Chapter (1)

<u>Medical Education</u>

In the era of globalization and Technological revolution, education is considered the first step for every human activity. It plays a vital role in the development of human capital and is linked with an individual's well-being and opportunities for better living. It ensures the acquisition of knowledge and skills that enable individuals to increase their productivity and improve their quality of life *(Abu et al., 2022).*

The art of medical education is about a teaching program that is designed to serve the community of the near future. The program is the result of a thorough evaluation of societal needs and is capable of influencing the properties of future care *(McKenney and Reeves, 2021).*

Medical education was developed with the objective of training students to serve to the health needs of the community. Globally there was a move to reorient the medical education to suit the needs of the developing nations. Developing an effective health care delivery system and ensuring universal access to health care immensely depend on the status of the medical education system and the nature of medical manpower it produces *(Saju et al., 2020).*

There is a powerful link between effective education and practice for medical graduate students. Obviously, graduates of medical sciences should be familiar with the practical application of theoretical knowledge, clinical actions and encounter with patients. So, continuing medical education (CME) programs are introduced and implemented in the field of medical education all over the world. So, the main goal of medical education is to empower and educate

personnel who have the knowledge, attitudes and skills necessary to maintain and promote the community *(Plathe et al., 2021).*

Medical education envisages training of candidates leading to career as practicing physicians. The curriculum develops the learning skills essential for independent study and continued learning in their future career as physicians *(Saju et al., 2020).*

An important goal of medical education educate students about teaching, personal improvement, self-esteem and social development related to social sciences and humanities; in addition, it should aim at helping their fellow citizens effectively *(Ataei et al., 2020).*

1.1. <u>Historical review about the origin of medical education:</u>

Although it is difficult to identify the origin of medical education, authorities usually consider that it began with the ancient Greeks' method of rational inquiry, which introduced the practice of observation and reasoning regarding disease, rational interpretation and discussion, where the Greek physician Hippocrates is said to have taught in the 5th century BC and originated the oath that became a credo for practitioners through the ages. However, the concept of medical education was not clear until the mid-19th century when a structured pattern of science-oriented teaching was created. This style, the traditional medical curriculum, is generally adopted by Western medical schools *(Balogun, 2020).*

So, the origins of medical education were grounded in the practice of apprenticeship as long as two millennia ago, with knowledge viewed as a commodity to be delivered directly to the learner *(Sharma et al., 2015).*

Medical education is a broad discipline; Medical education is expressed mainly as a complex ecosystem with different variables interrelated across classes, institutions, regions, and even countries. These interrelated factors include curriculum design, instructional format, learning models, program assessment, performance evaluation, faculty selection and efficacy, also learning environment and culture that play an important role in medical student's academic performance *(Atluru et al., 2015).*

Medical professionals around the world are tasked with the responsibility of graduating well-educated and competent graduate medical student. This desired outcome can be achieved by ensuring satisfactory academic performance and academic success *(Mthimunye and Daniels, 2019).*

1.2. <u>Challenges to Medical Education in the current era</u>

Medical education has always been challenged to keep pace with advances in science and technology, and this is certainly true for the current era, when these advances are arguably more rapid than ever before. But there is a deeper aspect to the current challenge in medical education namely, the profound cultural shift taking place as our civilization transitions from a print-based industrial society to a technology-based internet society *(Wartman, 2019).*

Medical education is currently undergoing a gradual but significant change in order to graduate competent medical students who are capable of managing common medical problems in the community *(Emanuel, 2020*), so patient-centered care is increasingly prioritized across medical schools and medical practice. Patient-centered care can be identified as patient participation and involvement, the relationship between the patient and the healthcare professional, and the context in which health care is delivered. That is, health care is delivered in

a way that is meaningful and valuable to the individual patient *(Hearn et al., 2019).*

1.2.1. The meaning of being part of a profession:

Traditionally, a "professional" has been defined as the exclusive bearer of a body of knowledge. But today the rapid dissemination of medical information outside of the profession is diminishing its exclusivity. This is true not only for information but also for skills that are increasingly being performed by machines. As a result, the profession of medicine is facing a loss of control in both information management and its unique expertise in many areas. Good example of the professional challenge in this area is the ability of the human clinician to fully understand the probabilities generated for diagnostic and therapeutic options *(Wartman, 2019).*

The medical profession now recognizes the importance of early introduction of professionalism into medical curriculum to provide learning opportunities, gaining experience and reflecting on the values of medical professionalism for better patient care. So, the role of doctor has undergone quantum shifts from the person who knew medicine to a manger, social worker, teacher, advocate, and leader to name a few. The doctors in the twenty-first century should possess the necessary skills for working in teams, utilizing resources effectively, providing patient-centered care, advocating for health care systems, and increasing accessibility for patients. Therefore, knowledge and understanding of the social determinants of health will provide the information and framework to understand the patient's need and societal factors that are intertwined with health outcomes *(Dash et al., 2022).*

1.2.2. Curricular Reform to Date

The past decade has seen a flurry of curricular reform that has improved the content and relevance of medical education. Among the many examples are the use of simulation and standardized patient technologies; small-group learning and flipped classrooms; earlier clinical and community-based experiences; time-flexible competency-based learning; and increasing input from the social sciences, engineering, ethics, arts, and humanities *(Fish et al., 2022)*.

1.2.2.1. Principles of recent curriculum changes in medical schools:

Principles of recent curriculum changes in medical schools includes proper integration of basic and clinical sciences**,** emphasis on self-directed learning**,** training students to practice patient centered care and shortening the pre-clinical curriculum to afford earlier and expanded clinical training *(Fischel et al., 2019)*.

Development of "cognitive skills" such as critical thinking, application, problem solving and forming the professional identity of the student that enables him to reach the required professional degree for the future healthcare professional are also considered as principles of recent medical curriculum *(Emanuel, 2020)*.

The significance of these reforms is a shift in the overarching goal of medical education: from training students to become supporters of medical knowledge and care to developing medical professionals who will become active participants in achieving holistic care and wellness in society *(Emanuel, 2020)*.

There are two Different medical curriculum courses including: The traditional subjects-based medical curriculum and the integrated organ/systems-based curriculum.

Chapter (2)

Methods of Teaching

A traditional medicine course involves two or three years of pre-clinical study, followed by three clinical years.

In the pre-clinical years, students will focus on learning the scientific theory of medicine and cover many different disciplines. They will be taught modules in distinct scientific fields, such as physiology, biochemistry and anatomy. This is unique to traditional medical schools *(Malau-Aduli et al., 2020).*

The rest of traditional course teaching takes place in clinical settings, such as ward rounds or GP placements. There may still be some lectures and tutorials at this stage, but they will be complementary to them by clinical learning *(Obi et al., 2022).*

2.1. Teaching and learning methods in medical education

This section describes the teaching and learning methods related to medical education, including both the traditional method of teaching like lectures as well as the new method of teaching like problem based learning, case based learning, peer assisted learning, reflection, and early clinical experience. Then we will discuss the integrated teaching as an effective method of medical education.

The traditional instructional approach focuses on lecture-based instruction as the teaching center, emphasizing the delivery of syllabus and concept. The professor explains the theoretical knowledge, the students listen and takes notes, passively accept the knowledge, while medicine education has many knowledge points and the content is always boring. Little attention is given to problem-solving, collaborate learning, and lifelong learning strategies. This makes students

lose motivation, lack self-study ability, and the combination of curriculum and clinical work is not close enough to train students' clinical thinking. The traditional teaching method has been shown to be less effective than other teaching strategies in practical application and critical thinking abilities *(Bi et al., 2019).*

The ultimate contribution of the new method of teaching like problem based learning, case based learning, peer assisted learning, reflection, and early clinical experience to academic strategies is the introduction of "active" or "participative" learning as compared to the traditional "passive" learning approach. The locus of control has been transferred from being relied on the knowledge of teachers to interactive group discussions *(Raza et al., 2019).*

2.1.1. <u>Traditional method of teaching (Lectures)</u>

Historically, up to approximately the last 20 years, lectures were the main driver *(Morris, 2021).*

Today, traditional lectures are still the most commonly adopted instructional method in medical and clinical teaching. Lecturing is a popular way of teaching because it is both necessary and effective for transmitting core knowledge and concepts, especially to large audiences *(Zhao et al., 2020).*

Lectures, in which the main teaching method is the transfer of information by an educator, constitute the most economical and productive way of transmitting knowledge. Lectures afford the opportunity to introduce a difficult subject, to describe different points of view on a given topic, or to sum up individual clinical or laboratory experiences *(Barkley and Major, 2018).*

Lectures are passive; knowledge based learning process implemented by providing detail on specific elements. A lecture is an educational event delivered

by a lecturer where either a single person or a group of people stand at the front of a seated area containing people requiring education on a particular topic. So, resultant learning is passively gained from attentive listening *(Morris, T. 2021).*

Despite the benefits of lecture-style teaching, research has produced evidence that shows that lectures are not effective for teaching important critical reasoning skills that are required in higher education, especially in professional courses, such as the study of medicine. This is because the traditional lecture method is regarded as a teacher-centered educational approach whereby knowledge is transmitted by and from the teacher and passively received by the students *(Zhao et al., 2020).*

2.1.1.1. <u>Problems faced by medical students on application of traditional lectures learning</u>

Traditional lectures are commonly understood to be a teacher-focused mode of instruction where the main aim is content delivery from the educator to the students. Traditional lectures is a delivery method where only limited time is allocated for students' interactions with other students and teachers ,so in lectures students are often passive because there is no mechanism to ensure that they are intellectually engaged with the material *(Dietrich and Evans, 2022).*

Lectures are not suited for teaching higher orders of thinking such as application, analysis, synthesis, or evaluation; for teaching motor skills, or for influencing attitudes or values *(Kapur, 2020).*

Lectures fail to provide instructors with feedback about the extent of student learning Lectures presume that all students learn at the same pace and are at the same level of understanding *(Bristol et al., 2019).*

For more than a decade, medical schools have been working to transform teaching method by reducing lectures; using technology to replace/enhance anatomy and laboratories; implementing team-facilitated, active, and self-directed learning; and promoting individualized and interprofessional education. The development of entrust-able professional activities and competency-based learning with identified milestones for achievement has transformed assessment *(Rose, 2020)*.

Recently, medical education stakeholders direct their efforts towards integrated teaching in which many schools have decreased the basic science curriculum to 12 or 18 months while integrating clinical medicine within this timeframe and revisiting the basic sciences later in medical school *(Rose, 2020)*.

2.1.1.2. <u>Modified lecture approach</u>

The modified lecture approach is a method of active learning that includes modification in lecture timing, learning styles, and teacher empathy. The modified lecture offers ways that teachers can incorporate active learning into their most frequently used format which in turn lead to a positive effect on the students' performance. It is proposed that instructors should pause throughout lectures to engage students in a short form of active learning before returning to the lecture. Examples included discussion, comprehension checks, short quizzes, or demonstrations *(Downing, 2019)*.

The type of change-up used to promote attention could be a creative activity, a lab, a visual aid, or a change in lesson direction or a simple change in pace that recharges the student's attention span. Maybe a change-up is nothing more than having the student explain their new knowledge to other students using a collaborative learning technique *(Monyela, 2020)*.

2.1.2. <u>New methods of teaching:</u>

Medical education is moving toward active learning in order to improve student engagement and critical thinking skills *(Challa et al., 2021).*

Active learning represents a shift away from exposition instruction that has a tendency to render learners bored or passive. Students take responsibility for their learning by engaging in activities or discussion in class. This method emphasizes higher-order thinking and often involves group work. Well-designed active learning lessons have been found to be effective for maximizing learning, engagement, peer collaboration and evidence-based medicine *(McCoy et al., 2018).*

The new methods of teaching include problem based learning, case based learning, peer assisted learning, reflection, and early clinical experience.

