INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

****

THE EFFECTIVENESS OF COMPUTER AIDED DESIGN (CAD) SOFTWARE AS DRAFTING PRODUCTION TOOL FOR THE BACHELOR OF SCIENCE IN TECHNOLOGY TEACHER EDUCATION STUDENTS

MINANGOAO P. IMAM, Ph.D.
Professor IV
MSU – Lanao National College of Arts and Trades
shamsaztab@gmail.com

ABSTRACT

The study determined the effectiveness of Computer Aided Design (CAD) software on the drafting performance of students under the Department of Engineering Technology. The researcher opts to identify the problems on the students' output using Computer Aided Design (CAD) as production tool, specifically on the Computer Aided Design software features, the effect of using Computer Aided Design software onto students' performance in drafting such are: lack of equipment, facilities and materials, financial supports, and the student-respondents' productivity.

The gathering of data underwent a process which was devotedly observed by the researchers to ensure that proper procedure has been meet in the course of investigation. Due to the limited access on the target number of respondents, the study is delimited to all graduating students under the Department of Engineering Technology and Home Economics of MSU-Lanao National College of Arts and Trades during the academic year 2020-2021. The researchers utilized self-made survey questionnaire, which consist of two parts; the part one is the respondents' profile and the second part is the problems on the effectiveness of Computer Aided Design (CAD) to the respondents' performance and output. The instrument was contained thirty (30) items.

The study used a mixed methods research design. The use of a survey-questionnaire is the sole instrument for the collection of study data to gain a greater understanding about the

****

****

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

respondents' problems on CAD software. A follow-up interview from both respondents and instructors that concerned the productivity of the student-respondents has been made to supplement the results of the study. Moreover, the researchers used Frequency (f) and Percentage Distribution (%) and Mode as statistical tools.

Keywords: *performance, production tools, Computer Aided Design, effectiveness*

INTRODUCTION

In this generation, technological growth is extremely high, the success of every graduate student in terms of employability is based according to the needs of industry which in turn impact the type of education required to prepare incoming professionals to inter in the industry. However, it is not just about what kind of advancement needs. Before computers came along to simplify the design process, drafters in both the architectural and engineering fields relied solely on their ability to draw by hand. Nowadays, there were many software that can be use in drafting, one is, the program Computer-Aided Design (CAD) which is a software frequently used by different types of designers, architects and engineers to create a 2D drawings or 3D dimensional models to visualize constructions and enables the development and modification.

In the study, researcher wish to determine the cause of drafting students' problem in performing their activities using CAD. Though it is quite understandable that the challenges of using CAD for students include a lack of understanding of its functions, limited access to personal computers, equipment, facilities, lack of interaction, and difficult in carrying out instructions. Moreover, students do drafting and designs should be guided with the country's legal basis; like RA 8293 and RA 10557, such according to Section 172 Intellectual Property Code, literary and artistic works refer to the original and intellectual creations protected from the moment of their

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

creation. Therefore, it is essential to guide the students to avoid conflict accordingly while doing their school requirements in drafting.

Furthermore, the researchers also wish to address the teachers' problem on teaching Drafting because of lack of knowledge of design processes and therefore have difficulties in teaching Computer-Aided Design (CAD) as it is clearly affecting the students' achievement during performing their activities using CAD. Additionally, the main purpose of the study is to determine the effectiveness Computer-Aided Design (CAD) on the drafting performance of Bachelor of Science in Teacher Education Students.

METHODOLOGY

A mixed methods research design was utilized in the study. The design was used for collecting data, analyzing it and mixing both quantitative and qualitative methods to understand the research problem. The survey-questionnaire was used as an instrument for the collection of study data to gain a greater understanding about the respondents' performance using Computer Aided Design application. Prior to the administering of instrument, pilot testing has been made to fifteen (15) non-graduating students selected through random sampling as respondents to validate the survey-questionnaire. Moreover, after retrieval of the instruments, a follow-up interview using an open-ended question to both respondents and instructors that concerned the productivity of the respondents to supplement the results of the study. Moreover, the gathering of data underwent a process which was devotedly observed by the researchers to ensure that proper procedure has been meet in the course of investigation. The results of data collected were then submitted to statistician for treatment after which the data were interpreted. Using frequency (f) and percentage distribution (%) and mode as statistical tools of the study.

