LECTURE 3: CS INSTRUCTIONAL STRATEGIES

1

Teaching strategies

- A teaching strategy, can be seen as an over-all approach in organizing and planning a lesson in order to achieve the set objectives
- A teaching strategy takes into account the nature of the objectives, the target population, the group size, the availability of resources, the physical facilities and the time available
- Teaching strategies extend over a continuum between two extremes i.e. expository and heuristics with intermediate points in between them as illustrated in the diagram below;

4

Objectives

➤ At the end of this lesson, the learner should be able to;
  i.   Define teaching strategy
  ii. Describe expository and heuristic teaching strategies
  iii. Describe characteristics of an effective teaching
  iv. Describe the various teaching methods
  v.   Choose and apply appropriate teaching method to a computer studies lesson

2

Teaching strategies

Expository .... Intermediary .... Heuristic

- These strategies may be considered as two extremes of a continuum with a combination of both in between
- For effective learning, a teacher should make informed decisions about the strategy appropriate to particular learning needs and particular learners since none of the two strategies is singly effective

5

Introduction

➤ Students learn through making effective choices, trial and error, experimentation, reflection, discussion, debate, argument, constructive feedback and criticism, inspiration and curiosity.

➤ It is important to know how students learn because this has implications for the teaching strategy that a teacher will adapt in the classroom.

➤ There is no one strategy is likely to be adequate to meet the diversity of learning needs, therefore, a teacher may need to employ more that one of these strategies for effective learning

3

Teaching strategies

➤ Teaching methods are more defined steps/phases along the continuum between expository and heuristic strategies, e.g. the lecture teaching method falls within expository strategy whereas the Role play method is within the heuristic strategy as illustrated below;

Expository .... Intermediary .... Heuristic

Lecture   Classroom discussion   Role play

6

a) The Expository Strategy

- This strategy is characterized by;

i. **The teacher:**

➤ Providing students with information, the meaning of things, examples, definitions, generalizations, notes and even evaluation

➤ Presenting opportunities for the learner to practice new skills on the new information taught

➤ Testing or assessing for the adequacy of reception recall or understanding of information by repeating, replicating information based on the feedback received or non-verbal messages absorbed

➤ Teacher-centered activities where the teacher autonomy is evident

7

a) The Expository Strategy

ii. The learner

➤ Play mostly the role of receivers of this information, meanings, examples or applications

➤ Listening, taking notes, asking or answering questions if given the opportunity

➤ Examples of teaching methods/ approaches that fall within this strategy are;

- Lecturing
- Dictating
- Narrative
- Audio visual presentation

8

b) Heuristic teaching strategy

➤ This strategy is also referred to as discovery or experimental strategy

➤ This strategy is characterized by;

i. The teacher

➤ Usually organizing the task, providing and suggesting resources to be used and monitoring the performance of the tasks

➤ Observing and testing the understanding of the activity, experience or the practical being done or the principles and generalizations being drawn

➤ Adopting the philosophy of "keep your hands off and eyes on, unless there is a need to assist"

9

b) Heuristic teaching strategy

ii. **The learner**

➤ Being involved in seeking and finding information, discovering meanings, attempting translations and definitions, thinking up examples and applications, making notes, summaries and compositions and critically judging

➤ Being allowed to plan, execute and evaluate their own activities

➤ Being encouraged to develop self-confidence and poise (self-assurance) especially if they have to present their findings to the class

10

b) Heuristic teaching strategy

➤ Examples of teaching methods/approaches that fall within strategy are: Discovery; Experimental; Project method; Class discussion; Group work; Role play; Computer Assisted Instruction (CAI) etc.

