

Teaching Radiomics through an Interactive Platform: A Qualitative Study on the Use of QuantImage in Medical Education

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Background:

Radiomics enables the extraction of quantitative features from medical images, offering new insights in precision medicine. However, its complex workflows often limit accessibility for non-technical users. The QuantImage (QI) platform was developed to support radiomics research without programming skills, allowing clinical researchers to build and validate models using patient data from hospital systems. Recently, QI has also been used as an educational tool to introduce radiomics to a broader audience of healthcare professionals.

Aim:

We aim to investigate the approaches to teaching radiomics among healthcare professionals and students in a Swiss university hospital, with a focus on how novice users interact with QI during hands-on training.

Method:

This qualitative study combined semi-structured interviews and observational data. Nine interviews were conducted with a diverse group of users: one senior physician, two physician master’s students, four radiography master’s students, and two radiography bachelor’s students. The interview guide covered themes such as task execution, workflow organization, learning experience, encountered challenges, interpretation of platform results, and suggestions for improvement.

In addition, non-participant observations were carried out during four educational sessions involving a total of 71 radiography and medical students. Each session included a brief introduction followed by practical group work (3–5 students per group) using QI. All participants provided informed consent; three opted out of being recorded but participated fully. Data was analyzed using thematic and interaction analysis to identify common patterns and phenomena.

Results:

Interview data revealed a consistent workflow across all users, involving data preparation, segmentation, upload, model creation, evaluation based on metrics (e.g., sensitivity, specificity), visual explanation (heatmaps, charts), and radiomics feature extraction. Although model training and

selection were considered manageable, interpretation and clinical integration of results were challenging, especially for students. Visual tools were helpful but not always directly understood, and participants often required support from senior physicians or engineers.

Users valued the platform's interdisciplinary nature and its ability to bridge the gap between medicine, AI, and data science using a simplified, shared language. Students appreciated the hands-on experience and were motivated by the challenge of identifying optimal models. Their approach evolved from trial-and-error to hypothesis-driven strategies, first based on technical parameters and later on clinical reasoning.

While the platform does not engage in communicative actions, participants often perceived it as an autonomous agent. Participants suggested several enhancements to support user understanding and autonomy, including visual aids, contextual pop-ups, FAQs, and the integration of large language models (LLMs) to provide real-time, personalized explanations. Data security and the option for local deployment were also mentioned as important. The presence of a human supervisor was seen as helpful but not essential, with users expressing a preference for constant, accessible guidance through the interface.

Conclusion:

This case study highlights QI's potential as a flexible educational and research tool for users with varying expertise. To support broader adoption, the platform must adapt to different contexts, user profiles, and educational needs. Further research is needed to integrate AI-based tools like QI into routine professional and educational activities beyond experimental trials.