



AutoCAD Practicum Teaching Strategies and Systems Using the Team Viewer Application

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ABSTRAK

Setelah era pandemi COVID-19, proses belajar mengajar daring telah diadaptasi dan digunakan untuk berbagai keperluan pembelajaran. Beberapa kekurangan dari sistem online adalah terbatasnya interaksi dalam pembelajaran praktik, seperti praktik berbasis aplikasi. Selain itu, proses praktikum tidak maksimal karena beberapa mahasiswa tidak dapat melaksanakan instruksi yang diberikan karena keterbatasan peralatan mahasiswa seperti personal komputer atau laptop. Oleh karena itu penelitian ini dilakukan untuk melakukan modifikasi sistem praktikum berbasis aplikasi (praktikum AutoCAD) dengan sistem jarak jauh menggunakan aplikasi Team Viewer. Penelitian ini menggunakan mixed method kualitatif dan kuantitatif dimana kuesioner diberikan kepada peserta setelah pelatihan. Populasi yang akan digunakan dalam penelitian ini adalah seluruh mahasiswa yang mengambil mata kuliah Pengantar Teknik Desain dengan materi Praktikum AutoCAD. Hasil penelitian ini menunjukkan bahwa aksesibilitas, interface dan pengoperasian aplikasi AutoCAD dapat dilakukan dengan baik menggunakan aplikasi Team Viewer dengan media smartphone siswa sehingga praktikum dapat dilakukan dengan baik. Strategi ini dapat mengatasi permasalahan keterbatasan peralatan dan interaksi pasif selama proses praktikum. Selain itu, strategi dan metode tersebut dapat diterapkan secara luas pada pembelajaran pada umumnya dan praktikum berbasis aplikasi lainnya.

ABSTRACT

After COVID-19 pandemic era, the online teaching process has been adapted and used for various learning purposes. Some of the shortcomings of the online system are the limited interaction in practical learning, such as application-based practice. In addition, the process of practicum is not optimal because some students cannot carry out the instructions given due to the limited equipment of the students such as personal computers or laptops. Therefore, this research was conducted to make modifications to the application-based practicum system (AutoCAD practicum) with a remote system using the Team Viewer application. This study uses mixed method qualitative and quantitative where the questionnaire was given to participants after the training. The population that will be used in this study are all students who take the Introduction to Design engineering course with AutoCAD Practicum material. The results of this study show that the accessibility, interface and operation of the AutoCAD application can be done properly using the Team Viewer application with the students' smartphone media so that the practicum can be done properly. This strategy can overcome the problems of limited equipment and passive interaction during the practicum process. In addition, the strategies and methods can be widely applied to learning in general and other application-based practicums.

1. INTRODUCTION

Covid-19 is a disease outbreak caused by a new type of coronavirus, SARS-CoV-2. This virus is known to originate from the Wuhan region, China and is transmitted between humans through droplets that come out when coughing or sneezing (Adityo Susilo et al., 2020; Yuliana, 2020). Seeing this, the government imposes various kinds of restrictions on the activity process, including in the education sector. In accordance with Circular Letter Number 15 of 2020 concerning guidelines for organizing learning from

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home during the Covid-19 emergency, the entire learning process at all levels has changed from face-to-face (offline) to distance learning (PJJ / online) (Laksana, 2020; B. Setiawan & Iasha, 2020).

Online learning system or distance learning (PJJ) is a condition where learning activities are carried out without the presence of teachers and students in one place. This learning system always uses media to create interaction in the process (Batubara & Batubara, 2020; Prawiyogi et al., 2020). The process of using this technology affects the quality of the learning process which certainly has an impact on learning outcomes (Aprianti et al., 2022; Setiaji & Dinata, 2020). Caused by this situation many online learning platforms have emerged independently (Qekaj-Thaqi & Thaqi, 2021; A. R. Setiawan, 2020).

Education is the process of changing the attitudes and behavior of a person or group of people in an effort to mature through teaching and training efforts; process, method, act of educating. Learning is influenced by several factors, including: teachers, learning methods/approaches/models, curriculum, instructional media, and students (Prasojo et al., 2020; Putri & Rukun, 2019). In the Law of the Republic of Indonesia Number 2 of 1989 Chapter 1 Article 1 explains that, "Education is a conscious effort to prepare students through guidance, teaching, and / or training activities for their future roles" (Akhwani, 2021; Amin & Hadiwinarto, 2022).

