

21st Century Approaches to Teaching Physics

Teacher Centered vs Student Centered Education

Change in the Instructional Paradigm

- **What is Pedagogy?,**
- **PEDAGOGY** is the method and practice of teaching
- **What is Paradigm?**
- **PARADIGM** is a model of something, or a typical example or pattern of something

Change in the Instructional Paradigm

- **Old – Instruction Paradigm**

- An educational institution exists to provide instruction.

- **New – Learning Paradigm**

- An educational institution exists to produce learning.

Change in the Instructional Paradigm

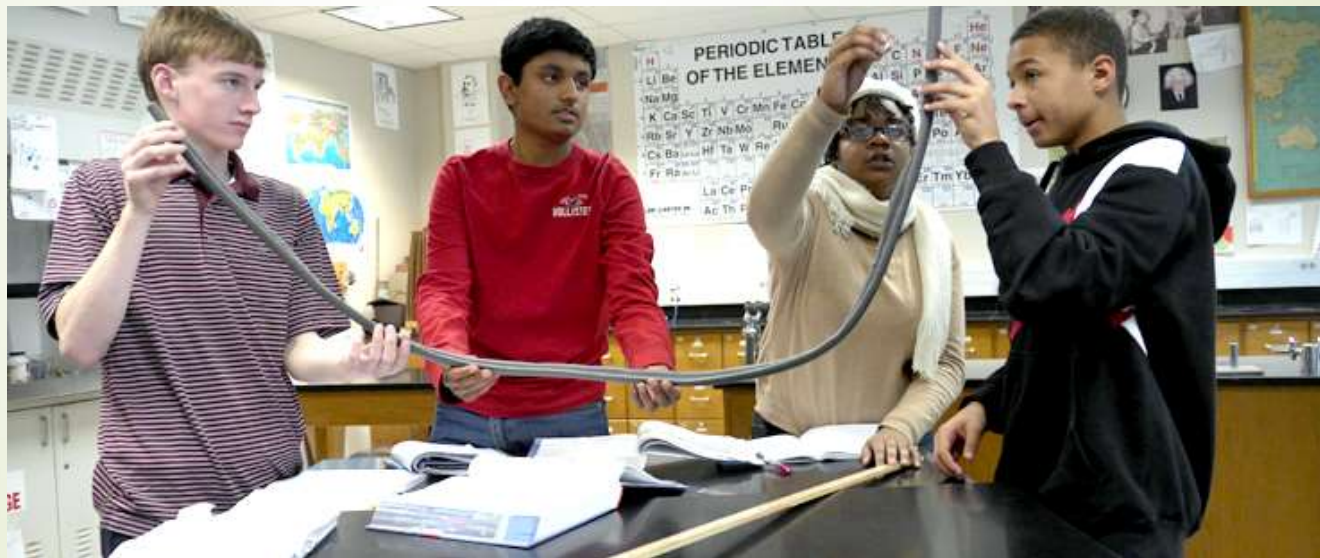
- **Teacher-centered pedagogy**
 - 'lecturing, note-taking, and memorizing information'
- **Learner-centered/Student centered model shifts the focus of activity from the teacher to the learners/students**
 - Emphasizes "*what the learners do*" instead of "*what the teacher does*"
- **Based on constructivist theories**
 - Learners are not passive recipients of information; they construct and reconstruct knowledge in order to learn

Instruction Paradigm

- ▶ **Most common teaching method used is LECTURING.**
 - ▶ Does this method promote student learning?
 - Think back about your own learning – how did you learn?
 - What do you remember best?
 - ▶ Lecturing is economical – Able to cover large amounts of information in a short period of time
 - ▶ Teachers are in the active role and students are in a passive, receptive role.
 - ▶ Students are listeners, NOT learners
 - Most people only remember some part of what they hear.
 - The longer the lecture, less of the information ended up in the students' notes.

What do the researches say?

- Researches show that students learn and keep more information when they are actively involved in the learning process.