➤ NB: Expository strategy is teacher-centered while heuristic strategy is learner-centered. Teachers are encouraged to use both types of strategies for different purposes at different points in one lesson or on different days

11

Characteristics of Effective Teaching

➤ A lesson can be said to be effective if the following characteristics are satisfied;

✓ Teacher knows his/her subject matter very well

✓ Organizes content well and presents it in clear language

✓ Uses different strategies in a given lesson which appeals to the learners

✓ Is purposive and committed to his/her work

✓ Makes the lesson interesting and enjoyable to the learners

✓ Expects the student to concentrate on the subject lessons

12

Characteristics of Effective Teaching

- ✓ Is an effective and clear communicator in setting the subject matter across the learners in simple clear language
- ✓ Relates the concepts in everyday life experiences of the learners
- ✓ Is enthusiastic and humorous in his or her teaching
- ✓ Makes concepts and ideas appear simple, reasonable and easy to understand and apply
- ✓ Shows respect to the learner and avoid embarrassing them in class
- ✓ Encourages students to ask questions as the lesson continues

13

Characteristics of Effective Teaching

- ✓ Encourages students to be creative and express their ideas and viewpoints freely
- ✓ Is friendly and warm to leaners
- ➤ To achieve this, the teacher must make a prudent choice of the teaching method/approach which is dictated by some factors like;
  - ✓ The general objectives of the subject
  - ✓ Whether you will teach in the classroom, laboratory or field course
  - ✓ Availability and quantity of apparatus and materials – teaching/learning resources
  - ✓ Specific subject objectives of a given topic
  - ✓ The level of the learner

14

Teaching methods/approaches

- ➤ The common methods or approaches that a teacher can apply are;
- a) **Lecture method**
- ➤ The lecture method is the process of delivering verbally a body of knowledge to the learners
- ➤ In is characterized by a one way communication from the teacher to the learners
- ➤ The teacher presents ideas and concepts while the learners listen and take notes

15

a) Lecture method

- ➤ **Applications of lecture method**
  - ✓ Introducing new topic
  - ✓ Presenting essential material that is not easily accessible to the learners
  - ✓ Due to shortage of time, you want to cover a lot of material in the little time available
  - ✓ Inculcating interest in the learners
  - ✓ Conveying information such as instructions to an experiment
  - ✓ Supplementing textbook material
  - ✓ Summarizing important at the end of the topic
  - ✓ Explaining abstract concepts

16

a) Lecture method

- ➤ **How to improve on lecture method**
  - • Consider the objectives you want to achieve and the style of presentation that will enable you to achieve them
  - • Use many appropriate examples to illustrate the main ideas and concepts
  - • Your personality should be good e.g. your appearance, dressing and poise/dignity/composure are important
  - • Use a well-modulated voice and correct punctuation
  - • Facial expression and gestures should be used to give emphasis

17

a) Lecture method

- • Talk to your students not the chalk/white board
- • Adopt the language to the level the leaners' understanding
- • Make use of illustrative devices/teaching aids
- • Development of lecture should be logical so that concept development is easily followed by the learners
- • Ensure proper understanding of the subject matter

18

a) Lecture method

➢**Advantages of lecture method**
- Suitable for suitable for large classes where material resources are inadequate
- Is inspirational e.g. in story telling type of lesson
- The teacher covers a large ground in a limited time
- It economical as not many teaching materials are used
- Students don't spend a lot of time exploring and finding out
- The is less effort on the part of the teacher in terms of organizing the class

19

b) Demonstration method

- Involve the learners in the demonstration e.g. in assembling of the equipment or making observation and readings

22

a) Lecture method

➢**Disadvantages**
- The learner is not actively engaged in the learning process. Thus they are passive recipients
- Does not develop creative and critical thinking among the learners
- Does not provide the learners with the opportunity to organize their thinking and verbally communicate to their peers during the lesson

20

c) Discussion method

➢The discussion method can either be small group discussions or whole class discussion
➢Advantages of discussion are;
- It promotes exchange of ideas and opinions
- Promotes critical thinking ideas are criticized and evaluated by the learner with supportive evidence for their arguments
- Promotes democratic principles in class
➢To make the discussion method more effective, note the following;
- Make the discussion group as smaller as possible to promote member participation

