

# The Influence of Active Learning on the Development of Learner Capabilities in the College of Applied Medical Sciences: Mixed-Methods Study

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**Background:** The learning process and the development of learning capabilities depend heavily on students' active participation in their education. However, no study from the Gulf region has previously evaluated the effects of active participation in the capability development of students studying in the College of Applied Medical Sciences (COAMS).

**Objectives:** The study's objectives were twofold: to assess the undergraduate students' active participation in the development of their abilities at COAMS, and then to evaluate the teachers' viewpoints on how active participation affects the general capabilities of COAMS students were examined.

**Methods:** This mixed-methods study employed an explanatory sequential design with quantitative (survey) data collected before qualitative data (face-to-face interviews). All final year students and faculty members from four programs were included. Eligible students were invited to complete the self-administered "Student Engagement Questionnaire (SEQ)" along with a questionnaire eliciting demographic information between January and April 2022. We further conducted open-ended ethnographic interviews with 12 faculty members. The programs and their effects on the students' abilities were assessed using ANOVA. The contribution of categorical variables to student active engagement was analysed using the Chi-square test. The responses from faculty members were analyzed thematically. Responses from the faculty members were analyzed using a thematic approach.

**Results:** Total of 145 eligible students (100%) completed the questionnaires. With regard to most of the questions regarding active engagement in the development of abilities, students expressed a high level of satisfaction. Therefore, modifying the curriculum to include critical thinking that addresses community issues, providing real-world experience, collaborative learning, and peer learning would improve students' cognitive, learning, and skills while also improving engagement.

**Conclusion:** This study provides first-hand information on the effects of active participation in the development of capabilities. It suggests that these effects are related to the interactions between students and teachers as well as the learning environment, which are essential for improving academic performance.

**Keywords:** active learning, engagement, capabilities, learner, COAMS

## Introduction

The association between student and faculty member perspectives regarding the institutional academic environment, study approaches, capabilities development, and academic performance was researched at both undergraduate and postgraduate levels. Several explanations were given as to how capabilities were developed in the undergraduate program. Since the learners are adults, active engagement and responsibility-taking are essential components in the learning process and for developing learning capabilities.<sup>1</sup> Learning is the constructive and active process of obtaining knowledge, skills, and attitudes/values, which are significant tools for studying, teaching, clinical reasoning, and practising.<sup>2</sup> Learning is a process that implies shifting students' mentality from passive to life-long learning.<sup>3</sup> This paradigm shift demands, however, a more conducive learning environment, space for active engagement for both faculty

and student, and learner motivation. It also demands efficient teachers with excellent teaching skills, such as planning, management of the learning and teaching process through a variety of teaching strategies, communication, interpersonal capabilities, and managing the learning atmosphere in the class.<sup>4,5</sup> The literature suggests that students with a self-regulated approach learn and perform academic activities in several areas in a more professional way.<sup>6</sup> They also take more interest in the management of the learning process, employing skills such as reasoning, self-reflection, planning, time management, communication, and creativity and innovation.<sup>6-8</sup> In addition, the research identified that students and faculty members from professional education programs tend to appreciate active engagement in learning. Results reported that methods using active teaching and engagement improved students' capabilities.<sup>9</sup> A study on a sample of undergraduate students reported that opinions were mostly influenced by academic achievement, satisfaction with the learning environment, and study approaches employed to develop generic skills.<sup>10</sup> However, results from the same study confirmed that high workload, inappropriate teaching and learning strategies, a poor learning environment, and unfavorable assessment methods were stronger predictors of their dissatisfaction.<sup>10</sup> To achieve the objective of student engagement in a learning process, many universities have designated active learning spaces, which allow for a collaborative process of solving problems, teamwork, and communication skills. A study aimed at assessing student perspectives on the impact of active learning spaces in the education process, reported that the majority of participants believed that their active engagement enhanced their interaction with peers, academic performance, quality of education, and assessment results.<sup>11</sup> Colleges for studying health professions in Saudi Arabia have shifted their teaching modality from teacher-centred to more student-centred learning such as King Saud University, King Khalid University and Alfaisal University. The focus is mainly on an effective use of blended and self-regulated learning, together with an emphasis on monitoring results. A study from Saudi Arabia, Bahrain, and Egypt identified that different aspects of self-regulated learning, including time management, cognition, communication, metacognition, and self-efficacy have a significant impact on students' performance in examinations.<sup>12</sup> Self-Regulated Learning (SRL) is defined as an approach to teaching where the students take responsibility for their own learning and search for information without the guidance of others.<sup>13</sup> Engagement is explained as a process where students are cognitively and psychologically involved in the process of learning and associated activities.<sup>14</sup> Little is known about the role of active engagement in the development of capabilities. Thus, this needs to be assessed to identify the students' experience when it comes to improving their performance and enhance their academic achievement, and capabilities. The objectives of the study were twofold. First, to assess the active engagement in the development of capabilities among students of undergraduate COAMS programs and second, to explore the teachers' perspectives about the influence of active engagement in the development of generic capabilities. It will help educators in designing and implementing proper methods and environments that enhance the student's performance and skills.

