

***Assessing Interest and Educational Gaps in AI and Robotics Applications
for Elderly Care Among Healthcare Students***

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Abstract

The global integration of AI and robotics (AI/R) in elderly care has immense potential, but significant educational gaps persist, especially in developing countries. To address this, we surveyed 188 undergraduate healthcare students in Vietnam in June 2023. Our aim was to assess their interest in AI/R applications in elderly care and identify educational deficiencies. Using a Likert-style questionnaire with two scales (AI non-physical work and robotic physical work), we found that a majority of respondents showed keen interest in AI/R in elderly care, despite lacking formal education on these topics. Regarding AI non-physical work, the students found applications like communication support with medical staff ($M=3.9$, $SD=0.83$), controlling lights and devices ($M=3.9$, $SD=0.81$), and providing patient reminders ($M=3.89$, $SD=0.84$) highly applicable. Regarding robotic physical work, they considered applications such as heavy lifting assistance ($M=3.88$, $SD=0.84$), room/house cleaning ($M=3.86$, $SD=0.84$), and patient feeding ($M=3.81$, $SD=0.83$) highly relevant. These findings highlight the urgent need to address the lack of formal AI/R education for undergraduate healthcare students in Vietnam. Bridging this knowledge gap is crucial to equip future healthcare professionals with the skills to leverage AI/R technologies effectively in elderly care and enhance healthcare services in the country.

Keywords: AI and Robotics, Elderly Care, Undergraduate Healthcare Students

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Introduction

The increasing global adoption of AI and robotics (AI/R) in healthcare presents promising advancements (Bohr & Memarzadeh, 2020; Yoon & Lee, 2019). The attitude and reactions of public to the healthcare AI/R are also various (Broadbent et al., 2010) including positive responses and concerns (Hamet & Tremblay, 2017; Reddy et al., 2019). AI/R is starting to be introduced in medical education (Masters, 2019; Paranjape et al., 2019), although there has been not so much progress until recent years (Chan & Zary, 2019). However, a substantial gap in learning opportunities exists, particularly in developing nations. Within the specific context of a developing country like Vietnam, notable strides have been taken in updating training programs to align with contemporary technology and worldwide trends (Duong et al., 2021).

While the significance of AI/R applications in healthcare continues to grow, there is limited understanding of how universities have integrated AI/R-related content into their training curricula. A study conducted in Europe reveals an absence of digital health-related formats in medical education and an apparent deficiency in digital health literacy among European medical students. The results suggest a disparity between the eagerness of medical students to actively contribute as pivotal figures in the digital transformation of healthcare and the education provided by their institutions (Machleid et al., 2020). Additionally, there is a lack of research demonstrating students' interest in AI/R as a fundamental component of their training programs.

This study aimed to investigate the interests of undergraduate healthcare students in Vietnam regarding AI/R applications in healthcare and identify gaps in their education programs that fail to address these topics adequately.

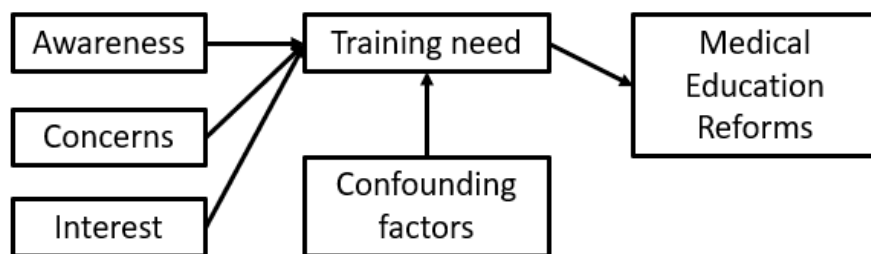


Figure 1. Conceptual Framework (by the authors)

Figure 1 presents the conceptual framework proposed by the authors illustrating the interconnected factors contributing to the training need on AI/R and medical education reforms.

Method

In 2023, a cross-sectional web survey was conducted targeting 188 undergraduate students from a university in Vietnam. The survey aimed to gather insights into students' attitudes towards the applications of AI/R in healthcare. The web-survey questionnaire covered demographic information such as age, gender, and academic year, and assessed attitudes using a five-level Likert-style scale ranging from 1 (strongly disagree) to 5 (strongly agree). The collected data were analyzed using IBM SPSS Statistics. Prior to participating, participants were briefed on the study's purpose, assured of the voluntary nature of their involvement, and guaranteed confidentiality and anonymity.

