Interior design students' perception for AutoCAD, SketchUp and Rhinoceros software usability

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Interior design students’ perception for AutoCAD, SketchUp and Rhinoceros software usability

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Abstract. Many previous studies regarding computer aided architectural design (CAAD) software for design have been developed with reference to how the CAAD software (in this case: AutoCAD, SketchUp and Rhinoceros) will benefit the students while learning to 2D-3D modeling design. The purpose of this study aims to identify the first year students’ perspective regarding the 2D-3D modeling software usability. A total of 127 first year interior design students participated in the study. After finishing the course about CAAD software, they completed a survey using System Usability Scale (SUS) and polling method. After that the data was analyzed and measured. Statically, the findings show that there a difference usability between SketchUp – AutoCAD, but not so different between SketchUp – Rhinoceros and AutoCAD – Rhinoceros; secondly SketchUp is less usability than the AutoCAD and Rhinoceros. But using the survey polling, the findings show that most students will be using SketchUp for their 3D modeling design. Possibly not occurring significant result is because: the students may not really understand the System Usability Scale (the greater showed negative usability) and ambiguous perception in the questionnaire statement

Keywords: Computer-aided architectural design, design digital, system usability scale

1. Introduction

In the past, an interior designer was only using hand sketches and manual three-dimensional models to draw and design. Nowadays, the design can be done faster, both two-dimensional and three-dimensional designs and drawings, using the help of various kinds of Computer Aided Architectural Design (CAAD) software. CAAD can perform certain tasks better than humans (including calculating speed and accuracy, information retrieval, and memory [1]. The most popular CAAD Software for 2D and 3D software is Google SketchUp, AutoCAD and Rhinoceros software. Google SketchUp is a program that helps in the concept design stage and is easy to learn [2]. AutoCAD is a program used to draw two dimensions and three dimensions developed by Autodesk. Rhinoceros is a 3D modelling using NURBS (non-uniform rational B-splines) modelling.

Surveys report that AutoCAD is the dominant software used by designer practices and architecture. Software that is also often used is Google SketchUp [2]. In recent years, Google SketchUp has become popular in academia, practice, and in digital design studies. The combination of the two systems is useful for exploration of design [3], because of differences in the nature of the two software programs. Having skills in both software programs, helps students to be critical of which programs are best for certain design tasks and that offer flexibility [4]. Google SketchUp is described as friendly, easy to learn [3].
The Interior Design Study Program of the Petra Christian University under the Faculty of Arts and Design was established in 1998, is one of the leading design study programs in Surabaya, also teaches students to use software technology assistance in designing. This can be seen in the 2016 study program curriculum which has Computer 1 courses since Semester 1 [5]. This Computer 1 course is a compulsory basic course that is part of the Interior Design study program curriculum. This course is a theory and practice course on skills/2D drawing skills and digital 3D modeling using design software such as: SketchUp, Rhinoceros and AutoCAD. The course goals for this course are: i. students are mastering the principles of Interior Rules, ii. able to show independent, quality and measureable performance and iii. Showing attitude of responsibility for work in the field. The learning outcome is for students to be able to recognize and operate commands from the softwares.

The aims for this research is to identify student’s perspective regarding the 3D modeling software usability and to identify the dominant software that they will use as the future interior designer. The result of this research will be reference regarding CAAD software usability in fresh year students’ perception as well as evaluation for the Computer 1 course in curriculum.

2. Literature study
There are several surveys that can be used as an assessing the usability products. From the one to evaluate specific though a wider range of interface types. The System Usability Scale (SUS) is one of the surveys tool that can be used to determine whether some software is useful or difficult to use to the user. The System Usability Scale (SUS) is relatively quick and easy to fill because composed only with ten statements (so the users only need few minutes to fill the survey), cost effective, the result can be scored very quickly and in a single score (with ranging from 0 to 100) and easy to understand by a wide range of people [6]. The key is of usability is more to determine whether the software is useful and the user interfaces (features) are easy to use [7]. Each statement having a five-point scale that ranges from Strongly Disagree to Strongly Agree. The ten statements are:

i. I think that I would like to use this system frequently.
ii. I found the system unnecessarily complex.
iii. I thought the system was easy to use.
iv. I think that I would need the support of a technical person to be able to use this system.
v. I found the various functions in this system were well integrated.
vi. I thought there was too much inconsistency in this System.
vii. I would imagine that most people would learn to use this System very quickly.
viii. I found the system very cumbersome to use.
ix. I felt very confident using the system.