Learning Paradigm

- Uses student-centered/active learning techniques to get students involved in the learning process
- Focuses on the student's needs, abilities, interests, and learning styles
- Requires students to be active, responsible participants in the learning process
- Acknowledges student activities as central to the learning experience for every student

Student-centered learning

► Research shows that student-centered methods lead to

- Increased student engagement with the content
- Deep learning
- Long term retention of knowledge
- Acquisition of critical thinking or creative problem-solving skills
- Positive attitude toward the subject being taught
- Confidence in knowledge or skills

What is student-centered learning?

- ▶ These activities allow students to apply what they have learned early.
- ▶ Instructional activities should involve students in doing things and thinking about what they are doing.
- ▶ The students has to be engaged in higher order thinking tasks such as analysis, problem-solving, synthesis, and evaluation.



What is student-centered learning?

- Students are not just learning, but they are allowed to work with and use the information alone or with peers.
- Their thoughts and perspectives are a necessary input to every class.
- Students are treated as co-builder in the learning process.



Some Student-Centered Teaching Methods

- **Student-centred learning does not employ a single teaching method.**
 - Emphasizes a variety of methods that shift the role of the instructors from “*givers of information*” to “*facilitators of student learning*”.

Some Student-Centered Teaching Methods

- Active Learning
- Cooperative Learning
- Inductive teaching and learning
- Discussion Forums
- Role-Playing
- Hands-On Projects