Results

Table 1 shows the characteristics of the respondents. The majority of the population is female, constituting 69.1% of the total. The highest representation is in the 2nd year (59.0%). The majority are majoring in Medicine (61.2%). The most common GPA category is "Average" (28.2%), followed by "Upper average" (26.6%).

Table 1. Participants Characteristics (N=188)

Category	Value	Total	
		n	%
Gender	Female	130	69.1
	Male	58	30.9
Grade	1st year	56	29.8
	2nd year	111	59.0
	3rd year	1	0.5
	4th year	20	10.6
Major	Medicine	115	61.2
	Traditional Med.	38	20.2
	Nursing	12	6.4
	Preventive Med.	3	1.6
	Pharmacy	11	5.9
	Technician	8	4.3
GPA	Lower average	26	13.8
	Average	53	28.2
	Upper average	50	26.6
	Good	44	23.4
	Upper good	12	6.4
	Excellent	3	1.6

The data in Table 2 provides insights into the awareness, interest, training, and perceived training needs related to AI/R in healthcare among the surveyed individuals. The majority of respondents (89.9%) have heard about AI/R in healthcare, indicating a high level of awareness within the surveyed population. A significant portion of the respondents (88.3%) express interest in AI/Robotics in healthcare. However, only a small percentage (5.9%) of the respondents have received training on AI/R in healthcare, indicating that the majority lack formal training in this area. Subsequently, a substantial proportion (89.9%) of the respondents express a need for training in AI/R in healthcare, highlighting a perceived gap in knowledge or skills that they wish to address.

Table 2. Awareness, Interest, and Training Needs

Category	Value	Total	
		n	%
Heard about AI/R in healthcare?	Yes	169	89.9
	No	19	10.1
Interested in AI/R in healthcare?	Yes	166	88.3
	No	22	11.7
Received training on AI/R in healthcare?	Yes	11	5.9
	No	177	94.1
Need training about AI/R in healthcare?	Yes	169	89.9
	No	19	10.1

The data in Figure 2 represent the perceived benefits of using AI/R in healthcare, as rated by respondents. Respondents generally perceive a high level of benefit in terms of AI/R assisting in data synchronization within hospitals and between networks, AI/R bring multiple benefits to healthcare, AI/R can effectively reduce the workload of medical staff, allowing them to concentrate on more complex tasks.

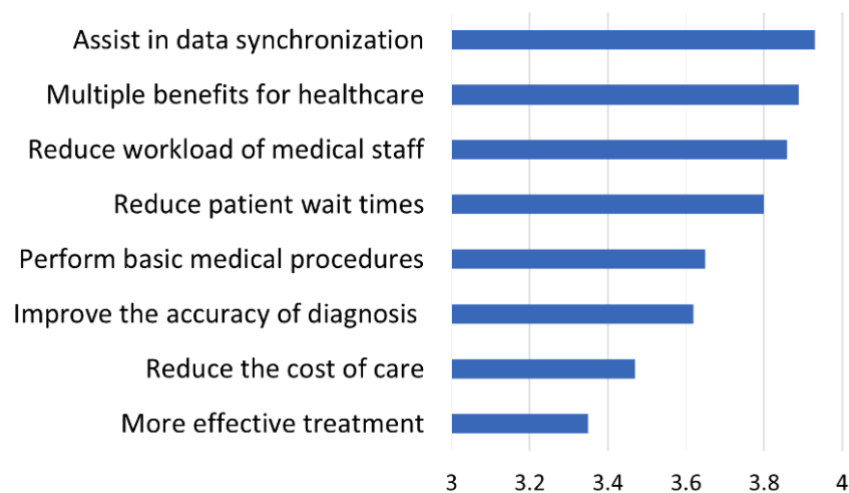


Figure 2. Perceived Benefits of AI/R (N=188)

The data shown in Figure 3 represent the concerns of individuals regarding the use of AI/Rs in healthcare, as rated by respondents. Respondents express a moderate level of concern about the security and privacy of patients and/or themselves when it comes to the use of AI/R in healthcare, the potential for excessive dependence on technology and its impact on patient and/or healthcare staff self-determination, and the potential loss of emotional aspects in the relationship between patients and medical staff.

