

ABSTRACT

Purpose: Shortages of trained medical physicists persist across Africa. Needs-assessment surveys were utilized to determine trainee interest and medical physics curricular gaps to aid in design of hands-on outreach workshops for the African School of Physics, a several weeklong school for college students across Africa to attend labs and lectures on various topics in physics.

Methods: Qualtrics surveys were distributed to African physics undergraduate/graduate program leads and students. Leads reported on availability and barriers to including medical physics content while students completed 5-point Likert assessments of awareness and interest.

Results: 106 respondents reported from 18 countries with 57 respondents completing all questions. Program leads reported that most programs include some medical physics content (72% yes, n=25), but only 52% offered a dedicated track and hands-on laboratories were rare (12%). Interest was rated “very” or “extremely” high by 61% and 78% perceived interest has increased over the past 5 years. The most common barriers were shortages of trained faculty and limited resources. Students (n=32) reported high baseline awareness and career interest (heard of medical physics 4.41/5; understand the role 4.28/5; career interest 4.25/5) but lower confidence in where to find medical physics resources (3.5/5). Curricular exposure was greatest for X-ray/fluoroscopy (69%), MRI (56%), dosimetry (50%), and radiation protection (50%), and lowest for treatment planning and brachytherapy (each 19%). Desired hands-on experience was highest for MRI (4.12/5) and X-ray/fluoroscopy (3.93/5) and lowest for brachytherapy (3.0/5), suggesting demand aligns with prior experience.

Conclusion: Interest in medical physics is strong and growing in Africa, yet dedicated tracks and laboratory experiences remain limited and constrained by faculty and resource availability. These findings are informing need-driven workshops in MRI, X-ray/fluoroscopy, brachytherapy, and treatment planning that expand hands-on exposure in high-demand subjects, introduce underrepresented topics, and encourage interest to strengthen the medical physics pipeline in Africa.

Aligning Outreach Curriculum with Learner Demand: Survey-Informed Design of Medical Physics Workshops for Students in Africa

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INTRODUCTION

This work applies a learner- and program-informed design process to build targeted physics outreach curriculum for the African School of Physics. Rather than selecting workshops based on instructor expertise alone, we used needs-assessment data to identify (1) where medical physics content currently exists in physics programs and (2) where students most want hands-on experience. This will guide workshops where students are motivated to engage (MRI and X-ray/fluoroscopy) while intentionally also including exposure to undercovered specialty topics (brachytherapy and treatment planning). Additionally, as students have indicated a high level of interest but lack of knowledge of where to find resources related to medical physics, the outreach activities will incorporate materials directing interested students to resources to help them learn more and engage in medical physics opportunities locally.

