

## Analysis of learning and teaching strategies in Surgery Module: A mixed methods study

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### Abstract

**Objective:** To explore perceptions of students and teachers about learning and teaching strategies used in the delivery of Surgery Module in a relatively newly established medical college.

**Methods:** The mixed-methods research with convergent parallel design was conducted at the Faculty of Medicine in Rabigh, King Abdulaziz University, Jeddah, Saudi Arabia, from January 2017 to February 2018. Students in the study completed the Motivated Strategies for Learning Questionnaire on the basis of which correlation analyses were conducted to determine the association among study variables and final scores. For qualitative part, 2 focus group discussions and 3 interviews were performed with students and teachers respectively. Their verbatim responses were recorded and analysed. Themes were generated.

**Results:** There were 47 students in the study. There were positive correlations between learning strategies, cognitive and metacognitive and resource management, with final grades of students ( $p < 0.001$ ). Items of the questionnaire showed positive correlation with each other. Some of the major themes were elaboration, organization, critical thinking, self-regulatory learning, group and peer learning, and focus of learning. Some important subthemes were personal notes, concept map, goals, think out of the box, life-long learning, open discussion, feedback, deep learning and alignment.

**Conclusion:** High achievers were found to be using learning strategies effectively. Both students and teachers favoured critical thinking, deep and conceptual learning, and learners' active participation.

**Keywords:** Learning strategies, Teaching strategies, Mixed-methods approach, Perception.

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### Introduction

The primary intention for any educational endeavour in a medical school is to enhance students' learning. This requires thoughtful selection of learning strategies that can be applied to achieve specific learning goals. Learning strategies for each student may differ as every person is unique in his / her learning process.<sup>1</sup> This philosophy also guides the curriculum development or review at medical schools and universities keeping in view incorporating diverse teaching methods / strategies so that students get the benefit of these changes.<sup>2</sup> Different teaching strategies have been used for a long time for undergraduate medical students. Among these strategies, some are traditional, like lecture, bedside teaching, tutorial, etc., while others are relatively new such as small-group discussion (SGD), problem-based learning (PBL), case-based learning (CBL), simulation and clinical skill lab, and

community-based learning, etc.<sup>3,4</sup> Each one has its pros and cons. The newer strategies have their underpinning in the recently developed trends like outcome-based, and competency-based education, which have shown to enhance learning in medical education programmes.<sup>5</sup> There is ample evidence on the effectiveness of different learning strategies, and how they may be used to enhance students' learning with better resource management and students' active participation in the process.<sup>6</sup> A study<sup>7</sup> identified that management of study-time and self-testing by students had a positive impact on their academic achievements. They also observed that focus of teaching should be to encourage students by answering their questions.<sup>7</sup> A qualitative study from Saudi Arabia explored different factors influencing learning of high achievers, and it was suggested that addressing those factors in a systematic way might improve the performance of students.<sup>8</sup> Others have also reported that appropriate use of learning strategies are positively associated with the

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performance of students.<sup>9</sup> The role of teachers in this context has also been implicated as an important variant.<sup>7,10</sup> It is observed that teachers can play a positive role in developing active learning strategies for better students' performance.<sup>10,11</sup> Therefore, the perceptions of students and teachers are equally important in the educational cycle.<sup>12</sup> A negative correlation in their perceptions about learning can be detrimental for the whole educational process.<sup>8,12</sup>

The Bachelor of Medicine, Bachelor of Surgery (MBBS) programme at the Faculty of Medicine in Rabigh (FMR), Saudi Arabia, has been in place for the last seven years. The programme takes an outcome-based approach and is modular integrated in design. The students in FMR are considered socio-culturally different from Western students.<sup>13</sup> Therefore, the learning strategies may differ and require customised teaching methods.

The curriculum in practice for delivery of the Surgery Module at the FMR had not been evaluated since its inception. There is no evidence of what students and faculty feel about the learning and teaching strategies used in the delivery of this important module that has 22 credit hours. The current study was planned to explore perceptions of students and teachers about learning and teaching strategies used in the delivery of the Surgery Module at FMR, a relatively newly established medical college.