2.1.2.1. <u>Problem based learning (PBL):</u>

Problem-based learning (PBL) is a student-centered innovating instructional approach in which students define their own learning objectives by using triggers from the problem case or scenario *(Virk et al., 2022).*

In PBL a problem is presented and subsequently solved with learning stemming from the time spent on the solution. This learning is then retained as a large chunk of related information. A problem can encompass several topics *(Aldayel et al., 2019).*

The PBL approach is an innovative teaching and learning method that stands to provide greater challenges and motivation by making use of realistic scenarios to engage and interact with students by building on their prior knowledge, enhancing comprehension of basic concepts, and molding knowledge gained in

silos to establish a complex yet elaborate and well-integrated knowledge structure *(Virk et al., 2022).*

2.1.2.2. History of PBL

PBL was introduced in the 1960s at McMaster University in Canada in Medical Education by Howard Barrows after he realized that students were not engaging deeply in the learning process .Today, PBL is used at many different universities in a number of disciplines and professional areas *(Karunathilake, 2019).*

Implementing a PBL course can also improve aspects of learning assessment outcomes and can be motivational *(Chang et al., 2020).*

Ultimately, problem-based learning (PBL) was developed to introduce a problem-solving approach to medical students, in order to equip them for life as a doctor. PBL has not been universally adopted, with some medical schools favoring the more traditional lecture-based approach *(Morris, 2021).*

2.1.2.3. Role of PBL in medicine:

PBL emphasizes learning behavior that leads to critical thinking, problem-solving, communication, and collaborative skills in preparing students for a professional medical career. Thereby, essential aspect of the PBL process is the ability of the students to recognize their current knowledge, determine the gaps in their knowledge and experience, and acquire new knowledge to bridge the gaps. PBL is a holistic approach that gives students an active role in their learning *(Ghani et al., 2021).*

Implementation of the PBL case scenarios reflect contextual integration of medical professionalism, evolving roles of doctors in health system and reflected

healthcare referral system based on the case complexity, which are critical in providing good clinical care, maintaining good medical practice, relationships with patients, working with colleagues, probity, and health *(Dash et al., 2022).*

PBL can work in the face-to-face, blended or online classroom thanks to the technologies and social media available today that are suitable for collaborative learning and inquiry. PBL allows a body system-based approach to learning. This approach generates integration via learning several subjects related to the system at the same time *(Chen et al., 2019).*

2.1.2.4. <u>Problems facing medical students on application of PAL in medicine:</u>

The major reasons for disliking the PBL by students were need for preparation for PBL that requires more time as compared to the conventional teaching methods *(Dujin, 2019).*

PBL affects students quality of learning and knowledge acquisition and it potentially lead to poorer performance on tests Also, time consumption, inadequate resources faculty intensive, highly individualism and student resistance are considered the main problems that are faced by students in implementation of PBL *(Abdelkarim et al., 2018).*

Another limitation of problem based learning was that PBL does not improve the possession of medical knowledge, though the application of knowledge was enhanced through this process. In addition, PBL often generates conflicts with the traditional approach to teaching and conventional expectations, such as "long term effects versus immediate learning outcomes," "depth versus breadth of the

curriculum," and "higher order thinking versus factual knowledge acquisition" *(Dujin, 2019).*

2.1.2.5. <u>**Steps of PBL**</u>

There are seven steps of PBL drive integration from the start, as follow:

Firstly, the students read through the case together, and then they highlight any content that is unfamiliar. The second step is the prior knowledge of some students that can help to explain unfamiliar ideas to others. Thirdly, prior knowledge that is also called on to integrate learning in the third step. It is activated to explain cues in the case and arrange them into explanations, then the fourth step that starts to integrate current learning by arranging the explanations into a description of the phenomenon under study, and then sets of learning outcomes are drawn up in step five. In the sixth step, these outcomes consist of topics from several subject areas; finally, after a period of learning, step seven is a group discussion that aims to integrate knowledge acquired in order to explain the case *(Morris, 2021).*
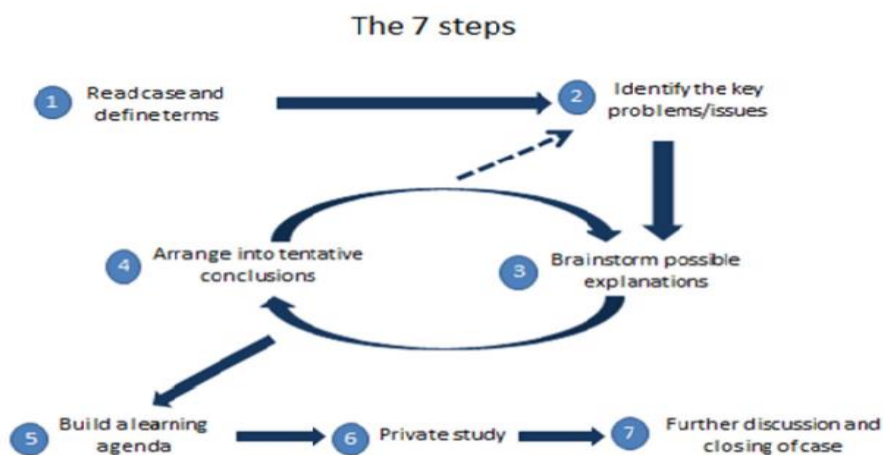

Figure (1): The seven steps of PBL *(Morris, 2021).*

2.1.3. <u>Peer assisted learning</u>

Peer-assisted learning (PAL) is a common teaching and learning method in medical education worldwide. *(Bugaj et al., 2019).*

PAL is a method of education in which individuals, often more experienced, teach their less-experienced counterparts *(Varghese et al., 2021).*

It is a class wide peer tutoring program in which the concept is that peers act as teachers to other peers. Teachers carefully partner a student with a classmate *(Duran, 2021).*

PAL activities encompass "People from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching". Within health professional curricula, PAL is well accepted and utilized as an educational method, involving a process of socialization, often with junior and senior students acting as tutees and tutors respectively *(Morris, 2021).*

Students of the Faculty of Medicine in Benha have one of the most important scientific families, which is "success without greed", which gave us a great example of the application of peer-assisted learning on the ground and the important role that enabled it to contribute to the development of medical education and create a door to competition that helps students achieve the highest performance grades, which helps graduates to acquire a great deal of competence makes them capable of managing common medical problems in the community.

2.1.3.1. <u>Role of PAL in medicine:</u>

Peer-assisted learning is believed to be one of the most cost-effective and convenient intervention to improve quality of medical education.

PAL activities provide a framework whereby students are permitted to practice and develop their healthcare and teaching skills. Through the contribution of students' varied experiences, and the use of shared resources, students learn with and from each other *(Burgess et al., 2020).*

PAL promotes reciprocal learning as PAL enhances the learning experience and is mutually advantageous to both tutees and tutors. Regarding the tutors PAL enables them to consolidate knowledge, identify their own learning needs and develop their teaching skills. , in a similar manner, broaden tutees' theoretical base, improve on examination technique, manage stress levels and establish an enhanced support network. This collaborative approach has advantages on an individual level, in terms of improving confidence and soft skills, as well as ensuring high-quality; consistent teaching is provided *(Varghese et al., 2021).*

A common purpose for implementation of PAL programs is the requirement of students to teach in their future careers, and the provision of early opportunities in helping them to prepare for these roles. Initial knowledge and skills are gained through participation in tutor training programs, where students are taught how to teach *(Burgess et al., 2020).*

PAL therefore creates a synergistic learning platform that promotes small group teaching in a unique, cost-effective and efficient format *(Varghese et al., 2021).*

So, for future clinicians, initiating educational systems such as PAL at an early stage has been suggested to improve communication skills, facilitate the role of team-working and implement a culture of openness in addressing knowledge gaps, whilst simultaneously providing encouragement into future teaching roles *(Botelho et al., 2022).*

In addition, PAL provided tutors with the opportunity to experience and seriously considers future teaching roles academic career pathways. On the other hand, PAL reduces stress for tutees, increase course satisfaction and improve examination technique *(Varghese et al., 2021)*.

2.1.1.1. Problems faced by medical students on application of PAL

Despite the well-documented benefits of peer-assisted learning, it would be unwise to consider it as a panacea that can cure all instructional ills. PAL raises three main concerns: peer competence, commitment and motivation. It was noted that many students doubt the efficacy of peer feedback on their work because they still believe that teachers are the only source of authority for giving accurate comments *(Mohamed, 2021)*.

The application of PAL was reported to be time-consuming *(Varghese et al., 2021)*.

On the other hand application of PAL may cause students to experience peer pressure and high anxiety level which might adversely affect their performance in reciprocal peer learning, highly capable students may lose motivation if they perceive that other peers do not assume responsibility or have any commitment to participate actively in the discussion. *(Kapoor et al., 2021)*.

Also, peer feedback may lead to a surge in aggression, peer rejection and emotional distress on the part of students with low emotional intelligence and social skills *(Mohamed, 2021)*.

2.1.2. Case based learning (CBL)

Case-based learning (CBL) is one of the new teaching and learning methods that is currently used in multiple health-care settings around the world *(Morris, 2021)*.

CBL is an active learning strategy, focusing on students as the center of the learning environment. Case-based approaches encourage the community-based, student-centered and patient-oriented exploration of realistic and specific situations. Students focus on the patient's case; engage in self-guided learning, scientific inquiry and collaboration with fellows, developing critical thinking and clinical problems' solving ability, integrating theory into practice *(Khalid et al., 2021)*.

A similar method to PBL used in medical education is the so-called case-based approach. The difference with case-based learning is that learning objectives are supplied with a case as opposed to being defined by the learners in PBL *(Morris, 2021)*.

An example of this approach is described in a study by *Schapiro et al 2011* at the University of Wisconsin in the U.S. Here, "integrative cases" which "blend clinical, basic science, and public health approaches in a single experience" were employed *(Schapiro et al., 2011)*.

So, Case based learning, then, is a method of teaching and learning whereby a clinical case is used to structure other learning around. As can be seen, this style of teaching and learning is quite similar to PBL in that it allows different subjects to be learnt in parallel and utilize discussion as a learning tool; and in this respect has the potential to drive integration. However, this method doesn't necessarily allow students to compile their own learning objectives, which tend to be assigned instead *(Morris, 2021)*.

2.1.2.1. <u>Role of CBL in medicine:</u>

CBL paves the way for developing a sound understanding of the core subject, provides insight into real-life experiences, helps them transform from fact memorizers into problem solvers, and keeps them engaged during sessions, which motivates them to attend more of these. CBL promotes deep learning and fostered their critical thinking *(Khalid et al., 2021).*

CBL is considered an ideal teaching method in medical education. It pays attention to cultivating students' ability of self-study, thinking innovation, independent analysis and problem solving. The teaching process simulates the hospital scene as much as possible *(Wang et al., 2021).*

Through students' independent thinking and collective cooperation, not only their ability to identify, analyze and solve a specific clinical problem is improved, but also the correct diagnosis and treatment concept, work style, communication ability and collaborative spirit are trained. From the perspective of medical practice, this method is conducive to cultivating students' practical ability *(Wang et al., 2021).*

2.1.2.2. <u>Problems facing medical students on application of CBL in medicine:</u>

Students' reactions to such an unfamiliar setting vary. For example, the flow and depth of the discussion may be disrupted by students being uncertain of how to respond to prompts from the case leader or other students. Class members might fail to assimilate the highly nuanced discussion and debate that case analysis often engenders, resulting in frustration or a growing disinterest with the topic and discussion at hand. The main cause of frustration is students' inability to trust their

own judgments and those of their peers to arrive at workable solutions *(McLean, 2016).*

Case preparation also constitutes an additional burden for the students, which increases academic pressure on them. Preparation can also be time consuming for students *(Haley et al., 2020).*

2.1.3. Reflection

The personal and professional development of medical students is driven by reflection contained in a portfolio of evidence. Manchester Medical School (MMS) suggested two models for students to use for this reflective teaching *(Cruess et al., 2018).*

With these models as a basis, students are encouraged to describe a situation, evaluate and analyze what was good and bad, and describe the effect on them and others. The aim of reflection should be to demonstrate that student experiences are learned from, therefore the final step of reflection is to draw up an action plan for similar future situations *(Morris, 2021).*

2.1.4. Evidence-based medical education

The need for research as a critical component of modern medical education has not only gained currency but also urgency Evidence-based medical education involves the systematic collection, synthesis and application of all available evidence, when available, and not just the opinion of experts. This represented a seismic shift from a position of expert based consensus guidance to evidence led guidance for evolving clinical knowledge *(Sharma et al., 2015).*

