ORIGINAL ARTICLE

Self-regulated learning attributes of high-performing medical and dental students in teacher-centered culture.

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ABSTRACT… Objective: To explore self-regulated learning strategies in high-performing undergraduate medical and dental students. **Study Design:** Qualitative Case study. **Setting:** Medical and Dental students of a Private Medical and Dental College in Karachi. **Period:** August 2021 to December 2021. **Material & Methods:** A qualitative case study using constructivist and pragmatic paradigm was done. Data was collected using semi-structured interviews of high-performing students. Thematic analysis was done using atlas ti-9 for organizing data. Microanalysis was used to collect data from high achievers in three sequential phases: Examination prepratory activities, During examination performance, and self-reflection, processes following examination. **Results:** It showed twenty codes under three themes, Examination prepration activities, performance, Examination attempting abilities and Reflective practices. Examination prepratory activities codes were memory strategies, organization of content, rehersals, eloboration, group discussions, imagery, goal setting,strategic planning, time management, Mindfulness, lesson plan monitoring activities, learning plan, intrinsic motivation, meta-cognition, quality sleep, co-regulatory network and procrastination. Process or performance codes identified were, self-control, self-confidence, presentation of content, Problem-solving abilities, self-instruction, time management during examination. Reflective practices codes identified were receptive to feedback, self-consequence, reflective attitude and vision. **Conclusion:** High- achievers have centain self-regulatory attibutes which enhance their learning experience and help them to excel. The attributes identified through the research after exploring self-regulatory attributes in high achievers can be utilized to improve abilities of all medical and dental students.

Key word: Problem-based Learning (PBL), Self-directed Learning (SDL), Self-regulated Learning (SRL).

INTRODUCTION

Some students continuously direct their learning activities using self-feedback and self-reflection to align their learning for achieving specific goal, such learning is called self-regulated learning.

Research question was what are self-regulatory attaributes in high achieving medical and dental students. Self-regulatory learning is context specific and dynamic learning process and is different from self-directed learning. Self-diected learning can be measured by aptitude questionnaire as its a general approach, but microanalysis assessment is required for self-regulated learning.[1] Self-regulatory learning focus on scientific questions on why? How? When? What? Where? and with whom, under psychological diemension of motivate, method, time, behavior, physical enviornment and social condition.

Previous studies literature suggests that there is significant ambivalence regarding the use of self-regulatory learning strategies by high achievers in medical education. Most studies done uptill date focus on relf-regulatory learning were quantitative so qualitative indepth research study was required to understand self-regulatory attributes of high achievers in all three phases of self-regulatory learning through microanalysis assessment. The attributes identified through the research after exploring self-regulatory attributes in high achievers can be utilized to improve abilities of all medical and dental students. The

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self-regulatory concept was first established relating it to the social cognitive theory. According to this theory outcome of learning process is effected by personal, enviornmental and behavioural factors. SRL has been defined as strategies of learning in which the learners personally initiate and conduct instead of relying on educators. Microanalysis assessment was used to explore SRL in high-perfoming medical and dental students. This strategy was used ingeniously to identify abilities of professional sportsman from novice to expert level, by using structured open-ended questions in three sequential phases of forethought, performance and reflection. This study has explored self-regulatory attributes in high achievers in three phases. First phase involves forethoughts and all the activities, planning and strategies before actual process in medical student context its preparations phase before examination. Second phase is performance control or actual process that is professional medical examination which represent how efficiently students performs during examination. Third phase is reflective thoughts that is how students reflects on examination process after its completed.[2] SRL microanalysis is an assessment approach that has been used extensively in non-medical contexts to identify deficient self-regulatory processes in individuals during context-specific task performance.[3]

Implementation of "Self-regulated learning"is important in professional medical and dental education, because in Pakistan medical and dental educationist still follow teacher-centered, passive and traditional teaching style. According to PMC accredidation standards five hunderd hours should be allocated to self- directed learning for medical students in MBBS course.

The philosophical paradigms used were constructivism and pragmatism. Constructivist believes in multiple realities in contrast to positivists who argue on existence of single reality. Pragmatism is more practical approach as it considers and focuses on what works instead of focusing on reality. Constructivism and pragmatism works well together and these two philosophical paradigms are associated with relativism.

MATERIAL & METHODS
Study was done in a private medical and dental college in Karachi, duration of study was six months. A qualitative case study design was used and philosophical paradigms used were constructivism and pragmatism. Ethical review was taken from ethical review committee of the institute (FRC-BUMDC 33/2021). Data was collected using semi-structured interviews of high-performing medical and dental students who scored more than eighty-five percent in final professional examination. Inclusion criteria were first, second, and third, fourth and final-year MBBS students first, second, and third, fourth year BDS students those achieved above 85% grades in the final professional examination and those who gave consent. Exclusion criteria were first, second, and third, fourth and final-year students of MBBS and first, second, and third, fourth year BDS students who achieved below 85% grades in the final professional examination and those who did not gave consent.