23

b) Demonstration method

➢Demonstration method involves the teacher carrying out an activity on behalf of the learners to teach them a certain skill or concept
➢To make demonstration method effective the teacher should;
- Let the learners know why you are carrying out the demonstration
- What the learners should look for during the demonstration
- Ensure the materials and equipment are working before the demonstration
- Every learner should be in a position to see the demonstration

21

c) Discussion method

- Ensure learner sit facing each other for effective group communication/discussion
- The topic for the discussion should be interesting and challenging to the learners
- Each group should have a group leader to control the discussion and a recorder to record points
- Members should respect each other's point of view and not personalize the differences in opinions
- Make groups of mixed ability

24

d) Field trip/excursion

- In this method the learners visit place of educational value such as museum, airport, etc for learning
- For the learners to benefit more from the field trip or excursion, the teacher should carefully plan for it
- Planning for the field trip;
  - Spell out the purpose and objective of the field trip
  - Notify the school authority and authorities you want the students to visit
  - Assemble all the materials and equipment needed for the field trip
  - List the main questions to guide the students
  - Organize and book transport

25

e) Project method

and materials to carry out the project are available and whether it be done within the available time
- The project should be to the level of the learner
- For the project method to be effective as teaching strategy the teacher should;
  - Design the learning outcomes you expect the learners to achieve
  - Ensure that the topics chosen are likely to develop interest to the learners and will be stimulating intellectual pursuits as they carry out the projects
  - You must approve every project before the learners go ahead with it

28

d) Field trip/excursion

- Organize for accommodation if the students will be away for one night or more
- Organize for meals
- Inform the personnel who will accompany the student
- Inform the student on the appropriate clothing and protective gears
- Take safety measure very serious and let the learners know it
- Prepare for follow up activities such as report writing or class presentations or written tests

26

e) Project method

- Ensure that all materials and equipment are available for the completion of each project
- Arrange for regular consultations with specific milestones as the project proceeds so that learners will not go astray in their work
- Ensure high standards of safety
- It is advisable to let the learners know what you will be marking the projects
- Ensure through documentation of the project work is done and a final project report submitted

29

e) Project method

- In the project method, the learner is expected to carry out a project to solve a defined problem or achieve a set goal
- They can carry out the project as individuals or groups
- A project can be short taking few weeks or long term taking several weeks to the whole school term or year
- Let the learners choose their own project rather than you as a teacher assigning the project, however, when they have chosen the topic, you choose discuss each learner's or group's project in the aim of scaling to manageable levels whether the

27

f) Experimental/discovery method

- Also referred to as enquiry or problem-based learning
- In this method, the teacher plays the role of a facilitator while the learner is actively involved in the learning experiences
- The school of thought for this methods advocates not in teaching of knowledge itself but to teach the learner the skills by which he/she can generate knowledge
- The learner is presented with a problem and has to go through the problem solving process that consists of five steps;

30

f) Experimental/discovery method

i. Identification of the problem
ii. Formulation of hypothesis (informed guesses)
iii. Collection of and analysis of data
iv. Drawing conclusions
v. Developing meaningful generalizations

➢Advantages of experimental/discovery methods are:
- Leads to understanding all opposed to note taking
- Learners are actively engaged in the teaching/learning process instead of being passive recipients
- Learners find such lessons more interesting and make them more enthusiastic

31

Characteristics CAL & CAI

➢Characteristics of CAL & CAI include;
- **Self-Paced -** This unique characteristic enables learners to move as slowly or as quickly as they like. Material included in the program can be reviewed again and again, as many times as the students require, without any consequences or set backs from the program.
- **Self-Directed -** This describes the ability of learners to decide what they want to learn, and in what order they want to learn it, based on their unique learning abilities and characteristics, in order to benefit, enhance, and individualize the learning process for students.

