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Effectiveness in Implementing Automated Computer Aided-Design to the Drafting Students

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Abstract

In this world, pool of skyrocketing innovations upon which people now are very dependent, became a really easy-life mode for us in such a way that things got easier to be created, manipulated and produced with lesser time and manual working. This is all because of the great people whom already contributed their inventions that made lives effortless. From the invention of the first computers up to this times well-known iPhones, from the black and white screens up to the plasma, touch screens and sound censored ones, and from the lacking-ability software up to what we are using now – the advance and still on the running in becoming more and more advance ones; is a real life changing event in the lives of everyone. CAD system is one of these software that made the architectural and engineering works easier.

Keywords: industrial companies, technology, design and engineering fields, etc.

INTRODUCTION

During the olden days, engineers and designers are struggling to produce and submit engineering drawings in their scheduled times. Every line, shape, measurement, scaling of the drawings – brought them headache to the drafting field; these pressures and difficulties put Computer Aided Design Drafting (CAD Drafting) technology on the line.

Beagley (1990) said that the early 1960's heralded significant changes within the field of drafting and design when major industrial companies, such as Boeing and General Motors in the U.S.A. accepted the use of Computer Aided Drafting and Design (CADD) as the latest technological tool in manufacturing.

Bertolline (1988), CAD has forced its way into the manufacturing industry significantly changing the internationally accepted methods used to produce drawings. Fuller (1988) added to this that it has a splendid effect on the drafting and design industry far greater on the previous changes combined.

Professionals in various design and engineering fields now have used AutoCAD software for a wide range of applications for over three decades. This application falls into the category of programs known as computer aided design (CAD) software.

Architects, interior designers and engineers commonly used computer aided design programs. Methods and techniques using computer aided design programs are now industry standard for these fields. Computer aided design has virtually replaced the traditional technical drawing model such as hand drafting. AutoCAD software has been available since early 1980's and currently features a host of application (research, blogspot.com).

The major advantage of any CAD system such as the AutoCAD is that, it increases efficiency which in return will be a greater productivity and of course, higher profitability. These days, many industries that are connected in engineering and designing require employees that are already trained in using CAD systems. The establishment of computer aided drafting and designing within secondary school will not only confirm in the minds of students the relevance of current technology, but will ensure that graduates will somehow be qualified in such industries. Hence, students must learn how to operate computer aided design systems, particularly automated computer aided design, for it will at least give them the assurance onto having a promising future. This gives rise to the opinion that schools are one of the many variables that has the biggest responsibility upon the performance of the students in operating AutoCAD.

The Beazley Report (1984, p.60) Recommendation 7, clearly identifies the responsibility of schools and school systems to provide computer education to all students. As a policy recommendation it provides a general direction for teachers, but it has been left to the Secondary Education Authority (SEA) to produce upper school curriculum documentation in order that specific subject programming may be facilitated. The here is, "how will the students gain knowledge and skills in operating AutoCAD if they lack of facilities?"

Facilities, specifically, computer units weren't just the factor that can have a great upshot on the performance of the students in operating AutoCAD, but there are more. This is why the researchers opted to execute a study pertaining to this specific topic that is entitled, "AutoCAD: Implementation and Effectiveness to the Drafting Students". This study will not just focus onto determining the factors in operating AutoCAD to the performance of the student, but it may also help other people to be informed about the rising software of the time in the lives of random people – mostly, the students who are future architects, engineers and designers

METHODOLOGY

Quantitative-tracer study will be used in this research to determine the implementation and effectiveness of Automated Computer Aided Design to the drafting students.

The respondents of this study is the sixty-eight (68) current and former drafting students who uses the AutoCAD application since it has been implemented in the school year 2012-2013 of Reina Mercedes Vocational and Industrial School.

The researchers will use the indirect method of collecting the data through the use of questionnaire. The questionnaire to be floated will be divided into four categories: (1) List of questions which are intended to sustain the answers on the profile of every respondent, (2) a checklist onto determining the benefits of AutoCAD, (3) another checklist for the factors in operating AutoCAD to the performance of the drafting students and lastly, (4) a checklist to determine how effective AutoCAD is to the drafting students.