Due to the limited access on the number of target respondents, the study is limited to all thirty-two (32) graduating students taking up Bachelor of Science in Engineering Technology and

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

Home Economics. The researcher utilized self-made survey questionnaire, which consist of two parts; the part one is the respondents' profile and the second part is the problems on the students' performance and the effectiveness of Computer Aided Design (CAD) as Drafting Production Tool. The part two also contained a total of thirty (30) items.

RESULTS AND DISCUSSION

1.1. Profile of Respondents

Table 1. Age

Age in years	Frequency (f)	Percentage (%)
20-22	18	56.25%
23-25	9	28.125%
25 above	5	15.625%
Total	32	100%

As shown from the table 1, it is undoubtedly that more of the respondents age range from 20 to 22 and females are dominant among the male graduating students of Bachelor of Science in Engineering Technology and Home Economics as can be seen from table 2.

Table 2. Gender

Gender	Frequency (f)	Percentage (%)
Male	9	28.125%
Female	23	71.875%
Total	32	100%

Table 3. Parents' monthly income

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

Parents' monthly income	Frequency	Percentage
Less than Php 5,000.00	6	18.75%
Php 5,001.00 – 10,000.00	5	15.625%
Php 10,001.00 – 15,000.00	14	43.75%
Php 15,001.00 – 20,000.00	4	12.50%
Php 20,001.00 or above	3	9.375%
Total	32	100%

Foremost, graduating students struggle with financial expenses during the school days because of the financial income of their parents or guardians who supported their schooling. Parents' financial income has been significant impact on the studies of the students. The table 3 showed that six and five of the student-respondents were from lower income households ranging from less P 5,000 to 10,000.00 respectively that lead to have lower in performance in drafting courses compared to the students' parents' monthly income reaching Php15, 000.00 or more. It is true then that poverty causes the more drop-outs students because they cannot afford the cost of school fees and requirements. According to one interviewed student-respondent, "*it is quite difficult to come in school at all times because of the long distance and the cost of daily transportation fee cannot meet because of limited financial resources*". However, student-respondents' parents reaching the Php15,001.00 – 20,000.00 or above monthly financial income can attend on the course requirements specially in drafting courses which quite costly.

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

1.2. Effectiveness of using Computer Aided Design Software on Students' Output

Table 4. Features of Computer Aided Design

Statement	Responses (*n*=32)			Mode	Qualitative Description
	1	2	3		
The Computer Aided Design (CAD) software increases students' productivity.	5	12	15	3	Agree
The Computer Aided Design (CAD) software can produce better quality design products.	4	17	11	2	Not Sure
The Computer Aided Design (CAD) Software allows users to accurately create 3D.	0	25	7	2	Not Sure
The Computer Aided Design (CAD) software can designed for creators to design, draft, and produce technical documentation.	7	8	17	3	Agree
The Computer Aided Design (CAD) software is a collaboration tools in terms of digitalization.	0	7	25	3	Agree
The Computer Aided Design (CAD) software enhances accuracy.	7	5	20	3	Agree
The Computer Aided Design (CAD) software offer creative styles in drafting.	2	10	20	3	Agree
The Computer Aided Design (CAD) software can create designs come to life through 3D.	5	10	17	3	Agree
The Computer Aided Design (CAD) is express tools makes the design process more integrated and complete than what is possibly by hand.	9	10	13	3	Agree
. The Computer Aided Design (CAD) can be stored digitally, making easier to share them or access them from multiple computers.	1	23	8	2	Not Sure
Mean Mode				**2.70**	**Agree**

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

****

Legend: 1.00 – 1.66 = Disagree 1.67 – 2.33 = Not Sure 2.34 – 3.00 = Agree

Using Computer-Aided Design (CAD) is a way to digitally create 2D drawings and 3D models for the drafting students. With the use of this software they can easily share, review, simulate, and modify designs easily, opening doors to innovate and differentiated software that is more applicable on their course. The table 4 shows the advantage of using Computer-Aided Design (CAD) software. indicator number 5 "*The Computer Aided Design (CAD) software is a collaboration tools in terms of digitalization"* appear to be the best featured that most student-respondents agreed, likewise statements, *"the Computer Aided Design (CAD) software enhances accuracy" and "the Computer Aided Design (CAD) software offer creative styles in drafting*", are another best featured of CAD as substantiate by the student-respondents which they assessed the same. Overall, the table 4 present that Computer-Aided Design (CAD) saves time for the drafting students. When they use Computer-Aided Design (CAD), it will save their time and they can make a higher quality and more systematic designs in shorter time duration. And it is easy to edit, when they are making designs whenever they make modifications.

