

SENTIMENTS OF 4TH YEAR ARCHITECTURE STUDENTS IN THE USE OF COMPUTER AIDED DESIGN TOOLS IN IMPROVING THEIR VISUAL-SPATIAL PERCEPTION OF DESIGN PROBLEMS USING VALENCE AWARE DICTIONARY FOR SENTIMENT REASONING (VADER): A COMPUTER-AIDED QUALITATIVE STUDY

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ABSTRACT. *The intent of this paper is to look into the sentiments of students in the use of computer aided drafting and design tools such as SketchUp and AutoCAD in improving their understanding of design-problems in architecture. Data from 31-4th year architecture students were collected through GoogleForms and were analyzed using the VADER (Valence Aware Dictionary for Sentiment Reasoning) functionality of Orange, which is a data-mining software. The qualitative results suggest that students consider SketchUp as an important tool in designing and generating ideas and that the students have an overall positive sentiment towards the use of cad software in their architectural studies as indicated in the heat-map and VADER sentiment table which indicated compounded sentiment values near +1.*

Key Words: Architecture Students,CAD software,Sentiment Analysis,Vader

1. INTRODUCTION

The courses in the Architecture curriculum in the Philippines are bounded within the context of CHED CMO 61 and Republic Act 9266 which defines the scope of practice of the architecture curriculum as well as the subjects that should be undertaken by students [1]. The design studio classes are done manually for four to five semesters and it is only in the 3rd year of study in the course that students are introduced to the use of computer aided design and drafting tools such as SketchUp, AutoCAD and Lumion. Therefore it is only 3rd to 4th year architecture students that have access to the use of computers in designing buildings since it is only in the 3rd to 5th year of study that students are allowed to use computer aided designs despite the benefits of using software in enhancing the perception of space of students [2]. However,according to the research study by Lee & Yan [3], Computer Aided Design or CAD is not suitable for conceptual design in architecture. This makes CAD not compatible in the ideation process in architecture especially for novice users as the concentration in design shifts more in the process of doing the computer aided design model instead of the idea. The research of Lee & Yan [3] also noted that exposure and mastery of 3 dimensional modeling software such as SketchUP is necessary in order for users to focus more on the generation of ideas instead of the program. This means that students need to be exposed to software like SketchUP to improve their mastery of the software and for them to be able to generate ideas in architecture. Furthermore, more academic literature and research point out that since architecture requires a lot of creativity in design, it could be further enhanced with the use of different types of software in design [4]. Moreover, the use of 3D modelling and presentation software enhance the spatial ability and understanding of students [5]. The architecture discipline is intensive in technology, and the limitations and restrictions placed by architecture schools in the use of technology will not benefit students in the long-run [6]. With architects being slowly marginalized in the housing sector, it is important for

students to be constantly developing their skills and expertise in the field of construction through the use of 3D computer technologies and other software [7].

2. METHODOLOGY

This study uses Computer Aided Qualitative Data Analysis (CAQDAS) to look into the sentiments of 4th year architecture students in the use of CAD software in their studies [8].

3. RESULTS AND DISCUSSION

3.1 Sentiment Analysis Results

The software ORANGE was used to explore and data mine the sentiments and comments of the 15 Full Time and Part Time Instructors of the Architecture Department which reflected the following results.The results are then analyzed through the VADER functionality of the program which analyzes textual data and derives numerical values from them [9]. The range of scores are between -1 and 1 , with the -1 being a strongly negative sentiment and values approaching +1 being positive sentiments [10].

Table-1: Sentiment Table (VADER RESULTS)

Respondent	Positive	Negative	Neutral	Compound
1	0.174	0.028	0.798	0.9948
2	0.201	0.024	0.779	0.9877
3	0.207	0.024	0.769	0.985
4	0.178	0.039	0.783	0.9914
5	0.125	0.04	0.835	0.9936
6	0.171	0.019	0.811	0.9903
7	0.117	0.012	0.871	0.9947
8	0.157	0.04	0.803	0.9864
9	0.269	0.015	0.716	0.9833
10	0.169	0.041	0.790	0.9947
11	0.157	0.04	0.803	0.9072
12	0.145	0.021	0.835	0.9072
13	0.177	0.031	0.792	0.9718
14	0.154	0.011	0.834	0.9841
15	0.132	0.02	0.849	0.9914