To describe the information that will be gathered in conducting the study, the researcher will use the frequency percentage distribution in order to trace the respondents and mean to determine the benefits of AutoCAD, the factors that affect the performance of the drafting students in operating AutoCAD and its effectiveness. Likert scale will also be used.

Scale 1: Benefits of AutoCAD

Option	Range	Description
5	4.20-5.00	Strongly Agree
4	3.40-4.19	Agree
3	2.60-3.39	Neutral/Uncertain
2	1.80-2.59	Disagree
1	1.00-1.79	Strongly Disagree

Scale 2: Factors in operating AutoCAD

Option	Range	Description
5	4.20-5.00	Never
4	3.40-4.19	Rarely
3	2.60-3.39	Sometimes
2	1.80-2.59	Often
1	1.00-1.79	Always

Scale 3: Effectiveness of AutoCAD

Option	Range	Description
5	4.20-5.00	Strongly Agree
4	3.40-4.19	Agree
3	2.60-3.39	Uncertain
2	1.80-2.59	Disagree
1	1.00-1.79	Strongly Disagree

RESULTS AND DISCUSSION**Table 1: Frequency and Percentage Distribution of the Respondents in terms of Their Demographic Profile**

	MALE		FEMALE		LGBT		Total	
	F	P%	F	P%	F	P%	F	P%
SY								
2012-2013 (grad.)	3	4.41	4	5.88	0	0.00	7	10.29
2013-2014 (grad.)	5	7.35	10	14.71	1	1.47	16	23.53
2014-2015 (grad.)	0	0.00	13	19.12	0	0.00	13	19.12
2015-2016 (comp.)	8	11.76	3	4.41	1	1.47	12	17.65
2016-2017 (comp.)	11	16.18	3	4.41	3	4.41	17	25.00
Current Drafting Students	2	2.94	1	1.47	0	0.00	3	4.41
Total	29	42.65	34	50.00	5	7.35	68	100

Table 1 presents the frequency percentage distribution of the respondents in terms of gender, it shows that half of the respondents are female followed by male with 42.65% and lastly, LGBT with 7.35%. It also shows the percentage of graduates every school year since the AutoCAD has been implemented, the highest number of graduates in high school is in the year 2013-2014 with 23.53% and the highest number of completers in Grade X is in the year 2016-2017 with 25%.

Table 2: Frequency and Percentage Distribution of Respondents in every year level

COLLEGE AND SHS	Frequency	Percent
GRADE 11	17	25.00
GRADE12	15	22.06
1ST YEAR	1	1.47
2ND YEAR	2	2.94
3RD YEAR	10	14.71
4TH YEAR	13	19.12
5TH YEAR	1	1.47

GRADUATED	4	5.88
OUT OF SCHOOL YOUTH	5	7.35
TOTAL	68	100

The table 2 manifests above the frequency percentage of the current year level of the respondents in their studies. It shows that the most number of respondents was taken in the Grade XI curriculum with 25%. It also shows that 5.88% of the respondents already graduated and 7.35% are un-enrolled in college.

Table 3: Frequency and Percentage Distribution of Courses and Track

COURSES	Frequency	Percent
TVL	15	22.06
STEM	11	16.18
HUMSS	2	2.94
ABM	4	5.88
BS ARCHITECTURE	4	5.88
BS CIVIL ENGINEERING	5	7.35
BS INFORMATION TECHNOLOGY	3	4.41
BSED and BEED	9	13.24
BS ACCOUNTANT	3	4.41
BS ACCOUNTING TECHNOLOGY	1	1.47
BS BUSINESS ADMINISTRATION	2	2.94
POLITICAL SCIENCE	2	2.94
BS ENTREPRENEURSHIP	1	1.47
PHARMACEUTICAL SERVICE	1	1.47
OUT OF SCHOOL YOUTH	5	7.35
TOTAL	68	100

The table 3 shows the frequency percentage distribution of the respondents in terms of their courses and track they have chosen. As shown on the table, out of 68 respondents, 22.06% enrolled for the TVL Track for the Senior High School Level and 13.24% has the highest enrolled course of the college respondents which is the BSED. For the related college courses to AutoCAD which is the BS Architecture, BS Civil Engineering and BS Information Technology, the Civil Engineering had the highest percentage which is 7.35%.