Some Student-Centered Teaching Methods

► Active learning

- Students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm during class

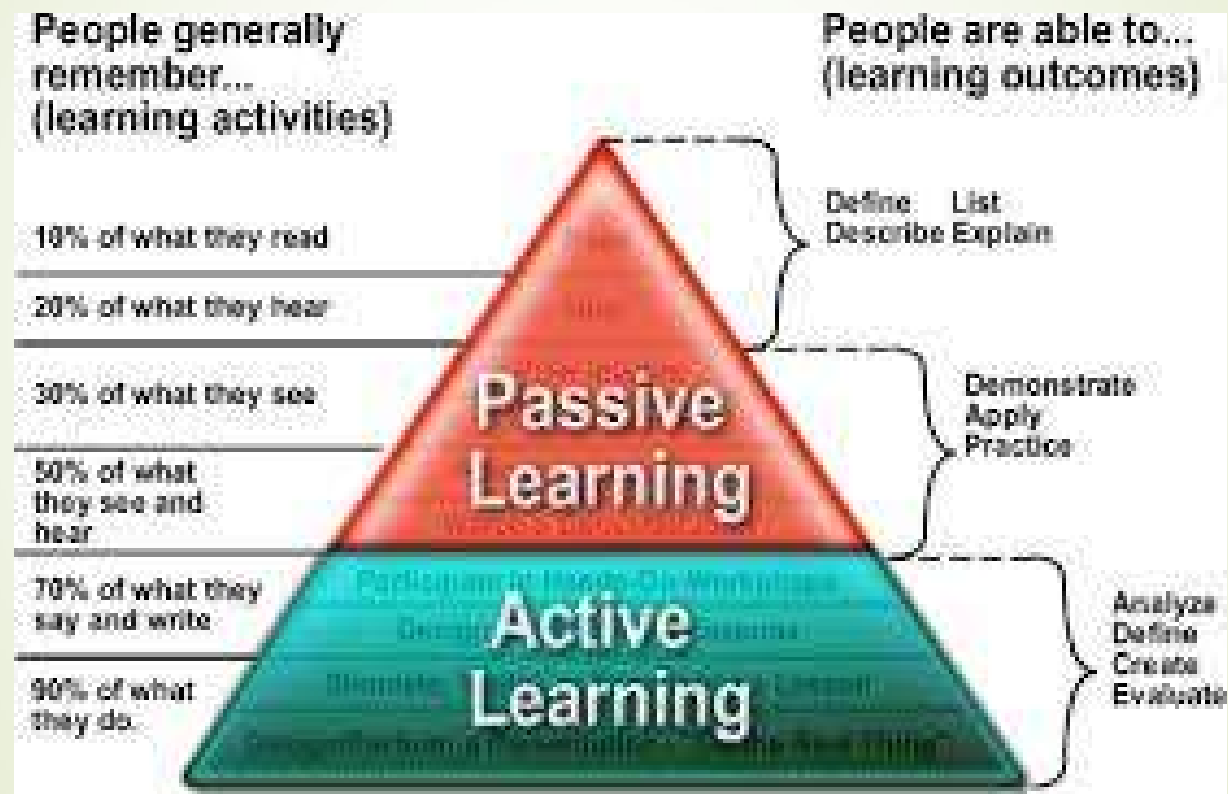
► Cooperative learning

- Students work in teams on problems and projects under conditions that assure both positive interdependence and individual accountability

► Inductive teaching and learning

- Students are first presented with challenges (questions or problems) and learn the course material in the context of addressing the challenges.
- Includes *inquiry-based learning, case-based instruction, problem-based learning, project-based learning, discovery learning, and just-in-time teaching.*

Active Learning-Passive Learning



Comparison of Student Centered and Teacher centered Instruction Paradigms

Teacher Centered	Student Centered
Knowledge is transmitted from teacher to student.	Students construct knowledge through collecting and synthesizing information and integrating it with the general skills of inquiry, questioning, communication, critical thinking, and problem solving.

Comparison of Student Centered and Teacher centered Instruction Paradigms

Teacher Centered	Student Centered
Students passively receive information.	Students are actively involved.
Emphasis is on gaining knowledge	Emphasis is on using and sharing knowledge effectively to solve problems in real-life contexts.




Comparison of Student Centered and Teacher centered Instruction Paradigms

Teacher Centered	Student Centered
Teacher`s role is to be primary information source and primary evaluator.	Teacher`s role is to coach and facilitate(to make easy). Instructor and students evaluate learning together.
Emphasis is on right answers.	Emphasis is on generating better questions and learning from errors.

Comparison of Student Centered and Teacher centered Instruction Paradigms

Teacher Centered	Student Centered
Focus is on a single subject or discipline.	Focus is not only on a single subject or a discipline but also on interdisciplinary investigation.
Culture is competitive and individualistic.	Culture is cooperative, collaborative, and supportive.
Only students are viewed as learners.	Teacher and students learn together.

Changing Role of Teachers

OLD		NEW
Teachers as disciplinary experts who give knowledge through lecture		Teachers as designers of learning environments applying best teaching methods
Teachers are actors on stage		Coach interacting with a team
Teachers are delivering a lecture		Designing and playing a team game

Role of the Student

- Moves from “*the role of note taker*” to “*active participant*” in the learning process
- Allows students to take control over their learning and, therefore, forces them to take more responsibility in the classroom

Advantages of Student-Centered Learning

1. Give opportunities to connect the content to real life
2. Provides opportunities for **higher order thinking** as opposed to passive listening
3. Promotes greater student-teacher and student-student interaction
4. Increases student learning
5. Provides for improvement of social interaction skills, greater acceptance of others, and a greater sense of “community” in the class
6. Encourages alternative forms of assessment
7. Encourages innovation in both teaching and student involvement

Challenges About Implementing Student Centered Model

1. Lack of confidence in trying new methods
2. Fear of loss of content coverage
3. Loss of control over the class
4. Lack of prepared materials for use in the class
5. The ego of the teacher/professor
6. Lack of background or training in the use of active learning approaches

Study Questions

1. Define pedagogy and paradigm.
2. What are the differences between old and new learning paradigms?
3. In which method of teaching, students learn better, student centered or teacher centered? Give at least five reasons.
4. What is the difference between active and passive learning?
5. Compare the teacher centered and student centered teaching methods by giving at least five points.
6. Give examples about changing role of teacher in the student centered education.
7. What are the advantages and challenges about implementing student centered education. Give five reasons from physics.

References

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