In the past, CAAD was once viewed as a replacement for production drafting work. Now Computer Aided Architectural Design software (CAAD) has being utilized in interior design studios from the earliest stages of conceptual design as an iterative tool through the 3D modelling and a true BIM software [1]. To determine the usability of CAAD by first year students, there were three software that were used: AutoCAD, SketchUp and Rhinoceros. This three software were introduced in Semester 1 in Computer 1 courses. As part of the core curriculum, in Computer 1 courses, students were taught to develop their knowledge and digital 2D-3D modelling drawing skills. Students attempted to learn and practice about 2D Digital drawing using AutoCAD, then they were introduced new ways of discovering 3D modelling and orthographic views using SketchUp and Rhinoceros software.

AutoCAD is a commercial computer-aided design (CAD) and drafting software application. AutoCAD were developed and marketed by Autodesk. AutoCAD is usually used by industries, architects, project managers, engineers, interior designer, graphic designers, and many other professionals. AutoCAD were introduced first in Computer 1 courses because this software was capable of producing precise drawings with a minimum effort, especially in 2D modeling.

SketchUp is a dynamic software program that is used to quickly compile, modify, and construct 3D modeling image. SketchUp software were developed and marketed by Google and Trimble Inc. This software usually used in the fields of architecture, design and engineering. SketchUp were introduced
second in Computer 1 courses because easy to use and can be used to teach and learn 3D space geometry concepts.

Rhinoceros is a commercial 3D computer graphics and computer-aided design (CAD). Rhinoceros or Rhino were developed by Robert McNeel & Associates. Rhinoceros geometry is based on NURBS mathematical model (NURBS or non-uniform rational B-splines are mathematical representations that can accurately model any shape from a simple 2-D line, circle, arc, or box to the most complex 3-D free-form organic surface or solid) (see Figure 1). Rhinoceros were introduced last in Computer 1 courses [7].

![Figure 1. NURBS Model in Rhinoceros.](image)

3. Research methodology

It is within this context that this study approached by Interior Design Department – Petra Christian University, requesting feedback on the current usability software in interior design education. This was accomplished through the distribution of an electronic survey (managed by Google Form) using SUS (System Usability Scale) technic. The survey was distributed in December 2018.

3.1. Participants

The study was conducted in Interior Design course especially Computer 1 course in first semester. Among 145 students enrolled in the Computer 1 course (class A = 74 students, class B = 71 students), 127 of them participated in this research (87.58 %). The age of participants ranged from 18 to 20. The majority participants were female.

3.2. The course schedule

The Computer 1 course is a two credits course, was held once a week for 4 h per meeting (Schedule for class A: Wednesday 13.30 until 17.30; Schedule for class B: Thursday 13.30 until 17.30) in first semester 2018/2019. The first 5 wk will be AutoCAD course, then continue with SketchUp course and Rhinoceros course (see Table 1)

| Week | Learning Outcome | Teaching Material | Assessment Criteria Indicator |
|------|------------------|--------------------|------------------------------|
| 1 | Able to recognize and operate 2D Modeling using AutoCAD commands | Introduction to Computer 1 | Accuracy, Accuracy, completeness, and neatness in describing the task using the commands. |
| 2 | | AutoCAD – Introduction (User Interface) + Toolbar Draw | AutoCAD |
| 3 | | AutoCAD: Toolbar Modify; Window Selection, Crossing Selection | |
| 4 | | AutoCAD: Block, Refedit Toolbar Layers; Toolbar Properties | |

