [8]. One such technology is that of calculators that aid in computations and estimations.

This paper looks at the ease with which students can access calculators and how the usage has affected their attitude towards e-cheating.

II. CALCULATORS NOW AND THEN

The first instrument to help making calculations easy and fast was the abacus. This has wooden beds that are moved along a wire or thin wooden stick to represent numbers [9]. The young French mathematician Blaise Pascal invented the first adding machine in 1642, a device driven by gears and capable of performing mechanical addition and subtraction [1].

A revolution in calculating machines took place between the early 1960s and the late 1970s. It was during this time period that electronics for calculators was at the forefront of electronics research. 'Calculators evolved from large, expensive, mechanical machines to cheap, electronic, credit card sized devices. The development of micro-electronics for calculators was an important phase in the history of technology, which included the development of the microprocessor.' [2]

III. CALCULATORS – BOON OR BANE

Calculators are very much a part of technology that have upgraded over the last decades to become part of e-learning. As mentioned in the previous study, calculators have been a breakthrough way before computers had become common place at every home [8]. It was definitely a technology above the use of booklets with pre-calculated tables and slide rulers [10] As highlighted before, in 1965, the first pocket calculator was introduced to the market; by 1974 it had achieved providing four functions with LED screen, and although it was well over a decade before school children had their own pocket calculators, the technology advanced rapidly [10] Now-a-days, calculators range from simple scientific to graphic to programmable with large amounts of memory space, data wires to allow sharing of information, formulas and so on among friends.

However, studies have shown that where calculators make it easy for students and adults to make quick calculations, they are ‘becoming a mental crutch for students, rather than a tool that promotes higher order learning’ [11]. It has been seen that most often than not academic institutions ban the use of certain types of calculators in examinations to ensure students are able to work out problems upon their ability rather than with the aid of technology. Such technology in the classroom is feared to ‘result in an over-reliance on technology to provide solutions, thereby stifling a student’s educational and creative growth’ [11]. The author has found little or no literature to show the actual effects of allowing calculators in the classroom. In many schools and universities, teachers are on high alert in examination halls, keeping an eye out for programmable calculators that students can bring in with uploaded formulas and pre-sketched graphs that would constitute cheating. But, there does not seem to be any study to actually register if there is any casual implications of allowing high-end calculators, or any computational devices that are affordable and readily available in stationary shops, on students’ attitude towards cheating [11].

IV. IS IT AFFECTING STUDENTS’ ATTITUDE TOWARDS E-CHEATING?

Although the author has found no direct studies showing affects of calculators on students’ attitude towards e-cheating; in the process of researching for this paper, the author has found many websites and other sources that seem to entice students into using calculators in the exam halls, for their term papers and homework in order to achieve higher grades. Sites such as Online 2 College and Teachapolis that is supposed to be a ‘virtual city for teachers’ are free to visit by

any user sitting on a PC connected to the Internet. With such topics as ‘Using Technology to Cheat • Calculator: programmable calculators can hold text, formulas, even pictures’ [3] it is giving students hints on how to use the calculators in something other than simply aiding in quick calculations. Another article by Andrew Kantor in USAToday.com relents about ‘add-on memory [that] lets you store software, turning your calculator into a pocket notebook... the company [Texas Instruments] is happy to point out that the TI-83 Plus is "allowed for use on the PSAT, SAT I, SAT II Math IC and IIC, AP Chemistry exam, AP Physics exam, and AP Calculus exam.’ [4]. In 2005, Texas Instruments (a company that pioneered in the development of calculator technology in the 1970s) recalled thousands of calculators issued to students in the United States of America, after a student discovered that pressing certain keys converts decimals into fractions [5]. As schools expected students to have the knowledge and skill to perform this task, the calculators being used for the same purpose was labeled as cheating.

Research into existing literature has shown that calculator technology has definitely had an impact on students’ attitude towards e-cheating. However, the author has found little or no evidence of actual studies carried out to establish a casual relationship between the two.

V. THE STUDY

Based on the literature reviewed, and the corresponding study being carried out on readily-available technologies and their effects on students’ attitude towards e-cheating, the following study was proposed: investigate if there are any casual implications of allowing calculator-technology in the classroom to students’ attitude towards e-cheating.

To carry out this study, the sample size chosen consisted of about 100 students of mixed ethnic and educational (curricula) backgrounds. Of these, 28 were discarded as they had not completed the surveys. A survey model was developed to gather student feedback on various topics related to academic integrity and specifically to the usage of calculator and other technology. Students interviewed were chosen in random in terms of age, gender and year of program. The survey model was developed on a 5-point Likert-scale and the questions ranged from testing students’ knowledge on academic integrity, to their understanding of calculators as e-learning tools and if they were using calculator-based technology in the classrooms, particularly to cheat. The results were tabulated using weighted average (ref Appendix A) for each category of question and summarized

as illustrated in Appendix B. A concurrent survey was carried out on various schools to collect data on the usage of calculators in the classrooms from 2006 – 2009 alone. Table 1 in Appendix B shows the results.