Evidence-Based Practice (EBP) is the integration of the best available research evidence with clinical expertise and patient's unique values and

preferences (i.e. personal concerns, expectations, cultural influences and individual characteristics during the clinical encounter). The Institute of Medicine (IOM), accreditation councils and health professional bodies consider EBP as a core competency needed for health professionals. Hence, EBP has become an integral part of undergraduate, postgraduate, and continuing health professional education curricula *(Albarqouni et al., 2018).*

2.1.4.1. <u>Role of Evidence-Based Medical Education</u>

Currently, the EBP stands as the "gold standard implementation of science as practice". This model has been imported from the medical domain as an approach to clinical decision-making that promotes the "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients *(Ward et al., 2022).*

The importance of evidence-based medicine has meant that physicians are expected to be skilled and knowledgeable in the use of research and scientific methods of enquiry as applied to medical practice *(Sokolet al., 2019).*

During undergraduate medical education, research instruction and involvement often provides the first opportunity for a medical student to gain exposure to research and participate in it *(Stone et al., 2018).*

Medical students who engage in research learn how to formulate cogent thoughts from the generation of research ideas through study implementation to dissemination. Also, it help them acquire skills of decision-making then prepare medical students to engage in the shared-decision making process with their patients *(Milota et al., 2019).*

Encouraging medical research improves critical thinking in guiding clinical judgement, the ability to competently locate and critically appraise the appropriate medical literature, interpret volumes of data and to integrate in clinical practice *(Stone et al., 2018).*

2.1.5. E-learning

The basic concept of e-learning is more than 150 years old. Attempt of learning was initiated through correspondence courses to facilitate learning beyond geographical and time barriers. Actual online learning began as intranet in 1960, where linked computer terminals were used to provide academic material to students. With the advent of internet in 1994, digital literacy spread its wings in academics paving way for formal, accredited online courses and modules. Easy availability of mobiles, internet services, web, and social media provided opportunities to learners for personalized learning experiences *(Saiyad et al., 2020).*

Medical education, like any other health profession education, requires high-quality educational methods. With the advances in technology and social media, e-learning is becoming a new and rapidly developing approach for medical education *(Jianget al., 2021).*

E-learning in the medical education field is a relatively new concept, but it is rapidly growing. The environment in which medical students learn today is vastly different than it was 20 years ago when the Internet was not such a dominant tool in medical education. E-learning platforms are now increasingly utilized by medical schools around the world and comprise adaptive tutorials, audiovisual clips, and virtual models. These educational media possess several distinct advantages over traditional didactic models of instruction *(Shabila et al., 2021).*

E-learning, also known as online education refers to the usage of electronic resources like internet, computers, and smartphones to acquire and disseminate knowledge. When enriched by audiovisual elements, e-learning can offer educational content and various tests supporting these contents, can facilitate access to necessary relevant information, and most importantly, provide an interactive environment for students and the faculty *(Olum et al., 2020).*

E-learning has been demonstrated to be as effective as conventional didacticism and can be used to foster self-directed learning. It encourages medical students to exert greater control over their learning by allowing flexibility over content and pace *(Amin et al., 2019).*

2.1.5.1. Factors affect e-learning:

Interaction and collaboration between learners and facilitators include considering learners' motivation and expectations, utilizing user-friendly technology; and putting learners at the center of pedagogy. There is significant scope for better understanding of the issues related to enablers and facilitators associated with e-learning, and developing appropriate policies and initiatives to establish when, how and where they fit best, creating a broader framework for making e-learning effective *(Regmi and Jones, 2020).*

2.1.5.2. Advantages of e-learning in medical education

Online teaching and learning hold distinct advantages over the traditional didactic ways of instruction, including; delivery of the newest evidence-based content to learners. It has been demonstrated to be as effective as traditional didacticism and can be instrumental in promoting self-directed learning. Online teaching also gives the learner ability to have greater control over their learning

due to the allowed flexibility (convenience) over content and pace *(Shabila et al., 2021).*

Students use e-learning technology to read lectures and course material outside the classroom, with the online classroom time is usually devoted to interactive problem-solving exercises. The use of e-learning will help them accomplish the aim of continuous professional growth, given the vastness of the program, the shortness of time and the often overburdened schedule. E-learning can also help students to assess their success in real-time *(Butola, 2021).*

E-learning is considered as a time-saving method of teaching. Additionally It makes education interactive visually using impressive content to learn and retain better Convenient learning from comfort zones, personalized guidance and mentoring multiple practice sessions flexible study time *(Obeidat et al., 2020).*

The teacher can evaluate competencies through online assessments, enabling learners to receive feedback for self-improvement *(Saiyad et al., 2020).*

The application of e-learning in medical education has been significantly enhanced during the COVID-19 pandemic. It has been suggested that e-learning might become an ideal solution to continue learning processes during the COVID-19 pandemic and other similar emergencies. Worldwide, many universities have applied e-learning for medical education during the COVID-19 pandemic *(Al-Balas et al., 2020).*

Cost-effectiveness: E-learning technology is much more cost-effective than most other methods of education. It provides education at a relatively lower cost than those for classroom facilities with access to all students around the world,

regardless of their educational and economic context, e-learning resources are accessible at a low price and provide them with better education *(Butola, 2021).*

2.1.5.3. <u>Challenges of e-learning in medical education</u>

The substitution of clinical sessions, which constitutes the backbone of medical education for teaching the clinical competencies, by e-learning, remained an important challenge *(Shabila et al., 2021).*

E-learning was hindered by multiple challenges that included not only the concern of initiating the virtual teaching process, but there were also the issues of ensuring connectivity to all students and faculties who may be in remote parts of the country *(Alblihed et al., 2021).*

The training of faculties and students by the IT departments/sections had to be planned and implemented, and technical and academic support had to be ensured.

Faculties have to devise quick, effective and educationally feasible means of virtual clinical training *(Alblihed et al., 2021).*

E-learning necessitates a more proactive, self-directed, self-regulated approach where students can put to use their meta-cognitive skills to plan, implement, and reflect on their learning *(Saiyadet al., 2020).*

So, e-learning is not helpful for students who are not self-motivated to learn *(Butola, 2021).*

Inadequate resources in terms of infrastructure (gadgets and internet) and skilled professionals to implement this platform were reported as important challenges for e-learning *(Olum et al., 2020).*

Also, insufficient or unstable internet connectivity, inadequate computer labs, lack of computers/ laptops, and technical problems were the highest challenge for adapting to e-learning *(Zalat et al., 2021).*

Chapter (3)

The Integrated Organ/Systems-Based Curriculum

Integration is considered to be a key part of medical education by the UK General Medical Council *(Morris, 2021).*

The dictionary meaning of the word integrate is " to form a more complete or coordinated entity, often by the addition of or rearrangements of elements *(Morris, 2021).*

On the other hand, integration means, "organization of teaching matter to interrelate or unify subjects usually taught in separate departments. "All strategies of integration in education are usually centered on these ideas *(Kim Bower et al., 2021).*

A traditional medicine course differs from an integrated medicine course, as integrated medicine courses teach scientific knowledge alongside clinical training so students will learn the material by topic, rather than by discipline. For example, when students learn about the digestive system, they will learn all of the physiology, biochemistry, anatomy, and clinical skill**s** etc. which are relevant to it, unlikely the traditional medicine course, where students learn the science first in the pre-clinical years and then move to a clinical setting *(Rockarts et al., 2020).*

The General Medical Council, which is a public body that maintains the official register of medical practitioners within the United Kingdom, recommends this approach to Medicine – and most universities now use this method of teaching *(Brauer and Ferguson 2015).*

3.1. __Historical review on the integrated system/organ-based curriculum:__

The first consideration is the genesis of the term 'integration'. In the past, teaching medical students in the basic sciences involved individual isolation of each discipline. It was conceptualized that curricula should be integrated, though without undertaking/considering research to evidence this view. Integration has been talked about in the terminology of medical education for over half a century *(Qaisi, 2021)*.

Generally, medical courses today are delivered in the name of integration by organizing the subject matter by the body system to which it relates: so that, for any one body system, the biology, physiology, anatomy, pharmacology, and associated bio-psychosocial science are covered in a parallel and interconnected manner. This approach to medical education using a system-based course is not new. Historical attempts to integrate clinical examination with basic science, pathology and clinical correlates have been made *(Morris, 2021)*.

The medical curriculum has historically changed with the definition of health and illness. From the definition of disease as an anatomical alteration of the organs in the eighteenth century to the understanding of its multicausality and influence on lifestyles, the social determinants, and social, political, and economic realities of defining health disease as a biological, social, and cultural process were considered *(Quintero-Hernandez et al., 2016)*.

Integrated curriculum is defined an as "education that is organized in such a way that it cuts across subject-matter lines, bringing together various aspects of the curriculum into meaningful association to focus upon broad areas of study". It views learning and teaching in a holistic way and reflects the real world, which is interactive *(Khan and Sethi, 2020)*.

Around the world, in places like the US and Canada, the traditional curriculum has disappeared to permit integration between basic sciences and clinical sciences, which are taught throughout the curriculum. But this has not been the case in countries with limited resources like Nigeria *(Quintero et al., 2016).*

Commonly, integration is taken to mean integration between subjects, but there can be more to it. Another type of integration that is used is the one between various domains of learning, knowledge skills, and attitudes. There has to be integration between clinical and behavioral sciences as well. Medical education officials have now also started talking of integration not only between subjects or domains but also between professions, such as (physicians, nurses, physiotherapist, and dentists) *(Römgens et al., 2020).*

3.2. Importance of integration in medical education

Why integrate? Integrated teaching is an important strategy to promote meaningful learning and make it last longer. The systems-based model is more student-centric and provides good-quality education.

An integrated curriculum purposefully draws together knowledge, skills, attitudes and values from different subject areas to develop a more powerful understanding of key ideas. Curriculum integration occurs when components of the curriculum are connected and related in meaningful ways by both the students and teachers *(Obi, 2022).*

Integration promotes deep learning; students centered teaching, meaningful learning, recall of knowledge, retention of knowledge, application of knowledge and interdisciplinary working *(Tejinder et al., 2021).*

Integration promotes deep learning as integrated learning is believed to be an approach that is oriented towards learning practices that are appropriate to the students' needs in their professional life *(Dubin et al., 2018).*

Integration plays an important role in promoting students centered teaching through the integrated relationship between concepts that will facilitate students to be actively involved in the learning process and encourage students to understand the concepts they learn through direct experience and relate them to real experiences *(Akib et al., 2020).*

Effective integrated learning will help in meaningful learning as it create broad opportunities for students to see and build interconnected concepts. Thus, student learning outcomes maybe more meaningful than if they separately taught *(Akib et al., 2020).*

Integrated learning provides an overview of how the learning experience of students in an integrated manner gives a meaningful impact and how integration is done. Just as is necessary for each subject to be treated as an integrated whole in a gestalt based curriculum, so all the subjects of the curriculum need to be related so that the learner's educational experiences result in coherent and meaningful gestalt *(Akib et al., 2020).*

In addition, integration helps to efficiently recall knowledge when it is required from this perspective *(Tejinder et al., 2021).*

Also, integrated teaching and other methods of training can improve knowledge retention and decision-making. Knowledge retention, or knowledge management, is the process by which new information is transferred from short-term to long-term memory *(Cutumisu et al., 2019).*

Integrated and self-directed curriculum approaches appear to promote application of knowledge, long-term retention of basic science knowledge, logical reasoning, and critical appraisal. Therefore, it is fair to consider that integrated teaching help students to use basic science principles to solve complex and atypical medical problems and improve clinical practice *(Malau-Aduli et al., 2019).*

Multidisciplinary care model that brings together different providers such as physicians, nurses, social workers, and other specialists not only improve health care outcomes but also reduce potential for errors. Given the need for doctors to actively collaborate with multiple professionals, it becomes a key necessity to introduce such learning modules early in the medical curriculum. Similarly, the medical students should be educated about the structure of the healthcare system they want to be a part, early in their curriculum. This will help them to integrate into the nation's healthcare system and improve their understanding of healthcare legislations, concerns and issues within the healthcare system *(Dash et al., 2022).*

3.3. Levels of integration:

There are three main types of integration that includes:

3.3.1. Horizontal integration

(In which integration is included within a program segment or year) *(Bandiera et al., 2018).*