Table 1. Detailed Schedule for Computer 1 Course

Table 1 continue on the next page
Table 1. Continued

| Week | Learning Outcome | Teaching Material | Assessment Criteria Indicator |
|------|------------------|-------------------|-------------------------------|
| 5    |                  | AutoCAD: Dimension; (Design Center) |                              |
|      |                  | Teaser for Advance AutoCAD: |                              |
|      |                  | Construction Drawing, 3D Modelling |                              |
|      |                  | AutoCad, 3dMax Rendering |                              |
| 6    |                  | SketchUp – Introduction (Introduction, SketchUp Concept & User Interface) | Accuracy, Accuracy, completeness, and neatness in describing the task using the commands SketchUp |
| 7    |                  | SketchUp Tools (part 1) (Principal Tool, Drawing Tool, Modification Tool) |                              |
| 8    |                  | SketchUp Tools (part 2) (Construction Tool, Camera Tool, Walkthrough Tool) |                              |
| 9    | Able to recognize and operate 3D Modeling using SketchUp commands | SketchUp Model Settings; Input - Output (Model-Material Browser and Entities, Import-Export 2D-3D Graphics) |                              |
| 10   |                  | Sketchup Extensions + Teaser for Advance Sketchup Extensions (3D Warehouse, Extension; Teaser Extension (Parametric Design using flowify and voronoi) | Accuracy, Accuracy, completeness, and neatness in describing the task using the commands SketchUp |
| 11   |                  | Rhinoceros – Introduction & User Interface |                              |
| 12   |                  | Rhinoceros – Introduction & User Interface |                              |
| 13   | Able to recognize and operate 2D-3D Modeling using Rhinoceros commands | Rhinoceros: Create Surfaces from Curves |                              |
| 14   |                  | Rhinoceros: Edit Surfaces from Curves |                              |
| 15   |                  | Rhinoceros: Organize, Render and Annotation + Teaser for Advance Rhinoceros |                              |
| 16   |                  | Final Test | Theoretical mastery of the operation of programs that have been taught: SketchUp, Rhinoceros, and AutoCAD 2D. |

3.3. Instrument

There were two instruments used in this study. The first instrument is for gathering the information regarding the usability of the software. The instrument was adopted using the System Usability Scale (SUS). Usability is a technique used to evaluate products/design by testing them directly on users. The SUS is contained of 10 statements (five positive statements and five negative statements). Each statement having a five-point scale that ranges from Strongly Disagree to Strongly Agree. The sample adapted SUS instrument can be seen in Table 2. This SUS instrument were applied in three software (AutoCAD, SketchUp and Rhinoceros) [8].
Table 2. The Sample of Adapted System Usability Scale (SUS) for AutoCAD Program

| Original SUS Question | Adapted SUS Question | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree |
|-----------------------|----------------------|-------------------|-------------------|--------|---------------|---------------|
| I think that I would like to use this system frequently. | I think I would like to use this Program AutoCAD frequently. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I found the system unnecessarily complex. | I found the Program AutoCAD less complex. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I thought the system was easy to use. | I thought the Program AutoCAD was easy to use. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I think that I would need the support of a technical person to be able to use this system. | I think that I would need the support of a technical person / tutor to be able to use this Program AutoCAD. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I found the various functions in this system were well integrated. | I found the various functions in this Program AutoCAD were well integrated. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I thought there was too much inconsistency in this System. | I thought there was too much inconsistency in this Program AutoCAD. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I would imagine that most people would learn to use this System very quickly. | I would imagine that most people would learn to use this Program AutoCAD very quickly. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I found the system very cumbersome to use. | I found the Program AutoCAD very cumbersome to use. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I felt very confident using the system. | I felt very confident using the Program AutoCAD. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I needed to learn a lot of things before I could get going with this system. | I needed to learn a lot of things before I could get going with this Program AutoCAD. | ☐ | ☐ | ☐ | ☐ | ☐ |

Users filled the questionnaire by checklist on provided checkbox as above.

The next step is the participant will have ranked each of the 10 templates questions above, from scale 1 to 5, based on their level of agreement. After the participant fill the scale, the calculation began. The first rule is for each of the odd numbered questions (question 1, question 3, question 5, question 7, and question 9 considered as positive statement), then subtract 1 from the score (for example, the participant scale is 5 for question no 1, then the final score will be 5 - 1 = 4). The second rule is for each of the even numbered questions (question 2, question 4, question 6, question 8, and question 10 considered as negative statement), subtract their value from 5. score (for example, the
participant scale is 3 for question no 2, then the final score will be 5 - 3 = 2). The next step is to take these new values which you have found, and add up the total score, after that multiply the total score by 2.5. The result of all these SUS score calculations is that our score out of 100.

The second instrument, is by doing the survey polling. In this polling, the same student will be asked regarding the possibility about programs that they will be use more often for their design process later. They can choose more than 1 programs between three program AutoCAD, SketchUp and Rhinoceros. (see Figure 2).