VI. RESULTS AND DISCUSSION

From the study, it can be seen that when agreeing on concepts, students have a fairly good idea of what is right and what is wrong. When asked ‘Academic Integrity can be defined as an adherence to a code of academic values’, 67% of the students agree to this philosophy, just as 51% agree that ‘‘E-cheating’’ or electronic cheating can be defined as using information technology (IT) to aid in the process of cheating in a class’. However, as has been established by previous studies [6] when it comes to applying these same concepts, students deter from their ‘prior knowledge’ [7]. A whopping 40.8% have agreed to the fact that they cheat on exams, 5.6% using minimized text (cheat sheets), 1.4% using mobile phones, 1.4% using memory sticks and an astonishing 13.8% using programmable calculators. Upon further interviews for clarifications, students suggested calculators as cheap and fast ways of carrying large sums of information into exam halls and using infra red to pass on the information to friends.

As illustrated by the graph below, the usage of calculators by students for various subjects have increased substantially over the three years (2006 – 2008 inclusive). At this rate of dependence, 13.8% students agreeing to use programmable calculators for cheating on exams is not a surprising percentage.

When compared to other technologies mentioned in the survey, students seem to access calculators more frequently as mode of cheating tool on exams than iPods, mobile phones, PDAs, pagers and such.

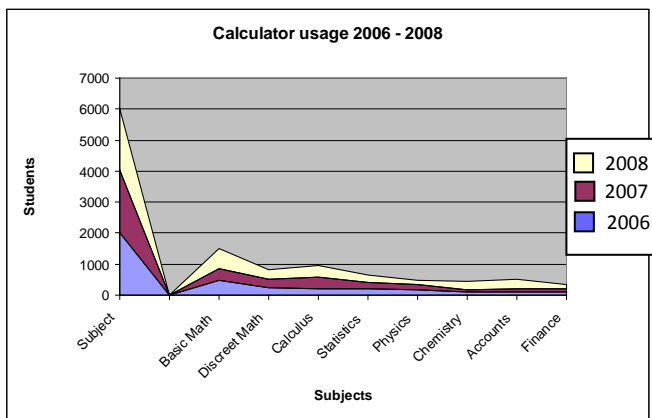


Fig 1: Calculator usage 2006 - 2008

VII. CONCLUSION

‘Discovering, evolving, enhancing and adopting are all reasons why man moved through so many different and varied eras from ice age to the information age’ [6]. However, over dependence on certain tools and technology can and have had adverse effects on the human kind before. Education and academic integrity are no different. Where teachers/parents are in a lead role to introduce and encourage student learning through whatever means available, be it traditional classrooms to electronic whiteboards, power point projectors to WebCT, these adults are also faced with the dilemma on the age-old concern of academic integrity, of testing students of what they know rather than what they can use.

Although this is a preliminary study, and a branch-out of an on-going study on the effects of readily-available technology on students’ attitude towards e-cheating, the author believes it has shed some light on the possible casual effects of increased usage of calculators in the classroom by students. Where calculators have indeed saved students precious time in solving complicated calculations quickly and easily, they seem to have been added to the ever-growing list of technologies that students use in order to destroy academic integrity.

As it is beyond the scope of this paper, based on a previous study by the author, it is recommended that further investigation be carried out to measure the impact of calculators on students’ academic achievements, and their ultimate usage in the work place; and study if then there is any casual implications towards e-cheating.

REFERENCES

- [1] Ament, P. (2007) Hand-held calculators. Troy MI. The Great Idea Finder. (Online). Available url: <http://www.ideafinder.com>
- [2] Tout, N. (2009). Vintage Calculators. About.com. (Online). Available URL: <http://inventors.about.com/gi/dynamic/offsite.htm?site=http://www.vintagecalculators.com/>
- [3] Bramucci, R. S. (2003). How to Cheat: techniques used by cheaters. (Online). Available URL: http://www.teachopolis.org/justice/cheating/cheating_how_to.htm
- [4] Kantor, A. (2008). Cheating goes high-tech with common-place tools. USA Today.com. (Online). Available URL: http://www.usatoday.com/tech/columnist/andrewkantor/2004-05-21-kantor_x.htm

[5] Block, R. (2005). Texas Instrument calculators help students cheat. (Online). Available URL: <http://www.engadget.com/2005/06/09/texas-instrument-calculators-help-students-cheat/>

[6] Khan, Z. R. (2006). E-learning techniques in IT programs – are they helping my sense of cyber ethics?. Conference paper presented at the IEEE Second International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering. December 4-14.

[7] Khan, Z., Al Qaimari, G. & Samuel, S. D. 2007, 'Professionalism and ethics: is education the bridge?', in G. R. Lowry & R. L. Turner (eds), Information Systems and Technology Education: From the University to the Workplace, Information Science Reference, New York.

[8] Khan, Z. R. and Samuel, S. D. (2009). E-cheating, technologies and online sources: a critical review of existing literature. Conference Proceeding, 9th Global Conference on Business and Economics. Cambridge University, UK.