Moreover, the student-respondents affirmed these indicators, "*the Computer Aided Design (CAD) software can produce better quality design products", "the Computer Aided Design (CAD) Software allows users to accurately create 3D",* and *"the Computer Aided Design (CAD) can be stored digitally, making easier to share them or access them from multiple computers",* into "*Not Sure*" because in some cases not in anytime they can access their CAD output especially work can be lost because of the sudden malfunction of computers and the CAD software likewise is not updated at all times and computers are susceptible to viruses.

****

****

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

Table 5. Equipment and Facilities

Statement	Responses (*n*=32)			Mode	Qualitative Description
	1	2	3		
No Internet Connection to keep Software tools updated.	5	20	7	2	Not Sure
Availability of Computer Laboratory.	1	27	4	2	Not Sure
Printer with plotters for a large models of Computer Aided Design (CAD) designs.	8	17	7	2	Not Sure
Lack of Computer sets with advance graphics.	0	4	28	3	Agree
Learning materials used as guide in using Computer Aided Design software	0	11	21	3	Agree
Mean Mode				**2.40**	**Agree**

Legend: 1.00 – 1.66 = Disagree 1.67 – 2.33 = Not Sure 2.34 – 3.00 = Agree

The table 5 presents the several challenges encountered by the student-respondents. It showed that there is inadequate provision of school support facilities such as computer laboratory, learning materials and equipment which hinders students' learning experience that contribute to the lower output in design and technology. The indicators, "*no internet connection to keep software tools updated*", "*Availability of Computer Laboratory*", and "*printer with plotters for a large models of Computer Aided Design (CAD) designs*" assessed as "*not sure*". The results claimed that missing school equipment and facilities can affect the quality of instruction and output of the drafting students as it impacting their preparedness in learning drafting through the use of Computer Aided design software. Additionally, the lack of utilization of computer facilities for drafting students can negatively affect students' learning motivation. Moreover, the overall

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

results as presented in table 5 is "*agree*" with an overall mode "2.40", the data suggested that the student-respondents find it difficult to understand the use of Computer Aided design software and hindering their ability to learn and produce a good output of designs due to lack of resources.

Table 6. Financial

Statement	Responses (*n*=32)			Mode	Qualitative Description
	1	2	3		
The Computer Aided Design (CAD) software package is high-priced.	0	13	19	3	Agree
The Computer Aided Design (CAD) software training is costly.	10	15	7	2	Not Sure
Using Computer Aided Design (CAD) software required skills and knowledge, trainings and it is costly.	6	5	21	3	Not Sure
Computer Aided Design (CAD) software updating is expensive.	0	7	25	3	Agree
Computer essential for running the Computer Aided Design (CAD) software are expensive.	11	17	5	2	Agree
Mean Mode				**2.60**	**Agree**

Legend: 1.00 – 1.66 = Disagree 1.67 – 2.33 = Not Sure 2.34 – 3.00 = Agree

The data showed that students encountered financial problem during their activities using Computer Aided Design (CAD) software. The mean mode is 2.60 descriptively define "*agree*" and it implied that student-respondents face financial difficulties due to their inability to increase income, as they prioritize their studies over finding ways to earn money and their parents' income cannot sustain all their family needs. It is no secret that they struggle financially. The indicator

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

****

"Computer Aided Design (CAD) software updating is expensive" is essentially out of thirty-two student-respondents, twenty-five rate "*agree*", this signified that they cannot attained to the frequent software upgrading because of high cost. The data revealed that students affect their output in drafting using CAD software because of financial constraints, thus more of them refrain in participating activities using CAD software. Likewise, students have limited knowledge using the CAD software for their designs because just a few of them have personal computers and availing to "*Computer Aided Design (CAD) software training is costly*", 65 % of the student-respondents manifest it. This supported by the Gracia-Ibanez and Vergara (2016), they emphasize the importance of continuing evolution in the training and educational needs of users of CAD systems.

Surprisingly, the best computer can run Computer Aided Design (CAD) software are computers with a very past CPU that supports the ECC memory, a large amount of RAM. Thus, teaching and learning Computer Aided Design software needs time taking process to know how to operate or run software, therefore, time and cost of training the students which will doing CAD designs is quite expensive and purchasing cost for new systems for high production is evitable.