**Conclusion**

**Overall, Which programs will you be use more often for your design process?**

| Program AutoCAD | Program SketchUp | Program Rhinoceros |
|-----------------|------------------|--------------------|

**And why you choose those programs?**

Figure 2. Polling questionnaire.

4. Results and discussion

The next step in this study is to identify the first year students’ perspective regarding the 2D-3D modelling software usability using SUS (System Usability Scale) method. This method was used to assess how the learnability, efficiency, memorability, errors and satisfaction from the users. The result from the participant can be seen in the chart below. For AutoCAD Program, the mean score for SUS question number 1 = 4.18; 2 = 3.62; 3 = 3.72; 4 = 2.88; 5 = 3.94; 6 = 4.05; 7 = 3.48; 8 = 2.36; 9 = 3.41; 10 = 2.51. While the mean score for SketchUp Program is 1 = 3.85; 2 = 3.56; 3 = 3.74; 4 = 2.83; 5 = 3.74; 6 = 3.84; 7 = 3.53; 8 = 2.40; 9 = 3.39; 10 = 2.76. The mean score for Rhinoceros Program is 1 = 3.77; 2 = 3.72; 3 = 3.91; 4 = 2.89; 5 = 3.99; 6 = 3.99; 7 = 3.62; 8 = 2.33; 9 = 3.55; 10 = 2.77. The next step is calculating the participants’ values based on regulation on SUS Score Calculation method (done in Microsoft excel program) (see Table 3). The higher the score mean that the programs are easier to use, quick in performing task, easy to reestablish, less error and pleasant to use. In this case, AutoCAD have the highest score then rhinoceros and SketchUp.

**Table 3** The system usability scale (SUS) Final Score for AutoCAD, SketchUp and Rhino program

| Modified SUS Question | Mean of Score | SUS Calculation Score | SUS Final Score (x 2.5) |
|-----------------------|---------------|-----------------------|------------------------|
| AutoCAD               |               |                       |                        |
| 1 I think I would like to use this Program AutoCAD frequently. | 4.19          | 3.19                  | 7.97                   |
| 2 I found the Program AutoCAD less complex.        | 3.62          | 1.38                  | 3.44                   |
| 3 I thought the Program AutoCAD was easy to use.    | 3.72          | 2.72                  | 6.81                   |

Table 3 continue on the next page
### Table 3 Continued

| Modified SUS Question                                                                 | Mean of Score | SUS Calculation Score | SUS Final Score (x 2.5) |
|--------------------------------------------------------------------------------------|---------------|-----------------------|-------------------------|
| I think that I would need the support of a technical person / tutor to be able to use this Program AutoCAD. | 2.88          | 2.12                  | 5.30                    |
| I found the various functions in this Program AutoCAD were well integrated.          | 3.94          | 2.94                  | 7.36                    |
| I thought there was too much inconsistency in this Program AutoCAD.                  | 4.06          | 0.94                  | 2.36                    |
| I would imagine that most people would learn to use this Program AutoCAD very quickly. | 3.49          | 2.49                  | 6.22                    |
| I found the Program AutoCAD very cumbersome to use.                                  | 2.35          | 2.65                  | 6.63                    |
| I felt very confident using the Program AutoCAD.                                      | 3.42          | 2.42                  | 6.04                    |
| I needed to learn a lot of things before I could get going with this Program AutoCAD. | 2.52          | 2.48                  | 6.20                    |
| **Total Score**                                                                      | **58.35**     |                       |                         |
| I think I would like to use this Program SketchUp frequently.                         | 3.85          | 2.85                  | 7.13                    |
| I found the Program SketchUp less complex.                                           | 3.69          | 1.31                  | 3.29                    |
| I thought the Program SketchUp was easy to use.                                       | 3.75          | 2.75                  | 6.87                    |
| I think that I would need the support of a technical person / tutor to be able to use this Program SketchUp. | 2.83          | 2.17                  | 5.41                    |
| I found the various functions in this Program SketchUp were well integrated.          | 3.75          | 2.75                  | 6.87                    |
| I thought there was too much inconsistency in this Program SketchUp.                  | 3.84          | 1.16                  | 2.89                    |
| I would imagine that most people would learn to use this Program SketchUp very quickly. | 3.54          | 2.54                  | 6.34                    |
| I found the Program SketchUp very cumbersome to use.                                  | 2.41          | 2.59                  | 6.48                    |
| I felt very confident using the Program SketchUp.                                      | 3.39          | 2.39                  | 5.98                    |
| I needed to learn a lot of things before I could get going with this Program SketchUp. | 2.76          | 2.24                  | 5.59                    |
| **Total Score**                                                                      | **56.85**     |                       |                         |
| I think I would like to use this Program Rhinoceros frequently.                       | 3.78          | 2.78                  | 6.95                    |