After pandemic the online learning system with the e-conference method has been adapted to continue to be used as needed in learning activities. This is a measure of the effectiveness of the online implementation of the learning process, especially the online practicum, which can be carried out effectively up to 75% as state in previous study (Saraswati & Mertayasa, 2020). However, this online system still has limitations, especially in practicum courses. This is because the platform only provides a one-way interface system where only the lecturer/operator can operate the main computer. Another problem is the requires equipment such as cell phones or computers and also internet networks. This of course will be an obstacle for students who do not have one (Adriana, 2020; Sadikin & Hamidah, 2020).

This is in accordance with the results of previous research state there are still some shortcomings in the online learning process (Hantari et al., 2022). According to the research, the need for facilities and infrastructure is an important element in the learning process and practicum. This will affect the ability of students to capture the learning outcomes (Romadhiyana Kisno Saputri & Akhmad Al-Bari, 2020). Therefore, in order to make the online internship more effective, the gap from this process must have some solution. This study was made to see whether the modification of the online system can be applied to courses with a practicum system, which in this study is the AutoCAD *software* practicum course.

The system that will be examined in this study is to use a remote system with the help of the Team Viewer application. Therefore, a study was made with the title Analysis Of The Effectiveness Of Using The Team Viewer Application As A Media Interface In Autocad Practicum. AutoCAD which is an application (software) used for drawing, designing drawings, testing materials where the program has the convenience and advantages of making precise and accurate drawings (Nurtanto et al., 2020; Pasa, 2020). Team Viewer is software that is used as a connecting medium between one *device* (PC, Laptop, *Smartphone*, etc.) by utilizing the internet network (Drugarin et al., 2016; Fathirma'rif et al., 2021).

Base on those problems and the result of previous study, the researcher are interesting to conducting this study. This study conducted to see whether the AutoCAD practicum process can run effectively or not if students use *smartphone* media to connect to AutoCAD in the campus computer laboratory using the Team Viewer application. This research was conducted to make modifications to the application-based practicum system (AutoCAD practicum) with a remote system using the Team Viewer application.

2. METHOD

This research is a mixed-method research which is a mixture of quantitative methods and qualitative methods (Molina-Azorin, 2016). The object of this research is the lecture process with the subject matter of *AutoCAD* practicum for engineering. The population that will be used in this study are all students who take the Introduction to Design engineering course with *AutoCAD* Practicum material. A practicum scheme (workshop) will be made using 1 main PC which will be accessed by students using a *smartphone* device through the Team Viewer application to do the practicum directly. The practicum materials that will be carried out are: 1.) Practicing how to change drawing units and units. 2.) Practice using the *Draw toolbar*. 3.) Practice using the *Modify toolbar* 4.) Practice giving *Dimension* to the image. 5.) Practice giving color and shading to images. 6.) Practice changing line thickness and type. 7.) Practice plotting images according to the size of the paper to be printed.

After the workshop was conducted, the questionnaire was distributed. The *survey* method used was a Likert scale through *Google Form*. The Likert scale is a psychometric response scale mainly used in

questionnaires to obtain respondents preferences for a statement or a series of statements (Suwandi et al., 2018). The weighting of the questions contained in the questionnaire are show in Table 1.

Table 1. Research Likert Scale

Scale	Description
5	Strongly Agree
4	Agree
3	Undecided
2	Disagree
1	Strongly Disagree

The Open-Ended Question method with google form media is used to get an overview / perception of students regarding the understanding and effectiveness of *AutoCAD* practicum using the *Team Viewer* application media. There are 25 items or questions related to students' understanding and perception of the results of the online *AutoCAD* practicum with the *Team Viewer* application media as an interface. This method is used to obtain results in the form of qualitative data on students' views on the practicum implementation process in accordance with the questions in the questionnaire distributed. The numbers of respondents used in this study were 30 students who were students of the Faculty of Science and Technology.

Furthermore, the validity and reliability of the questionnaire will be tested to determine whether the rubric questions given are valid or not. Whether the instrument or in this study is a questionnaire is determined by its validity and reliability (Sanaky, 2021; Yusup, 2018). This test uses manual calculations in MS. Excel. If all questions are valid and have a minimum level of reliability, the research will proceed to the analysis stage (Arikunto, 2010; Yusup, 2018).