Table 4: Benefits of having AutoCAD, Mean, Standard Deviation and Description

Statement	Mean	S.D.	Description
1. I draw with high consistency, greater accuracy, neatness and legibility.	4.29	0.7738	Strongly Agree
2. My AutoCAD output is more accurate than the manual drawing output.	4.26	0.956	Strongly Agree
3. I save a lot of time in planning and designing.	4.24	0.7554	Strongly Agree

4.	More drawings and designs can be done in a short period of time.	4.24	0.8485	Strongly Agree
5.	I draw and design faster than the manual drawing.	4.18	0.8454	Agree
6.	It contributes a positive and beneficial learning environment within technical drawing in general.	4.18	0.7715	Agree
7.	Traditional aspects of technical drawing such as lettering and dimensioning are performed automatically using AutoCAD.	4.07	0.7788	Agree
8.	I easily learn and manipulate the application. (AutoCAD).	4.04	0.9531	Agree
9.	I learn drafting skills easily using the computer.	3.97	0.9615	Agree
10.	Students who underwent CAD drafting as their initial subject are well-trained than students who learn drafting manually then move into CAD.	3.71	1.1071	Agree

Based on the benefits presented above, the statement I draw with high consistency, greater accuracy, neatness and legibility ranked first with a mean of 4.29 corresponds to strongly agree description. The result of this study is parallel to the findings of Murphy (1987) that CAD systems can produce drawings of greater accuracy. This table shows the benefits of having AutoCAD to the drafting students with a computed general weighted mean of 4.11 corresponding to agree description.

Factors in Operating AutoCAD to the Performance of the Drafting students

Table 5: Environment, Mean, Standard Deviation and Description

Statement	Mean	S.D.	Description
The noise from the people made me confused in operating AutoCAD.	3.24	0.8125	Sometimes
The noise from the machineries can affect my concentration.	3.19	0.9659	Sometimes
The weather or temperature affects my mood to do my task in AutoCAD.	2.96	1.1387	Sometimes
The arrangement of the room affects my performance in AutoCAD.	2.68	1.2025	Sometimes

The table 5 shows the factors in operating AutoCAD to the performance of the drafting students in terms of their environment. It also shows that the noise from the people made students confused in operating AutoCAD is the main factor encountered by the students with a mean of 3.24 that corresponds to sometimes description.

Table 6: Facilities, Mean, Standard Deviation and Description

Statement	Mean	S.D.	Description
The insufficiency of computer units with AutoCAD application affect our production of outputs.	3.93	1.1371	Often
Outdated version of windows affects my performance because of software compatibility.	3.69	0.8683	Often
Unavailability of AutoCAD application causes problems in installing the software.	3.6	0.9946	Often
The insufficiency of books, learning materials, modules, etc. affect my knowledge in operating AutoCAD.	3.35	1.0476	Sometimes

The table 6 manifested the factors under the category of facilities. It also manifests that the insufficiency of computer units with AutoCAD application affects the production of outputs with a weighted mean of 3.93 that corresponds to often description.

Table 7: Organization, Teachers and Staff, Mean, Standard Deviation and Description

Statement	Mean	S.D.	Description
1. The strategies and techniques employed by my AutoCAD teacher affect my operating performance.	3.63	0.8794	Often
2. The learnings of my teachers in AutoCAD affect my performance in operating.	3.47	1.0855	Often
3. Rewards and appreciations from my teachers affect my eagerness to learn AutoCAD.	3.44	1.1248	Often
4. The unavailability of AutoCAD teachers affects my knowledge and skills.	3.34	1.141	Sometimes
5. Tenured teacher can't teach accurate and updated information especially in operating the AutoCAD.	3.32	0.9051	Sometimes

As presented in table 7, the strategies and techniques employed by the AutoCAD operating performance of drafting students with the highest mean of 3.63 corresponds to often description. The outcome of this study is parallel to the findings of Chadderdon (1992) that problems encountered in the field of CAD include inexperienced instructors, dated texts and reference materials.

