The role of interesting topics and contexts in physics education

Motivation

Previous studies show that students’ interest differs across physics contents (e.g. mechanics), contexts (e.g. biological) and activities. However, students’ interest types were mainly described in terms of gender, even though other factors (e.g. self-concept) might have a strong influence. Moreover, previous studies did not include modern physics or open questions of current research, which might be particularly interesting for students.

This poster provides a literature review as a basis for a PhD research project. New research will be conducted to figure out which topics and activities arouse interest in physics among today’s high school students.

Moreover, interest types will be described while considering various factors of influence. The results will be used to develop a learning intervention equally interesting for all types of high school students.

Research aims

The role of interesting topics and contexts in physics education

Interest – Structure of the construct

Person-object-theory [1]

What is interest?

- specific relationship between a person and an object [2]
- content and domain specific [2]
- multidimensional (cognitive, affective, emotional and value-related components) [2]

2 levels of Interest

1) Individual interest
   - i. individual interest
   - ii. external factors, i.e. interestingness [2]

2) Operational interest
   - caused by
   - individual interest
   - external factors

Interest vs. attitude

- attitude: general, non-personal evaluation [2]
- interest: subjective value attached to knowledge about an object [2]

What is an object of interest?

- Certain part of the cognitively represented environment [2]
- Which object of interest is interesting for PER?

General interest in science, or interest in a domain, a subject, a content, a context, a learning environment, ...

Development of interest

1) Triggered situational interest
   - Yiel: engagement with object, recognition of personal value, positive feelings (x)

2) Maintained situational interest
   - No external trigger, already existing knowledge, desire to learn more

3) Emerging individual interest
   - Interest -n-ness

4) Well-developed individual interest
   - Desire to learn more - even when associated with difficulties

Objective of interest – Activities

4 main facets: content, context, task, learning environment

For analysing the structure of interest

- contents can be grouped according to a context, subject, or domain, and
- tasks can be grouped according to learning environments.

Previous studies focused on different aspects:

IPN interest study [4]

- Gender:
  - Boys: extending their interest in optical instruments and thermodynamics, and, in particular, in motion of vehicles and electricity/electronics
  - Girls: higher interest in natural phenomena and medical devices

RIASEC+N-model

- RIASEC model originally developed for categorising vocational interests [3]
- Adaptation for education research [4, 5]
- Interest in different activities is measured in
  - 4 categories (additional category Networking)
  - 3 learning environments (school, vocational interests, and enrichment) [4, 5]

Assessment of interest

Interest in domains and subjects:

- PISA 2006 [8]: content (and) general interest in science
- PISA 2015 [9]: general interest in science
- BUT: Interest is not equally high for all contents or tasks of domain or a subject.

Topological structure of interest:

- IPN interest study [10]: content, contexts, and tasks
- ROSE survey [11]: content and contexts
- RIASEC+N study [4, 5]: tasks and learning environments
- BUT: Students are asked about their interest when they are not directly involved with (contents or) tasks.

- IPN 2006 [8]: content (and general interest in science)
- ROSE survey [12]: content (and general interest in science)

- Contextualised items (stimulus text and task)

Previous findings – Activities

RIASEC+N study

8th - 12th grade [8]

- Most popular: social and networking
- High-achievers, students with high self-concept: students with high general interest, higher interest in all activities and environments

- Gender:
  - Girls: higher interest in social (school) and artistic activities (school, enrichment)
  - Boys: higher interest in realistic activities: boys (vacation), girls (school, enrichment)

4th grade [4]

- Most popular: realistic and investigative
- Least popular: social and entering

- Gender:
  - Girls: higher interest in artistic activities (physics, chemistry)
  - Boys: Higher interest in social activities (physics, chemistry)

PISA 2015 [13]

- Boys (and NOT girls): technical, mechanical, electrical, spectacular, violent, explosive
- Girls (and NOT boys): health and medicine, beauty, human body, ethics, aesthetics, wonder, speculation (and the paranormal)

- Equal AND high interest: space, life, wonder, openers (winner, possibility of life outside earth)
- The more developed the country, the less general interest in science

Have a look!

Download poster