## Materials and Methods

This mixed-methods study leveraged an explanatory sequential design with quantitative (survey) data collected before qualitative data (face-to-face interviews), which was conducted at the College of Applied Medical Sciences (COAMS), Riyadh, KSAU-HS. The design is appropriate for this study because it allows faculty members and students to reflect on their own experiences of the teaching and learning processes in the development of generic capabilities.<sup>15</sup> Mixed methods studies are usually very useful in explaining contradictions between quantitative results and qualitative findings because they reflect participants' points of view. In addition, mixed methods studies give a voice to participants and ensure findings are grounded in participants' experiences. One-on-one interviews were used in this study for a variety of reasons. Firstly, they promote more focused, conversational and two-way communication by allowing for the inclusion of different viewpoints from various participants. The second benefit is that they grant the latitude necessary for a researcher to engage participants in more in-depth discussions of broader perspectives or ideas.

The students in COAMS are enrolled in both theoretical and practical courses with clinical components. Students in the clinical courses attend lectures as well as training sessions in the college's simulation lab. The theory portion of the course is often covered through face-to-face and interactive lectures. The clinical component is taught in the clinical simulation laboratory (CSL), which covers psychomotor skills. Students participate in simulation activities and conduct clinical competencies and procedures in order to connect theory to clinical practice. Additionally, students complete

a clinical placement at a hospital to develop their psychomotor skills and experience real-life clinical practice. As part of their clinical assessment, students complete two evaluations in the CSL that are based on simulations. The mini OSCE is replaced with a clinical reasoning examination. Students are given a clinical scenario and must complete a series of brief essay questions over the course of an hour.

All final-year students who attended the course after curricular from the Clinical Laboratory Sciences (CLAB) program (total 29 students; 17 males, 12 females), the Radiological Sciences (RADS) program (total 33 students; 21 males, 12 females), the Occupational Therapy (OT) program (total 41 students; 22 males, 19 females), and the Respiratory Therapy (RT) program (total 42 students; 24 males, 18 females,) were invited to take part in the study. They were chosen because of their exposure to both basic and clinical courses. Roasoft was used to calculate the sample size. With a 95% confidence level, a 50% response distribution and an 8% margin of error, a sample size of 145 was predicted. All of the COAMS program's final-year students were enrolled in the study due to its small sample size. A non-probability consecutive sampling technique was used. The potential to reach such a high number of participants is a strength of this sampling method. This strategy is most frequently employed because it is simpler for researchers to find those people who are most easily accessible. The study omitted those who refused to take part. In this study, the students' experiences served as the dependent variable and active involvement served as the independent variable.

In order to evaluate students' perspectives on their capabilities and their level of active participation in the learning process, quantitative data were gathered using a self-administered standardized questionnaire called the "Student Engagement Questionnaire (SEQ)", developed by Kember et al. Paper questionnaires were distributed among the students and the filled questionnaires were collected in three months period.<sup>16</sup> The questionnaire consists of a five-point Likert scale from (1) completely agree to (5) completely disagree. The questionnaire comprises two main sections: "Analyse the capabilities that university students have to acquire during the process" and "Assess the learning environment that the teacher creates in class to make it easy to acquire".

The data was collected face to face between 23rd of January and 25th April 2022. The questionnaire was given to students after their respective class. Those consented to participate were included.

During the qualitative section, we conducted individual face-to-face interviews using a semi-structured template. In order to learn more about active learning, faculty members' role in the development of capabilities and their recommendations to improve the process, researchers spoke with faculty members actively involved in delivering the curriculum. A purposeful sampling technique was used and a total of twelve faculty members (3 from each discipline in each focus group) completed think-aloud cognitive interviews, sharing their thoughts on the overall impact of active learning in the development of students' capabilities.

An interview guide with prompts (as shown in [Appendix](#)), an informed consent form and an invitation were sent to the participants' official university email addresses. Each participant has filled out and signed a consent form before starting the study. In addition, the participants informed consent included publication of anonymized responses. Thus, only those who gave their consent to participate were included. All interview questions were related to the factors that influenced students' capabilities in the respective course and their perspectives on how the teaching-learning environment influences these capabilities. However, the interview process was largely dependent on the questions that arose in the interactions between the interviewer and interviewees. After obtaining permission from the participants, the interviews were recorded and immediately transcribed verbatim by two independent transcribers to avoid any inaccuracy. The interviews lasted from 50 to 60 minutes. Responses were collected until data saturation was achieved. All interviews were conducted through Microsoft Teams in English as all participants were bilingual and able to express themselves in the required level of detail. The interviews were conducted in a private and quiet place. The researcher assured the privacy of the conversation and that the recordings were saved and accessible only to the research team.

