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The operating theatre as classroom: A qualitative study of learning and teaching surgical competencies

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Abstract

Background: There has been a worldwide movement toward competency-based medical education and training. However, this is the first qualitative study to analyze the perceptions of surgical trainees and surgeons toward competency-based education in the operating theatre. We aim to examine views toward the specific learning and teaching of the nine competencies of the Royal Australasian College of Surgeons (RACS) and to explore perceived ideal conditions and challenges for learning and teaching these competencies in the operating theatre.

Methods: Individual semi-structured interviews with surgical trainees and surgeons in the specialty of General Surgery. Ten surgical trainees and surgeons who worked together were purposively sampled, for maximum variation, from an outer metropolitan public hospital in Melbourne, Australia, to identify emergent themes relating to learning and teaching surgical competencies in the operating theatre. **Results:** Five themes were identified as: (1) Learning and teaching specific surgical competencies is through relationship based mentoring and experiential learning; (2) Ideal conditions and challenges in the operating theatre are availability of time and personal attitude; (3) Level of pre-operative briefing was variable; (4) Intra-operative teaching is perceived as structured; and, (5) Post-operative debriefing is recognized as ideal but not consistently performed. **Discussion:** Professional relationships are important to both surgical trainees and surgeons in the process of learning and teaching competencies. Ad hoc *apprenticeship style* learning is perceived to remain prominent in the operating theatre. Sufficient time for training is valued by both groups. The surgical competencies are inherently different to each other. Some appear more difficult to learn and teach in the operating theatre, with technical expertise most readily identified and health advocacy least so. Elements of guided discovery learning and other educational models are described. Further emphasis on structured competency-based teaching methods may be beneficial for surgical trainees, surgeons and other specialties, both in Australia and worldwide.

Keywords: Competency-based medical education, CanMEDS, education, international, operating theatre, postgraduate education, qualitative research, Royal Australasian college of surgeons, surgery, teaching, surgical competencies

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The operating theatre is a unique environment in which learning is shaped by people, case complexity and distractions.^[1] It is a high-risk environment.^[2] The impact of human factors on patient safety is crucial, and the surgeon's performance is a core element of successful surgery.^[2] The need for a more deliberate approach to operating room teaching becomes an imperative as duty hour restrictions,^{[3],[4]} a heightened sense of public accountability^[5] and an emphasis on operating theatre efficiency^[6] further challenges training.

In 1996 the Royal College of Physicians and Surgeons of Canada introduced the Canadian Medical Education Directives for Specialists (CanMEDS) framework of essential physician competencies.^[7] This was to further define the roles and abilities required of physicians in the context of a changing health care environment. The College identified patient consumerism, government regulations, financial constraints, medical information on the Internet, litigation, technology and the explosion of medical knowledge as forces changing the nature of health care delivery.^[7]

The CanMEDS Framework has since been adapted to local cultural contexts around the globe [Table 1]. Worldwide, medical boards have faced the challenge of creating competency-based postgraduate training programs,^[8] Competency frameworks devised at national and international levels have been well received, and in many cases mandated, by governing bodies.^[9] The International Competency-Based Medical Education (ICBME) Collaborators focus on implications for undergraduate education, postgraduate training, continuing professional development and policy in this field.^[10]

Country	Accredited body	Competencies
Australia	Royal Australasian College of Surgeons	Collaboration, communication, health advocacy, judgment-clinical decision-making, management and leadership, medical expertise, professionalism, scholar and teacher, technical expertise
Canada (Adapted use in Netherlands)	Royal College of Physicians and Surgeons of Canada	Medical expert, communicator, collaborator, manager, health advocate, scholar, professional
UK	Royal College of Surgeons	Specialty-based knowledge, clinical judgment, technical and operative skills, professional behavior and leadership
USA (Adapted use in Singapore)	Accreditation Council for Graduate Medical Education	Professionalism, patient care and procedural skills, medical knowledge, practice-based learning and improvement, interpersonal and communication skills

Table 1: Competency-based Medical Education by various Western countries

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In the United States of America, a similar framework was developed by the Accreditation Council for Graduate Medical Education^[11] in 1999, with the Singapore Ministry of Health aligning with this framework.^[12]

