

9- Computer in Health/Medical Education

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- Revised by: Basel almeflh
- References: 436 Doctor's Slides , E.H. Shortliffe and Marsden
- [Editing file](#)

Objectives

Not found ☹️

Color index

- Doctor's notes
- Extra information and further explanation
- Important
- Main titles
- Subtitles



This slide from doctor's slides



This slide from the book

All informatics lectures are done, we just want to thanks all our magnificent members who volunteered their time to help us:

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Medical
INFORMATICS

Informatics leaders

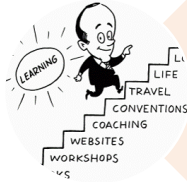
- Allulu Alsulayhim

- Moaid Alyousef

Reality of Healthcare



Multidisciplinary team
(فريق متعدد التخصصات)



Constant learning



Information Rich Environment



Provide high quality care



1. **Problem-based learning (PBL), Case-based learning (CBL).**

Difference between (PBL) and (CBL):

- PBL: Problem (clinical case) → Explore case (brain storming)
→ Self directed learning → Group discussion & conclusion.

- CBL: prior reading → Problem (clinical cases, SP, video tapes)
→ Seek outside sources of information & case discussion →
Learners interview SP with timeouts.

The facilitator's role in PBL is passive while in CBL is active.

2. **Content:**

- Physiological processes.
- Procedures, Effects of Intervention.
- Soft skills (interpersonal skills, leadership ethics).
- Information & communication technology (ICT) skills (basic Office, library database, smart phone Apps).

3. **Teaching Strategies:**

- One-way lecture based.
- Two-way interactive (Computer-based, e-learning).
- Online (black board).

4. **Assessment Methods:**

- Multiple choice questions (Midterm, Final).
- Short answers questions.
- Assignment Project.
- Presentation.

Theories of Learning (Important)



Behaviorism

- How one learn by looking at the observable behavior.
- **Based on stimuli and responses.**
- Not all process of learning can be measured (such as understanding, reasoning)

Cognitive Science

- The process of learning is based on thinking.
- Mind is information processing system.
- Learning is permanent change in cognition.
- Brain is no longer black box, it is a dynamic system.

Constructivism

- Learning process through interaction.
- Problem-based learning (PBL).
- Arriving to solution given the knowledge available.

Advantages of Using Computers in ME



Extending Storage

- Google Drive.
- Drop box.

Access to References

- Saudi Digital Library.
- PubMed.
- British Medical Journal (BMJ).
- Clinical Key.
- Up to Date (<http://www.uptodate.com/home/help-demo>).

Access to new content

- Forums.
- Meducation (www.meducation.net).
- Patient Cases (<https://www.patientslikeme.com/about>).

Mode of Computer-Based Learning



❖ Introduction:

- Student needs references to facts and knowledge.
- Must know how to apply to form diagnostic hypothesis & plan therapies.
- Computer is used for a wide range of learning methods- from drilling students to allowing student to explore a body of material.

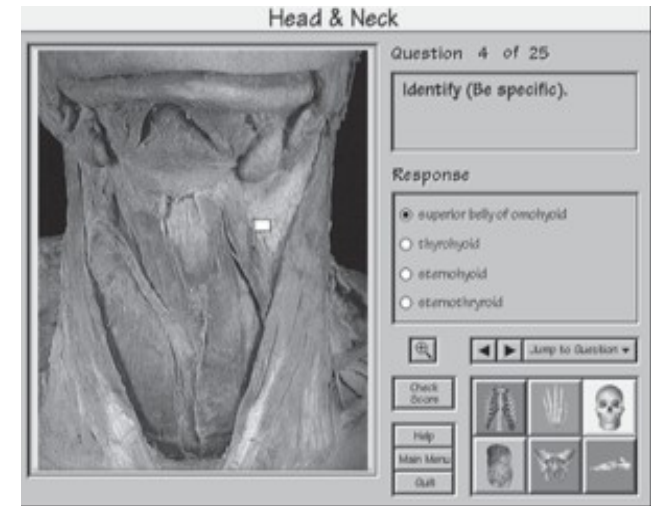
❖ Types:

1. Drill and Practice:

- Present material to students.
- Answer MCQ.
- Repeat till mastery.
- Move to the next material.

▪ Advantages:

1. Student can learn factual material.
2. Allow everyone to learn on their own pace without needing one to one guidance.





2. Lectures

Didactic lecture

- Traditional teacher-centred learning.
- Lecture based.
- Students only passive participants.