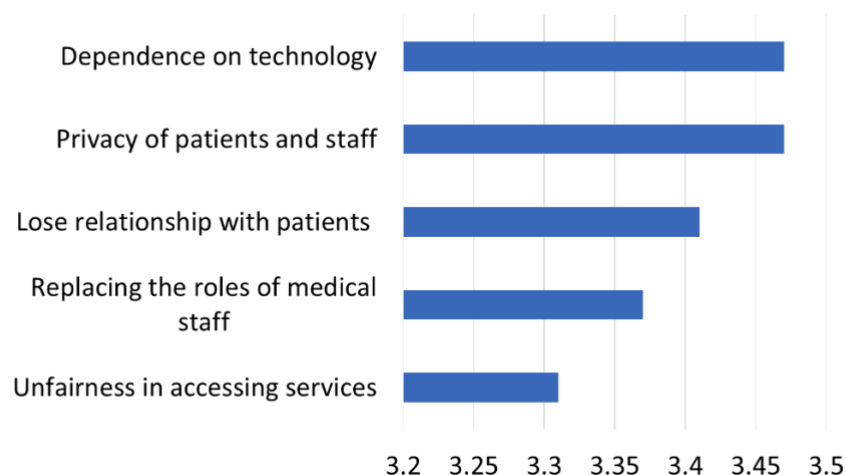


Figure 3. Concerns of AI/R (N=188)

Table 3 compares the perceived benefits and concerns regarding the use of AI/R in healthcare. While there is a moderate level of concern, the perceived benefits outweigh the concerns (Paired samples t-test, $p < 0.001$). The high internal consistency of both scales suggests that the items within each scale are reliable measures of respondents' perceptions of benefits and concerns related to AI/R in healthcare.

Table 3. Comparing perceived benefits versus concerns

	Mean	SD	Cronbach's Alpha	N of Items
Benefit Scale	3.7	0.76	0.936	8
Concern Scale	3.4	0.72	0.865	5

Paired samples t-test. $t(df)=5.942(187)$; $p<0.001$

The association shown in Table 4 suggest that individuals with lower perceived benefits and lower concerns about AI/R perceived higher need for training. Those who are interested in AI/R, male, or have heard about AI/R, are more likely to express a higher need for training. The weak or negligible correlations with grade, major, and GPA suggest that these factors are less strongly associated with the perceived need for AI/R training.

Table 4. Associations of the perceived need for AI/R training and other factors

	Training Need
Benefit Scale	-0.269**
Concern Scale	-0.199**
Heard about AI/R	0.180*
Interested in AI/R	0.482**
Sex	0.235**
Grade	0.008
Major	0.053
GPA	-0.017

*Pearson Correlation. * $p<0.01$; ** $p<0.001$*

Conclusion

The results revealed a high level of awareness and interest in AI/R in healthcare among the respondents. However, the low percentage of individuals who have received training indicates a potential need for educational initiatives in this field. The fact that a significant portion still expresses a need for training reinforces the idea that there is an opportunity for educational programs to bridge the gap in knowledge and skills related to AI/R in healthcare. This position is in line with existing evidences about this training gap in medical education (Machleid et al., 2020).

The respondents demonstrated awareness regarding the benefits of AI/R, yet they also expressed concerns. These results are similar to some previous findings that healthcare providers are generally welcoming AI with optimism, the applications of AI in healthcare offer both optimistic possibilities, and challenges that need to be addressed (Lee & Yoon, 2021). Additionally, correlation test identified significant associations between the perceived need for AI/R training and factors such as familiarity with AI/R, awareness of benefits, level of interest, male gender. These findings underscore the urgency of addressing the educational gaps in AI/R knowledge among healthcare students, which is consistent with the mainstream trend that medical education should move to the age of AI (Wartman & Combs, 2018). The study provides insights for educational institutions in developing countries, facilitating the preparation of a competent workforce capable of harnessing the potential of AI/R in healthcare.

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