The analysis and decision-making process will be carried out quantitatively by looking at the percentage of questionnaire results on each question item which will then be concluded qualitatively descriptive. By looking at the results of the questionnaire and analysis, it can be seen whether the practicum process that was previously only done face-to-face (offline) was changed with an online system that can run well. The results of the questionnaire will be grouped and the total percentage will be sought to see the level of understanding of students towards the remote practicum process using the *Tim Viewer* application media accessed through their respective smartphones.

3. RESULT AND DISCUSSION

Result

Instrument Validity and Reliability Test

After distributing questionnaires using Google Form containing 25 questions to students who have attended *AutoCAD* practicum workshops using the *Team Viewer* application as a media interface. To see whether the questions are valid or not for use in this research, the validity test calculation uses the correlation coefficient formula. The results are shown by Table 2.

Table 2. Results of Correlation Efficiency Calculation (rxy)

Item Number	rxy	Item Number	rxy
Item 1	0.729	Item 14	0.778
Item 2	0.726	Item 15	0.767
Item 3	0.616	Item 16	0.840
Item 4	0.572	Item 17	0.907
Item 5	0.789	Item 18	0.857
Item 6	0.897	Item 19	0.833
Item 7	0.678	Item 20	0.866
Item 8	0.810	Item 21	0.725
Item 9	0.655	Item 22	0.920
Item 10	0.608	Item 23	0.901
Item 11	0.756	Item 24	0.777
Item 12	0.726	Item 25	0.689
Item 13	0.807		

In the validity test, this study uses a significant level of 5% for a two-way test with the N value used is 25. Based on the r table, the r table is obtained at 0.396. The validity test results and variant value are obtained as show in Table 3.

Table 3. Summary of Validity Test Hail

Summary of Validity Test Results				
Item Number	rx_y	r_{tabel}	Status	Var. Grain
Item 1	0.72927	0.396	Valid	1.0448
Item 2	0.7262	0.396	Valid	0.7862
Item 3	0.61608	0.396	Valid	0.7586
Item 4	0.57249	0.396	Valid	0.7920
Item 5	0.78907	0.396	Valid	0.2575
Item 6	0.89732	0.396	Valid	0.5471
Item 7	0.67823	0.396	Valid	0.4885
Item 8	0.80957	0.396	Valid	0.3230
Item 9	0.6551	0.396	Valid	0.7138
Item 10	0.60797	0.396	Valid	0.2540
Item 11	0.75561	0.396	Valid	0.2816
Item 12	0.72578	0.396	Valid	0.4414
Item 13	0.80749	0.396	Valid	0.3690
Item 14	0.7781	0.396	Valid	0.2713
Item 15	0.76657	0.396	Valid	0.3506
Item 16	0.83966	0.396	Valid	0.3724
Item 17	0.90659	0.396	Valid	0.6161
Item 18	0.85749	0.396	Valid	0.8920
Item 19	0.83277	0.396	Valid	0.6161
Item 20	0.86565	0.396	Valid	0.4885
Item 21	0.72508	0.396	Valid	0.4885
Item 22	0.92028	0.396	Valid	0.4644
Item 23	0.90123	0.396	Valid	0.5069
Item 24	0.77721	0.396	Valid	0.6483
Item 25	0.68883	0.396	Valid	0.4609

Base on Table 3 show the validity test results, 25 question items used as instruments have valid status and we can got varian value. So the sum of the item variance and total variance is obtained as show in Table 4.

Table 4. Results of Total Item Variance and Total Variance

Number of item variants	Total variance
13.233	187.357

Base on Table 4, by using the Cronbach alpha formula is obtained $r_{11} = 0.968$ (very high reliability status). Based on the results of the Validity and Reliability test, the instrument in the form of a questionnaire used in this study is declared valid and can be used.

Post-Workshop Perception

The questioner result are 22 (73.3%) respondents answered AGREE that the Team Viewer application is easy to connect with computer devices in the laboratory. In analyzing the *interface* or display of AutoCAD through TeamViewer there is 3 questions are given. The results of the survey to respondents are show in Figure 1.