## Subjects and Methods

The mixed-methods research with convergent parallel design<sup>14</sup> was conducted at the Faculty of Medicine in Rabigh (FMR), King Abdul Aziz University (KAU), Jeddah, Saudi Arabia, from January 2017 to February 2018, after approval from the institutional review board. Both quantitative (QUAN) and qualitative (QUAL) data was collected on parallel tracks which was then compared, and interpretations were drawn.

The study was guided by three research questions: is there a correlation of final grades in the Surgery Module with different learning strategies used by final-year undergraduate medical students; what are the perceptions of students and teachers regarding different learning and teaching strategies in the Surgery Module; and do the quantitative and qualitative databases converge and present consistent findings, or is there contradiction in the findings? For the quantitative part, Motivated Strategies for Learning Questionnaire (MSLQ)<sup>11</sup> was used

to evaluate students' use of learning strategies. MSLQ is a valid and reliable tool based on classic social-cognitive learning theories for assessing motivational orientation and use of learning strategies by the students.<sup>15,16</sup> Convenience sampling method was used, and the questionnaire was sent to all the students via Google Drive, while hard copies were provided to those who could not fill it online. It was mentioned that filling of questionnaire would be considered consent for participation in the study.

Learning strategy part of the questionnaire was used, including five subscales for measuring cognitive and metacognitive strategies; rehearsal strategies; elaboration strategies; critical thinking strategies; organisational strategies; and meta-cognitive and self-regulation strategies. Correlations of these subscales with the level of success (grades) of the final-result were measured. Achievement scores were used where numerical data was required.

Regarding the qualitative part, open-ended questions were developed keeping in mind the published literature<sup>8,14</sup> and the nature of the current study. Focus group discussion (FGD) and interviews were conducted in line with literature.<sup>17</sup> For students' feedback, FGD with a sample of students from two consecutive batches were conducted to explore their points of view regarding learning and teaching strategies. For faculty feedback, interviews with faculty members involved in teaching and assessment during the module were conducted. Interviews and FGD were semi-structured.

Purposeful maximal variation sampling for FGD from students and purposeful homogenous sampling for faculty interviews were adopted. Maximal variation depended on different characteristics and demographic variations. Students were chosen according to diverse characteristics; students from big cities and small towns; students who got grade A and lower grade e.g. B or C in previous modules. However, students fluent in English language were given preference regardless of any variation. Data for quantitative part was analysed using SPSS AMOS version 23. Mean  $\pm$  standard deviation (SD) was calculated for quantitative variables, like rehearsal, elaboration, organisation strategy, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning, help-seeking, and score. Correlation test was used to determine the correlation between study variables and achievement score. A path analysis was

performed with  $p \leq 0.05$  being statistically significant. Regarding qualitative data, hand-analysis was performed. Audiotape recordings were made and transcribed verbatim by external staff. Students from each focus group and faculty members involved in the interviews confirmed that the transcripts were an authentic record of events. The transcriptions were checked for accuracy, then analysed and coded independently by the researcher and another faculty member who was not involved in the research. Then broader themes about learning and teaching strategies were constructed based on the codes. Data validity was done with member-discussion and triangulation.<sup>14</sup> For FGDs and interviews, pseudonyms were assigned to the participants. All data was kept under the custody of the principal investigator for five years, and anonymity of the participants was assured.<sup>14</sup>

## Results

There were 47 students who completed the questionnaire. They were all (100%) males, and were divided according

**Table-1:** Correlation of cognitive and metacognitive strategies, resource management strategy & resource management with final grade.

Strategy	Item	Mean±SD	Correlation with grade
Cognitive and metacognitive strategies	Rehearsal.	17.7 ± 7.5	0.59*
	Elaboration.	26.7 ± 10.0	0.55*
	Organization strategy.	18.4 ± 6.4	0.56*
	Critical thinking.	22.8 ± 9.2	0.56*
Resource management Strategy	Metacognitive self-regulation.	52.1 ± 20.1	0.58*
	Time and study environment.	36.6 ± 14.3	0.59*
Resource management	Effort regulation.	16.4 ± 4.3	0.60*
	Peer learning.	14.2 ± 5.6	0.56*
	Help seeking.	18.6 ± 6.8	0.59*

\* Correlation is significant at 0.01 level (2-tailed), SD: Standard deviation.