For analyzing the qualitative data, we used thematic analysis to highlight commonalities and patterns in the faculty members' responses about their personal experiences through coding and categorizing themes. The interviews were transcribed using Microsoft Office. As an initial step, open coding was used to identify important words and label them accordingly. These open codes were created for each interview question and given a description in order to facilitate later coding and ensure that all data were relevant to the questions. Accordingly, data were examined using a line-by-line strategy to make certain that all data were appropriately labelled. Later, categories and themes were generated from these codes.

Descriptive statistical analysis followed quantitative data collection. All quantitative data analysis was performed using IBM SPSS version 25.0 (IBM Corp, Armonk, New York, NY, USA). The frequency and percentage were used to present categorical data. By adding the responses for each category, the latent scale data was transformed into a numerical scale and given as mean + standard deviation. One way ANOVA was carried out to evaluate the program and its impact on the abilities of the students. To compare active engagement with other categorical variables like gender, the Chi-Square test was utilized. Statistical significance is defined as a P-value of  $<0.05$ . Open coding was used to analyze individual interview data, researcher field notes, and open-ended. Descriptive codes were assigned to summarize the data in words/short phrases.

To increase credibility, researchers leveraged data triangulation and an audit trail including the use of multiple data sources: quantitative data from surveys, individual interviews transcripts, and researcher field notes.<sup>17</sup> As the researchers adopted a constructivist paradigm, during thematic data analysis, thick, rich descriptions were used to work towards credibility in this analysis.<sup>18</sup> Each student has filled out and signed a consent form before starting the study.

The proposal of this study was approved by the research committee in the College of Medicine at the King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) and then after reviewed and approval by the Institutional Review Board in the King Abdullah International Medical Research Centre (KAIMRC) in the Ministry of National Guard Health Affair, Riyadh, Kingdom of Saudi Arabia under the reference (SP22R/015/02).

## Results

### Quantitative Analysis

#### Demographic Information of the Participants

Table 1 shows that 58% of the respondents were male while about 42% were female. The mean age ranged from  $21.79 \pm 1.08$ , with 29% of the respondents from RT, 28% from OT, 22% from RAD, and 20% from CLAB.

The majority of the faculty members held Ph.Ds. ( $n=9$ ) or Masters in Applied Medical Sciences ( $n=3$ ). Assistant professors ( $n=8$ , 66.7%) with one to five years of teaching experience ( $n=8$ , 66.7%) made up the majority of the participants (Table 1).

#### The Influence of Active Engagement in the Development of Capabilities

Students from four COAMS programs indicated significantly different levels of satisfaction across the majority of active engagement in capability development elements (Table 2). No significant differences were found in the items on program strategies that encouraged students to come up with new ideas ( $\chi^2=1.51$ ,  $p=0.680$ ), more willing to change views and accept new ideas ( $\chi^2=11.61$ ,  $p=0.009$ ); improved ability to convey ideas ( $\chi^2=9.45$ ,  $p=0.024$ ); feel confident to deal with a wide range of people ( $\chi^2=9.29$ ,  $p=0.026$ ); to do well in the assessment you need to have good analysis skills ( $\chi^2=4.69$ ,  $p=0.195$ ); frequently work together with other in my classes ( $\chi^2=6.22$ ,  $p=0.102$ ); and discussing course material with other students has helped in a better understanding ( $\chi^2=7.93$ ,  $p=0.048$ ). The analysis shows that about 50% of the CLAB program students believe that using active engagement strategies has enhanced their skills across a range of domains. A majority of students - nearly 50% and above of the students think their programs' learning practices were not helpful for improving their skills. However, the majority of the students in OT, RAD, and RT (about 70% and above) think that their program has enhanced their capabilities through active engagement.

#### Comparison of Study Programs and Their Impact on Students' Capabilities Development

Table 3 displays the mean scores for the capabilities domain. With the exception of creative thinking ( $p=0.006$ ), adaptability ( $p=0.006$ ), and relationships with other students ( $p=0.025$ ), all differences in the mean scores were demonstrated to be statistically significant at the 5% level. There are differences in critical thinking ( $p=0.002$ ), self-managed learning ( $p=0.001$ ), problem-solving ( $p=0.001$ ), communication skill ( $p=0.001$ ), interpersonal skill ( $p=0.001$ ), computer skill ( $p=0.001$ ), active learning ( $p=0.001$ ), teaching for understanding ( $p=0.001$ ), feedback to assist learning ( $p=0.001$ ), assessment ( $p=0.001$ ), teacher-student relationship ( $p=0.001$ ), working together ( $p=0.001$ ), cooperative learning ( $p=0.001$ ), and coherence of curriculum ( $p<0.001$ ).