34

---

f) Experimental/discovery method

- Enhances research and critical thinking skills in the learner, thus enhancing scientific culture
- Learners are exposed to scientific methods of research

➢Disadvantages of experiments/discovery methods
  ➢It is time consuming for both the teacher and learner
  ➢It is costly in terms of materials
  ➢It requires very careful planning and preparation by the teacher
  ➢Unless well supervised, some learners might not gain from experiments/discovery method

32

Characteristics CAL & CAI

- **Use of Various Senses -** Computer assisted Instruction (CAI) uses computers and various forms of technology that allow students to process instructional material using a variety of different senses making it easier for students to remember and learn the material
- **Variety of Media -** The utilization of technology and computers by this strategy encourages student learning by providing a constantly stimulating environment and promotes enthusiasm by presenting academic content in a way that is interactive, enjoyable and relatable for students.

35

---

g) Computer Assisted Learning (CAL) and Computer Assisted Instruction (CAI)

➢Computer Assisted Instruction, abbreviated as CAI, is a term that refers to interactive instructional strategies that use computers to convey and teach instructional material to students, as well as monitor their learning

➢ "Computer-assisted learning (CAL) is to convey a vast amount of information in a very short period of time. It is a powerful method of reinforcing concepts and topics first introduced to you through your textbook, and discussion in the classroom. Computer-assisted learning enables you in a powerful way to comprehend complex concepts."

33

Purpose of CAI

➢**Learning Rate**- It is found that CAI enhances student learning rate. Student learning rate has proven to be as much as forty percent faster with CAI than with traditional instruction

➢**Retention of Learning**-According to researchers, student scores on initial tests and delayed tests indicate that students instructed using CAI retain more content than if they had been instructed using traditional instruction only

➢**Locus of Control**-Students instructed using CAI strategies have more of an internal sense of self-efficacy and ability to control their own learning.

36

Purpose of CAI

- **Attitudes** - A lot of the research examining CAI strategies and their effects on student achievement and learning outcomes simultaneously observes how student attitudes are effected by this instructional strategy. This has led many researchers to the consensus that using CAI strategies will lead to more positive student attitudes than conventional instruction
- **Attendance**- Students had better attendance when instructed using CAI strategies

37

MODES OF DELIVERY OF CAI

- In tutorial method, a module lesson consists of:
  - ✓ Presentation of content in a structured way
  - ✓ Task prescription to elicit the learner's response
  - ✓ Instant feedback and reinforcement to the learner
  - ✓ Can be effectively used by individuals or groups of 2-3 students

40

Purpose of CAI

- **Motivation and Time on Task** - Studies show that students instructed by the use of CAI strategies have higher rates of time spent on task in class than students instructed using traditional instruction only
- **Cooperation and Collaboration** - Cooperative and positive social behaviors are greater among students instructed using CAI strategies

38

MODES OF DELIVERY OF CAI

3) Simulation Activities - Provides a real-life scenario with the material to be learned being applied as it would in the real world. It provides a simplified representation of a real situation, phenomenon, or process. It also provides the opportunity for students to apply knowledge in a realistic format but without the time, expense, or risk associated with the real thing. Simulation provides safety of learning environment. Simulation software can provide an approximation of reality that does not require the expense of real life or its risks. Simulations can mimic physical objects or phenomena, processes, procedures, and situations.

41

MODES OF DELIVERY OF CAI

➢ **1) Drill-and-Practice -** Drill and practice provide opportunities to the students to repeatedly practice the skills that have previously been presented and that further practice is necessary for mastery. In this, the students learn facts and memorize them by drill method. This method is useful for slow learners.