Digital lecture

- Recorded and **broadcast** to students.
- Medias: **Podcast, Webinars**, Youtube, Slideshare.
- Open Courseware by MIT (2001) can be shared across partner universities.

3. Discrimination learning:

- Process of teaching student to differentiate between the different clinical manifestations.
- Computer help to detect the subtle difference.

4. Construction learning:

- Use computer program to reconstructing the human body (Putting together the separated parts of body or placing cross sections at the correct location in the body).
- Effective learning using constructive approach to learning.

Types of Computer-Based Learning Cont.



5. Exploration:

- Students have the freedom to explore without guidance and interruptions.
- **Examples:**
 - Tooth Atlas.
 - Exploring dental anatomy .
 - 3D model and radiographs.
- **Advantages:**
 - Encouraged self discovery and experimentation.
- **Disadvantages:**
 - Without guidance, students may be lost (do not meet learning objectives) and wasting time.



Types of Computer-Based Learning Cont.



6. Simulation:

- Engage and actively involved in decision making (Interaction between a student and a simulated patient)
- Approximate the real-world experience of patient care.
- Put attention to subject being presented.
- Effective learning using constructive approach to learning.
- Simulation can be static or dynamic.



Static vs Dynamic	
Static	Predefined problems and clinical outcomes.
Dynamic	Simulate changes as students are interacting; make students understand their actions and clinical outcomes.



Types of Computer-Based Learning Cont.



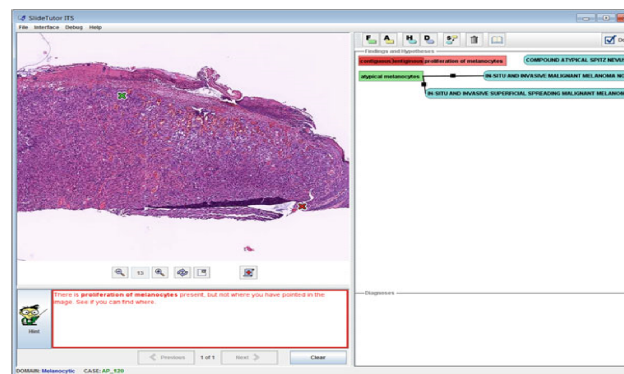
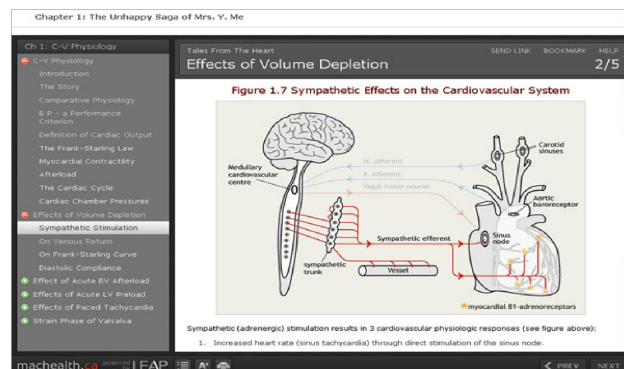
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❖ Scenario-, Case- and Problem- Based Learning

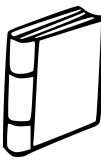
- the computer presents the learner with a story that includes a problem.
- The presentation may be only in text, with text and graphics, or as an interactive movie in a near realistic three-dimensional environment that replicates a space such as a clinic
- the learner may be required to investigate the situation (examine the patient), define the problem, find any supporting resources and guide the scenario to an end goal.

❖ Intelligent tutoring systems, mentoring, feedback and guidance

- Closely related to the structure of an interaction is the degree to which a teaching program provides feedback and guidance to students.
- Coaching systems: only when the student requests help or makes serious mistakes.
- Tutoring systems: guide a session aggressively by asking questions that test a student's understanding of the material and that expose errors and gaps in the student's knowledge.
- Mixed - initiative systems allow students freedom but provide a framework that constrains the interaction and thus helps students to learn more efficiently.



In this illustration from Slide Tutor, the student has correctly identified the proliferation of melanocytes. However, Slide Tutor provides the hint that the location of this finding is incorrect (Reproduced with permission of Rebecca Crowley)



Types of Computer-Based Learning Cont.

❖ Learning through design

- Student is asked to become the teacher
- Students create Web sites, games, virtual patient simulations, and other constructs, as learning tools for other students.
- **Disadvantage:** too time-consuming for the benefit received. Lack of teacher understanding of this tool is another reason that the method is rarely used.