#### Comparison of Active Engagement and Different Domains of Capabilities by Gender

There were no statistical differences between the male and female students' responses when comparing how actively engaged they were in developing various capability domains of critical thinking ( $p=0.73$ ), creative thinking ( $p=0.25$ ),

**Table 1** Demographic Information of Participants (N=145)

Variable	Analysis
	Mean $\pm$ SD
<b>Student participants</b>	
<b>Age</b>	21.79 $\pm$ 1.08
<b>Gender</b>	<b>Number (%)</b>
Male	84 (57.9)
Female	61 (42.1)
<b>Program</b>	
Clinical Laboratory Sciences (CLAB)	29 (20.0)
Occupational Therapy (OT)	41 (28.3)
Radiological Sciences (RAD)	33 (22.8)
Respiratory Therapy (RT)	42 (29.0)
<b>Faculty members</b>	
<b>Gender</b>	
Male	6 (50)
Female	6 (50)
<b>Marital status</b>	
Married	10 (83.3)
Single	2 (16.7)
<b>Qualifications</b>	
Masters	3 (25.0)
PhD	9 (75.0)
<b>Designation</b>	
Associate professor	1 (8.3)
Assistant professor	8 (66.7)
Lecturer	3 (25.0)
<b>Programs</b>	
Clinical Laboratory	3 (25.0)
Occupational Therapy	3 (25.0)
Radiological Sciences	3 (25.0)
Respiratory Therapy	3 (25.0)
<b>Teaching experience</b>	
1–5 years	8 (66.7)
6–10 years	1 (8.3)
>10 years	3 (25.0)

self-managed learning ( $p=0.77$ ), adaptability ( $p=0.91$ ), problem-solving ( $p=0.73$ ), communication skill ( $p=0.51$ ), interpersonal skills ( $p=0.65$ ), computer skills ( $p=0.29$ ), active learning ( $p=0.22$ ), teaching for understanding ( $p=0.77$ ), feedback to assist learning ( $p=0.87$ ), assessment ( $p=0.63$ ), teacher-students relationship ( $p=0.95$ ), working together ( $p=0.68$ ), relationship with other students ( $p=0.78$ ), cooperative learning ( $p=0.25$ ), and coherence of curriculum ( $p=0.86$ ) (Table 4).

## Qualitative Analysis

### Thematic Analysis

Four themes naturally emerged from the inductive analysis: active engagement that promotes learning and professional attributes, the impact of a supportive learning environment, enhance results by strengthening teacher-student relationships and making active participation and skill development more effective. The themes encourage health professions faculty members and students should be more actively engaged in learning activities in their respective programs which helps them in remaining involved and enthusiastic about their learning pursuits. All the themes reflected the participants' understanding of the concepts and the need to develop effective education and training programs to deliver quality

**Table 2** Students' Agreement on Influence of Active Engagement in the Development of Capabilities

Statements	Programs				Analysis	
	CLAB	OT	RAD	RT		
	n (%)	n (%)	n (%)	n (%)	$\chi^2$	Sig
Developed ability to make judgements	13(45)	26(63)	25(76)	35(83)	13.06	0.005
Become more willing to consider different points of view	15(52)	30(73)	25(76)	38(90)	13.62	0.003
Encouraged to use my own initiative	15(52)	26(63)	25(76)	36(86)	10.98	0.012
Challenged to come up with new ideas	18(62)	27(66)	24(73)	31(74)	1.51	0.680
Take the responsibility of my own learning	17(59)	27(66)	25(76)	39(93)	12.93	0.005
More confident of my ability to pursue further learning	18(62)	26(63)	27(82)	39(93)	13.75	0.003
Learned how to be to be more adaptable	16(55)	27(66)	26(79)	39(93)	15.08	0.002
More willing to change views and accept new ideas	14(48)	25(61)	25(76)	35(83)	11.61	0.009
Improved ability to use knowledge to solve problems in field of study	14(48)	28(68)	27(82)	41(98)	24.83	<0.001
Able to bring information and different ideas to solve problems	12(41)	27(66)	27(82)	33(79)	14.65	0.002
Developed the ability to efficiently communicate with others	14(48)	27(66)	24(73)	38(90)	15.59	<0.001
Improved ability to convey ideas	15(52)	29(71)	26(79)	35(83)	9.45	0.024
Learned to be an effective team or group member	15(52)	27(66)	22(67)	41(98)	21.00	<0.001
Feel confident about the way I deal with a wide range of people	15(52)	24(59)	25(76)	34(81)	9.29	0.026
Feel confident in using computer applications when necessary	11(38)	24(59)	24(73)	36(86)	18.99	<0.001
Learned more about using computers for presenting information	14(48)	28(68)	23(70)	37(88)	13.20	<0.004
Our teaching staff use a variety of teaching methods	12(41)	17(41)	25(76)	34(81)	21.25	<0.001
Students are given the chance to participate in classes	13(45)	27(66)	27(82)	38(90)	20.25	<0.001
The teaching staff try hard to help us understand the course material	13(45)	25(61)	25(76)	41(98)	26.83	<0.001
The course design helps us to understand the course content	15(52)	14(34)	26(79)	37(88)	31.25	<0.001
The explanations provided by the teaching staff is useful	17(59)	23(56)	25(76)	40(95)	19.36	<0.001
There is sufficient feedback on activities and assignments	14(48)	15(37)	22(67)	34(81)	19.00	<0.001
The program uses a variety of assessment methods	13(45)	20(49)	25(76)	39(93)	26.41	<0.001
To do well in assessment you need to have good analysis skills	17(59)	24(59)	22(67)	33(79)	4.69	0.195
The assessment tested understanding of key concepts	14(48)	24(59)	23(70)	37(88)	14.60	0.002
The communication between teaching staff and students is good	15(52)	16(39)	25(76)	42(100)	39.75	<0.001
Teaching staff helpful when asked questions	15(52)	19(46)	26(79)	37(88)	21.47	<0.001
Manage to complete the requirements without feeling unduly stressed	16(55)	12(29)	23(70)	27(64)	15.16	0.002
The amount of work is quite reasonable	14(48)	15(37)	23(70)	30(71)	13.56	0.004
Feel a strong sense of belonging to my class group	16(55)	23(56)	26(79)	37(88)	14.66	0.002
Frequently work together with other in my classes	16(55)	25(61)	25(76)	33(79)	6.22	0.102
Frequently discussed ideas from courses with students out-of-class	14(48)	18(44)	22(67)	34(81)	14.44	0.002
Discussing course material with other students has helped in a better understanding	13(45)	18(44)	19(58)	30(71)	7.93	0.048
Courses fitted together to make a coherent program of study	12(41)	17(41)	23(70)	31(74)	13.95	0.003
The program of study for my major was well integrated	13(45)	18(44)	23(70)	35(83)	18.14	<0.001