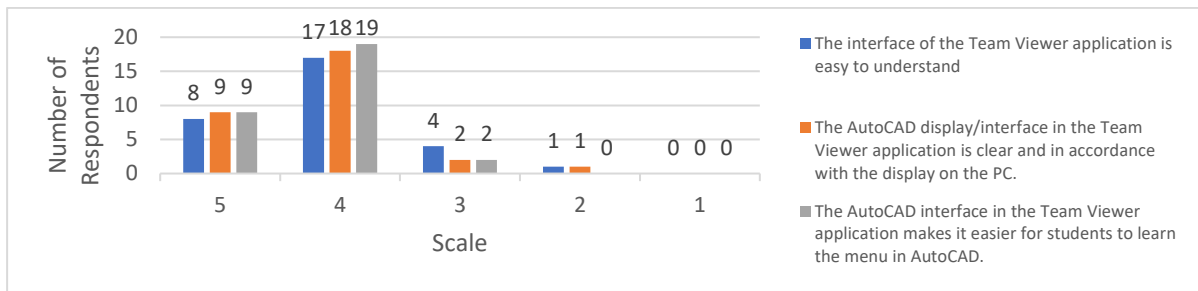


Figure 1. Interface Responses

Base on Figure 1, show the result of interface response. For the first question, it can be seen that the respondent's answer is dominant on scale 4, namely 17 votes (56.7%). This means that more than 50% of respondents agree to the statement that the appearance of Team Viewer is easy for users to understand in its operation. A total of 8 votes (26.7%) which means that about 25% of all respondents very agree to the first question statement. It can be seen that the survey ratio for the second question is 18 votes (60%) were agree and 9 votes (30%) were very agree. This means that Team Viewer is able to display the actual appearance of the AutoCAD application. The survey results for the third question were 19 votes (63.3%) means agree and 9 votes (30%) means very agree. The results of these respondents show that Team Viewer is able to help students understand the menu in AutoCAD through its appearance.

Cursor Operation and Keyboard Operation

In computer operations, especially in the AutoCAD application, the cursor is an important element in its activities. Therefore, in this study, the ease of operating the mouse cursor using the touchscreen system of the mobile screen is analysed through responses from students. The results of the survey on the operation of the mouse cursor using the touchscreen system are show in Figure 2.

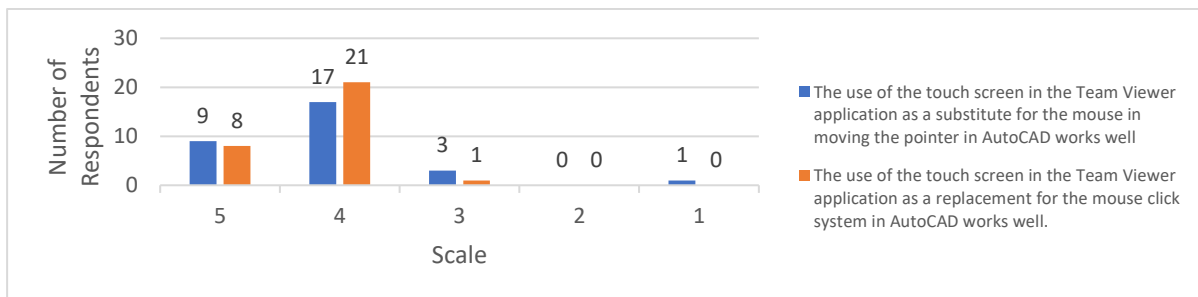


Figure 2. Cursor Operating

The survey results were obtained as shown in Figure 2 for the first question, 17 respondents (56.6%) were agree while 9 other respondents (30%) were very agree. This means that around 80% of all respondents agree on the first statement. As for the second statement, 21 respondents (70%) were agree and 8 respondents (26.7) were very agree. In using AutoCAD software, the keyboard is used in entering work commands and dimensions of the drawn object. Therefore, to see the learners' response to keyboard operation through Team Viewer in using AutoCAD, two questions were asked to the students. The survey results obtained are show in Figure 3.