Participant selection technique was Purposive sampling. Twenty-six students fulfilled the selection criteria. Twenty MBBS and six BDS students respectively. There was no prior relationship between researcher and participants. A meeting prior to interview was organized for students to inform them about the aim and ethics of the study. The students were informed that their participation in this study was voluntary, and anonymity as well as confidentiality was assured. After students agreed to participate in the study, the students completed the informed consent form and an interview was scheduled. All interviews were audio-recorded. Thematic analysis was conducted to understand and analyze data obtained from interviews. Three main themes identified for semi-structured interviews were preparations activities, performance control and reflective practices. An inductive approach to thematic analysis was employed, and philosophical paradigms used, within a constructivist and pragmatic epistemology. Recorded interviews were transcribed; translation and transliteration of transcribed data was done

where required. Thematic content analysis was conducted to understand the meaning within the data. An inductive approach to thematic analysis was employed and worked within a constructivist epistemology. Interpretation will be obtained from data using codes and themes. All themes repeated and important as well as less common ones will be displayed as it will give complete picture of results.

RESULTS

Memory Strategy
Most commonly used memory strategies among high achievers were rehearsal, elaboration, mental imagery and group discussion. Rehearsal was found to be the most frequently used strategy, followed by mental imagery, elaboration and group discussion. Participant explained that rehearsal works well in remembering a list of items, but is less effective for remembering more complex, conceptual and meaningful information so for that purpose group discussion is preferable.

Organization of Content
One of the attribute of high achievers is that they organize content to study during preparatory period as well as during giving examination according to level of difficulty.

"First thing I do is to organize content and material to be studied and during giving examination also try to organize content in a way that I attempt question which I know best first"

"It depends, what is content on which I am focusing so my style will be rehearsal for few items, like musle origin or insertion but it may be discussing with peers if its a complex mechanism of physiology".

High achievers switch between different styles of memory retention strategies. They have ability of selection and adaptation of cognitive strategies.

Rehearsal
Rehearsal is strategy to learn by repetition and frequently used by high achievers as tool for memory retention in working memory, although it is difficult to retain new information in long term memory by this exercise.

Elaboration
It is ability to connect prior knowledge with new information to remember the new concept during learning process.

Group Discussions
Group discussion help students to retain the learned content in long term memory.
"When I teach a topic to my friends and they ask question it seems I retain more"

Imagery
Few high achievers described imagery as strategies for retention of cognitive content. Imagery is helpful when a student has some grasp of the information to be learned. Creating images of the information allows for efficient access, and personalizes the learning for the student. Imagery effectively meets the diverse learning needs of students. It is a highly effective strategy for increasing comprehension.

"I make image in my mind of all steps of procedure that I am trying to learn, sometimes I draw each image on paper so this helps me in remembering each step of difficult procedure"

Goal Setting
Goal in high achievers is usually on process and outcome based instead of focusing entirely on outcome. High achievers set their goals of medium difficulty, which they know that they can achieve within pre-determined time.

"I never set my goals so high that it would be difficult for me to achieve, what is use of marking high goals, they will only disappoint me if I fail to achieve same in set timeline"

It has been seen that goal setting leads to an increase in motivation and improvement of student's performance. Selection of goals level of difficulty is important as if student decide medium difficulty level and achieve that, it will enhance his motivation but if very difficult goal has been choosen, students might not be able to achieve it and level of motivation will decrease instead of

increasing.

Time Management
High achievers respect and understand importance of time as valuable resource as it could not be gathered, stored, or repeated. The ability of students to use their available time efficiently and effectively may affect learning. Effectively utilizing time efficiently increases productivity.

"Time, Well time management is most important and how to divide time for difficult subjects and topic is the whole story"

"Time is grades! More quality time given to studies is equal to higher grades"

Learning Plan and Monitoring Activities
High achievers make flexible planning for incorporation of practical changes and keep on shifting between reducing and elaborating learning plan on particular topic.

"If I complete certain topic before allotted time, I change my timetable and learning plan accordingly"

As students monitor their learning progress by continuous self-evaluation and make corrective action plan to adjustment learning behavior in alignment to goal-achievement.

Meta-cognition
High achievers have good awareness of how they learns required knowledge and how to use information in achieving a goal. According to research data analysis of this study metacognitive awareness in high achievers was seen in all three phases that is prepartory, process and evaluation phase. Most of them have strong level of higher cognitive awareness.

Procrastination
High achievers under no circumstances procrastinate. Procrastination is individuals own choice to delay or intentional delay of planned action, regardless being well aware of the negative impacts of that delay.

"Its like now or never situation, if I have any scheduled learning plan, I will complete it within dedicated time otherwise this dealy will create feeling of stress and anxeity"

Procrastination has been seen to associated with stress and lack of productivity.

Stress Management with Coping Mechanism
High achievers also take stress but it is productive stress which encourages them to complete the required task and they know how to apply different coping mechanisms to any extra stressors.