**Notes:** Kember D, Leung D. Development of a questionnaire for assessing students' perceptions of the teaching and learning environment and its use in quality assurance. *Learn Environ Resear.* 2009;1:15–29. Springer Nature.<sup>16</sup>

healthcare and improve patient outcomes. The fundamentals of learning attributes, teacher-student relationships, and environmental effects on students' cognitive skills were emphasized by the participants. Arguably, results will enrich the learning environment by establishing the validity of feedback and response (See Table 5).

Theme one: Active engagement that promotes learning and professional attributes.

The study's findings showed that every participant recognized the value of engaging actively in promoting one's professional attributes.

There are many attributes, however, communication, professionalism and ethics are the attributes students should achieve in their program of study satisfactorily. For this, AMS programs should provide more practical training to enhance the skills to excellent levels

**Table 3** Comparison of Program and Its Role on the Development of Students' Capabilities

Capabilities	Program				P-value
	CLAB (n=29)	OT (n=41)	RAD (n=33)	RT (n=42)	
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	
Critical thinking	3.43 $\pm$ 1.16	3.85 $\pm$ 0.85	4.02 $\pm$ 1.16	4.29 $\pm$ 0.63	0.002
Creative thinking	3.50 $\pm$ 1.21	3.79 $\pm$ 0.87	3.99 $\pm$ 1.23	4.20 $\pm$ 0.82	0.036
Self-managed Learning	3.64 $\pm$ 1.27	3.79 $\pm$ 0.89	4.17 $\pm$ 0.95	4.56 $\pm$ 0.51	<0.001
Adaptability	3.53 $\pm$ 1.15	3.82 $\pm$ 0.88	4.69 $\pm$ 2.56	4.38 $\pm$ 0.69	0.006
Problem-solving	3.24 $\pm$ 1.29	3.83 $\pm$ 0.77	4.29 $\pm$ 0.86	4.38 $\pm$ 0.56	<0.001
Communication skill	3.29 $\pm$ 1.36	3.89 $\pm$ 0.78	4.17 $\pm$ 1.01	4.32 $\pm$ 0.71	<0.001
Interpersonal skills	3.39 $\pm$ 1.18	3.89 $\pm$ 0.81	4.09 $\pm$ 1.06	4.41 $\pm$ 0.63	<0.001
Computer skills	3.31 $\pm$ 1.11	3.85 $\pm$ 0.97	4.21 $\pm$ 0.96	4.44 $\pm$ 0.64	<0.001
Active learning	3.31 $\pm$ 1.09	3.65 $\pm$ 0.83	4.23 $\pm$ 0.85	4.36 $\pm$ 0.75	<0.001
Teaching for Understanding	3.36 $\pm$ 1.32	3.49 $\pm$ 0.76	4.17 $\pm$ 0.93	4.43 $\pm$ 0.59	<0.001
Feedback to Assist Learning	3.38 $\pm$ 1.12	3.38 $\pm$ 0.75	4.05 $\pm$ 0.98	4.38 $\pm$ 0.76	<0.001
Assessment	3.42 $\pm$ 1.02	3.56 $\pm$ 0.72	4.02 $\pm$ 0.91	4.35 $\pm$ 0.71	<0.001
Teacher-Students Relationship	3.43 $\pm$ 0.99	3.42 $\pm$ 0.99	4.18 $\pm$ 0.97	4.70 $\pm$ 0.52	<0.001
Working together	3.41 $\pm$ 1.14	3.01 $\pm$ 0.94	4.02 $\pm$ 1.06	3.87 $\pm$ 1.08	<0.001
Relationship with Other Students	3.72 $\pm$ 1.16	3.71 $\pm$ 0.86	4.23 $\pm$ 0.92	4.20 $\pm$ 0.96	0.025
Cooperative Learning	3.28 $\pm$ 1.33	3.39 $\pm$ 0.88	3.88 $\pm$ 1.16	4.09 $\pm$ 0.98	0.003
Coherence of Curriculum	3.16 $\pm$ 1.32	3.39 $\pm$ 1.02	4.08 $\pm$ 0.98	4.17 $\pm$ 0.87	<0.001