It brings together the disciplines, topics, and subject. It refers to the provision of learning within the structure where individual departments/subject areas contribute to the development and delivery of learning a meaningful, holistic manner. By this process and links are made between the different subject areas and

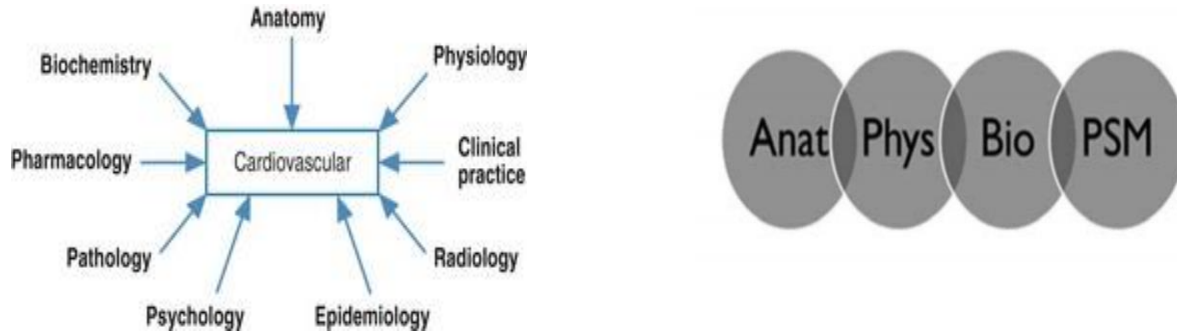that learning is enriched by the connections and interrelationships being made explicit *(Obi, 2022).*

Figure (2): Horizontal integration *(Husain et al., 2020).*

3.3.2. Vertical integration:

(In which integration is across successive program segments or years) *(Bandiera et al., 2018).* It brings together the basic and clinical sciences *(Obi , T. 2022).*

Vertical integration in medical education may be viewed as a reorganized curriculum structure (as a move from an H to a Z shape - see Fig. 3) with a cognitive purpose, to have students learn and remember better *(Wijnen-Meijer et al., 2020).*
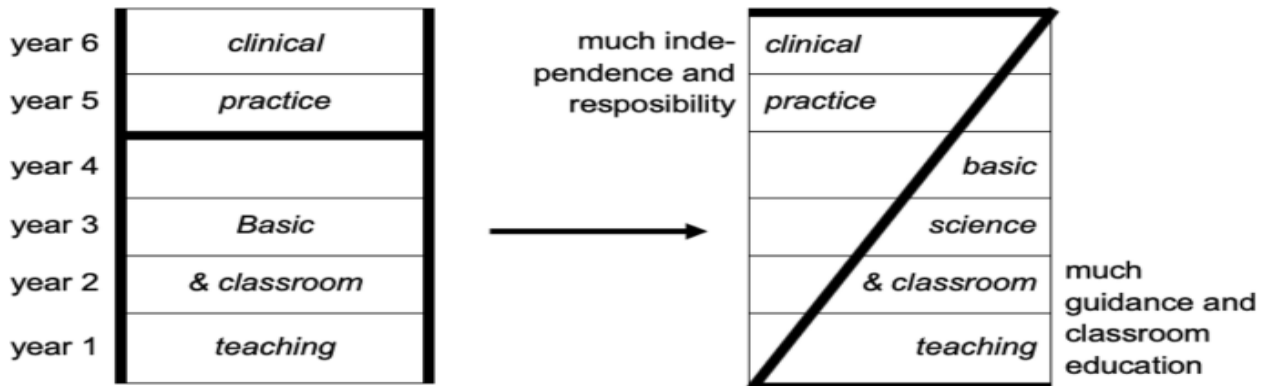

Figure (3): Vertical integration: The traditional H-shaped medical curriculum is being replaced by a Z-shaped curriculum model *(Wijnen-Meijer et al., 2020).*

So, integration can happen within subjects being taught at the contemporary stage (e.g., basic sciences), in which case, it is called a horizontal integration. Some experts call it alignment. This can happen when anatomy, physiology, and biochemistry, of say thyroid, as an example, taught at the same time. Integration can also happen between subjects taught at different phases of curriculum (e.g., physiology and medicine), in which case, it becomes vertical integration *(Tejinder et al., 2021)*.

3.3.3. <u>Integration ladder</u>

Harden's integration ladder is a tool for planning, implementation and evaluation of medical curricula. It is a ladder with 11 steps in the level of integration *(Sethi and Khan, 2020)*.

3.3.3.1. <u>Eleven steps in the ladder</u>

The integration ladder is shown in Fig. 4. It has 11 steps from subject-based to integrated teaching and learning. These steps on a ladder overlap and have vague boundaries; these steps are seen as a marker of quality and criterion for assessing the degree of innovation in a medical curriculum *(Husain et al., 2020)*.

In the first four steps on the ladder that called isolation, awareness, harmonization and nesting, the emphasis is on the subjects or disciplines. Moving up the ladder, the following six steps (temporal coordination, sharing, correlation, complementary, multidisciplinary and interdisciplinary) emphasize integration across several disciplines. In the final step "the transdisciplinary step" the student takes more responsibility for the integration and is given the tools to do so *(Junevicius et al., 2021)*.
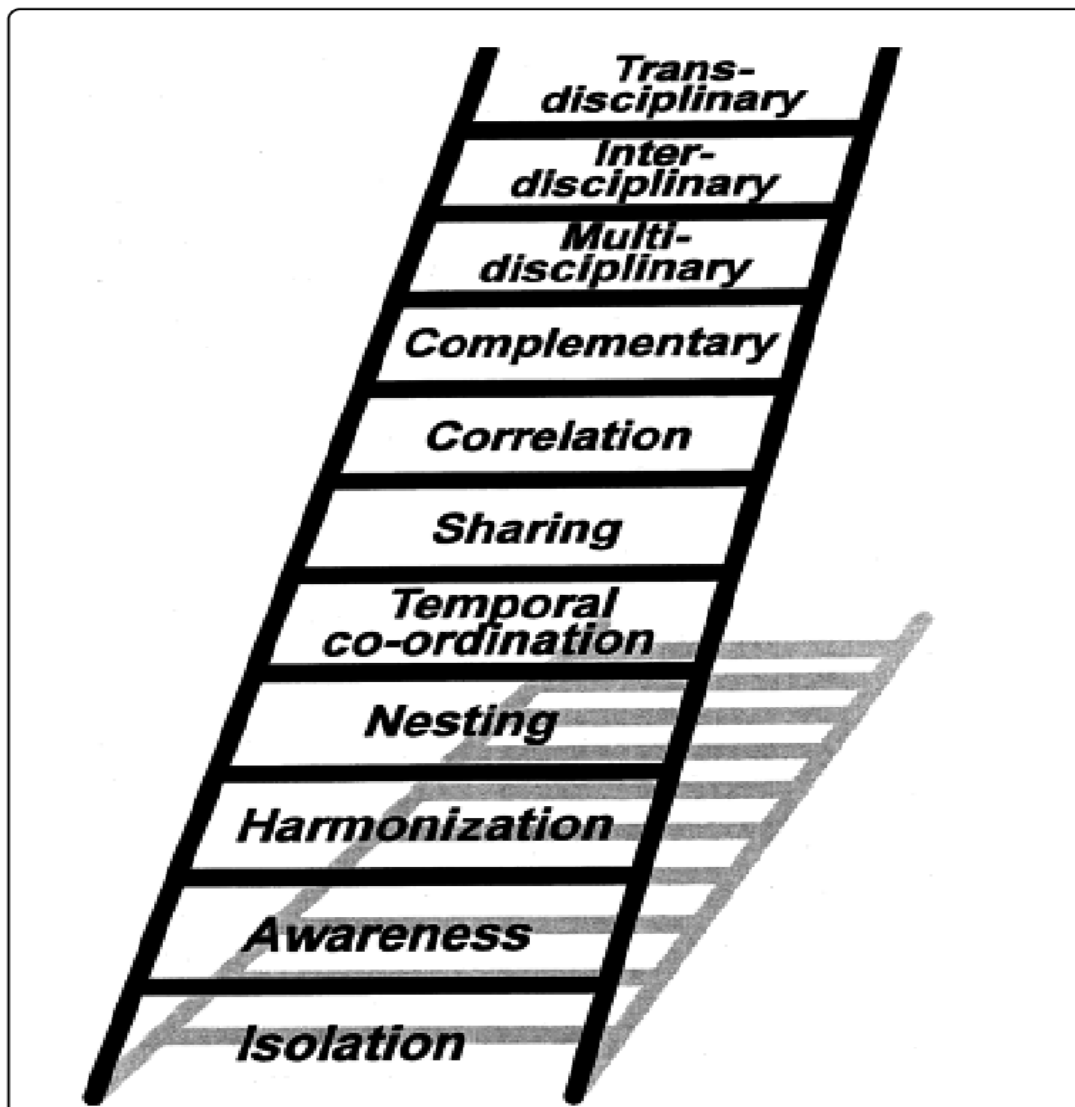
Figure (4): Harden's Integration Ladder *(Ananthakrishnan, 2018).*

Step one is called isolation or fragmentation in which each departments or subject specialists organize their teaching without consideration of other subjects or disciplines. Each discipline looks, from the perspective of their own discipline, at the curriculum content in terms of areas to be covered, depth of coverage, sequence and timing. This isolation approach may be found in the traditional medical curriculum with blocks of time allocated to the individual disciplines. Students attend a lecture on anatomy, and then move on to a lecture in physiology

with neither lecturer being aware of what was covered in the other lecture *(Omoniyi-Esan, 2019).*

At the stage of awareness, harmonization and nesting, there is increasing interaction between departments, but the subjects are still taught separately. In awareness, the teachers are aware of what is taught in the other disciplines, but subjects are not harmonized. But, at the stage of harmonization, there is interaction amongst the teachers both informally and formally about the content of instruction, but the subjects are still taught as individual disciplines. This is also known as the connection step. The fourth step is nesting that involves identifying generic skills that cut across other subjects and teaching it as a subject on its own while other subjects are taught individually. *(Ananthakrishnan, 2018).*

Temporal coordination is also known as parallel teaching in which each subject remains responsible for its own teaching program. The timing of the teaching of topics within a subject, however, is done in consultation with other disciplines The timetable is designed in such a way, that similar topics are taught at the same time, but students are left to make the connections by themselves This approach has been described also as "parallel" or "concurrent" teaching. In a basic medical science program with temporal co-ordination, physiologists address the subject of the function of the heart at the same time as the anatomists look at the structure of the heart. Students are left to make the links between the two subjects but this is facilitated by the timetabling, with the heart being examined from the two perspectives in the same time-frame *(Härkki et al., 2021).*

The sixth step is called sharing at which two disciplines may agree to plan and jointly implement a teaching program. The shared planning and teaching takes place in two disciplines in which overlapping concepts or ideas emerge as

organizing elements occur. The two disciplines which come together to offer such a program are usually complementary subjects and the joint course produced emphasizes shared concepts, skills and attitudes. The focus of the course is usually in these shared elements *(Omoniyi-Esan, 2019).*

In the correlation step of integration, the emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. The next step concerning the complementary approach that has both subject-based and integrated teaching. The integrated sessions now represent a major feature of the curriculum. These sessions are recognized to be, in terms of time, allocated resources and assessment as important, if not more important, than the subject-based teaching. The focus for the teaching may be a theme or topic to which the disciplines can contribute. This is discussed further in the following sections. Running alongside the integrated teaching are scheduled opportunities for subject-based teaching. The implications of the approach for assessment are important *(Junevicius et al., 2021).*

Then, the multidisciplinary approach brings together a number of subject areas in a single course with themes, problems, topics or issues as the focus for the students' learning. The themes selected as the focus in an integrated course may function in different ways. The themes can delineate an area in which practical decisions have to be made and which serve as a focal point of interdisciplinary thinking. Problems and the tasks to be undertaken by the professional may also be used as a focus for integrated teaching. The task may be the management of a patient with abdominal pain, screening for diabetes or the mounting of a coronary

artery disease prevention program. In task-based learning, the learning is concerned not only with mastery of the tasks but with learning related to the tasks, including an understanding of the relevant basic and applied medical sciences *(Mathur et al., 2019).*