2) Tutorial - In this computer assumes the role of a tutor, introducing content, providing practice, and assessing learning. Tutorials are used to introduce new content to learners in much the same manner that a human teacher might. This mode, if used well could result in 90% retention of the content compared with 30% retention after the best lecture

39

MODES OF DELIVERY OF CAI

4) Games - Games use the instructional material to create a contest for the learner. The learner can compete against his own personal best, the computer, or other learners while mastering the material. Game software often creates a contest to achieve the highest score and either beat others or beat the computer. Usually, they are aimed at younger learners such as those in the elementary grades. **Games can substitute for worksheets and exercises, as a reward, or, in some cases, to foster cooperation. General features are:-**
  - ➢ An end goal and rules of play
  - ➢ Sensory appeal and motivational elements

42

MODES OF DELIVERY OF CAI

5) Discovery - Provides the learner with an opportunity to draw his own conclusions. Presents learner with a wealth of material on a topic and allows the learner to seek answers on his own. Discovery approach provides a large database of information specific to a course or content area and challenges the learner to analyze, compare, infer and evaluate based on their explorations of the data.

43

The Process of CAI & CAL

➤ Choose a relevant topic
➤ Decide the cognitive level of the students, aimed by the module i.e. knowledge, understanding, or problem-solving
➤ Decide the computer assisted learning mode to be used
➤ Develop CAL sequence in the forms of frames
➤ Introductory frame gives directions to the learner
➤ Learning frame presents the matter to the learner
➤ Test frame tests the learners and gives appropriate feedback.

46

MODES OF DELIVERY OF CAI

6) Problem Solving - Problem solving presents material in such a way as to develop problem solving rationale. This approach helps children develop specific problem solving skills and strategies. Usually focuses on a specific type of problem solving and provides practice on a number or variety of problems. Problem solving applications sometimes focus on specific topics areas (e.g., mathematics, science) and sometimes they are designed to promote general problem-solving abilities (e.g., pattern recognition, prediction).

44

The Process of CAI & CAL

➤ Pre-validate the CAL by sharing them with peers and students and get feedback
➤ Too easy, rigid, difficult parts need to be revised.
➤ Get the written CAL module converted to a computer program.
➤ Do post-validation of the CAL program and make corrections if needed.
➤ Release CAL unit for learners to use and learn.

47

MODES OF DELIVERY OF CAI

7) Laboratory mode - Computer could be programmed to stimulate a variety of biological processes to supplement or do away with laboratory experiments. The learner explores various options and learns by inference.

45

Advantages of CAI & CAL

➤Interesting and motivating
➤Compatible learning style
➤Promote enthusiasm
➤Helps shy and slow   learner
➤Immediate feedback
➤Error analysis
➤Critical thinking ability
➤Process design ability
➤Team work
➤Outcome oriented process
➤Communication skills

48

Disadvantages of CAI & CAL

➤ Learners with low motivation or bad study habits may fall behind.
➤ Without the routine structures of a traditional class, students may get lost or confused about course activities and deadlines.
➤ Students may feel isolated from the instructor and classmates.
➤ Instructor may not always be available when students are studying or need help.
➤ Slow internet connections or older computers may make accessing course materials frustrating.

49

Barriers For CAI Implementation

➤ Finance problems
➤ Poor training opportunities
➤ Time and teacher workload
➤ CAI in the Home
➤ Government policies
➤ Teachers' belief
➤ Content
➤ Program development

52

Disadvantages of CAI & CAL

➤ Managing computer files and online learning software can sometimes seem complex for students with beginner-level computer skills
➤ Hands-on or lab work is difficult to simulate in a virtual classroom
➤ Learner may feel overwhelmed at the volume of material presented.
➤ Overuse of multimedia can detract from intended learning objectives.
➤ Inability to ask a "person" a question when material is not understood.

50

Questions:

➤ Define the following terms: teaching, teaching strategy, teaching method
➤ Differentiate between expository and heuristic teaching strategies
➤ Discuss the following teaching methods and their applications in teaching computer studies;
➤ Lecture; discussion; excursion; discovery, CAI
➤ Highlight the characteristics of an effective teaching
➤ Discuss the modes of delivery using CAI
➤ Explain factors to consider when choosing a teaching method to employ in a computer lesson.

53

Disadvantages of CAI & CAL

➤ Equipment can malfunction can occur.
➤ Lack of good CAI packages or lack of infrastructure to deliver CAI.

51

---END---

54