**Table 4** Comparison of Male and Female Students' Responses on Active Engagement in the Development of Capabilities

Capabilities	Gender		t-Test	P-value
	Male (n=84)	Female (n=61)		
	Mean $\pm$ SD	Mean $\pm$ SD		
Critical thinking	3.96 $\pm$ 0.99	3.90 $\pm$ 0.97	0.34	0.73
Creative thinking	3.98 $\pm$ 1.04	3.78 $\pm$ 1.05	1.16	0.25
Self-managed Learning	4.09 $\pm$ 1.01	4.04 $\pm$ 0.92	0.29	0.77
Adaptability	4.14 $\pm$ 1.83	4.11 $\pm$ 0.86	0.12	0.91
Problem-solving	3.95 $\pm$ 1.02	4.01 $\pm$ 0.88	-0.34	0.731
Communication skill	4.01 $\pm$ 1.10	3.89 $\pm$ 0.89	0.66	0.51
Interpersonal skills	4.02 $\pm$ 0.98	3.94 $\pm$ 0.96	0.46	0.65
Computer skills	4.07 $\pm$ 1.02	3.89 $\pm$ 0.97	1.06	0.29
Active learning	4.00 $\pm$ 0.98	3.80 $\pm$ 0.92	1.22	0.22
Teaching for Understanding	3.91 $\pm$ 1.05	3.86 $\pm$ 0.92	0.29	0.77
Feedback to Assist Learning	3.81 $\pm$ 0.98	3.84 $\pm$ 1.00	-0.16	0.87
Assessment	3.89 $\pm$ 0.86	3.82 $\pm$ 0.96	0.48	0.63
Teacher-Students Relationship	3.97 $\pm$ 1.06	3.96 $\pm$ 1.00	0.06	0.95
Working together	3.60 $\pm$ 1.09	3.52 $\pm$ 1.15	0.41	0.68
Relationship with Other Students	3.95 $\pm$ 1.02	4.00 $\pm$ 0.95	-0.29	0.78
Cooperative Learning	3.77 $\pm$ 1.15	3.5 $\pm$ 1.08	1.15	0.25
Coherence of Curriculum	3.74 $\pm$ 1.16	3.70 $\pm$ 1.06	0.18	0.86

All participants agreed that teachers' active involvement in teaching, mentoring, assessment, and course management enables students to experience high quality and standards of instruction. Their understanding can be evaluated in the context of their arguments during the interviews.

**Table 5** Inductive Analysis of Faculty Members on Strategies That Boost Student Engagement

Theme	Categories
Attributes that promote learning	<ul style="list-style-type: none"> <li>• Soft and technical skills</li> <li>• Communication, professionalism and ethics</li> <li>• Inquiry-based research</li> <li>• Engage in theoretical and practical courses</li> <li>• Achievement motivation</li> </ul>
Impact of a supportive learning environment	<ul style="list-style-type: none"> <li>• Improve competency</li> <li>• Develop interest in the field</li> <li>• Provide space for open discussion</li> <li>• Enhance commitment</li> <li>• Determine obstacle of learning</li> <li>• Trigger thinking ability</li> <li>• Reduce cognitive load</li> <li>• Develop the generic capabilities</li> </ul>
Enhance results by strengthening teacher-student relationships	<ul style="list-style-type: none"> <li>• Provide means for success</li> <li>• Encourages for active engagement</li> <li>• Improves self-confidence</li> <li>• Communicate and produce effectively</li> <li>• Exposure to situated learning</li> <li>• Understanding students' capabilities</li> </ul>
Making active participation and skill development more effective	<ul style="list-style-type: none"> <li>• Improve learning outcome</li> <li>• Update curriculum</li> <li>• Address community need</li> <li>• Integrate critical thinking in the curriculum</li> <li>• Introduce interprofessionalism</li> <li>• Emphasis on reading from different sources</li> </ul>

There are formal and informal methods to optimize students' attributes. The formal method is through mentoring and counselling sessions with program faculty and the informal method is through peer influence in research and community engagement

In addition,

In each semester a program should grant a student to be a team leader which privileges him/her to gain extra favourable attributes

More specifically, the majority of participants connected active participation through different teaching modalities to the development of abilities.

Emphasis on attributes maintain enthusiasm, competencies, and professionalism which can be achieved through team-based learning, problem-based learning and so on

They also identified that achieving these attributes in the program is possible through the program mission. Like one said:

I believe that any graduate of such a program should have attributes of their program mission pillars. For instance, my program mission is cycled around the quality of learning, research, and community engagement. Hence students are assessed to have competencies in these pillars

Another participant shared a story of him as a teacher.