16	0.141	0.015	0.844	0.9658
17	0.181	0.058	0.761	0.9648
18	0.105	0.038	0.858	0.9814
19	0.154	0.066	0.780	0.9709
20	0.189	0.036	0.775	0.969
21	0.150	0.02	0.830	0.9882
22	0.221	0.061	0.718	0.9949
23	0.163	0.018	0.819	0.9894
24	0.108	0.061	0.830	0.793
25	0.163	0.05	0.787	0.9847
26	0.189	0.021	0.790	0.9965
27	0.194	0.032	0.773	0.9975
28	0.145	0	0.855	0.9312
29	0.108	0.061	0.830	0.793
30	0.097	0.032	0.871	0.946
31	0.092	0.052	0.857	0.965

The results of the sentiment analysis using VADER suggested that the compounded scores have values near +1 which means that the sentiments of the 31 respondents in the use of Computer Aided Design tools such as SketchUp and AutoCAD is positive. This is supported by some of the student verbatims which narrate that:

“My experiences with Advanced CADD in my third year were positive; I learned my basic CADD during this time. Although I was disappointed that I couldn't learn more about sketch up and other software.” -**Student 1**
 “For me, it's not that computer-aided software can help solve the problems always, but it sure can make our progress much faster and accurately (if mastered though). IT IS ONLY LIKE A BETTER VESSEL FOR OUR IDEAS TO BE REALIZED AND BE ABLE TO VISUALIZE! So I think, mastering it can lead to more productivity and creativity.” -**Student 2**

3.2 Word Cloud and Heat Map

The result of the word cloud suggest that Sketchup, CAD and learning are the most repeated words by the respondents. This means that the software the students thought of the most is SketchUp and that learning it has been quite helpful as supported by the verbatims.



Figure-1: Word Cloud

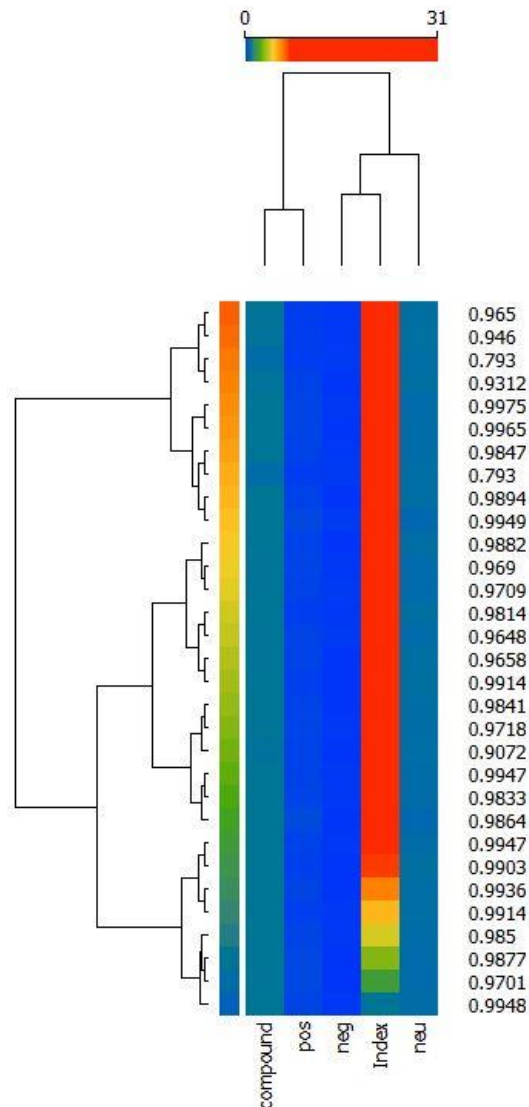


Figure-2: Heat Map

The heatmap as indicated in figure-2 indicates the sentiment is moving towards the positive direction. It means that the students have positive sentiments towards computer aided design programs.

CONCLUSION AND RECOMMENDATION

The results of the sentiment analysis reveal that 4th year architecture students have positive sentiment scores towards the use of computer aided design tools such as SketchUp and AutoCAD. They also believe that the use of the softwares had improved the way they solve design problems. Further research is thereby recommended on the impact of CAD software on architecture students' performance in design classes.

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