[9] Allsands.com History of Calculator. Accessed October 24, 2009. (Online). Available URL: http://www.allsands.com/History/Objects/historycalculat_sih_gn.htm

[10] Calculator.org (2009). A First Calculator. Flow Simulation Ltd. [Online] Accessed March 2009. Available URL: <http://www.calculator.org/firstcalc.html>

[11] Bsmarte. (2006). Managing Technology: Is technology in the classroom good or bad?. Bsmarte.com [Online] Accessed February 2009. Available URL: <http://www.bsmarte.com/issues/managingtechnology.pdf>

APPENDIX A

Calculating the weighted average:

In Table 1, for each Likert Item, there is a 'weight' placed depending on how close the choice is to being right.

For instance, for the question 'It is okay to download MP3 or movies from peer-to-peer websites', the weights start from 1 to 5 for each of the Likert items 'strongly agree', 'agree', 'neither agree nor disagree', 'disagree', 'strongly disagree' respectively. This is because if a respondent chooses 'strongly agree', he/she demonstrates he/she has chosen a wrong answer. For another question, 'Cheating can be defined as violating accepted standards or rules', the scale is reversed such that if a respondent chooses 'strongly agree', the response receives 5 point on the scale thus showing he/she has chosen the right answer. Once the weights have been placed on each response, the average is calculated by totaling response for each question and dividing by the total number of respondents for each question (72 students) in each case.

APPENDIX B

TABLE 1: CALCULATOR USAGE OVER THREE YEARS FOR A VARIETY OF SUBJECTS.

Calculator Usage

Year 2006-2008

Subject	2006	2007	2008
Basic Math	468	401	650
Discreet Math	238	265	300
Calculus	210	365	365
Statistics	200	200	255
Physics	165	165	165
Chemistry	100	55	290
Accounts	110	100	300
Finance	100	100	144

TABLE 2: ACADEMIC INTEGRITY

Answer Options	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
Academic Integrity is the same as Ethics	2	25	33	10	1	230.00	
Weight	5	4	3	2	1	3.19	Weighted Average
Academic Integrity can be defined as an adherence to a code of academic values (Webster Dictionary)	10	48	13	1	0	283.00	
Weight	5	4	3	2	1	3.93	Weighted Average
Cheating can be defined as an act of deception for profit to yourself	27	27	10	5	1	284.00	
Weight	5	4	3	2	1	3.94	Weighted Average
Cheating can be defined as violating accepted standards or rules	27	31	10	2	2	295.00	
Weight	5	4	3	2	1	4.10	Weighted Average
"E-cheating" or electronic cheating can be defined as using information technology (IT) to aid in the process of cheating in a class (King and Case, 2007)	14	37	16	2	2	272.00	
Weight	5	4	3	2	1	3.78	Weighted Average

TABLE 3: CONCEPT APPLICATION

Answer Options		Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree		
it is okay :								
(a) to share information among friends during tests or exams		5	10	16	29	12	249.00	
	Weight	1	2	3	4	5	3.46	Weighted Average
(b) to copy from the website that has the required information for an assignment		3	17	18	28	6	233.00	
	Weight	1	2	3	4	5	3.24	Weighted Average
(c) to copy from a text book that has the required information for an assignment		4	21	22	20	5	217.00	
	Weight	1	2	3	4	5	3.01	Weighted Average
(d) to write in the information from what someone else says for an assignment		1	13	19	33	6	246.00	
	Weight	1	2	3	4	5	3.42	Weighted Average
(e) to copy from another friend who has the information for an assignment		2	7	15	37	10	259.00	
	Weight	1	2	3	4	5	3.60	Weighted Average
All of the above points a-e but with due citations and reference list		28	30	7	4	0	289.00	
	Weight	5	4	3	2	1	4.01	Weighted Average
It is okay to install a copy write software given to me by a friend		9	25	24	10	3	186.00	
	Weight	1	2	3	4	5	2.58	Weighted Average
It is okay to download MP3 or movies from peer-to-peer websites		18	35	9	7	3	158.00	
	Weight	1	2	3	4	5	2.19	Weighted Average
It is cool to buy pirated movies from vendors on the streets for AED 5/- instead of the original for more than AED40/-		13	21	15	17	5	193.00	
	Weight	1	2	3	4	5	2.68	Weighted Average
'Anything goes' is a sure attitude to success		4	9	30	22	4	220.00	
	Weight	1	2	3	4	5	3.06	Weighted Average

TABLE 4: WHAT I PRACTICE

Cheated on exams: 40.8% (29 out of 72) have answered YES

Cheated on exams using technology such as :	Yes	No	%
A) Mobile phone wireless connectivity	1	71	1.4
B) PDAs	0	72	0
C) Programmable calculators	10	68	13.8
D) Pagers	1	71	1.4
E) Minimized text using photocopy machine to make cheat sheets	4	68	5.5
F) iPod	0	72	0
G) e-dictionaries	0	72	0
H) Memory sticks for online exams	1	71	1.4