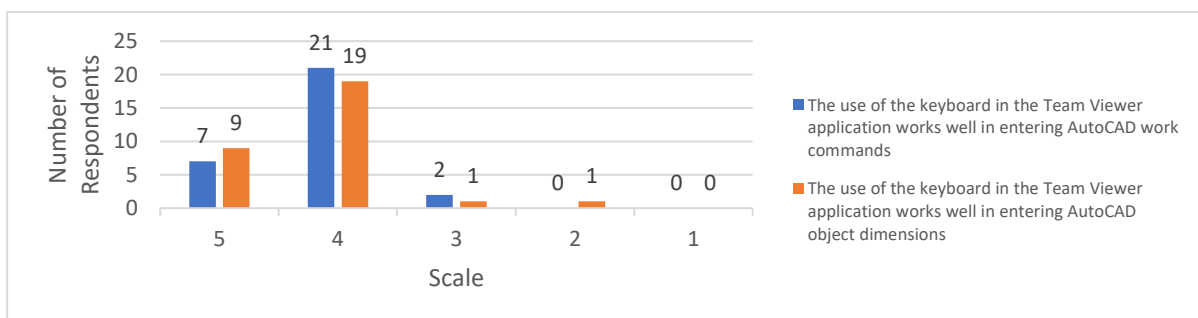


Figure 3. Keyboard Operating

From the graph displayed by Figure 3, it can be seen that 21 respondents (70%) are on agree and 7 respondents (23.3%) are very agree the operation of work commands through the Team Viewer keyboard is going well. As for the use of the Team Viewer keyboard in entering object dimensions, 19 respondents (63.3%) said agree and 9 respondents (30%) stated very agree. This means that the Team Viewer keyboard operation in operating AutoCAD can be done well.

Use of Menu Bar and Tool Bar

In seeing the ease of using the Menu Bar and Tool Bar in AutoCAD, a survey was conducted to respondents containing 2 questions. The results of the survey are is show in Figure 4.

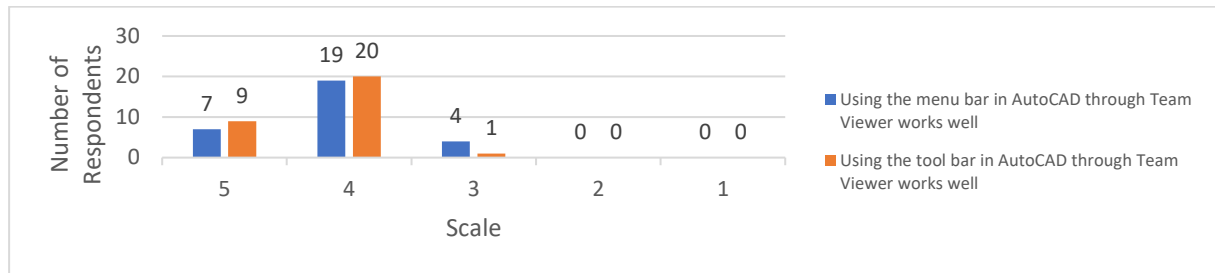


Figure 4. Menu Bar and Tool Bar Operating

From Figure 4, it can be seen that 19 respondents (63.3%) are agree and 7 respondents (23.3%) are very agree. This means that there are no obstacles in operating the menu bar in AutoCAD through the Team Viewer application. As for the second statement, 20 respondents (66.7%) stated agree and 9 respondents (30%) stated very agree. From the survey results above, it can be concluded that the AutoCAD menu bar and tool bar can be operated properly through the Team Viewer application. This will make it easier for students to carry out the instructions given by the teacher during the practicum.

Drawing Process

A survey was conducted on the effectiveness and ease of the drawing process through the following 10 questions. The results of the calculation of the average respondent are as shown in the Table 5.

Table 5. Average of Drawing Process Responses

Scale	Average	Percentage
5	8.7	29%
4	18	60%
3	2	7%
2	1.2	4%
1	0.1	0%
Total	30	100%

The Table 5 shows that 18 respondents (60%) out of 30 respondents gave a positive response agree to the drawing process using AutoCAD through the Team Viewer application according to the statements asked in the questionnaire. While 8.7 or 9 respondents (29%-30%) were very agree.

The use of AutoCAD Runs Well Through the Team Viewer Application

To validate the average data of the drawing process using AutoCAD through the Team Viewer application, a survey was conducted containing statements that the overall use of AutoCAD through Team Viewer can be done well. The results of the survey are shown in Figure 5.