The Dutch Advisory Board for Postgraduate Curriculum Development reformed in 2005 in line with CanMEDS competencies^[8] and in the UK, the Inter-Collegiate Surgical Curriculum Program of the Royal College of Surgeons has also set competency standards of training.^[13]

In 2008, the Royal Australasian College of Surgeons (RACS) introduced the competency-based Surgical Education and Training (SET) program rather than the traditional time-based model,^[14] such as five years training for General Surgery. Trainees are now evaluated on their level of mastery in nine core competencies,^[15] where professional expertise results from gradual improvement in outcome-based performance.^[16]

Though setting standards, a RACS working party has addressed the educational steps to reach key outcomes within the clinical context of the workplace.^[17] Progressive development is required through five stages of increasing complexity: Prevocational, novice, intermediate, competent and proficient,^[17] which is reflected in learning philosophies. Kolb's theory of experiential learning describes learning through interrelated concepts of gaining concrete experience, reflective observation, abstract conceptualization and active experimentation.^[18] Lave's model of situated learning, in communities of practice, emphasizes learning that takes place in the same context in which it is applied.^[19] Situated learning allows an individual to learn by socialization, visualization and imitation. Participation as members of a community of practice shapes newcomers' identities, and in the process, gives structure and meaning to knowledgeable skill.^[19]

In order to train surgeons effectively, it is important to consider what and how they learn.^[20] It has been emphasized that surgical training should be recognized as a priority and resourced appropriately with time and funding.^[21] Development of teaching these competencies may require novel approaches. Surgeons who better understand the relationship between learning outcomes and the planning and delivery of educational activities can help trainees receive more from their education and training.^[22]

The aims of our research were (i) to explore the perceptions of surgical trainees and surgeons toward outcome-based competency training and (ii) to identify perceived ideal conditions and/or challenges in learning and teaching in the operating theatre.

Methods

Approach

We conducted a prospective qualitative study using individual semi-structured interviews to explore the research aims. Participants were recruited directly from the field of General Surgery at a single centre in an outer metropolitan public hospital in Melbourne, Australia, serving a community population of over 300,000 people. Due to peaks in population of under 19 and over 60 years, our hospital has a particular focus on the provision of emergency care. The hospital provides general and specialty medical and surgical services, mental health, maternity and pediatric care across 336 beds. There are 14 visiting consultant general surgeons across General Surgery, including the sub-specialties of Upper Gastrointestinal, Colorectal and Breast and Endocrine. Surgeons of this hospital received informal training in methods of teaching. The number of learners includes eight surgical registrars, six surgical interns and rotating medical students from affiliated universities.

The study was approved by the Peninsula Hospital Ethics Committee and written informed consent was obtained from all participants, including consent for audio-taping interviews.

Setting and sampling strategy

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Purposive sampling was used to select surgical trainees and surgeons. The principle of maximum variation sampling was used, to be most representative of the diversity of opinions at our hospital. Our sample was structured to include both accredited and un-accredited surgical registrars, staff surgeons and visiting specialist surgeons. All Surgeons were Fellows of the RACS.

Variables of participants included their demographic profile of gender, age, duration of training or time as a consultant [Table 2]. Experiences were sampled from an equal number of five surgical trainees and five surgeons who worked together. Both groups undertook semi-structured interviews on their experiences of learning and teaching in surgical practice. The mean length of interview for registrars was 20:25 min (range 12:48-26:03) compared with consultants of 17:57 min (range 9:59-38:52).

	Trainees (n=5)	Consultants (n=5)
Age range (years)	Mean 32:25 Range 28-53	Mean 38:8 Range 32-44
Gender	1 Female (20%) 4 Male (80%)	2 Female (40%) 3 Male (60%)
Years experience	1-4	2-5
Accreditation with RACS	3 Accredited 2 Un-accredited	All RACS fellows
Medical degree	2 Undergraduate 2 Postgraduate	-
Medical school	All Australian	3 Australian 2 Overseas trained

Table 2: Informative characteristics of participant trainees and surgeons

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Semi-Structured interviews

The lead author (VK) conducted each interview between September 2011 and January 2012. All interviews used a topic guide [Table 3] and were semi-structured with open-ended questions to encourage disclosure. Interviews were audiotaped and transcribed verbatim.