"It's natural, I take stress for my studies but it usually helps me to achieve my goal and never reaches point where my productivity start decreasing as I have my coping mechanisms"

Satisfaction and Productivity
High achievers have greater amount of productivity because of significant feeling of satisfaction on their performance. Relationship between satisfaction and productivity directly porportional. It is not, that, satisfaction leads to productivity, but productivity that leads to satisfaction. Then, satisfaction affects productivity, generating a feeling of dedication towards the goal.

"My good grades give me satifsction and motivation to work even harder"

Mindfulness
High achievers focus on process of learning more than outcome. They pay attention non-judgmentally in particular purpose in the present time.

"When I am studying my full focus and attention is on my content of subject, what grade I will get is not my concern at that time"

Supportive and Co-regulatory Network
High achievers seek guidance from teachers and peers and engage in group discussion activities. In self- regulated learning the learning process is designed, implemented and evaluated by learner but it is not mandatory that it should be in isolation. Self-regulated learner can recognize

the ways of engaging in group-learning settings, provided that its their own choice to enhance their learning experience.

High achievers usually have co-regulatory network.

" Sometimes prefer to study alone, sometimes in group and I nerver hesitate to seek help from others when required whether its teachers or peers"

Attitude
High achievers are highly receptive to feedback, they have attitude of learning new things and improving their knowledge.

"Its journey from I don't know to I will find out, and I wish to I will make a plan"

Quality Sleep
High achievers know the importance of quality sleep for better academic performance.

"I studied throughout year; quality sleep is important one day before examination so that my mind is fresh during giving examination"

Cognitive inhibition, decrease in self-control capacity and emotion disturbance issues are related to poor sleep quality A good night's sleep allows students to resume better cognition and self-control for the next day.

Problem-solving Abilities
It has been seen that high achievers are better problem-solver, this ability is especially important during giving examination.

"I think I am good at understanding the question paper as I can recognize depth of questions and what examiner wants to ask in a specific question"

Presentation of Content
High achievers have better abilities to present the content in organized and attractive style.

" I try to present content in form of diagram or flow chart and give heading and sub-heading"

Such content give better impression to examiner and it saves examiners time also.

Self-consequences
High performing students have personal reward and punishment practices and attitude.

Reflective Attitude
High achievers have attitude of reflection inculcated in them, they reflect on each and every step of their examination.

Vision
High achievers usually have vision target to excel nationally or internationally.

DISCUSSION
Self-regulation of resourses involves active control or use of resources available to students such as time, study environment, study material, effort, and peers. Self-regulation of cognition involves the use of cognitive strategies such as rehearsal, organization, elaboration, and imagery Positive impact is seen on students outcome by use of self-regulatory activities.[5] A prodominant feature of self-regulated learners is that they make strategic planning for each task and perform task in proper sequence and in cyclical strategic manner.[6,7]

Self-regulated learning was explored in previous studies in various ways including qualitative, quantitative and mixed methods. Three major findings were found levels of self-regulated learning change in the clinical environment, self-regulated learning is associated with academic achievement, success in clinical skills and mental health and various factors can support self-regulated learning levels in medical students.[8,9,10,11,12] This study explored the characteristics of high-performing medical students from the SRL perspective to gain a better understanding of the application of SRL for effective learning. SRL microanalysis has been used to assess the athletic skills and exprtise of sportsman but there has been no previous research on self-regulated learning of high achievers in medical education using microanalysis. Microanalysis was however used in medical

students to explore displayed adequate skill in venipuncture exhibited strategic thinking before, during and after performance. SRL microanalysis has strong potential as a structured assessment technique targeting the self-regulatory processes underlying clinical skill performance.[2] There is much work to be done regarding the use of SRL microanalysis in medical contexts. Medical and dental students are future practitioners so they are required to have cognitive abilities that include problem-solving, decision-making skill and need to be life-long learners. To become life-long learners and achieve required competencies they need to become a self-regulated learner. Problem-based learning has been introduced as an active learning strategy by many medical and dental colleges to enhance SRL skills. PBL aims to develop effective problem-solving skills in medical and dental students by enabling them to construct knowledge and enhance SRL skills.[13]

It is seen in previous studies that they compared different approaches of using SRL among high-performing students to understand the elements for effective learning.[14,15,16] Previous studies were also conducted relating portfolio and flipped classroom to effective SDL.[18,19] Comparisons between high and low-performing students on how they learn would help differentiate the effective and ineffective measures for learning.[20,21,22]

Most of articles published in last five years focus on exploring the self-regulated learning of medical students during the clinical years, showing a growing interest in the area.

Most studies done on SRL used clinical setting and quantitative design so this study explored in-depth using qualitative design. Focus group discussion were not used, which is limitation of the study as focus group gives more detailed information of the phenomenon.

Future research could explore the self-regulated learning in medical students using a longitudinal research design. The explored self-regulator attributes which have been identified could be inculcated in all students and students with learning difficulties.

CONCLUSION

This study has shown a significant relationship between academic success and use of self-regulation skills, and gave breif overview on understanding ways of practicing self-regulation. The study showed that medical students used SRL skills in form of different strategies and believed in their ability to learn effectively in the context and demonstrated the relationship between SRL skills and self-efficacy beliefs

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