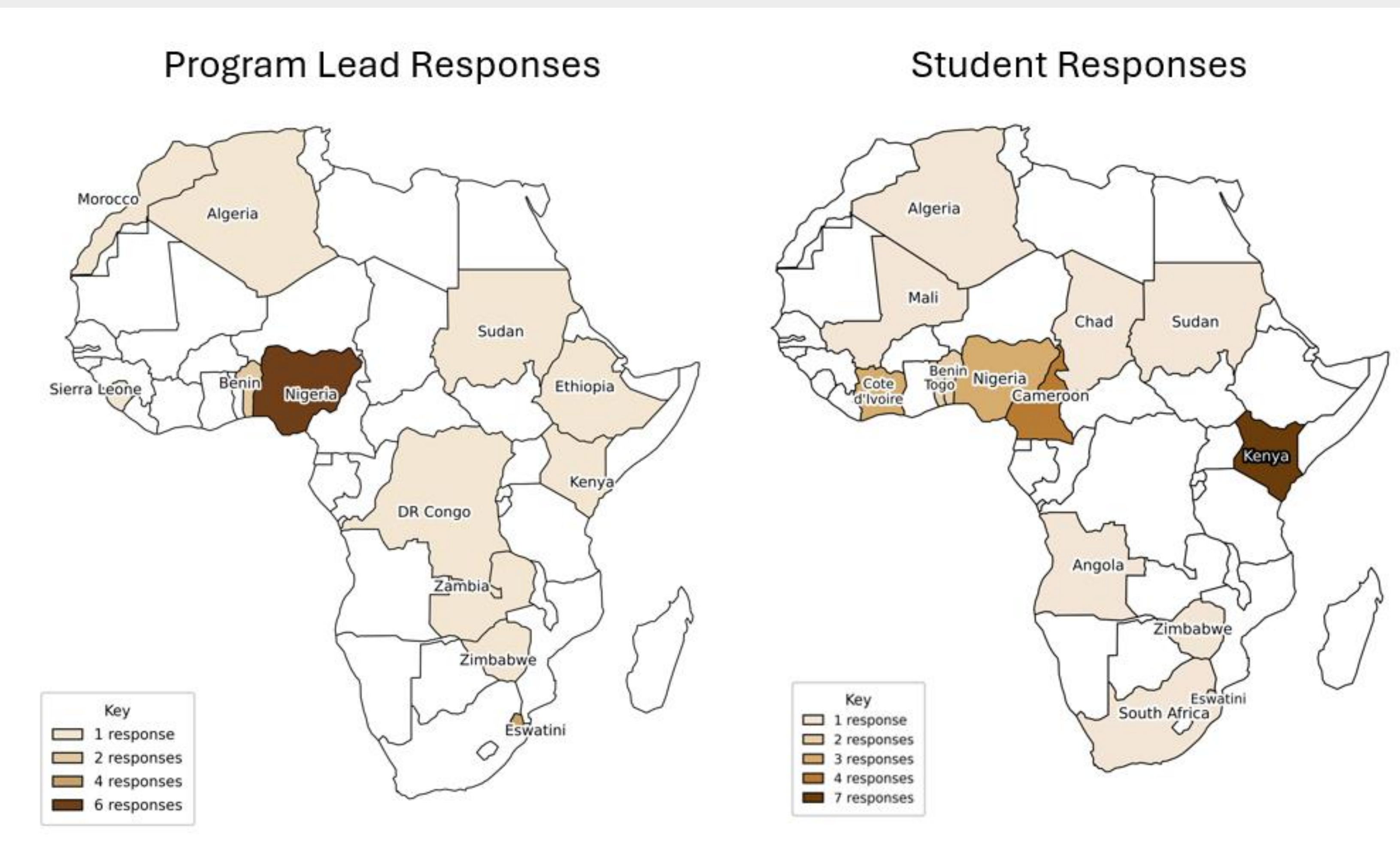


Figure 1: Map illustrating location of respondents for each survey type. (Left) Location of program lead respondents. (Right) Location of student respondents.

RESULTS

A total of 106 responses were received from 18 countries, with 57 respondents completing all survey questions. Program lead responses indicated that medical physics content is present in many physics programs but often limited in depth: 72% reported some medical physics content, 52% reported a dedicated medical physics track, and only 12% reported hands-on laboratory experiences. Program leads also described growing interest in medical physics, with 61% rating interest as “very” or “extremely” high and 78% reporting that interest has increased over the past 5 years. The most common implementation barriers were lack of trained faculty and limited resources.

Student respondents reported strong baseline awareness and interest in medical physics. Mean ratings were high for having heard of medical physics, understanding the role of a medical physicist, and interest in a medical physics career, but lower for knowing where to find medical physics resources. Prior curricular exposure was highest for X-ray/fluoroscopy, MRI, dosimetry, and radiation protection, and lowest for treatment planning and brachytherapy. Desired hands-on experience was highest for MRI and X-ray/fluoroscopy, supporting inclusion of an MRI simulation lab and X-ray/fluoroscopy workshop. Lower prior exposure to treatment planning and brachytherapy supports inclusion of these topics to broaden students’ understanding of medical physics specialties.

REFERENCES

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METHODS AND MATERIALS

Needs-assessment surveys were distributed using Qualtrics to two respondent groups: African undergraduate/graduate physics students and physics program leads. Program leads reported the availability of medical physics content, dedicated tracks, hands-on laboratory opportunities, and barriers to implementation. Students rated medical physics awareness, career interest, confidence finding resources, prior exposure to specific medical physics topics, and desired hands-on experience using 5-point Likert-style questions.