What are ideal conditions for learning/teaching in the operating theatre?
Can you talk about your learning/teaching methods with trainees/consultants?
Can you describe a usual sort of learning/teaching episode in the operating theatre?
What and how do you learn/teach?
How could you optimize your learning in theatre?
To what extent do you actively seek learning opportunities in theatre?
What facilitates an active approach to learning? What are the barriers?
To what extent is your learning structured?
Can you give examples of how you learn/teach these nine surgical competencies in the operating theatre?
How important is it to ask trainees about their learning needs before you get started in teaching?
How do you ask about learning needs?
To what extent do your surgical trainees ask you about your learning needs before you get started?
Inter-operatively, how do you know when to step in, when to leave them?
How important is it to give trainees feedback on their performance in the operating theatre?
To what extent do you give feedback from your trainees? How? When? What's usual?
How and when do you give feedback?
What's the hardest thing about learning/teaching in the operating theatre?

Table 3: Topic guide for semi-structured interviews

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Semi structured interviews were used as our primary data collection tool to allow depth of answers through probes, to determine emphasis and to delve into the topic.

Analysis

Using thematic analysis, transcriptions were analyzed independently, by a combination of two different authors (VK, LS, PH, MS, DN). Thematic analysis is a qualitative analytic process for organizing, describing and interpreting patterns within data through themes. [23] We used this technique as themes can capture important information in relation to research questions and represent a level of patterned response or meaning within the data set. [23]

To facilitate a broad perspective, our research group was composed of different disciplines and types of educational background. Our group comprised of a medical student, accredited and unaccredited surgical and medical registrars, surgeons and an anthropologist researcher and educator. This allowed the opportunity to relate to the data set differently and reflect on answers as a way to improve real life learning and teaching in our own clinical context. We reconciled different viewpoints at a higher level though conceptual integration of themes to enable reflexivity. To maintain qualitative rigor, we positioned ourselves as active researchers in the analysis process, checking that themes were coherent, consistent and distinctive.

Themes and subthemes were coded, mind maps were used, and discrepant results discussed to reach consensus on the meaning of individual statements. Techniques used included constant expansion, where questions were added to interviews to pursue issues raised in earlier questions and constant comparison where data were compared with previous data, as they were collected.

Results

Five primary themes emerged from the data.

Theme 1: Learning and teaching specific surgical competencies is through relationship-based mentoring and experiential learning

Trainees desire active explanation by consultants, who are "available for questions", "not in a hurry" (Trainee 1) (T1) and support them through "motivation" and "confidence" (T2). Some consultants preferred "one-to-one" (Consultant 1) (C1) teaching, while others preferred multiple "so you can teach on different levels" (C3). One consultant described mosaic mentoring where trainees "should be working with a similar group of surgeons" (C4).

Professionalism

Trainees felt that they acquire "respecting patient confidentiality" (T1), "clear documentation" (T2) and self-control through role-modeling, "if consultants behave professionally, you learn" (T4). Surgeons emphasize "you teach by example, say by being courteous and cooperative with everyone else and you do tend to intervene when a trainee is not being that way" (C4). Escalate teaching through explicit direction, "make a comment if they don't... introduce themselves to the patient" (C5).

Scholar and teacher

Trainees pre-read through a "duty to teach yourself" (T1) and identify a role to teach junior staff, "medical students come to theatre and I do actually, commentate as we're going as to what we're doing, there is an opportunity for that in theatre" (T5). Surgeons expect trainees to teach. "I would ask the questions to the intern, in an indirect way, showing the registrar, look, actually you should be asking these questions" (C3) then directly "can you show them where the liver is?" (C5).

Health advocacy

There were a range of opinions, with most trainees and surgeons stating there was not much role for health advocacy in the operating theatre. One trainee emphasized completing the consent form "*helping patients and families... understand what the problems are and giving them clear information*" (T1) where another identified maintenance of ergonomics and meal breaks (T2). One consultant noted surgical time out (C3) and another the community issue of obesity as examples of demonstrating this competency (C5). Singularly, one surgeon acknowledged the high levels of stress associated with being a registrar, but did not mention how they would teach coping mechanisms. "*In terms of managing stress, I think that's a huge part of a registrar's life. It's not easy to be a registrar, long hours, high stress work...so I think it's important that I advocate psychological well being as well*" (C5).