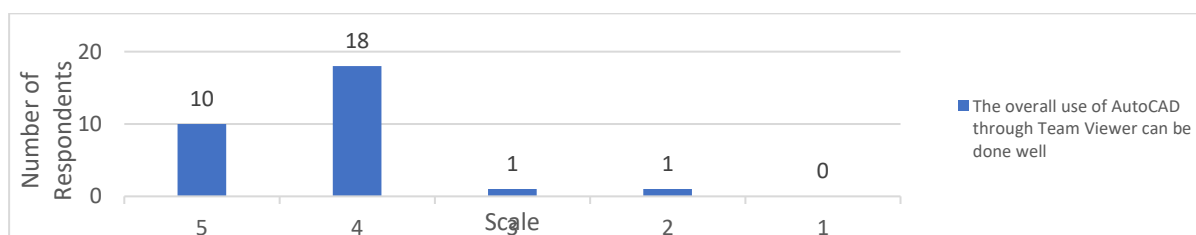


Figure 5. Overall Responses

From the [Figure 5](#) it can be seen that 18 respondents (60%) are agree and 10 respondents (33.3%) very agree that the use of AutoCAD through the Team Viewer application can run well.

Discussion

Based on the result of respondent answer in post-workshop perception means that as long as the internet network is stable and gets access from the central computer, students can easily connect their smartphone devices to the computer device. This result means the learning process can be carried out anywhere by teacher and student ([Nambiar, 2020](#); [Rahayu & Wirza, 2020](#); [Susilowati et al., 2022](#)). Based on the three questions, it can be concluded that Team Viewer is able to display the AutoCAD display very well so that it helps students to understand and learn the display and menu in AutoCAD through their mobile screen. This is supported by previous research, which explains that how an application is designed to interface and control makes it easier for users to use ([Ghiffary et al., 2018](#)). In addition, the resulting display will be better if the device used (smartphone) has a larger screen.

The survey results on the two statements can be concluded that the use of touchscreen on the cell phone screen through the Team Viewer application is able to operate the cursor well like using a mouse ([Limpraptono & Nurcahyo, 2021](#)). Today, the rapid development of science and technology (IPTEK) goes hand in hand with the development of globalization ([Fadli, 2021](#); [Agus Susilo & Sarkowi, 2018](#); [Yani & Dewi, 2021](#)). Therefore, alternatives that make work easier, including in the field of learning. In this study, after the respondents (learners) carried out drawing activities using AutoCAD through the Team Viewer application

Based on the survey results above, it can be concluded that the drawing process using AutoCAD through Team Viewer can be done without significant obstacles. Based on previous research, it was found that one of the disadvantages of the online system is the lack of interaction and response time during the learning process ([Fikri et al., 2021](#); [Mahardika, 2022](#); [Primasari & Zulela, 2021](#); [Shodiq & Zainiyati, 2020](#)). By using this remote system, the interaction between teachers and students will be better than the traditional online system. The online practicum system also makes it easier for teachers to assess student understanding, which is consistent with previous research showing that technological sophistication makes it easier for teachers to assess student understanding ([Pais et al., 2017](#); [Pangestu & Wafa, 2018](#)).

This means that Team Viewer can be used properly in the implementation of students' AutoCAD practicum through their respective cell phone screens. In addition, flexibility system makes some students prefer to learn online ([Agung & Krisnad, 2020](#); [Pasa, 2020](#)). This of course will open up great opportunities in the process of implementing online practicum for other software. This is in accordance with previous research where a remote-based practicum system can overcome the problem of the availability of practicum tools ([Tukan & Julian, 2017](#)). As with previous research, innovation and motivation are needed to improve learning performance ([Napsawati, 2020](#); [Sant et al., 2019](#)). Therefore students will need to be able to adapt to this new system to get the most out of learning.

The implication of this research is to improve the teaching effectiveness of AutoCAD. This study discusses AutoCAD teaching strategies and systems using the Tim Viewer application which can increase the effectiveness of teaching AutoCAD practicum. In addition, this research also helps improve students' skills in using AutoCAD, especially in understanding how the application works and its features. However, the limitations of this study include that it may only be carried out on certain groups of students in certain environments, making it difficult to generalize the findings to the wider population. Another limitation is on the application, this study only discusses the use of the Tim Viewer application in teaching AutoCAD, so the findings cannot be applied to different teaching applications or environments.

4. CONCLUSION

Based on the results of the research and analysis conducted, it can be concluded that the AutoCAD lab activities can be properly carried out using the Team Viewer application as a medium of interaction in carrying out the instructor's instructions. Team Viewer App's accessibility, connectivity, interface, cursor and keyboard operation, menu and toolbar use, drawing process, and overall responses are positive (5 or 4 Likert scale). In addition, this remote-based practicum also solves the problem of students' limitations on practicum devices such as laptops or computers, as students only need to use their respective smartphones. This remote-based practicum system can be widely used for all application practicums and other general practicums.

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