Uses of Technology to Support Learning

1. **Medical, Nursing, Dental and Other Health Science Students**
2. **The Practicing Professional, Continuing Education and Certification:**
 - It has become obligatory for physicians to be lifelong learners both for their own satisfaction and, increasingly, as a formal government requirement to maintain licensure.
3. **Health Informatics Education:**
 - Is considered key components in creating safer hospitals and in improving quality of Care.
4. **Curriculum Inventory:**
 - Learning objectives or competency objectives are operationalized through the definition of a curriculum.
 - The Curriculum Inventory Portal uses the Medbiquitous standards.

Uses of Technology to Support Learning



Chapter: 23

5. Consumer Health Education

- patients. Computers can be used to print information about medications, illnesses, and symptoms so that patients leave the office with a personalized handout that they can read at home
- An important role for the health care provider today is to suggest high-quality Web sites that can be trusted to provide valid information ex: Medline Plus, WebMD.

The Ecosystem of Computers in Health Sciences Education

1. Accessing Learning Content (The Web):

- Eighty percent of Internet users look online for health information
- Medscape's professional site, emedicine, makes available detailed, professionally authored summaries of all major diseases and their management. Collections such as Up-To-Date and
- Ovid provide integrated access to a selection of journals and books to which the institution
- chooses to subscribe.
- The electronic medical record (EMR) has the potential to be a point-of-service learning tool for much of this information.
- EMR supports "just- in -time learning" within the context of patient care.
- Some EMR products support interfaces to third party knowledge products. An example, Infobuttons, provide context-specific links from one information system, such as the EMR, to some other resource that provides relevant information.

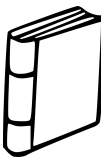
The Ecosystem of Computers in Health Sciences Education



Chapter: 23

2. **Accessing Learning Content:** Learning Centers.
3. **Accessing Learning Content:** Simulation Centers: A simulation center is a specialized type of learning center, though its governance may reside in an academic department such as anesthesiology or surgery depending on the center's origin and history. Immersive, simulation-based learning is a bridge between classroom learning and real clinical experience.
 - Adequate support of a simulation center requires: highly specialized staff, Simulation programmers, Instructional designers, Business managers and trained faculty members.
4. **Creating Learning Content:**
 - Technology-enabled learning content is now delivered across many platforms, ranging from the mobile phone and the tablet, through laptops and the Web, to physical manikins and game-like virtual worlds.
 - Creation of technology-enabled content can be labor intensive and time consuming and, hence, needs careful consideration. Three steps that should be considered are:
 1. **Needs assessment:** Defining the need for computer- based teaching in the curriculum is the first step.
 2. **Formative evaluation:** Prototyping, rapid iteration of development cycles, and formative evaluation are essential in creating a useful learning product
 3. **Summative evaluation:** after the product is in use, is valuable both to justify the completed project and to learn from one's mistakes
5. **Standards for Learning Objects:** Content Object Reference Model (SCORM) is a collection of standards and specifications that supports exchange of information between the client and the host.

Future Directions and Challenges



Chapter: 23

- Most faculty members are interested in finding out how technology can help them become better teachers. Most students, on the other hand, want to know how computers can help them learn more efficiently and effectively
- Answers for those questions are:
 1. Comparing educational software at three increasingly granular levels:
 1. configuration “big picture” of how the software is used, for instance as a tutorial or to support small group learning.
 2. instructional method, i.e. the techniques that support learning processes, such as questions, simulations and interactive models.
 3. presentation, i.e. The detailed attributes of how a particular instructional method is presented to the learner.
 2. Continue to identify which unique types of learning outcomes educational software can support.
 3. “Just-in-time” learning.
 4. Consider the information infrastructure for learning and professional development from the learner’s perspective.

Questions

1. A gastroenterologist consultant gave a 3rd year medical student a very interesting case. He discussed with them the history, physical examination and the treatment plan. What type of Theories of Learning is this:

- A. Behaviorism B. Constructivism C. Cognitive Science D. Drill and Practice

2. DXR is consider as what type of Computer-Based Learning:

- A. Exploration B. lecture C. Learning through design D. Simulation

3. Dr. Najeeb videos consider as which type of Computer-Based Learning:

- A. Digital lecture B. Didactic lecture C. Static D. Dynamic

4. Which ONE of the following consider as uses of Technology to Support Learning:

- A. Health Informatics Education B. Scenario-, Case- and Problem- Based Learning C. both

5. is a collection of standards and specifications that supports exchange of information between the client and the host:

- A. Consumer Health Education B. Teaching Strategies C. Content Object Reference Model
D. Electronic Medical Record

1. B
2. D
3. A
4. A
5. C