Management and leadership

Trainees believe "*the surgeon should be able to motivate the junior staff under them, give them a love for the work they're doing*"(T1), but not describe explicit learning techniques. Surgeons discussed the ability to give instructions, "*you've got to lead the people, and tell your assistants what to do, and how to do it*" (C2). One surgeon believed in indirect teaching, "*leadership I think that's mainly something that they would see from their peers and how they will learn from their peers*" (C3).

Collaboration

"*Collaboration is really your ability to deal with colleagues*" (T1) where "*you learn that through observation... and implementing it yourself*" (T1). Operating with peers and different teams was also, "*quite exciting and very social*" (T2) for one trainee. Surgeons agreed, "*so one has to liaise very closely with the anaesthetist, with the scrub nurse, with the scout nurse and with the assistant*" (C1). However, one surgeon also stated, "*not something that you teach. I suppose you show a good example and try to encourage them to follow*"(C4).

Communication

Communication may be learnt by "*trial and error*" (T1), "*so when you speak to senior people presenting patients, you learn what information is important and what isn't*" (T1). Surgeons expect trainees to communicate with the operating team "*they need to communicate to other people whether it's going to be a difficult case, it's going to be an easy case so they can prepare accordingly*" (C1). Written communication is also learnt through exposure, where communication skills, "*come with practice, experience and confidence*"(C5).

Medical expertise

Trainees ask questions to, "*discuss clinical presentation particular case, physiology, with surgeons, also anaesthetists*"(T4) where, "*you have to have thought about potential complications and are prepared to deal with them if they arise*" (T2). "*Being knowledgeable*" (C2) is important, where, "*I'd try to give a feedback if I think that their knowledge isn't good enough about the subject I'd question them, I would say it's worthwhile to read in the books and go back to the basics*" (C3).

Clinical judgment and decision-making

Learning to make decisions requires feedback, "*really the feedback loop, which is a big part of clinical judgment*" (T1) and flexibility, "*still have to critically analyze and make sure that if things change down the line, that you can adjust to it*" (T2). Surgeons desire trainees to be safe, "*to ask for help, to realize when things are going wrong and act on them early rather than waiting for that to get out of hand*"(C2). While one consultant thought, "*you cannot teach this*" (C3), another believed judgment included, "*how to deal with consequences and not view mistakes as a failure*" (C5).

Technical expertise

Trainees "*think the predominant sort of aspect of teaching in theatre is the technical side of things*"(T4). "*It's just exposure that will give you the expertise,*" (C3), with knowledge taught by asking questions, and practical skills by demonstration, "*I would explain what I would expect them to do. If there is an issue, if it doesn't work, I will show them how I would do it, how I would expect the technique to be, and then ask them to have a go*" (C3).

Theme 2: Ideal conditions and challenges in the operating theatre are availability of time and personal attitude

Perceived ideal conditions occurred when there was sufficient time in a list for consultant input and a willingness of the registrar to take on advice. Conversely, challenges arose when there was lack of time, balancing other duties of service and administration against teaching, and when there was little interaction and communication between consultant and trainee.

Time was the most important factor to both trainees, "*so you can concentrate on the task at hand*" (T2) and consultants to remain "*unpressured*" (C2). Trainees required appropriate theatre lists with the "*right amount of simple and complex cases*" (T4) and one consultant preferred a registrar to "*keep coming to my list*" (C5) over a rotation rather than a "*once off*" (C5).

Time constraints exemplified by conflicting dichotomy of service versus learning, "*it's a challenge to have to balance off your own learning versus what's greater good for most of the hospital and the patient*" (T1).

Trainees mention access barriers of variable consultant input, other duties, other staff, opportunity, where "*work is first priority... learning secondary*" (T4). Consultants agree time management balancing external pressures of service and administration against teaching. "*If I know that there are so many other cases waiting or there's another sick patient who needs to be done, then I feel the pressure*" (C3). "*Relinquishing of control*" (C2), responsibility for trainees' actions is a "*challenge letting someone else do the case when you are ultimately responsible*" (C1).