Table 3 continue on the next page
The result is as can be seen in Table 3, where the AutoCAD is 58.35, SketchUp 56.85 and Rhinoceros is 57.85. The next step is comparing the result with the grade scale (see Figure 3) [5]. The result from SUS scores are not percentages, but to understand how each programs compares to others, by looking at its percentile ranking [9]. There are three ways that will be used to determine score: using acceptability range, grade scale and adjective ratings. [10]. For the acceptability range, there will be three categories: not acceptable, marginal and acceptable. For the grade scale, there will be six scale: A, B, C, D, E, and F. While the adjective ratings, there will be six ratings: worst imaginable, poor, Acceptable, good, excellent and best imaginable. Based on the SUS score (AutoCAD is 58.35, SketchUp is 56.85 and Rhinoceros is 57.85), the acceptability range for the three programs are Low Marginal, the grade scale are grade E and the adjective ratings are ACCEPTABLE. Based on the score from the first year students, they find that the AutoCAD is the most usability, second is the Rhinoceros and third is SketchUp.

Secondly, the participants were also requested to give feedback through survey polling regarding the regarding the possibility about programs that they will be use more often for their design process.
The survey produced 127 responses (which the participants can voted more than one choice). From the polling question, 52% preferred AutoCAD, 60.6% preferred SketchUp and 39.4% preferred Rhinoceros. (see Figure 4). Between those polling question, there are several participants that voted more than one.

Figure 4. Program polling from the students.

Beside the polling question, the participants were also requested to fill the reason about their vote. The reason from some participants who voted AutoCAD software were because AutoCAD is more detail, more consistent, more accurate, most widely used especially for detailed 2D modeling. Some participants who voted SketchUp, found out that SketchUp is easier to use, more attractive, more realistic and more practical for 3D modeling. Rhinoceros has more features and lighter because of its NURBS-based 3D modeling. Some who voted AutoCAD and Rhinoceros because AutoCAD and Rhinoceros has similar user interface. Some who voted AutoCAD and SketchUp because these two program are relevant and usually an interior designer use both of these programs. Some who voted SketchUp and Rhinoceros because they could immediately create a 3D modeling. Some who voted all the program because they found out the difference usability among these three programs such as using AutoCAD to create 2D layout as a floor plan, then modeling it 3d using SketchUp, then create the product in 3D using Rhinoceros (see Table 4).

Table 4 Participants’ opinion regarding preferred programs

| Programs   | Students ID | Why you preferred those programs? |
|------------|-------------|----------------------------------|
| AutoCAD    | xxxxx016    | Because it’s more accustomed to using the program |
|            | xxxxx023    | More detailed and more consistent with distance |
|            | xxxxx033    | More detail, precision, complete and clearer use. |
|            | xxxxx089    | Because it’s easier to use and the shape can be applied through two dimensions first |
|            | xxxxx058    | Because it is more accurate and easy to use |
| SketchUp   | xxxxx123    | Simpler and easier to operate |
|            | xxxxx014    | in my opinion besides being easy to learn, Sketchup programs are among the most efficient programs |
|            | xxxxx127    | Because it is more attractive, in 3D and colored, so it’s easier for me to imagine my design. |
|            | xxxxx065    | Because its use is easier, and usually people use it more often in designing plans |