Survey responses were summarized descriptively and used to guide the design of hands-on medical physics workshops for the 2026 African School of Physics in Kenya. Workshop topics were selected to balance high learner demand with curricular gaps, including MRI, X-ray/fluoroscopy, brachytherapy, and treatment planning. Learning outcomes during ASP will be assessed using anonymous pre- and post-lab surveys measuring awareness, interest, perceived understanding, and feedback on workshop feasibility and engagement.

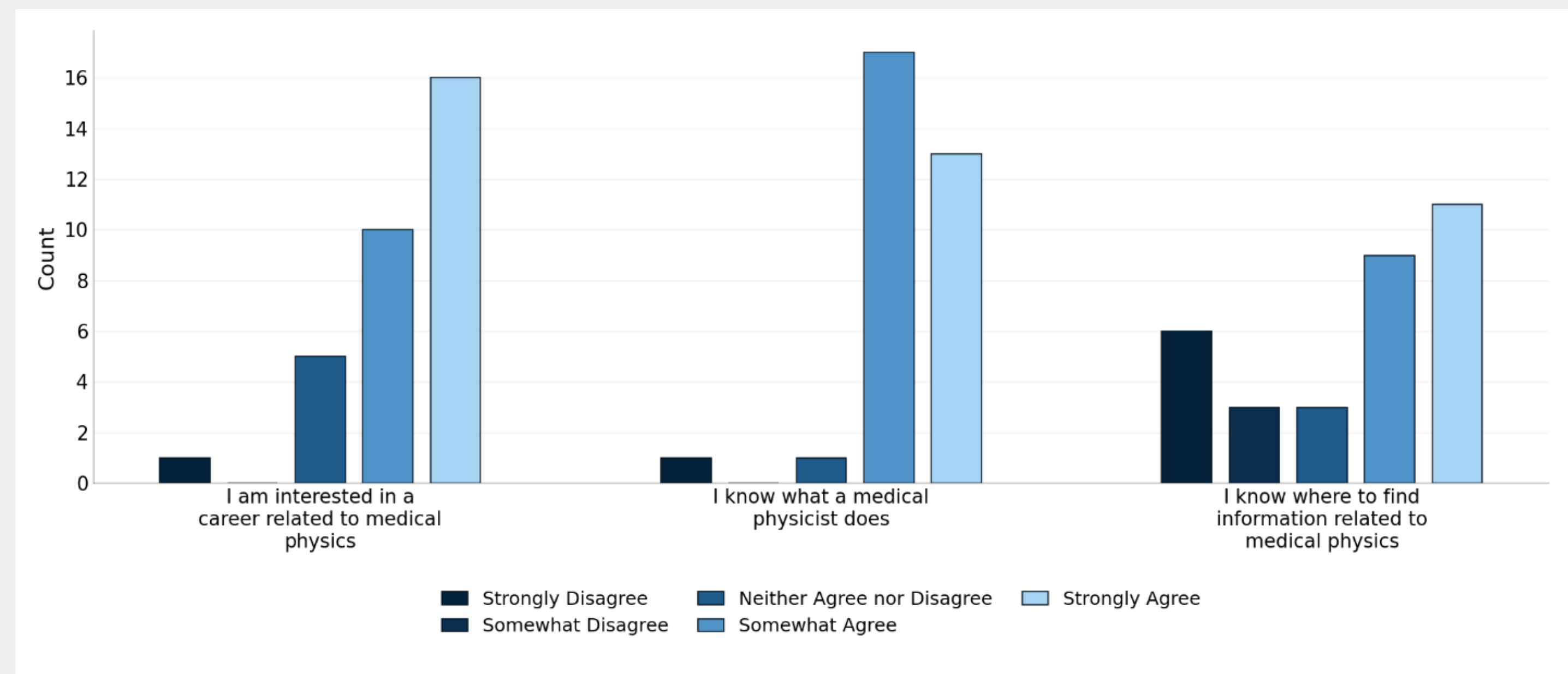


Figure 2: Student responses (n=32) indicating interest and knowledge of medical physics