Both mention poor attitudes, "*biggest wildcard is the consultant themselves, and how they interact with you*"(T1) contrasted with sometimes a lack of willingness to learn, "*feel they don't want to learn from a particular person, or they just don't want to take advice*"(C5).

Theme 3: The level of preoperative briefing was variable

While surgeons unanimously agreed that it was important to know the level of the trainee, trainees described variable guidance of learning objectives. Surgeons stated they would ask directly about learning needs, with some outlining their expectations of the trainee. Most would question what the trainee had done hitherto and what they wanted to get out of the operative experience.

Theme 4: Intraoperative teaching is perceived as structured

Trainees believe that learning could be structured with certain conditions, "if you have a very proactive consultant who wants to teach you things" (T1). Surgeons valued structured and consistent teaching, though a step-wise approach "as they become more proficient, they can do the more difficult parts, and eventually learn how to do the whole thing" (C2). Deciding when to step in varied between surgeons, but was usually done, "if they are doing something wrong or dangerous. I think there are grades of stepping in. From giving a tip, to overt instructions to taking over the operation. A lot of the time I would go through all of those steps" (C4).

One surgeon also highlighted the importance of teaching in the medical profession "...probably my main message is that doctors, the whole word even, originates from the word teacher, and if we forget that, and we just turn up, we don't really speak to many people, we just operate on our list of patients and then just leave, I don't think we are actually doing the right thing by your medical staff, or even by the patients" (C5).

Theme 5: Postoperative debriefing is recognized as ideal but not consistently performed

While all acknowledged debriefing is ideal, trainees found they needed to work proactively to get feedback. "Whether it be positive or negative, I think it will definitely aid towards your teaching" (T3) and that successful use of the information is "the difference between the bad trainees and the good trainees where they can adjust quickly" (T2). Surgeons described the importance of immediate feedback, given verbally at the end of a case or a list. However, scope to improve debrief techniques as "traditionally in surgery you just get feedback when you have done something wrong, and if nobody says anything it means that you have done okay" (C4).

Discussion

This qualitative study improves our understanding of the perceptions of surgical trainees and surgeons toward learning and teaching in the operating theatre in the context of competency-based training. Our principle findings were that (i) Most trainees and surgeons thought that all surgical competencies could be learnt and taught in the operating theatre and that (ii) the ideal environment required relationship-based mentoring to facilitate experiential learning and a need to overcome the challenge of time. Both groups identify the operating theatre as a suitable workplace and learning environment for expert performance in nearly all surgical competencies. However, they described variable ease of teaching methods.

Skills appeared more easily learnt and taught than knowledge and behavior.

The specific competency of technical expertise appeared most easily taught in the operating theatre, with health advocacy least emphasized by both trainees and surgeons. Technical expertise was taught through watching, assisting with didactic instruction and demonstrating skill. Both groups used active questioning and discussion for knowledge-based competencies of scholar and teacher, medical expertise, collaboration and clinical decision-making and judgment.

One singular consultant, however, did not think that clinical decision-making and judgment could be actively taught. Indirect learning was expressed through observation and role-modeling for the behavioral competencies of professionalism, management and leadership, communication and health advocacy.

Both groups emphasized the challenge of time, particularly balancing service provision with education. Interpersonal factors, such as the willingness to learn or teach, played a major role in the educational experience. Furthermore, attention to preoperative briefing, intraoperative teaching and postoperative debriefing were important to both groups. Areas of improvement were to better identify learning objectives, structure teaching and provide feedback.

To our knowledge, this is the first study using semi-structured interviews and thematic analysis to explore the perceptions of surgical trainees and surgeons toward core competencies in the operating theatre. Other qualitative study designs have been used. A cross-sectional online survey of trainees and program directors in sub-specialty surgical training found that not all core competencies were perceived to be effectively taught, and mentorship in areas outside of patient care and research was deemed lacking.^[24] An observational study of the operating room found that the competency of Patient Care was taught primarily through direct commands, displays of technical skill and operative technique, however, competencies least taught were Professionalism and Systems-based Practice.^[25]

The strength of our research is that it allowed candid contributions by participants in a single specialty group of General Surgery. Limitations, however, exist in our study. In comparison, the gender balance and age group of the consultant surgeons did not reflect that of the RACS surgical workforce.^[26] Our surgeons were younger and a higher percentage were female. This may reflect the workforce demographic at our hospital, and those we sought to participate in our qualitative research. While participants were voluntary, their selection may be more biased than if randomly sampled. Additionally, there may be recall bias, as participants were asked to think about and evaluate past events.

