



## The Use of Digital Image Processing Applications by Radiology Students at Universitas Widya Husada Semarang

Lucky Restyanti Wahyu Utami<sup>1</sup>, Masfufatun Jamil<sup>2</sup>

Universitas Widya Husada Semarang

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### Abstract

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In the field of radiology, image processing is divided into 2, namely conventional image processing and digital image processing. Conventional image processing consists of manual image processing and automatic image processing. While digital image processing consists of computed radiography and digital radiography. This study aims to determine how the use of digital image processing applications using the RadiAnt DICOM viewer application in radiology students at Universitas Widya Husada Semarang after classroom learning activities. The type of research used is quantitative research. Respondents in this study were third-semester radiology students at Universitas Widya Husada Semarang in the 2024/2025 academic year. The results of the study obtained were an increase in knowledge about the RadiAnt DICOM viewer application with a percentage of 94.7%, an increase in the use of the RadiAnt DICOM viewer application with a percentage of 93% and the level of satisfaction with the RadiAnt DICOM viewer application hand on has a percentage of 63.2% after learning activities in third-semester radiology students at Universitas Widya Husada Semarang in the 2024/2025 academic year.

**Keywords:** Applications, Digital Image Processing, Radiology.

(\*) Corresponding Author: [lucky.restyanti@gmail.com](mailto:lucky.restyanti@gmail.com)

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## INTRODUCTION

Image processing in radiology is divided into conventional image processing and digital image processing. Digital image processing uses computed radiography (CR) and digital radiography (DR). Digital image processing in radiology generally uses files in the DICOM format (Utami, 2024).

DICOM stands for digital imaging and communications in medicine, which is the leading standard for medical image data management. Image-based imaging biomarkers in clinical trials and medical registries require DICOM devices with advanced functionality for visualization and integration (Haak et al., 2016). DICOM is a standard protocol for capturing, exchanging, and storing data in medical applications. DICOM is accessible with a wide variety of commercial, free, and open source software (Haak et al., 2015).

The RadiAnt DICOM viewer is free, simple, and accessible, with great potential for 3D rendering. Data from MR imaging can be processed and provided with a rich image for study with RadiAnt DICOM. RadiAnt can be used in clinical tumors to reconstruct 3D images to assess the size, shape, position, and condition of the surrounding area (Hoai et al., 2022).

The availability of remote DICOM file access via mobile phones has been shown to improve healthcare systems, particularly for communication between physicians. Most DICOM files require viewing using conventional institutional DICOM viewers (Tharek et al., 2020).

Based on the background that has been described, the author is interested in studying further in a study that aims to find out how the use of digital image processing applications using the RadiAnt DICOM viewer application is carried out by radiology students at Universitas Widya Husada Semarang after learning activities in class.

## METHODS

This research is an observational research conducted by conducting observations or observations of research variables (Sucipto, 2020). This research is a quantitative study aimed at understanding the use of digital image processing applications using the RadiAnt DICOM viewer among radiology students at Universitas Widya Husada Semarang after learning activities. The data collection tool used in this study was a questionnaire. A questionnaire is a collection of questions designed and compiled to obtain data (Sucipto, 2020).

The research procedures carried out included requesting approval from radiology students to be research respondents, submitting a research permit letter to Universitas Widya Husada Semarang, collecting research data by giving questionnaires to research respondents, then the results of the research respondent questionnaires that have been obtained are processed so that conclusions can be drawn. Respondents in this study were third-semester radiology students at Universitas Widya Husada Semarang in the academic year 2024/2025.

The ethical principles in this research will follow the procedures set out in the Guidelines and Ethical Standards for National Health Research and Development which have been regulated by the National Health Research and Development Ethics Commission of the Ministry of Health of the Republic of Indonesia in 2017. This research will implement ethical principles by paying attention to respect, kindness, justice, culture, norms, safety and welfare of research participants which are in line with the rules of science and research for individuals and the community where this research is conducted (Komisi Etik Penelitian dan Pengembangan Kesehatan Nasional & Indonesia, 2017).