**Table-2:** Correlation matrix for all study variables.

No	Variables	1	2	3	4	5	6	7	8	9
1	Rehearsal	1								
2	Elaboration	0.93*	1							
3	Organization strategy	0.96*	0.97*	1						
4	Critical thinking	0.97*	0.94*	0.96*	1					
5	Metacognitive self-regulation	0.97*	0.96*	0.97*	0.97*	1				
6	Time and study environment	0.96*	0.94*	0.95*	0.96*	0.97*	1			
7	Effort regulation	0.88*	0.88*	0.88*	0.89*	0.89*	0.91*	1		
8	Peer learning	0.95*	0.94*	0.93*	0.93*	0.95*	0.95*	0.86*	1	
9	Help seeking	0.93*	0.96*	0.93*	0.92*	0.95*	0.96*	0.88*	0.95*	1

\*Correlation is significant at 0.01 level (2-tailed).

**Table-3:** Students' and teachers' perceptions about different learning & teaching strategies used in the surgery module

Themes	Subthemes	Verbatim Quotes
Elaboration	Relatedness Discussion Make connections Application of knowledge	"Teacher should discuss stories of his patients that will help us to connect things in our mind." * "When I discuss real-life scenarios, there is a feeling of relatedness and they show more interest." **
Organization	Learning objectives Concept map Personal notes	"First thing first, and that's my strategy." * "Give us objectives so that we may prepare accordingly." * "Important issue is how they organise their thoughts." **
Critical thinking	Think out of box Brain-storming	"Your brain should work as a clinician." * "Critical thinking must be part of any strategy." **
Self-regulatory learning	Life-long learning Goals Self-evaluation	"Anything we learn is meant for life-long learning." * "More they reflect on their work, better would be their learning." **
Group & peer learning	Open discussion Threat of wrong concept	"I prefer it, but it depends on the team-mates." * "My students are engaged more in small group discussions." **
Focus of learning	Deep learning Student-oriented approach Critical thinking Clinical reasoning	"I learn better when a teacher gives me importance during a session." * "I think reasoning; they should focus on reasoning." **
Improvement plan	Better use of technology Alignment Program evaluation Feedback	"I enjoyed online assignments and discussion on Blackboard." * "... should be a dynamic process." ** "We need change to make it better considering students' and faculty's feedback." **

\*Students' perceptions, \*\*Teachers' perceptions.

to the grades they achieved in the final examination: 7 (15%) got A+; 27 (57%) got A; 7 (15%) got B+; 2 (4%) got B; 3 (6%) got C; and 1 (2%) got D. Their mean age was  $24.2 \pm 2.5$  years. Different strategies had positive correlation with the final grades of the participants (Table 1). Items of MSLQ had positive correlation with each other (Table 2).

Sub-themes were generated from FGDs with students and interviews with teachers. FGD were conducted with two groups of consecutive years, eight students in group 1 and six students in group 2. For faculty members, three interviews were conducted. Major themes were generated from those sub-themes (Table 3).

## Discussion

The study showed that final examination grades of students were positively correlated with cognitive and metacognitive strategies, resource management strategy and resource management. Positive correlation of items with each other increased the validity. Similar findings were mentioned in a study.<sup>15</sup> These findings are consistent with some of the themes of the qualitative part. For instance, critical thinking, self-directed learning, etc. are few of the main themes from FGD. One of the verbatim points used by a student, "I learned the whole topic as a mind map" shows that students understand the deep learning strategies and how to organise things. A qualitative study from Saudi Arabia<sup>8</sup> also supports these findings. It was observed that high achievers used deep learning strategies and mind mapping. They preferred SGDs, patients as a learning source, and skills lab as a learning strategy.<sup>8</sup> One of the verbatims, "I enjoy it." under the theme 'group and peer learning', in this study, shows that SGD motivated students. Similarly, interviews with faculty members elaborated that teachers were using diverse teaching strategies, including SGDs, CBLs, simulation, and bedside teaching. The comment, "Students are more active in small groups.", shows how a faculty member understands the importance of active participation of students in their learning process. They also perceive that focus of learning should be deep and conceptual learning i.e. the tilt is towards deep learning strategies.