A move from informal to formal mentoring, upheld on an organizational level, has been advocated.^[27] Dedicated training lists have been postulated as a solution, with support, reward and compensation to encourage surgeons with an interest in surgical education to be trainers.^[21] Collaborative trainee-trainer agreement on SMART goals (specific, measurable, achievable, realistic and time-bound)^[28] and active educational models such as the BID (brief, intraoperative teaching and debrief) focused guided learning program,^[4] the SHARP (set learning objectives; how did it go?; address concerns; review learning points; and plan ahead)^[29] and OSAD (objective structured assessment of debriefing)^{[30],[31],[32]} have been proposed to better structure education and utilize available time.

Conclusions

Outcomes-based medical education has the admirable goal of improving the education of surgical trainees.^[15] To stand the test of time and to maintain adequate funding and support, competency-based training curriculum and competency framework must be evidence-based and frequently audited to uphold the highest standards of excellence.^[33]

Our study shows that most surgical trainees and surgeons thought that all competencies of the RACS framework can be learnt and taught in the operating theatre, but that challenges exist in heightening the mentor-based relationship and improving time pressures to facilitate experiential learning.

The need to better support surgeons as teachers is required as ideal conditions of time and mentoring are not yet met. Further research into novel approaches, such as dedicated training lists, formal mentoring programs and utilizing active teaching strategies, is required to improve surgical educational outcomes in the operating theatre in Australia and around the world.

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Teachers usually reported that these disturbing behaviors in the classroom are intolerable [2] and stress-provoking [3], and they had to spend a great deal of time and energy to manage the classroom [4, 5]. Obviously, student misbehaviors retard the smoothness and effectiveness of teaching and also impede the learning of the student and his/her classmates. It is, therefore, important to carry out a qualitative research study to unravel relevant and up-to-dated descriptions of the students' problem behaviors in Hong Kong classroom based on the views of teachers. Three schools, each admitting students having low, medium or high academic competencies, were invited to join this study. Chatting during lesson affects teaching and learning most. Keywords: Learning in the operating theatre, teaching in the operating theatre, operating room education, student experiences of surgery, surgical education for medical students. Introduction. Surgical exposure is incorporated into the curriculum of virtually all medical schools, and widely considered a necessary component of the undergraduate experience. Teaching competencies. A competency is more than just knowledge and skills; it involves the ability to meet complex demands by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. 1. Teachers demonstrate leadership a. Teachers lead in the classroom by: - evaluating student 3. Teachers know the content they teach a. Teachers develop and apply lessons based on an effective course of study by: - integrating Multiple teaching and learning strategies should help engage students in active learning opportunities that promote the development of critical thinking, problem solving, and performance capabilities while helping them assume responsibility for identifying and using learning resources. Any classroom teacher who is more than willing to discover and experiment in his class with other methods. Case study An account of a problem situation is provided to the class, and classroom learners may have an opportunity to analyze the problem involved. In the process, all learners are dragged into the discussion as the case is a slice of life that encourages diagnoses, prescription, and possible treatment of problems. The teacher should exercise good control to avoid off-tangent discussions. Learning-teaching This method follows almost the same procedures of the mutual inquiry. What is added is that the group members should be teaching one another based on the readings and individual activities they have independently undertaken. Conclusion. In certain classes, this is practically required. For example, when you're teaching a math unit, you'll usually need to display your work on the board, or else your students will be completely lost. This is how the class can follow along with better comprehension. Some students will need to see more than one example to get a good understanding. Make sure that you include several different demonstrations for each new unit, as repetition is a big part of committing new ideas to memory. You'll see a big difference in visual students' test scores when you implement this method. 2. Make mistakes. T...