So, as any teacher/faculty, we are restricted by a set of teaching methods; therefore, we have to construct our teaching environment to choose from such methods which limit the ability of innovation and creativity to foster student's capabilities

Theme two: Impact of a supportive learning environment:

Participants talked about how crucial a student's environment is for learning. All participants agreed that a healthy atmosphere promotes the growth of the necessary skills, cognitive capacities, and dedication to one's subject of interest, reducing the likelihood of burnout and demotivation. For instance:

I believe that giving students a chance to decide which solution is a better option for the problem can develop their interest in the field and improve competency

Another participant said:

For example, "students" ability can be triggered by critical questions and make the students solve the problem by creating solution

Aside from problem-solving, the majority of participants emphasized the value of practical training for students and fervently argued that it is imperative that they develop their professional abilities.

—teaching method and learning plans are very important to build cognitive skills, understand the students' capabilities, and their learning loads

Furthermore, one shared that:

Students should not be merely receptive to information; however, students should take an active role in information generation and synthesis. This can be acquired through student self-directed learning. In addition, students can perform tutoring sessions for their peers. All of which influence students capabilities

Theme three: Enhance results by strengthening teacher-student relationships:

Participants travelled through thoughts to look at ways in which the teacher-student relationship would contribute to better learning outcomes. While explaining, many participants mentioned that strengthening teacher and student relationships can be utilized to improve capabilities in general.

—interaction between teacher and student not only improves the student's confidence and communication skills but encourage them to be engaged actively in the process of learning, I believe this is a two-way process

Additionally,

I believe that teacher who provides real-life experience enhances students' practical knowledge and skills so faculty should assess their environment based on the course taught and then implement strategies that enhance the learning. The general framework is actively engaging students in learning processes

Participants perceived this relationship as complementing experiential learning, exposing students to real-life experiences related to patients, better environmental conditions, and accessibility of available lab and support facilities.

So having a relationship, this will help to solve a lot of students' problems and this will result in providing better real-life learning experiences

Through active engagement, the students gained insights regarding how they wanted to learn, improve their confidence, communication, and problem-solving skills.

It added new perspectives on professional skills, especially in the hospital settings. As health professionals, you cannot focus on the illness only... You must learn to see the patient holistically and to consider other aspects. This way you can solve the problems, especially in road traffic accidents

Participants reflected on understanding students' needs to be heard. They also acknowledged that listening, addressing their concerns, and plain-language communication are integral aspects of a teacher-student relationship.

In the end, you want to do no harm to any student so teachers should know everything about your students in terms of what can affect them, ... to give the best outcome. We should be more empathetic now

During interview discussions, participants described the added value, as healthcare professionals, of knowing and being aware of student weaknesses and shortcomings. Participants highlighted that awareness about students contributes to understanding patients' conditions in the community in a holistic way.

the better you understand their interests, strengths, weaknesses, and personal challenges, the more effective you will be at developing a learning environment and building a positive relationship with your students

Theme four: Making active participation and skill development more effective

The participants openly addressed their practices and emphasized the modifications that are required to improve their knowledge and competence in dealing with students' active participation in capability building. The majority of participants placed a strong emphasis on updating the curriculum by including critical thinking that addresses community needs.

I studied in a conventional undergraduate school. We should update the curriculum and integrate it with the critical thinking skills

Integration of active engagement and skills development in my opinion may decrease the cognitive load on our students

Despite the fact that participants valued the present COAMS program teaching methods, some believed that studying independently from various resources and an interprofessional team would increase students' understanding and aid them in putting it into practice. The majority of participants—nearly half—said that it is solely their responsibility to acquire knowledge and develop appropriate abilities.

I noticed that students do not have a habit to read from books or other resources. It surely affects the learning skills of students

Either via Google, through to a credible website, not like a personal blog and such but through a credible website, or even Google Scholar through the literature, PubMed and such, basically, the official scientific websites

Another participant explained it as:

All students are not actively participating in teaching & learning, I noticed that reading only from PPT slides will not give a full knowledge of that course

The best resources during undergraduate studies or clinical practice, according to all participants, are interactive lectures, simulated cases, and discussions with faculty members who provide assistance and constructive feedback.

Faculty members and students should be asked to give constructive feedback on each other's work and to explain difficult ideas to each other' through discussions

Participants believe that employing proper strategies to encourage students' active participation will help healthcare professionals improve the existing state of healthcare and better meet the requirements of the community while also fostering a culture of trust. However, faculty members must be motivated to switch from their conventional to more constructive teaching methods.

As health professionals, we are playing a very significant role to help and enhance the quality of curriculum and to increase their awareness, educate students more, and give them a road map for how they can learn in a good environment

—only we need to motivate our faculty to accept the change and shift from traditional to constructivist approach of teaching and learning

## Discussion

This mixed methods study was inspired by recent literature that emphasized the need for triangulation in measuring engagement. This leads to this mixed methods study that aimed to examine the relevance of active learning methods in influencing the engagement and participation level of students. Hence, to create the possibility of personality development of students and foster a productive learning culture, it is essential to promote activities encouraging student

engagement. The results suggest that the variables under the teaching and learning environment influencing active engagement effect the development of graduate capabilities. Furthermore, the results reveal that active learning-based strategies are the method of providing knowledge to students.