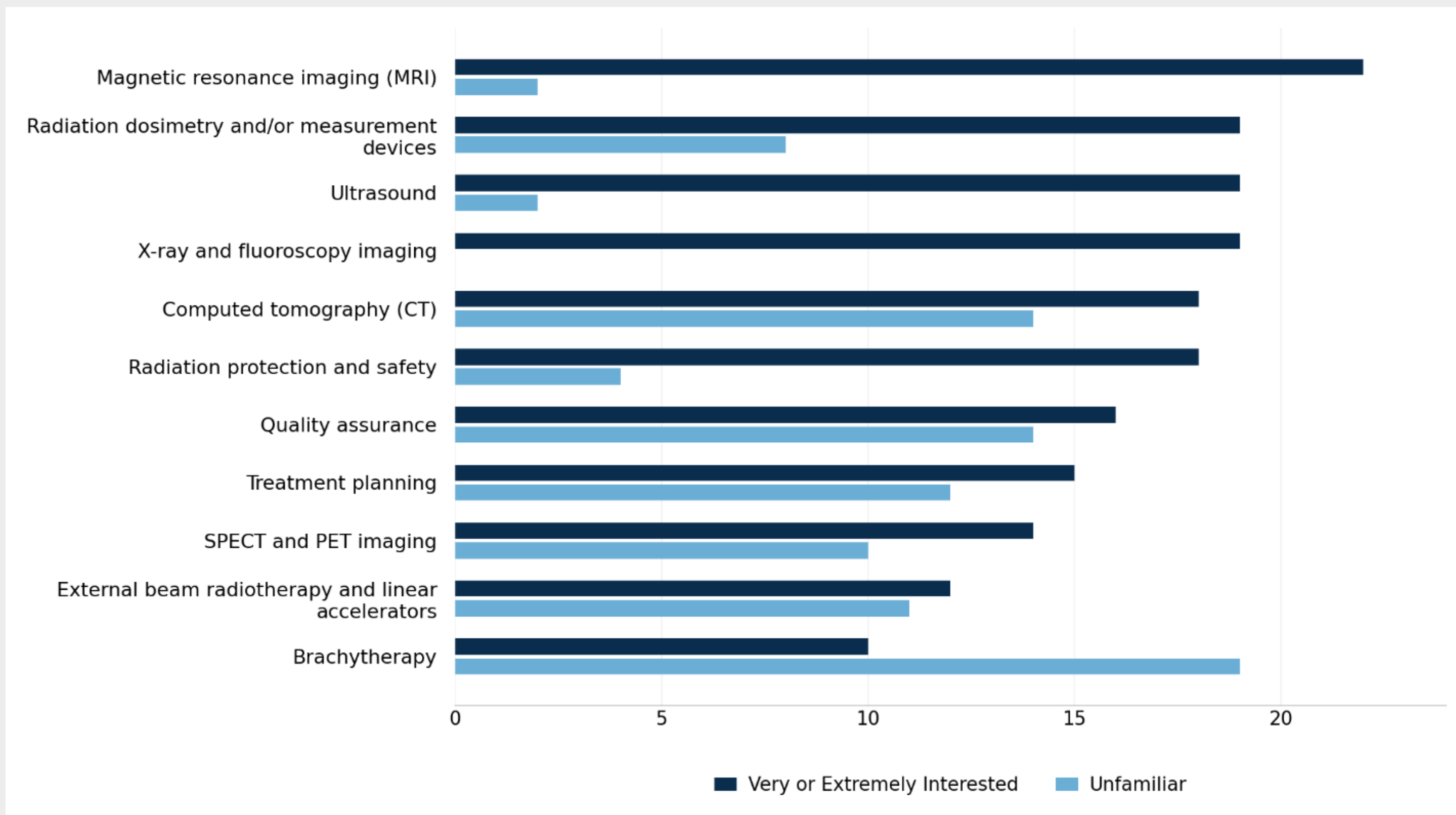


Figure 3: Student Interest (dark blue) and exposure (light blue) to different medical physics topics.

DISCUSSION

Survey findings support a learner-informed workshop design for ASP 2026. Students expressed strong interest in medical physics, but program leads reported limited hands-on training and barriers related to faculty and resources. Inclusion of lower-exposure topics such as treatment planning and brachytherapy may broaden student understanding of medical physics career pathways. Pre/post-lab surveys will evaluate whether the workshops improve awareness, interest, and perceived understanding. In resource-constrained settings, access to laboratories, clinical environments, and specialty instruction is often limited. By combining scalable educational tools with a structured outreach model, this initiative offers a practical approach that can be adapted for future use in other low-resource settings.