It was observed in a meta-analysis that MSLQ might be used reliably to see the relationship between different strategies and grades of students. There was strong relationship between self-efficacy and certain learning

strategies.<sup>16</sup> The findings are supportive of the results of this study. On the contrary, another study found that deep learning strategies, such as elaboration, organisation, metacognition, and effort regulation were not showing a positive correlation with the results. However, those strategies could have done this by another important factor, 'participation'.<sup>6</sup> It was observed in a study that although most of the times high achievers in summative exams adopted deep learning strategies, low achievers also used deep learning strategies.<sup>1</sup>

A study found that discovery-oriented approach had a positive correlation with self-regulation of students and deep and concrete processing.<sup>18</sup> This constructivist approach was reflected in the present study, as it was observed that students who used active learning strategies effectively got good grades. Students mentioned that they liked active learning strategies as reflected from a verbatim, "I struggle more, so learn better, in case-based learning". So, clinical cases can be used as a discovery-oriented approach in the module, and, encouragingly, teachers are using such strategies in their teaching.

Another important point which can be derived from the results is the activities in which students are engaged, as obvious from the correlation of elaboration with grades. Students stressed relatedness and application of knowledge, in the QUAL part instead of passive learning. Even a study on high school students found that challenging activities were better to enhance the learning of students as they were engaged more in independent tasks, individual or group activities than in lectures.<sup>19</sup> So, why not to shift towards learner-centred curriculum in medical education where students are adult and responsible, as evident from the sentence of a student, "I don't like teachers are giving us knowledge and knowledge". A study found that students perceived problem-based learning (PBL) as the most favourite method. They also liked Socratic lectures, a form of the interactive lecture.<sup>20</sup> Another study revealed that second-year students preferred PBL and interactive sessions.<sup>21</sup> All these elements support the idea of students' involvement in the learning process.

Critical thinking and active learning strategies are important findings in the study which is reflected from QUAN and QUAL parts. Students who opted for critical thinking and metacognitive self-regulation got better grades in final exam. Similarly, students in QUAL part shared their ideas about critical thinking, as evident from

sub-themes like 'think out of box', 'case-based', 'evidence-based', etc. One of the students remarked, "I don't believe everything blindly". Active participation of students can be evident from the sentence, "My course, my responsibility". A review article observed that both students and faculty generally have positive perception about flip classroom - a well-known active learning strategy.<sup>22</sup> It has been suggested in a consensus statement to include case-based learning and team-based learning in a way that would help students to engage in critical thinking. The role of faculty in this aspect has been advocated.<sup>23</sup>

Most of the databases from QUAN and QUAL parts of the study are consistent with each other. However, there are some discrepancies in the findings, like, for instance, teachers have discussed about active learning of students in the learning process, but they admit that lectures, still, are used as the main instructional strategy in the module due to certain feasibility issues. Similarly, students talked about objectives and goals in FGD (Table 3), but teachers did not mention it in the interviews. Perhaps they perceived that the module was already planned as outcome-based. Perceptions of faculty about implementation of critical thinking and reasoning in the sessions were also different. A study<sup>24</sup> discussed different learning barriers, especially in Saudi context, and he pointed out lack of time and scheduling problems among other barriers.<sup>24</sup> These factors might be responsible for low achievers in this study as 'time and study environment' is positively correlated with final grades. Both students and faculty agree that learning and teaching strategies should be focussed on active participation of students which seems good as it was pointed out in a study that both teachers' and students' perception should be compatible with each other for better learning of students.<sup>25</sup>

There were certain limitations to the current study. The FMR, being a relatively new faculty of KAU, Jeddah, had less number of students in each year of study. No female students was part of the study because FMR was exclusively a male-campus at the time of the study. Number of students who got A grades was quite high which might have affected comparison. Convenience sampling method was used for a questionnaire-based study. As this was an in-depth exploration of a single module, generalisation might not be possible. But the findings can be transferable to other modules in the same

college and other faculties with modifications according to feasibility and local circumstances because most of the findings are relevant in the learning of undergraduate medical students.

## Conclusion

Undergraduate medical students who used learning strategies more effectively were found to be getting higher grades in exams. Students preferred active participation in the learning process and emphasized the need for conceptual learning. Faculty was also in favour of strategies that could enhance deep learning and critical thinking. Further work necessitates the amalgamation of critical thinking, reasoning and deep learning strategies in the curriculum.

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