Step ten is the inter-disciplinary integration. In this step of integration students can study of a phenomenon that involves the use of two or more academic disciplines simultaneously. The interdisciplinary teaching implies a higher level of integration, with the content of all or most subjects combined into a new course with a new menu. In the interdisciplinary course there may be no reference to individual disciplines or subjects, and subjects are not identified as such in the timetable.. In multidisciplinary teaching, the contributions of the individual disciplines to the theme are stated implicitly in the curriculum documents and the timetables *(Husain et al., 2020).*

So, Interdisciplinary learning involves teacher approachability, supports student inquisitiveness, and allows teachers to anticipate many aspects of classroom behaviors to reduce or prevent unwanted behaviors more effectively. Implicit in the move from a multidisciplinary to an interdisciplinary approach may be the loss of the disciplines' perspectives *(D'Souza et al., 2021).*

The top of the ladder represents transdisciplinary integration in which students learn in a real world setting that stimulates internal integration in the mind of the learner. At this final step, the learner takes more responsibility for the integration. The focus with trans-disciplinary integration for learning, however, is not a theme or topic selected for this purpose, but the field of knowledge as exemplified in the real world. Of note, Harden originally described

transdisciplinary integration as only occurring in the clinical clerkship setting *(Heck and Chase, 2021).*

Therefore, the trans-disciplinary approach, which dissolves disciplinary boundaries, is capable of enabling decision-makers to work towards understanding and enhancing value by fostering awareness of stakeholders' perceptions of value *(Maguire and Murphy, 2022).*

3.4. <u>Recent trends in integration practice</u>

Despite recent advances in the theory of integration and concerns related thereto, it appears that the curricular integration train has left the station. There has been a marked increase in the number of publications related to integrated curricula in the last 10 years *(Bandiera et al., 2018).* Unless we train our students that way right from the beginning, it may be difficult for them to accept it later. *(Römgens et al., 2020).*

3.4.1. <u>Early clinical exposure (ECE):</u>

Early clinical exposure (ECE): Although it may be tempting to think of vertical integration as more useful, horizontal is of no less importance, especially in the conventional models of medical education *(Morris, 2021).*

ECE is a method that allows early year medical students to spend time learning clinical skills alongside their basic science learning *(Kar, et al., 2017).*

3.4.1.1. <u>Role of ECE in improvement clinical skills of medical graduate:</u>

ECE or authentic human contact in a social or clinical context during preclinical medical training has been adopted by medical schools worldwide to close the gap between basic and clinical sciences. Recent studies have shown that certain clinical

practices have already been integrated into early stages of medical education throughout the world. While the term used to narrowly refer to formal clinical experiences early in medical school, ECE is based on abroad definition that includes community contact and early student-patient contact, as well as early clinical exposure *(Liu et al., 2021).*

Physical presence of medical students in both inpatient and outpatient settings has been an active principle tenet of early clinical immersion experiences and the clerkship curriculum *(Rose, 2020).*

Studies have proven role of ECE in improvement students' academic performance also the efficiency of ECE in building a sense of professionalism has been proved *(Liu et al., 2021).*

ECE also helps to learn the ethical dimensions of doctor-patient relationship *(Tayade and Latti, 2021).*

3.4.1.2. Role of student in ECE:

In the integrated curriculum, ECE makes an overall impact on student's performance and confidence. In the curriculum, students can have following four simple roles in early clinical posting which are (passive observer, active observer, actor in rehearsal and actor in performance) *(Tayade and Latti, 2021).*

As a passive observer, medical students can be observed in different situations in the hospital in real-time practices such as the minor procedure at outpatient department level, minor surgeries, patient interaction, and patient's response. Actual visualization of medical or surgical procedure rather than theoretical reading and mugging can have a higher impact on memory retention and development of competency *(Berry, 2020).*

As an active observer, the students can observe a few simple clinical skills such as catheterization, pleural fluid tapping, and intubation. Students can note the checklist for these procedures. Students can correlate these things with what they were taught in a classroom setting. The active involvement of students enriches the memory of clinical skills *(Han et al., 2019).*

As an actor in rehearsal, the students perform a task for learning such as performance of catheterization, and intramuscular injection. These real-time rehearsals can be initially performed on simulation-based models can be more helpful *(Tayade and Latti, 2021).*

Finally, as an actor in performance, the students can assist the resident in performing procedures such as catheterization, and intramuscular injection. This makes education more interesting. The active involvement of students enriches memory in clinical studies. Faculty should promote students active learning through self-reflection and participation in case discussion *(Szulewski et al., 2019).*

3.5. Challenges in Implementing Integrated Curriculum

3.5.1. Faculty members' concerns about an integrated program Curriculum:

Most of the staff members expect that this system is bad, not only for the students but also for the health of the people *(Mohammed, 2020).*

Overall changes in the academic culture of the Faculty are necessary. All academic community of the Faculty and representatives of the business community are to be engaged in the development and implementation of the integrated curriculum *(Wilkins and Alberti 2019).*

3.5.2. Resistance to the curriculum reform:

Several participants of the program, including students, were reluctant about the curriculum reform. They thought that decreasing lectures to incorporate social discussions of learning outcomes in small groups sets aside many important topics that students will not learn, hence affecting the quality of our graduate medical students *(Quintero-Hernandez et al., 2016)*.

Resistance of the staff members is by far the most difficult problem facing Implementing the integrated curriculum. Many of the staff members believe that the new system is wrong and it is impossible not to teach the curriculum that was taught maybe for more than 100 years *(Mohammed, 2020)*.

3.5.3. Insufficient number of staff

Staff members in some departments are too few. The new system decreased markedly the number of lectures, and teaching depends mainly on small group discussion, practical lessons, and other activity. So, instead of one lecture given in one hour by one tutor *(Giuliani et al., 2021)*.

3.5.4. Administrative and financial resources

We are in a bad need of new administrative system for registering the students and following them through their study. This means efficient software with many computers and trained employees and staff members. A new system came with new requirements. Without enough and reasonable resources, it would be impossible to fulfill the needs of implementing it that re hindered by lack of laboratories, class rooms and equipment *(Mohammed, 2020)*.

Unequipped teaching room is one of challenges in implementing integrated curriculum. Because of presence of multiple small groups of students, each room

should have enough space, enough chairs for the students, suitable table, computer, projectors, screens, boards, flipcharts, and markers *(Ramgobin et al., 2022).*

3.5.5. Technicians and other employees

Lack of technicians and inability to cope with the new system used to be some of the greatest problems facing the implementation of the new integrated system *(Ferguson-Patrick, 2018).*

3.5.6. Impact of new integrated curriculum on Students

Although, Students on the new integrated system reports earlier clinical exposure than those on the traditional curriculum, which provided them with valuable experience of interacting with other healthcare professionals *(Samuriwo et al., 2020),* they are exposed to anxiety due to presence of a new unknown system nobody knows about it even their tutors *(Mohammed, 2020).*

Chapter (4)

<u>**Determents of Academic Performance of Medical Students**</u>

Students are most essential asset for any educational institute. The social and economic development of the country is directly linked with students' performance. The students' performance (academic achievement) plays an important role in producing the best quality graduates who will become great leader and manpower for the country thus responsible for the country's economic and social development. Academic achievement is an apparent phenomenon in many developing countries *(Maganga, 2016).*

Medical schools are facing a shift in their teaching system to overcome different challenges facing medical education, so educators direct their efforts to close the gap between the theoretical knowledge and practice of medical graduates by different methods like restructuring curricula, developing small-group sessions, and increasing self-directed learning and independent research. *(Okuda et al., 2009).*

There is an even greater challenge in the field of medical education, where multiple research methodologies are used by scholars from ideologically polarised backgrounds to answer the same question *(Hesse-Biber, 2015).*

A medical student's academic performance attracts the attention of all those involved in medical education. Many medical education stakeholders are concerned about students' performance as it reflects their various areas of interest. Those stakeholders are not only faculty members but also medical school selection committees, curriculum planners, and instructional designers *(Al Shawwa et al., 2015).*

Many medical students face different academic difficulties in which they are unable to meet the academic standards set for preclinical or clinical stages of the course. So it is important to explore how medical students make sense of their academic difficulties, because their beliefs about the causes of their difficulties influence how they treat with support processes and remediation programs *(Kirtchuk et al., 2021).*

4.1. <u>Determents that affect academic performance of medical students</u>:

One of the most important indicators of the effectiveness of teaching can be the academic achievement of learners. Academic achievement is the ability to prove academic achievement in the acquisition of the planned outcome. Many scholars emphasize the impact of mental and cognitive abilities on academic achievement; however, having high intelligence does not guarantee academic achievement, and individuals need to be aware of their learning styles. The learning styles are methods of learning applied by students in achieving, analyzing, and internalizing their newly acquired knowledge *(Nabizadeh et al., 2019).*

The transition into the university can also affect students' academic success, especially during their first semester. This transition can be tough for students as they lack knowledge on how to find themselves as learners at university, how they should learn, how to set academic goals and how to progress toward them. Hence, it is very hard to get success at university for the first-year students as they need to deal with new academic surroundings, policies, procedures and academic expectations *(Jony, 2022).*

Many studies were conducted to identify the factors that affect (positively or negatively) student achievement. Identifying those factors and the correlation between them is a very complex process *(Khan et al., 2020).*

The determents that affect academic performance of medical students include socioeconomic determents, personal factors and academic factors *(Khan et al., 2020)*.

4.1.1. <u>Life style and social factors</u>

There are multiple socioeconomic determents that affect academic performance of medical students like parents' education, family income, self-motivation, age of student, learning preferences, class attendance, gender, age, residential area

Socioeconomic status: socioeconomic status of the parents of students has a great impact on student's academic performance. Multiple studies states that students learn better if they are from an above-average or average income family *(Maganga et al., 2016)*.

Families support: Family plays a big role in helping collecting and analyzing information, depending on the experience and knowledge of family members. Family size and whether the student lives with family *(Al Shawwa et al., 2015)*.

Family problem and issues: family problems also cause a student to lose focus on studies, and restraint the level of motivation and determination. Family problems such as illness or death of a family member or a break-up between the parents are contributing reasons for poor academic performance. Regardless of the severity, these family problems work as a constraint towards a student's concentration and motivation in studying and eventually leading to poor academic performance *(Jony, 2022)*.

Residential issue: academic performance of medical students was found to be affected also by the distance between home and the college, the mode of transportation, either public or private *(Al Shawwa et al., 2015)*.

Students who joined the university from outside cities and rural areas find it very difficult to adjust to their new lifestyle. For many, they have never lived outside their family and are out of their home for the very first time. Therefore, homesickness is an issue for many *(Jony, 2022).*

Poor Health: research proves that a health problem, whether physical or mental is expected to adversely affect students' academic performance. Physical health problems such as an injury or illness directly prevent a student from attending classes, participating in group activities or preparing examinations which are reflected during the final grading of a particular semester. However, a mental health problem seriously affects a student's concentration level and destroys self-motivation which is very crucial for studying and good academic performance *(Jony, 2022).*

4.1.2. <u>Personal factors contributing to medical students' performance:</u>

Personality is another factor influencing the patient-physician relationship and patient care. Personality traits have long been recognized as strong predictors of subjective well-being. Performance and patient care have been shown to be affected by high levels of stress.