Table 8: Students, Mean, Standard Deviation and Description

Statement	Mean	S.D.	Description
1. I cannot afford to buy a laptop or a desktop.	3.41	1.136	Often
2. My attitude (idleness) affects my AutoCAD performance.	2.78	1.144	Sometimes
3. I am not able to finish my AutoCAD job on time because of my poor health condition.	2.62	1.1722	Sometimes
4. I lack skills and knowledge in operating AutoCAD.	2.46	1.1899	Rarely

Table 8 shows the factors under the category of students. It shows that the major factor that students faced is that they cannot afford to buy a laptop or desktop with a mean of 3.40 and a description of sometimes.

Table 9: Effectiveness of having AutoCAD to the Drafting Students, Mean, Standard Deviation and Description

Statement	Mean	S.D.	Description
1. I can easily understand the lesson/s using the actual performance.	3.94	1.0911	Agree
2. I am applying my AutoCAD knowledge in planning and designing.	3.76	1.2827	Agree
3. I am using AutoCAD to finish my layouts immediately.	3.6	1.351	Agree
4. I am using my advance skills and knowledge in using AutoCAD.	3.54	1.2864	Agree
5. I got a higher score by finishing my outputs.	3.47	1.2152	Agree

The table 9 shows that the statements I can easily understand the lesson/s using the actual performance has the highest mean of 3.94 which is described as somewhat agree. This result is the same with the study of Godfrey (2000) indicating that there is no need to teach manual drafting, as they are not used in industry today. Drafting lessons and skills can be learned just as easily on the computer. It is also parallel to the research of Becker (1987); he found out that students need to be given 'hands-on' experience after giving the general understanding of basic concept and principles of CAD, because they tend to forget the instruction over a period of time if not practiced. The table above also displays the effectiveness of having AutoCAD to the drafting students

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This quantitative-traced study aims to determine the effectiveness of implementing AutoCAD to the drafting students. Specifically, this study aimed to seek the benefits of having AutoCAD to the drafting students, the factors in operating AutoCAD to the performance of the drafting students and the effectiveness of AutoCAD.

Using a self-administered survey questionnaire as a research instrument, the Slovin's formula were used to traced the sixty-eight (68) former and current drafting students of Reina Mercedes Vocational & Industrial School who underwent AutoCAD as their major subject in high school. The data gathered were analyze using simple descriptive statistics like frequency percentage distribution, mean and Likert Scale.

Based on the data presented and analyzed, the researchers came out with the following findings:

1. Grade XI has the highest number of respondents in senior high school while in college level, 4th year has the highest number of respondents.
2. BSED has the highest enrollees from the former drafting students.
3. As a related course to AutoCAD, BSCE has the highest rate of former drafting student-enrollees in college.
4. TVL track in senior high school is chosen most of the Grade 10 completers who used AutoCAD on their junior high school.
5. Respondents strongly agreed that they can draw with high consistency, greater accuracy, neatness and legibility using AutoCAD with a mean of 4.29.
6. Respondents answered that their environment sometimes affects their AutoCAD operating performance.
7. The facilities often affect their AutoCAD operating performance.
8. Respondents answered that the organizations, teachers and staffs often affects their AutoCAD operating performance.
9. Personal problems sometimes affect their AutoCAD operating performance as shown in Table 8.
10. Based on the result of the Table 9 which is the effectiveness of having AutoCAD to the drafting students, AutoCAD is somewhat effective to the drafting students.

Conclusion

In the light of the findings of the study, the following conclusions were drawn:

1. The major benefits of having AutoCAD to the former and current drafting students with a description of strongly agree are as follows: (1) they can draw with high consistency, greater accuracy, neatness and legibility. (2) Their AutoCAD output is more accurate than the manual drawing output. (3) They saved a lot of time in planning and designing and (4) more drawings and designs can be done in a short period of time.
2. The contributing factors in terms of environment and students sometimes affect the operating performance of drafting students while the contributing factors in terms of facilities and organizations, teachers and staffs were often affect it.
3. AutoCAD is somewhat effective to the drafting students.

Recommendation

Based on the result of the study conducted, the researchers highly recommend the following:

1. The environment where students perform in operating AutoCAD must be organized.
2. Needed facilities must be provided without insufficiency, as well as teachers and staffs responsible for the AutoCAD learning of the students.
3. AutoCAD should be used more by drafting students rather than planning and designing manually.

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