Table 4 continue on the next page
Table 4 Continued

| Programs          | Students ID | Why you preferred those programs?                                                                 |
|-------------------|-------------|--------------------------------------------------------------------------------------------------|
| Sketch Up         | xxxxx036    | Because in my opinion, SketchUp is the lightest in operating on a laptop and the software is relatively small compared to other 3D modeling software. SketchUp is also the easiest to learn. There is also a filling of the furniture that can be downloaded and used directly on our design. Its use is practical and not too time consuming. |
|                   | xxxxx077    | because SketchUp is easier and more practical to use, and the results generated from the SketchUp program are very good |
|                   | xxxxx146    | because in my opinion SketchUp program is easier to use.                                           |
|                   | xxxxx154    | I think SketchUp is the most realistic to use in terms of what I need and is easier than others.   |
|                   | xxxxx009    | Because the results of the use of Rhinoceros are good and compared to other programs, the Rhinoceros is more visible and will be easier. |
|                   | xxxxx160    | Because it is better and has many features                                                       |
|                   | xxxxx143    | Simple and easier                                                                                 |
|                   | xxxxx083    | Because Nurbs-based 3D modeling results are more concise and easy to use                          |
|                   | xxxxx139    | because in both programs the command can be typed without having to remember which icon, and especially on the AutoCAD background screen so that my eyes are not too painful when using it too long. |
|                   | xxxxx024    | because the usage that I understand is better and both are not much different in terms of the user interface |
|                   | xxxxx031    | In my opinion, when compared to the SketchUp program, the AutoCAD program is easier to use, because the operation of AutoCAD is not complex and coherent or not random so it does not make me confused. The results are neat and detailed. I also chose Rhinoceros because Rhinoceros can produce cool, detailed product designs, smooth results and the program is also quite easy to use |
|                   | xxxxx041    | easier to learn, the commands are quite similar                                                   |
|                   | xxxxx110    | because in my opinion the AutoCAD and SketchUp programs are relevant for use in interior design study programs |
|                   | xxxxx053    | Because both can be more detailed in the arrangement of space and not just interior products.     |
|                   | xxxxx098    | From the material I got, I was more comfortable using AutoCAD and SketchUp. And the application is more suitable for me to use in the future in my lecture on Interior Design |
|                   | xxxxx136    | The programs that I will use more frequently are AutoCAD and SketchUp because as interior design students we have to master both programs to realize the design that will be made |
|                   | xxxxx052    | because SketchUp is in the three-dimensional form of making space, Rhinoceros has an easy to use because it can be seen from all sides, compared to AutoCAD which only has two dimensions |
|                   | xxxxx025    | in my opinion the Sketchup and Rhinoceros programs are more realistic and easier to understand because of some tools. And in my opinion the program is more often used in interior designer work because it is easier to see according to customer / client desires, and more realistic. |
|                   | xxxxx076    | Because it is quite easy and for the future semester will often use the program                  |
Table 4 Continued from page 10

| Programs                  | Students ID | Why you preferred those programs?                                                                 |
|--------------------------|-------------|---------------------------------------------------------------------------------------------------|
| AutoCAD, Rhinoceros, & SketchUp | xxxxx157    | I chose all three because they were important to use to design. Also I don't think it would be more practical if all three were used in designing later. Like the floor plan can use AutoCAD. |
|                          | xxxxx007    | I will use all three because each application has its own advantages in making a 3D modeling that will help me in the future. |

5. Conclusion

Based on the result and discussion above, the finding for are:

i. On the SUS Score, AutoCAD program is 58.35, SketchUp program is 56.85 and Rhinoceros is 57.85, the acceptability range for the three programs are Low Marginal, the grade scale are grade E and the adjective ratings are ACCEPTABLE for first year students who just learn about CAAD. Based on the score, students find that the AutoCAD is the most usability, second is the Rhinoceros and third is SketchUp.

ii. On the survey polling regarding which software that the students will be used in the future, majority students preferred SketchUp (by 60.6%), then AutoCAD (by 52%) and Rhinoceros (by 39.4%). But based on students’ opinion, each program has its own strength and usability. Such as AutoCAD is better for 2D modeling, SketchUp is more flexible and easy to use for a 3D modeling and Rhinoceros is for creating a 3D product based on NURBS system.

iii. Based on the SUS survey, these three programs are acceptable to used especially AutoCAD software but on the polling site, the students even though the SketchUp is not an easy program, but they will prefer to use SketchUp more often rather than the other software. The reason is because they can straight away see the image of the 3D space design in 3D modelling by using SketchUp, therefore most of them voted for SketchUp program. But AutoCAD is more usability (based on SUS) because more neat and detailed especially while doing 2D modelling such as layouts and the program show more complete icons that can be used while doing modelling, while SketchUp did not show complete icons.

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