Motivational beliefs, physical and emotional well-being have great impact on medical students' performance. In the USA, the Association of American Medical Colleges (AAMC) states in their learning objectives for medical school education that "physicians must be compassionate and empathetic in caring for patients" *(Abe et al., 2018).*

In addition, the feeling of a sudden independent life and no one to monitor the mind setup of students creates a great obstacle to academic performance *(Jony, 2022).*

Sleep disruption severely impairs learning ability, affecting academic performance in students *(Seoane et al., 2020).*

Sleep deprivation to less than 6–7 hours per night can lead to significant impairment of daytime alertness, impaired neurocognitive and psychomotor performance (reduced attention, concentration, memory, problem-solving ability, critical thinking), and diminished academic performance, often resulting in poor grades . Sleep-deprived students tend to avoid more difficult tasks. Sleep-deprived students are also often unaware that their academic difficulties may be related to lack of sleep *(Habiburrahman et al., 2021).*

Incapability in stress management and difficulty remembering facts and figures also considered as personal factors contributing to medical students' performance *(Kim and Shin, (2021).*

Study skills are one of the most decisive predictors of academic performance. Poor time management, poor study habit, weak writing and presentation skills in English, lack of interaction with course teacher and lack of academic goal setting are examples for poor study skills which I turn negatively affect academic performance *(Jony, 2022).*

Chapter (5)

Academic Factors affecting Academic Performance

Academic factors affect academic performance includes Classroom attendance, prior academic achievement (i.e., GPA or grade-point average) and the concepts of self-regulated learning (SRL) *(Kirtchuk et al., 2021).*

5.1. Classroom attendance

Classroom attendance has a great impact on academic performance. It is an important issue for both students and their lecturers. So, the association between students' class attendance and academic performance had been the subject of several studies in a wide variety of courses. *(Elbilgahy et al., 2021).*

Several previous studies have shown that class attendance is an important determinant of academic outcomes: students who attend more classes earn higher final grades, so lecture attendance is critical for learning *(Fadelelmoula, 2018).* Therefore, any problems related to attendance should be identified as early as possible so that appropriate measures can be taken to address them. To motivate student to come to class, some universities give students bonus points for attending classes *(Bai et al., 2018).*

5.1.1. Impact of classroom attendance on academic performance

Classroom attendance helps teachers and students to acquire skills, build good relationship and progress *(Ahmad et al., 2017).*

Classroom attendance also promotes an atmosphere of trust, respect, and teamwork; promoting high and consistent academic standards *(Ingersoll et al., 2018).*

Poor lecture attendance can negatively affect the medical school experience in several ways. For example, faculty morale is damaged by low lecture attendance, which can erode the quality of instruction *(Emahiser et al., 2021).*

Faculty tends to view class time as an opportunity to help their students develop their professionalism, critical thinking skills, and deeper understanding of the sciences that are useful for future physicians *(Emahiser et al., 2021).*

5.1.2. **Factors affect lecture attendance**

There are Several notable factors that influence attendance and grades are motivation, prior grade point average (GPA), self-financing by students, hours worked on jobs, quality of teaching, and nature of class lectures *(Hollett et al., 2020).*

The main factors affecting student attendance include mandatories of lectures *(Huang et al., 2019).*

In today's learning environment, traditional methods of learning are continually being complemented by innovative teaching methods such as blended delivery and the use of online tools. The use of information technology means that students no longer have to sit through lectures to get course information, but through web-based approaches, information can be obtained at the click of a mouse. Indeed, the requirement to be in class has shifted from compulsory to voluntary for most courses, as long as the student is using the available tools to keep up to date with the course content and maintains good academic performance *(Tani et al., 2019).*

Personal factors like stress, time management and skills. Also, course-related factors and teacher-related factors influence students' attendance *(Hollett et al., 2020).*

The classroom environment likes the distance between resident area and the college and difficulty travelling to the university *(Huang et al., 2019)*.

Research suggests that blended learning has a major influence on a student's decision to attend class or engage with online resources *(James and Seary 2019)*.

Other factors can be calcified into extrinsic factors such as rewards and intrinsic motivators, such as, notably, student interest, the desire to be successful and prove themselves attitudes and supportiveness of educators; all exert an effect on lecture attendance *(Huang et al., 2019)*.

5.1.2.1. <u>Course-related factors:</u>

Course-related problems that students face may include: lack of interest in the subject, especially when it had been taught in another course or if it far from real life and the requirements of practical life, the lecture notes and prepared materials being presented in a boring way. Also, the scope and difficulty of the subject and the possibility of learning about the same subject outside lectures are considered course-related problems *(Soffer and Nachmias, 2018)*.

Change in curriculum content and the quality of learning process and curriculum that require deep understanding and engagement in the process of learning *(Yau et al., 2020)*.

Feeling that the course does not live up to their expectations, also, availability of course outlines affect students' attendance *(Zhang et al., 2020)*.

The gap between theoretical course and clinical needs: students in clinical learning environments are often unable to match the theoretical content learned in

the classroom with what they are actually doing in practice and consequently, they cannot provide the care competently for patients. multiple studies have shown some of the factors that the gap between theoretical course and clinical needs may be due to system inadequacies, resource restrictions, lack of experience, poor workplace condition and the lack of collaboration of clinical settings and educational institutions with students *(Hashemiparast et al., 2019).*

Feeling that the course is not being delivered in the fair or right way, feeling not convinced with a course or department's policy or being under motivated on the course affect lecture attendance negatively *(Precourt and Gainor 2019).*

Facilities on the course: the accessibility and the actual value of learning-facilities e.g. computer, library, research laboratory as well as academic strategies applied by the faculty. Institutes with lacking of elementary services and assets such as recommended text books may have reduced academic-performance *(Mushtaq et al., 2019).*

Daily study hours and accommodation trend have a role to play in determining the academic achievement of students *(Rahiem, 2021).*

The quality of study and the focus on the course can directly improve the academic performance that learning strategies and motivational strategies *(Nabizadeh et al., 2019).*

5.1.2.2. Teacher-related factors:

Teachers are the providers and facilitators of basic information, abilities, and states of mind required for the advance and future of student nurses.

Medical teachers should recognize their students' motivations and prevailing learning strategies, monitor their learning in their academic environment, and encourage them to be engaged in learning *(Nabizadeh et al., 2019).*

Teacher-related factors also play a significant impact on students' academic performance. The performance of a teacher affects attendance as the students have a better chance of understanding the subject if the teacher has full control over it thus help the teacher will easily deliver the knowledge in such an easy way that the students understand and not struggle for understanding. An attendance rate at live class sessions is also related to the teaching style adopted by the instructor *(Emahiser et al., 2021).*

At times, the teacher does understand the subject but fails to communicate it effectively due to lack of communication skills like intelligence, confidence, the ability to present the subject in An interesting way and stability in making-decision, which in turn influence the university achievement of the students *(Mushtaq et al., 2019).*

Coming late to class or not showing up for it (absent) may have a negative impact on the students' performance If the teacher fails to appear for classes, then the interest of the students in the subject is already lost which results in not paying attention at all. The result of it all will be that the students will not like the teacher and the subject as well in the future . Although not all students react the same way, many students will still be interested in the subject due to their likeness of it but might not perform up to standards because of the irresponsibleness of the teacher *(Khan et al., 2022).*

Criticism and motivation of the students by the teacher has great importance in their academic performance. In education, the effect of motivation on students is considering an important factor of student learning. Frequent scolding by the teacher may make the student less enthusiastic and may eventually perform poor in the subject against their real self. It has been proved that motivation help student to keep interested in studies. Appreciation can be in a form of kind

words or present them with something to boost up their morale or reward those *(Madigan et al., 2021).*

Shortage of the staff in the clinical area and teacher's attitude towards its students also affects the classroom attendance *(Mohmmed et al., 2020).*

5.1.2.3. <u>The classroom environment.</u>

The classroom is a very important area in the grooming of a student, it is highly necessary to understand the factors affecting the overall class ambiance to achieve maximum output. What needs to be understood is that if schools do play a major part in teaching the upcoming generation of students how to be a successful pillar of the society then every preventive measure must be taken to ensure that the students thrive in the provided learning environment *(Said et al., 2018).*

5.1.3. <u>The reason for the downward trend in lecture attendance</u>

Lecture attendance has been a growing concern for medical educators for over a decade due to the continuing downward trend. Absenteeism refers to a situation where the learner is not available in the faculty for an entire day. Absenteeism increases when a medical student does not attend in classroom and clinical learning area *(Jones and Korula, 2021).*

The reason for the downward trend in lecture attendance has several explanations, with most rooted in evolving educational technology. First, most medical schools currently record lectures, which allow students to view them at their own pace—accelerating or rewinding the recordings as needed however, because some students may view them instead of attending the live class session,

thereby decreasing attendance, while others may use them to review selected live lecture material, which may have been unclear *(Emahiser et al., 2021).*

A second contributor to low-class attendance is the growing number of supplemental medical education materials, some of which are freely available online. Large portion of medical students use online resources to study. These online resources make the teaching material available anytime *(Emahiser et al., 2021).*

The introduction of social media like Facebook, Twitter, Instagram, etc., has brought the world in the grasp of a small smartphone. The students now have access to the best graduates from the finest medical institutes in the world. Apart from social media pedestals, focused medicine-related academic networks also came to the horizon in the past decade. These include Research Gate, Academia.edu, E-Medicine, Medscape, and other programs that also targeted medical literature like Google scholars, Linked In, etc. *(Alabdulwahhab et al., 2021).*

Poor self-motivation, in particular, is one of the most potent factors. It leads to a decrease both in academic performance and in interactions with lecturers *(Hettiarachchi et al., 2021).*

The lack of suitable resources, shortage of academic staff, equipment in the areas of practical training in hospitals, as well as insufficient lab numbers, and low ratio of patients to students make the students don't have enough training and practice and increase their absenteeism rate *(Kalyani et al., 2019).*

Lack of interest and unchallenging curriculum were common causes for absenteeism *(Chyutin, 2021).*

A desire for activities with peers, negative self-image and self-esteem, lack of subject interest, lack of personal interest in studies the mental capacity of a student that does not match with the course update *(Abdelrahman and Abdelkader 2017).*

Additionally, difficulty in adapting to the university environment is one of the factors that increase student absenteeism *(Lim et al., 2019).*

5.2. Self- regulated learning (SRL)

Self- regulated learning (SRL) has been one of the predominant issues in the study and practice of medical education in the last 4 decades *(Ainoda et al., 2005).* It has also been shown that self-regulated learning is one of the best predictors of academic performance *(Lucieer et al., 2016).*

SRL is the ability of students to attribute their academic performance. SRL is defined as an active, constructive process by which students set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features of the environment *(Zheng et al., 2020).*

Self-regulation can be defined as the processes that individuals use to guide their goal-directed activities by controlling, managing, and adapting their thoughts, feelings, and actions *(Artino et al., 2022).*

Self-regulated learning is a proactive rather than as a reactive learning process that is used to define learning goals and develop effective strategies for learning *(Zimmerman et al., 2015).*

5.2.1. **Role of SRL in improvement the students' academic performance**

SRL is one of the determinants of performance of the students. It is an academically effective form of learning, through which before acquiring knowledge, the student set an objectives and make plans; throughout the learning process, the student monitor and regulate attitude, cognition, and motivation; and reflect on the learning process. The goal of this type of learning is to produce self-regulated learners who always have both the will and skill to perform task and eventually from self- regulated learners they will become successful learners *(Layco, 2020).*

Decades of research supports the idea that the theory of SRL can promote human learning and development in various contexts. Scientific thinking found that individuals who self-regulate their learning exhibit improved time management skills, increased reflection, increased motivation, increased task interest and improved perceptions of self-efficacy *(Cleary, 2021).*

SRL has also been shown to improve student engagement, increase academic performance, and may also be able to support students across all developmental levels *(Cleary & Labuhn, 2013).*

Self-regulation enables people to function effectively in their personal lives as well as to acquire the knowledge and skills needed to succeed in higher education and the workforce *(Artino et al., 2022).*

Students with and without learning disabilities were able to write longer, more comprehensive, and higher quality essays after receiving SRL strategy instruction. Additionally, in their hierarchical regression analyses.