Fitzsimons<sup>19</sup> points out that active learning-based instructional modules allow students to take responsibility for their learning and to explore and understand new concepts. Similarly, the findings of the present study reveal that the participants generally agree with the notion that an active learning-based approach boosts students' self-confidence, improves their practical knowledge and skills, gives them the chance to solve problems in a highly constructive manner and develops cognitive skills. According to one study, there are numerous barriers to the adoption of active learning approaches and the development of students' abilities, including student disengagement, a lack of faculty members able to effectively manage a large student group, faculty resistance to implementing new teaching strategies and the preference of students for lecture-based teaching mechanisms.<sup>20</sup> Another barrier is that academic institutions typically adopt the lecture-based teaching approach.<sup>21</sup> To overcome these barriers, the students and the instructors must both actively participate.

The necessity to replace the conventional teaching approach has arisen with the advent of the digital revolution and the growing dependence on technology. As a result, participants in the current study also placed a strong emphasis on the promotion of instructional strategies based on active learning, such as in-class discussions, online discussion forums, collaborative learning groups and peer learning in order to enhance behavioral, cognitive and emotional engagement. This method of instruction helps students' social and cognitive abilities while also educating them on concepts relevant to schooling.<sup>22,23</sup>

The literature suggests that the educational system and learning environment should change its teaching methods and take into account the growing need to give students opportunities to think critically, solve problems and develop their capabilities. This would be achieved by emphasizing active learning strategies in students' personal development and improvement of their professional skills.<sup>24</sup> Similarly, the results of the current survey showed that most students and faculty members stressed the importance of the school environment in the students' level of active participation.

The correlations in the current study indicate that the teaching approaches in COAMS have a direct influence on almost all domains of capability. The degree and type of interaction between teacher and student, as well as the nature of the teaching, can be seen as supporting each other in this way. The more active teaching approaches employed in the courses help to promote the level of interaction between teachers and students, which contributes to the development of teacher-student relationships. The more confident the teachers feel about interacting with students, and the more useful the contributions, the greater the inclination to employ active approaches to teaching and learning. These results are in contrast to those of an American study, which found no significant differences in cognitive development between students engaged in two- and four-year college courses.<sup>25</sup>

Furthermore, the survey showed that as students reach higher education levels, their priorities shift toward career development and fulfilling family commitments. Here, it is crucial to give students knowledge that is grounded in real-world scenarios in order to keep them interested in their studies. As reported by the faculty members in think-aloud interviews, the biggest obstacles to student participation are a lack of understanding of each student's learning challenges and disparate levels of prior knowledge. Teachers must be able to provide an in-depth understanding of many ideas by implementing an interactive or collaborative strategy.<sup>21</sup> Moreover, the interest and involvement levels of the students were also impacted by the promotion of team-based activities. Therefore, for better development of young people, educational institutions should update their curricula and begin implementing these active learning techniques. It may even be possible to apply certain novel techniques, such as technology-based education or participatory teaching methods. With the aid of these methods, real-world situations can be assessed virtually and knowledge can be applied in real-world situations, raising students' levels of understanding and making for an engaging learning environment.<sup>26</sup> As a result, the teaching approach must be changed and an interactive medium must be used.

As only 145 students from one institution took part in the study, more data is needed to generalize the findings to other educational environments. The results of the analysis are trustworthy, however, since the issue of student engagement and active involvement with learning is a global one. In this regard, further research might evaluate the

skill sets of students who are exposed to active learning against those of students taught via conventional teaching methods, and practically examine the effects of these learning strategies.

## Recommendation and Conclusion

According to this study, the teaching technique, teacher-student interaction, and student engagement in class all had a high impact on how well students developed their talents. Building strong teacher-student relationships is facilitated by the use of active learning and teaching strategies. When relationships are strong, teachers feel more at ease introducing instructional methods that involve active student participation. The indicator for active learning had the highest standard coefficient to the teaching variable. The other indicator looked at how much instruction was intended to advance understanding. The growth of teacher-student engagement and the provision of support by teaching staff served to strengthen both effects of this active attitude toward teaching and learning. Colleges should consider the methods of instruction used in their courses if they want to supply graduates with the skills required for societies that rely on these graduates. When compared to teaching and learning methods that involve active student participation, standard didactic teaching, which is frequently used in lecture-based instruction, appears to be less effective in fostering intellectual development.

## Acknowledgements

The author would like to acknowledge Sajida Agha, professor of medical education, College of Medicine, KSAU-HS for her support and advice in completing this work. Naif M. Alhawiti. BSc, MSc, PhD, is associate professor of hematology. He has another master's degree in medical education.

## Disclosure

The author reports no conflicts of interest in this work.

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