Moreover, teaching drafting using CAD software is important for drafting students instead of using manual tools and equipment and practices. The essential advantage of using CAD helped the students output better. Table 7 showed the mean mode is 2.50. This implied that the student-respondents *"agree"* that CAD software shorten their time spent on design creation and they insinuate that learning CAD software allows them to unleash their creativity by providing them with versatile platform for experimentation and exploration with extensive range of tools and customized options. Indescribably, the results conveyed that 78.13% or 25 out of 32 from the respondents "*disagree*" that "*Computer Aided Design (CAD) software is flexible and easy to access in computer*", this also implied that it is not true that using CAD is accessible at all times because the knowledge in using CAD has become necessary with persistently increasing technological advancement in terms of upgrading the software. Computer Aided Design software is a very

****

****

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

complex technology work. "There is a need to educate more the drafting students in using CAD, otherwise they will be frustrated and turn to a passive learning", according to one drafting instructor. As can be observed from the indicators, "*Computer Aided Design (CAD) software is can be done in minimum capacity of Computer RAM", "using Computer Aided Design (CAD) software minimized the time for drafting", and "Computer Aided Design (CAD) software allows students to revised their output anytime",* was assessed "not sure"

Because the time will be spent depend on the heaviness of the design, as it involved students' imaginative abilities to build up a unique thinking and creativity, that later to be use in design.

Table 7. Productivity

Statement	Responses (*n*=32)			Mode	Qualitative Description
	1	2	3		
Computer Aided Design (CAD) software help modified and reproduction of the design much better.	5	7	20	3	Agree
Using Computer Aided Design (CAD) software minimized the time for drafting.	0	29	3	2	Not Sure
Computer Aided Design (CAD) software allows students to revised their output anytime.	3	25	4	2	Not Sure
Computer Aided Design (CAD) software is flexible and easy to access in computer.	25	4	3	1	Disagree
Computer Aided Design (CAD) software is can be done in minimum capacity of Computer RAM.	0	30	2	2	Not Sure

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

Computer Aided Design (CAD) software can create 2D drawings and 3D models with accurate measurements and can visualized construction.	0	7	25	3	Agree
In Computer Aided Design (CAD) software, designs can restore and rep reproduced anytime.	3	10	19	3	Agree
Computer Aided Design (CAD) software files are more secure.	3	12	17	3	Agree
Computer Aided Design (CAD) software abridge problem-solving processes related to designs.	2	4	26	3	Agree
. Using Computer Aided Design (CAD) software is easy to understand the design.	3	6	23	3	Agree
Mean Mode				**2.50**	**Agree**

Legend: 1.00 – 1.66 = Disagree 1.67 – 2.33 = Not Sure 2.34 – 3.00 = Agree

CONCLUSIONS

The Computer Aided Design software as production tool for the students cannot be fully realized because the students find Computer Aided Design (CAD) software very challenging. The challenges of using CAD for students include a limited access to personal computers, limited of financial supports and equipment, trainings that leads to lack of understanding of its function and difficulties in carrying out instructions from the instructors. Therefore, the students' quality output design varies.

RECOMMENDATIONS

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

****

The students will be motivated to learn when the course is structured in a way that students learn best when incentives for learning in a classroom is given. Based on the findings and conclusions, the following recommendation are provided:

1. Instructors should educate properly the students on Computer Aided Design software and program their activities. When the instructors expect best work from their students, program the students for success because students rise to the task. Encourage students to focus on their continued improvement of their design;
2. The instructors should frequently ameliorate its knowledge in Computer Aided Design software and other related technology software;
3. The drafting students should have their personal computers;
4. Parents should financially and emotionally support the need of their children especially on their school needs; and
5. The Institution should provide completely the facilities, tools and equipment needed by the drafting students.

INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume V, Issue III
February 2024
Available online at https://www.instabrightgazette.com

****

REFERENCES

Bilda, Z. and Demirkhan, H. (2002). An Insight on Designers sketching activities in Traditional versus digital media, Design Studies. www.researchgate.net

Jefferris, A. and Madsen D. (2011). *Architectural Drafting and Design*, sixth edition, Delmar publishing. Quezon City

Gracia-Ibanez, V. and Vergara, M. (2016). *Applying action research in CAD teaching to improve The learning experience and academic level.* InternationalJournal.Springeropen.com

Olukoya, O. and Kuti, O. (2015). *Effects of the use of Computer Aided Design (CAD) on the Architecture: A Qualitative Approach.* International Journal of Education and Information Science.

Vindollo, S. and Buendia, M. (2016). *Educational Technology 2.* Adriana Publishing Co. Inc. Quezon City

****

****