The following is a flow diagram of the research activities carried out:

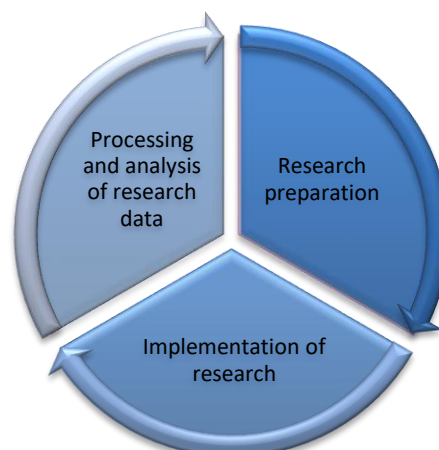


Figure 1. Research Flowchart

## RESULTS & DISCUSSION

Based on the results obtained from the questionnaire given to research respondents, the following results were obtained:

Table 1. Gender

| No               | Gender | Percentage |
|------------------|--------|------------|
| 1                | Man    | 42,1%      |
| 2                | Woman  | 57,9%      |
| Total Percentage |        | 100%       |

Based on table 1, it can be seen that the majority of research respondents who were third semester radiology students at Universitas Widya Husada Semarang in the 2024/2025 academic year were female with a percentage of 57.9% and research respondents were male at 42.1%.

Table 2. Practical Groups

| No               | Practicum Group | Percentage |
|------------------|-----------------|------------|
| 1                | Group I         | 21,1%      |
| 2                | Group II        | 17,5%      |
| 3                | Group III       | 22,8%      |
| 4                | Group IV        | 19,3%      |
| 5                | Group V         | 19,3%      |
| Total Percentage |                 | 100%       |

Based on table 2, it can be seen that the majority of research respondents are group III with a percentage of 22.8%, then followed by group I with a percentage of 21.1%, then group IV and group V with the same percentage of 19.3% and group II with a percentage of 17.5%.

Table 3. Results of the Research Respondents' Questionnaire

| No | Question                                                | Answer Yes | Answer No | Total Percentage |
|----|---------------------------------------------------------|------------|-----------|------------------|
| 1  | Do you know about the RadiAnt DICOM viewer application? | 94,7%      | 5,3%      | 100%             |
| 2  | Can you use the RadiAnt DICOM viewer application?       | 93%        | 7%        | 100%             |
| 3  | Are you satisfied with the hands on                     | 63,2%      | 36,8%     | 100%             |

### RadiAnt DICOM viewer application?

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Based on table 3, it can be seen that 94.7% of research respondents know about the RadiAnt DICOM viewer application, 93% of research respondents can use the RadiAnt DICOM viewer application and 63.2% of research respondents are satisfied with the hands-on RadiAnt DICOM viewer application that has been given after the learning activities given to third semester radiology students at Universitas Widya Husada Semarang in the 2024/2025 academic year.

Based on the literature results obtained, there are also good results in the use of radiological image processing, including the results of education conducted for new students regarding conventional radiological image processing, it is known that there is an increase in knowledge of manual radiographic film processing by 100% and there is an increase in knowledge of the steps for manual radiographic film processing by 97.8% (Utami, 2024). This is also supported by the results of training conducted for new students regarding conventional radiological image processing, with the results showing an increase in knowledge of automatic radiographic film processing of 97.8% and an increase in knowledge of the stages of automatic radiographic film processing of 93.5% (Utami et al., 2025).

Based on the research results and literature results obtained, it can be seen that the learning, education and training activities provided to radiology students related to radiology image processing, both conventionally and digitally, are considered to be able to increase knowledge and skills that can be applied in the field of radiology as prospective radiographers.

### CONCLUSION

Based on the results and discussion, it can be concluded that after the learning activities in third semester radiology students at Universitas Widya Husada Semarang in the 2024/2025 academic year there was an increase in knowledge about the RadiAnt DICOM viewer application with a percentage of 94.7%, an increase in the use of the RadiAnt DICOM viewer application with a percentage of 93% and the level of satisfaction with the hand on RadiAnt DICOM viewer application had a percentage of 63.2%.

It is hoped that with the increase in the use of digital image processing using the RadiAnt DICOM viewer application for radiology students at Universitas Widya Husada Semarang, this can be a provision that can be used during education and when working later.

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