JIGSAW Method: the Electric field in Physics

by

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Overview

I would like to improve students' use of the "JIGSAW" method [1-2] to improve student marks.

Outcome: student will be learning and understanding the electric field in Physics [3].

How?
I will introduce "JIGSAW" activities in module: **the electric field**.
Topic resources: The basics of electric field using book, YouTube, Internet demo.

Futures topic and resources
Electric field behavior using a book, online simulation, and YouTube.

Possible issues?
If some students are low performance, he/she cannot transfer knowledge to the Home group.
- Solution A: reprocess, but reduce time or reduce marks.
- Solution B: reprocess, but regrouping (preference-based, GPA-based, skill-based).
- Solution C: reprocess, but only low performance students have freely chosen topic and resources.
- Solution D: only low performance students tutorial with a teacher.
- Solution E: change method.

Measurement impact
Comparing student scores
- JIGSAW method – another method from the last year.

JIGSAW method assessment using Questionnaire or Poll
- GoogleForm.
- Zeetings.
- PollEverywhere.

Aims and objectives

Aims [4]
- Students will understand and become proficient at identifying the behavior of the electric field.
- To enable students to learn physics.
- To develop scientific and realistic attitude toward life.
- To develop the skills to use the modern devices.

Objectives [4]
- Cognitive: Students will identify the keyword of the the electric field.
- Affective: Students will connect the relationship of the electric field keywords from a list developed by the entire class.
- Physical: Students will create the electric field **map** to go with their keyword diagnosis.

Activities

Jigsaw learning intervention in **the electric field**.

All Students are separated by 4-member per group as "Home group".
- Only one member will be the leader or center of group.
- Each member will be regroup as "Expert group" to study the topics of the electric field keywords
  - "Equipotential lines",
  - "Electric field lines",
  - "The direction of electric field lines" and
  - " Potential Energy".
- They will have 30 minutes to explore the content in Expert group (20 marks).
- They will have 30 minutes to present and discussion (role play) about the electric field and topic resources in Home group (30 marks).
- They will create the electric field map and calculate magnitude of the electric field and potential energy at the interesting point (50 marks).

Wrap up by teacher.

Outcomes

Student learning outcomes state what students are expected to know or be able to do upon completion of a course or program.

- Contextualization of Knowledge: Students can be able to
  - demonstrate their understanding of major concepts of the electric field.
  - demonstrate an understanding of the basic electric field.
  - identify characteristics of certain structures of the electric field and explain how structure governs function.
  - apply knowledge of mathematics and physics to materials and materials systems.
  - identify, formulate and solve problems using appropriate information and approaches.
  - calculate the magnitude and direction of the electric field created by moving electric charges.
- Praxis and Technique: Students can be able to
  - have an understanding of professional and ethical responsibility.
  - associate with working as a collective unit toward a common goal of teamwork.
  - use basic video and web technologies in the learning of the electric field.
- Critical Thinking: Students can be able to
  - recognize, describe, predict, and analyze systems behavior of the electric field.
  - evaluate evidence to determine and implement best practice.
  - examine technical literature, resolve ambiguity and develop conclusions.
  - synthesize knowledge and use insight and creativity to better understand and improve systems of the electric field.
- Research and Communication: Students can be able to
  - retrieve, analyze, and interpret the professional and lay literature providing information to both professionals and the public.
  - design and conduct experiments, as well as analyze and interpret data of the electric field.
  - communicate effectively through written reports.

Impacts

Students were central to the field of study.
- Students were asking and finding the meaning of learning keywords as
  - What does equipotential lines, electric field lines and, direction?
  - How to calculate the magnitude of the electric field and potential energy?
- They were attractive to most learners as the member of the group.
- They can readily be explored through the open-ended question.
- They can be investigated through a variety of learning resources.

Note: Not yet assessment using Questionnaire or Poll.

Future development of project

Future development of project:
- Short-term:
  - Seek feedback: establish a feedback loop with students and colleague. Feedback is a critical component of professional growth, particularly when I need to learn quickly in a short period of time.
- Medium-term:
  - To apply JIGSAW method to another courses.
  - Seek feedback.
- Long-term:
  - To use JIGSAW method collaborate another method.
  - Seek feedback.

References

[1] E Aronson. Jigsaw Classroom. Available at http://www.jigsaw.org/index.html, accessed Feb 2018.
[2] SW Tina Choe and PM Drennan. Analyzing scientific literature using a jigsaw group activity. *Journal of College Science Teaching*. 2001, **30**(5); 328-30.
[3] R Killen. *Teaching Strategies for Outcomes-based Education*. Juta Academic, 2004; p 212.
[4] LW Anderson, et al. *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon, 2000, p. 336.