Student's SRL ability was a better predictor of academic achievement than even student self-discipline *(McPherson et al., 2019).*

Self-directed learning involves medical students' self-assessment of learning needs; independent identification, analysis, and synthesis of relevant information; appraisal of the credibility of information sources; and feedback on these skills *(Hill et al., 2020).*

5.2.2. <u>Main components of SRL</u>

It includes three main components: cognition, metacognition and motivation. *(Panadero et al., 2017).*

Cognition includes skills necessary to encode, memorize, and recall information. Metacognition includes skills that help learners to understand and monitor their cognitive processes. Motivation includes beliefs and attitudes that affect the use and development of cognitive and metacognitive skills. *(Banarjee et al., 2014).*

Application of SRL to medical education can help medical students exploring the journey from novice to experienced learners by helping them took control of their learning with more focused goals which in turn improve their academic performance *(Kirtchuk et al., 2021).*

This process helps people to transform mental abilities in academic skills, like setting goals, developing learning strategies, and monitoring the progress and effectiveness of their learning. SRL also help learners Know how to monitor the progress of his own learning process and how to control and adapt his learning behavior, that is seen as a requirement for being a truly effective learner *(Lucieer et al., 2016).*

Self-regulated learners are aware when they know a fact or acquire a skill and when they do not. Unlike their passive classmates, self-regulated students proactively seek out information when needed and take the necessary steps to master it. When they encounter obstacles such as poor study conditions, confusing teachers, or abstruse text books, they can find a way to overcome these obstacles and succeed. Self- regulated learners see the learning process as a systematic and controllable process, and they accept greater responsibility for their achievement outcomes. *(Banarjee et al., 2014).*

5.2.3. The SRL Models

There are several proposed models of SRL. These models are divided into two groups: social-cognitive models that focus on motivational processes (e.g., Boekaerts, Pintrich, and 11 Zimmerman), and metacognitive models (e.g., Efklides, Winne, and Hadwin*) (Panadero, 2017).*

All models tend to agree that SRL is a cyclical process composed of different sub-processes (e.g., organizing, setting goals, etc.), most commonly represented as a three-phased cycle: planning, performance, and self-evaluation. This process creates a positive feedback loop, as performing tasks provides feedback for the strategy used in future tasks *(Brandmo et al., 2020).*

5.2.4.   Zimmerman's models of SRL.

Zimmerman (1990) theorized that learners are met cognitively, motivationally, and behaviorally active participants of their own learning. Met cognitively, students who engage in SRL tend to organize and plan, setting goals for themselves. Motivationally, self-regulated learners are persistent, put in large amounts of effort, and report high levels of self-efficacy and intrinsic task interest. Behaviorally, self-regulated learners engage in knowledge seeking behaviors and

self-instruct during the acquisition stage, while self-reinforcing when enacting what was learned. Zimmerman therefore believes SRL is a goal-driven process *(Layco, 2020).*

Barry Zimmerman`s SRL model is organized in three phases: forethought, performance, and self-reflection.

In the forethought phase, students assess the task, set objectives, do an action in order to achieve them and a number of motivational beliefs energies the process and affects the activation of learning strategies *(Layco, 2020).*

In the performance phase, the students while monitoring how they are improving, perform the task, and utilize a number of self-control techniques to keep them cognitively involved and motivated to finish the task.

Finally, in the self-reflection phase, students assess how they have performed the task, making attributions about their success or failure. How the students approach the task may be positively or negatively affected by these characteristics caused by self-reaction *(Layco, 2020).*
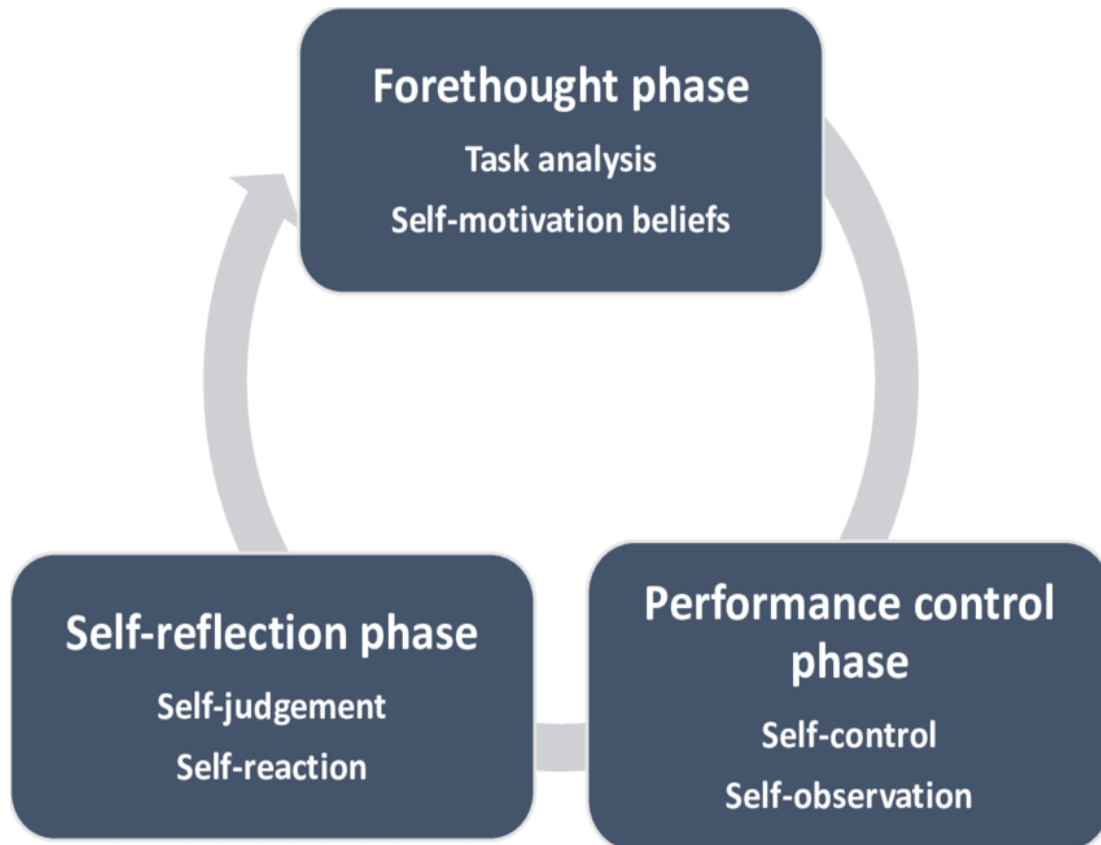
Figure (5): Barry Zimmerman`s SRL model *(Layco, 2020).*

5.2.5. <u>**A Social-Cognitive Model of SRL**</u>

One of the most influential models of SRL comes from the social-cognitive perspective which states that a learner's behavior is determined by the reciprocal interactions between personal factors (e.g., beliefs, expectations, attitudes, feelings, and biological processes) and environmental factors (e.g., social supports and physical surroundings). Changes in one or more of these three factors – behavior, person, or environment – will influence the other factors in a dynamic and constantly evolving way *(Artino et al., 2022).*

Chapter (6)

Methods of Students Assessment

Assessment and evaluation are crucial steps in educational process. Students are positively affected by good exam results, while being negatively affected by anxiety, boredom and bad exam results *(Curelaru and Diac 2022).*

Assessment is the systematic collection, review, and use of information about educational programs undertaken to improve teaching and learning. It ensures quality in training programs, motivates, and directs students' learning. Assessment is also used for verification of achievement of objectives of training, feedback to students, licensing, certification, and screening of students for advanced training. Assessment has a powerful positive steering effect on learning and the curriculum. It conveys what we value as important and acts as the most cogent motivator of student learning. Assessment is purpose driven. In planning and designing assessments, it is essential to recognize the stakes involved in it. The higher the stake, the greater will be the implications of the outcome of the assessment *(Kipkulei et al., 2022).*

A wide range of assessment methods currently available include essay questions, patient management problems, modified essay questions (MEQs) checklists, OSCE, student projects, Constructed Response Questions (CRQs), MCQs, Critical reading papers, rating scales, extended matching items, tutor reports, portfolios, short case assessment and long case assessment, log book, trainer's report, audit, simulated patient surgeries, video assessment, simulators, self-assessment, peer assessment and standardized patients *(Cooke and Lemay. 2017).*

6.1. Grade point average (GPA)

Another academic factor that affects academic performance of medical student is the prior academic achievement (i.e., GPA or grade-point average) of the previous year. According to the Center for Research and Development Academic Achievement (CREATE) (2005) report, academic achievement (GPA) is a construct to measure students' achievement, knowledge and skills. *(Davison CB & Dustova G., 2017).*

Grade point average (GPA) scores are considered to be an important indicator of academic performance in medical schools *(Wietholter et al., 2020).*

GPA or Grade Point Average is a number that indicates how well or how high you scored in your courses on average. It's meant to score you (usually on a GPA scale between 1.0 and 4.0) during your studies and shows whether your overall grades have been high or low. This number is then used to assess whether you meet the standards and expectations set by the degree program or university *(Tomkin and West 2022).*

It has been used as a unit of measure to assess the academic performance of the students, so it is important to identify and understand the factors that influence the Grade Point Average of students. These factors such as gender, previous academic performance, living place and income level of family, social environment, time spend for studying; learning ability and living place during the university life basically affect GPA *(Yogendra and Andrew A., 2017).*

Letter Grade	Percentile	GPA
A+	97-100	4.0
A	93-96	4.0
A-	90-92	3.7
B+	87-89	3.3
B	83-86	3.0
B-	80-82	2.7
C+	77-79	2.3
C	73-76	2.0
C-	70-72	1.7
D+	67-69	1.3
D	65-66	1.0
F	Below 65	0.0

Figure (6): The GPA Conversion Chart *(Jing, 2017).*

6.2. <u>Methods of Students Assessment</u>

6.2.1. **Written examination**

There are different methods that largely focused on "classroom" assessments

<u>Multiple-choice questions</u> (**<u>MCQs</u>**) represent the most common assessment tool in medical education worldwide. consist of a clinical vignette followed by up to five potential answers or alternatives and may be structured as to require a single best answer, a combination of alternatives, true or false for each alternative, or matching. Involving students in creating MCQs appears to be a potential learning strategy that combines students' pragmatic approach and actual active learning *(Touissi et al., 2022).*

The MCQs have the advantage of being more objective and easily scored both manually and electronically *(Farooquiet al., 2018).*

Unfortunately, MCQs have a cueing effect, so there are higher chances of student guessing, which ultimately lead to falsely higher scores than other methods *(Farooquiet al., 2018).*

Another major disadvantage of MCQs is they are often poorly written in a way that test memory recall rather than application of knowledge, application and critical thinking skills. For students, MCQs are not easy and need more time to be exactly solved *(Silambananet al., 2021).*

<u>Extended matching questions</u> (**<u>EMQs</u>**) resemble MCQs in their use of a clinical vignette with a single best answer selected from a list of alternatives, but they contain longer lists of potential answers (more than five) that are applied to multiple questions *(Sulieman and Wannus, 2021).*

Short- or long-answer (essay) questions describe a method wherein a clinical vignette is followed by one or more questions answered using constructed free-text responses that range in length from a few words to several sentences *(Daniel et al., 2019).*

Short answer questions scoring is more time consuming and subjective than other MCQs. Usually, a short answer (usually written in 1 or 2 sentences) was somewhat challenging since it includes short answers of remembering and understanding level written in natural language ,also long answers (usually written in 2-3 paragraphs) takes longer time as compared to short answers since it involves explanation, demonstration, justification, comparison, analysis and so on which will demonstrate their skill of reasoning. An evaluator who is grading long answers has to worry about consistency in grading long answers, maintaining consistency in grading similar answers is a time-consuming process *(Farooquiet al., 2018).*

Modified essay questions (MEQs) are a method wherein serial information is provided about a case chronologically whereas the clinical skills assessments are the long case, short cases, after each item, learners must document a decision in a constructed free-text (essay) format before they can view subsequent items *(Kipkulei et al., 2022).*

Patient management problems (PMPs) consist of context-rich clinical scenarios, where specific resources are available for diagnosis and management. The learner must select among multiple alternatives for action, and the results of those actions are then provided (e.g., electrocardiogram [ECG] findings) as they continue working through the case *(Boussetta et al., 2021).*

Key feature examinations (KFEs) contain clinical vignettes followed by two to three questions focused on the critical steps in clinical decision making. Key features are case specific (e.g., a thunderclap headache is a key feature in the diagnosis of subarachnoid hemorrhage) *(Lang et al., 2019).*

Script concordance tests (SCTs) comprise short clinical scenarios associated with uncertainty that are designed to represent the way new information is processed during clinical reasoning. Learners must answer a series of questions (e.g., if you were thinking X and then you found Y, this answer would become more likely, less likely, or no change). Responses are compared with those acquired from a reference panel of "experts," accounting for the variability of clinicians' responses in different clinical situations *(Daniel et al., 2019).*

6.2.2. Formative examinations

The concept of formative assessment is quite new, and was defined only in the 1960s; however, teachers have been using "formative assessments" in their teaching long before. Scriven (1967) indicates that formative assessment is a phrase generated from the term 'formative evaluation concerning the evaluation of educational programs including curricula, instructional material and the overall teaching methods Thus, formative assessment is an ongoing process where teachers use the learning evidence to provide the student with a feedforward in order to improve the student's performance *(Sulieman and Wannus, 2021).*

A major importance is given to formative assessment which is an ongoing process with an opportunity for the students to attain the competency through feedbacks from the faculty *(Thangaraj, 2021).*

The basic element of FA is providing feedback to the students based on

their performance on the assigned task. Feedbacks are defined as 'information provided by an agent (teacher, peer, self, etc.) regarding aspects of one's performance or understanding. This information will ultimately reduce the discrepancy between the present understanding and performance to the desired level *(Thangaraj, 2021).*

The main purpose of providing feedforward is to give insight into what should be done to provide a future orientation so that the student can use feedforward as a pattern in other assignments to enhance students' performance *(Sulieman and Wannus, 2021).*

6.2.2.1. <u>Advantages of formative examinations</u>

Formative assessments are mainly low stakes, which means that they have little impact on students' grades: for instance, students can make mistakes, dare to fail, and repeat the assignment because the focus is on the learning process rather than the grades Peer assessment and self-assessment are formative assessments in nature but can be summative as well. Unlike, formative assessments, summative assessments are high stakes because the goal of the summative assessment is to evaluate a student's achievement over a certain period: a midterm, a final exam, or any graded paper is an example of a summative assessment. *(Sulieman and Wannus, 2021).*

In short, the formative assessment is an ongoing assessment that gives feedforward to improve learning/teaching, while summative assessment tests are originally designed to decide the boundaries of students' learning of the given material for grading and certification *(Skolverket, 2018).* The primary distinction between formative and summative assessment relates to purpose and effect, not to timing *(Irons and Elkington, 2021).*

The formative assessment plays a key role in improving the process of learning rather than grading the students. The role of educators is primarily to motivate the intrinsic desire to learn rather than extrinsic motivation, where the concept of learning becomes the goal *(Thangaraj, 2021).*

6.2.2.2. Disadvantages of Formative examinations

One of disadvantages of formative examinations is the negative and demoralized effect on students when they receive low scores which lead to decrease in their motivation toward the course and making them feel anxious so being unable to answer questions *(YILMAZ et al., 2020).*

6.2.3. Practical & clinical assessment

Objective Structured Clinical Examination (OSCE) for the first time is a complex and time-consuming task. It helps the development of academic and administrative structures. The OSCE is already being used as an assessment tool, quality assurance and continuous improvement *(Daniel et al., 2019).*

The purpose of using OSCE is to assess students' competencies and clinical performance. It aims to enable students to practice in safe and competent manner to ensure high quality of medical education and ultimately to empower future nurses to provide the best quality of medical care. Using OSCEs presents a chance to apply vital clinical tasks in real life environment without affecting patients' safety, so the OSCE is a reliable, valid and easy to use to assess medical students' knowledge and clinical competencies. Also, it enhances learning process and increases students' confidence *(Bdair et al., 2019).*

Effective clinical reasoning is central to clinical competence. The Accreditation Council for Graduate Medical Education (ACGME), the Can MEDS

frame work and the Tuning Project (Medicine) in Europe11 all describes clinical reasoning as a core competency. Ensuring the development of clinical competence (including clinical reasoning) across the medical education continuum requires an evidence-based approach to assessment. There is currently a wide array of clinical reasoning assessments *(Daniel et al., 2019).*

The implementation of OSCEs in nursing education has some disadvantage and obstacles that makes it limit its applicability. These drawbacks include that OSCE examination is difficult to run and increases students' anxiety and stress. The need for numerous examiners with two per station to maintain objectivity in the OSCE examination, It also requires intensive examiners and training as well as proper training of students *(Bdair et al., 2019).*

Chapter (7)

<u>Medical Education in Egypt</u>

Evolution of medical education begun in the ancient Egyptian civilization which was the first to record systematized practical knowledge on diseases and their treatment. Egyptians were considered the best doctors in the ancient world starting from before 2600 B.C. until the fourth century B.C. They wrote medical texts on papyrus and sold these papyri by the Egyptian temples to physicians. Egyptian papyri discovered indicated advanced surgical and pharmacological practice *(Harust et al., 2020).*

Then there were Calls for change worldwide. Medical education specialists around the world recommended the urgent need of profound changes in the learning methods to concern on understanding principles rather than memorizing facts. Egypt had responded to calls for change quickly and began to establish medical education units that sought to implement this change as soon as possible *(Hulail et al., 2018).*

Medical education units have existed in Egyptian Medical Schools for more than 70 years and they have been involved in curricular reform and other activities that improve the educational process. However, the efficiency of their roles has been on a whole spectrum in different universities, while, the first academic department of medical education was established in 2001. Some schools followed the steps and established their own departments. In 2019, the Egyptian government issued a decree that all Egyptian medical schools should have a medical education department and assigned it the role of managing curricular reform in the newly imposed 5-year medical program. These departments have since become an active player in implementation of the designed curricula. The mandate that was assigned

to these departments had them involved in the area of education that was cross cutting with many already active units in the schools like the assessment unit, the medical education unit, the quality assurance unit. Managing the hierarchy and establishing functional workflow was important and mandatory to ensure the effectiveness of this role *(Shehata et al., 2020).*

For more than 100 years, Egypt adopted discipline-based curricula, in which didactic large-group lectures and apprenticeship approaches to clinical teaching were the main methods of instruction Egyptian medical schools have followed *(Abdelaziz et al., 2018).*

Egypt adopted French model, comprising a six-year program of undergraduate medical education. This system features a clear preclinical–clinical dichotomy, and (in Egypt) takes English as the language of instruction. A Bachelor of Medicine and Surgery (MBBCH) is awarded upon graduation *(Abdelaziz et al., 2018).*

7.1. <u>Methods of Medical Education teaching in Egypt:</u>

The National Authority for Quality Assurance and Accreditation of Education (NAQAAE) in Egypt recognized that undergraduate education in Egypt was not properly fit for-purpose over a decade ago. It urged changes to the medical education focus away from simple factual knowledge acquisition to application of knowledge and skills in medical practice. As a result, the current spectrum of educational programs in Egyptian medical schools can be perceived as undergoing a gradual shift toward integration, student-centeredness, and early clinical exposure. The latest revision of The National Authority for Quality Assurance and Accreditation of Education (NAQAAE, 2016) emphasized the importance of

producing graduates who are safe, practically skilled, ethical and professional medical practitioners *(Sabry et al., 2021).*

So, the current state of educational programs in Egyptian medical schools is undergoing a gradual shift toward integration, student-centeredness, and early clinical exposure for early encouragement of undergraduate students to become active and self-directed participants in their learning Students-centered teaching approaches such as reasoning and problem-solving proved to be more effective than traditional lectures as they help stimulation of deep learning and development of the students' higher intellectual skills *(Elwakil and EzzEldin, 2020).*

Beginning of 2018 an integrated curriculum was implemented. The integrated curriculum features innovative instructional methods, including simulation, early clinical exposure, and project-based learning, in addition to problem-based learning (PBL) and community-based education (CBE) *(Abdelaziz et al., 2018).*

Now, medical schools undergo a five-year accreditation cycle by the National Authority of Quality Assurance and Accreditation of Education (NAQAAE) *(Talaat et al., 2022).*

7.2. Methods of assessment of medical students in Egypt:

Each medical school designs its own system for assessment according to its internal bylaws. In common and despite these variations; formative-type assessment, standard-settings, blueprinting, planning of test specifications, and upholding other quality standards in assessment are adopted as recommended by the National Authority for Quality Assurance and Accreditation in Education (NAQAAE). Innovative schools or programs tend to use assessment tools that

match their educational approaches. For example, self- and peer-evaluation, direct observation, and quizzes may be used for formative assessment. For summative assessment, scenario-based multiple-choice questions (MCQs), triple-jump exams (TJEs), and modified essay questions (MEQs), amongst other ordinary question types, are utilized *(Abdelaziz et al., 2018).*

7.3. Problems facing medical education in Egypt:

Despite the well-known benefits of new methods of medical education, there is evidence of a set of barriers or challenges that hinder the implementation of the new integrated curriculum in health professions education. These challenges can be categorized under the following categories: professional boundaries, curriculum, resources, leadership, stereotypes and attitudes, teaching, variety of students, different concepts, enthusiasm, and requirements of accreditation *(Abdelaziz et al., 2021).*

In Egypt, as well as in other countries, medical education faces challenges that have guarded against the general implementation of this teaching approach as follow;

7.3.1. Problems related to method of teaching:

Unfortunately, traditional lectures are still the most popular instructional method in different universities In Egypt at which the students had to learn many subjects at the same time. They are loaded with an unbalanced and disproportionate knowledge. They had no chances to acquire skills as critical thinking, problem solving, and decision making or the ability to investigate, diagnose, and treat the patient as a whole *(Hulailet al., 2018).*

With the new integrated program, teaching of the content is based on two main instructional methods. The first was by facilitated large-group discussions based on case scenarios. The other method of instruction was a small group discussion of another set of case scenarios addressing complex ethical dilemmas. But time consumption and student resistance are considered the main problems that are faced by students in implementation of PBL *(Abdelaziz et al., 2021).*

Peer assisted learning had become one of the new methods of teaching for medical students. Therefore, peer pressure on the students caused by senior students and their peers increase their suffering and anxiety *(Mohammed, 2020).*

Nowadays, online learning is a new method of teaching in Egypt that has played a major role especially in the wake of COVID-19 where online learning has been used at the national level as per the directives of the Ministry of Higher Education. Online learning requires a great deal of resources and careful planning. Moreover, it requires a huge change in mindset of the students and faculty to play new roles in the educational process. Another major challenge for medical educators in the online context is how to replicate the experience of clinical encounters. This approach may have helped in delivering the content, but we lost the connection with the students *(Shehata et al., 2020).*

7.3.2. <u>Problems related to curriculum:</u>

For the medical students, the main challenge to medical education in Egypt is complexity of the required curricular design for different courses, especially for the first year due to the language barriers that makes them suffer from high rates of depression, anxiety, stress and disappointment which negatively affect their academic performance *(Rashid et al., 2019).*

7.3.3. <u>Problems related to resources:</u>

The lack of financial resources like insufficient class halls is considered one of the main challenges facing medical education in Egypt due to increased numbers of students enrolled in Egyptian medical colleges every year. Also unequipped teaching room like lack of enough space, enough chairs for the students, suitable table, computer, projectors, screens, boards, flipcharts, and markers, as well as unavailability of internet services hinder the educational process in most of Egyptian medical colleges *(Mohammed, 2020).*

Also poor financial support for research is a great challenge for the future of medical education in Egypt *(Shehata et al., 2020).*

7.3.4. <u>Problems related to staff members:</u>

Shortage of staff members occupies second place after the lack of financial resources as an effective factor that hinder the educational process in different medical colleges in Egypt. Implementation the new integrated program in Egypt may be a cause of insufficient number of staff as the new system decreased markedly the number of lectures, and teaching depends mainly on small group discussion, practical lessons, and other activity. As the problem were further complicated by the brain drain of trained and qualified lecturers abroad as a result of poor financial compensation, as well as unpaid overtime *(Abdelaziz et al., 2018).*

Also, most of the university teachers are not familiar with modern teaching methods. Most of them have been taught in learning environments that were instructor centered, therefore, they teach in this way too. The sluggish response to

change is the characteristic of traditionalism of the educational institutions *(Rashid et al., 2019).*

7.3.5. <u>Problems related to methods of assessment:</u>

Summative assessment is used to be common method of assessment of medical students in Egypt. They were time consuming and subjective which make them not were preferred. Now, formative exams like online quiz or exam using Microsoft or Google forms or Moodle, Open book exam, and online assignments and research were implemented as a part of the new integrated program. Online MCQs were strongly recommended by the faculties but at the same time, it was highly resistant by the students *(Shehata et al., 2020).*

On the other hand, the problem of too much exams is an extremely terrible problem that faces medical student in Egypt *(Abdelaziz et al., 2018).*

Finally there are many factors might resist change in medical education in Egypt. These are strong standing traditions, lack of real need for change, strong disciplinary empathy of faculty members, need of departmental protection of curriculum time, lack of experience, lack of time to implement changes and fear of loss of resources *(Hulailet al., 2018).*