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Increasing Girls participation in Physics Education

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Abstract

The aim of this research is to identify factors affecting girls negative attitudes towards physics and suggests pedagogical approaches that can help secondary physics teachers to engage girls in physics. In this study we used survey method and standardized questionnaire and try to find factors that affect girls negative attitude towards physics study. The sample consists of 47 grade K-12 girls. We try to find possible reasons for their disengagement about physics study. In order to increase girls participation in physics related careers we try to change teachers attitude about girls engagement with physics and equipping teachers with effective pedagogical strategies to address the problem should become one of the top priorities of physics education community. This paper highlighted research literature on the reason for girls' disengagement from physics and suggested research based pedagogies that help teaching to address this problem.

Keywords: Pedagogical, disengagement, equipping, strategies.

1. Introduction

The aim of the review of the research literature was to establish current understanding of the nature of the problem of girls' participation in physics and the possible reasons found by research for girls choosing not to continue with their study of physics. It also tried to identify what strategies have been successful in increasing the number of girls studying physics post-16. The focus on girls' participation and recruitment post-16 was in recognition of the trends in entry patterns at A-level. The decline in entry to physics A-level has applied both to boys and girls. The paper identifies factors affecting girls' negative attitudes toward physics and suggests pedagogical approaches that can help secondary physics teachers to engage girls in physics. This paper describes a number of research-based pedagogies effective at engaging girls (and other underrepresented students) in secondary and post-secondary physics courses. However, before discussing how we can engage girls in physics, we need to uncover possible reasons for their disengagement. This will be done in the following section.[1-5]

1.1Criteria for inclusion of the research studies:

The following criteria were taken into consideration:

Sample: The student of 10^{th} and 11^{th} grade girls of S.M.P. School, Amravati.

- age of the students 11–16;
- contemporary nature of the research;
- clarity of purpose;
- clarity of data-collection tools;

- attention to the validity of the analysis and its interpretation.

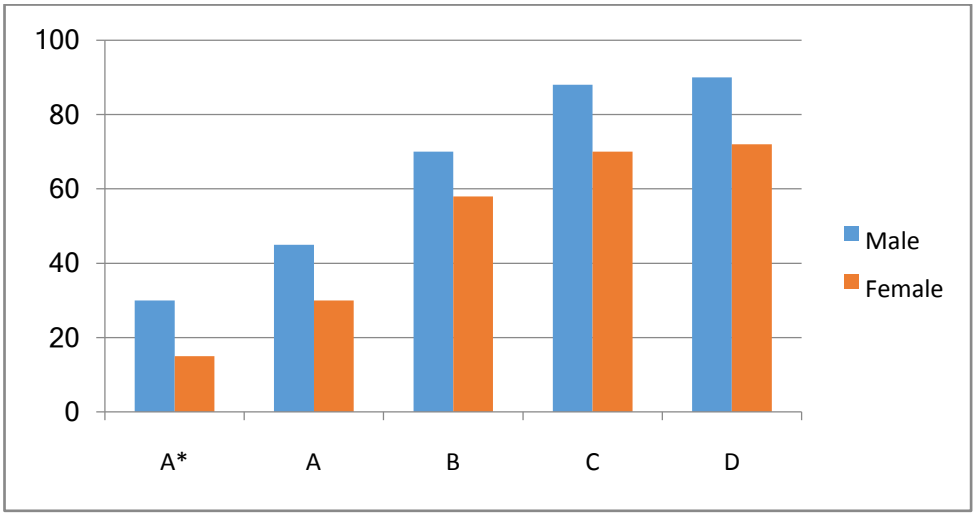

Fig.1: Cumulative performance by gender for physics

2. Research-Based Evidence for the Reasons behind Girls' Disengagement from Physics

a) Different gender-dependent socialization patterns.

b) Different gender-dependent attitudes, interest levels and self-efficacy about physics.

c) Different effects of the classroom culture on boys and girls.

d) The lack of appeal of traditional physics curriculum and assessment strategies to girls.

e) Teachers' beliefs about girls' ability to succeed in physics and teachers' lack of awareness of the reasons for girls' disengagement.[6-8]

3. Research Based Pedagogies For Increasing Girls' Engagement With Physics:

At first glance, the obstacles for girls' disengagement from physics look insurmountable. However, a closer examination reveals that while some of them are located outside of teachers' control, there is a lot teachers can do to alleviate the problem. For example, Daly and Grant identified six areas of good practice in a physics classroom that promote positive girls' attitudes about physics. They include:

1) Pedagogy: teaching and learning physics in a way that is accessible and engaging for girls;
2) Classroom management: engaging and supporting girls;
3) Careers: emphasizing the value of physics and physics-related careers;
4) Progression: making physics relevant for girls (and boys) in secondary and postsecondary education;
5) Workforce: girls (and boys) have access to good physics teaching;
6) Culture and ethos.
7) Promoting student active engagement inside and outside of school
8) Focusing on developing students' metacognitive strategies
9) Using modern technologies to make physics relevant to students' lives and to their future aspirations:
10) Using history & philosophy of science to build a more realistic picture of science and scientists:
11) Introducing female role-models and mentoring:
12) Providing continuous constructive feedback on students' progress.
13) Using multiple ways to assess student understanding.
14) Emphasizing collaborative nature of science

15) Raising teachers' awareness of their beliefs and attitudes about girls' engagement with physics:

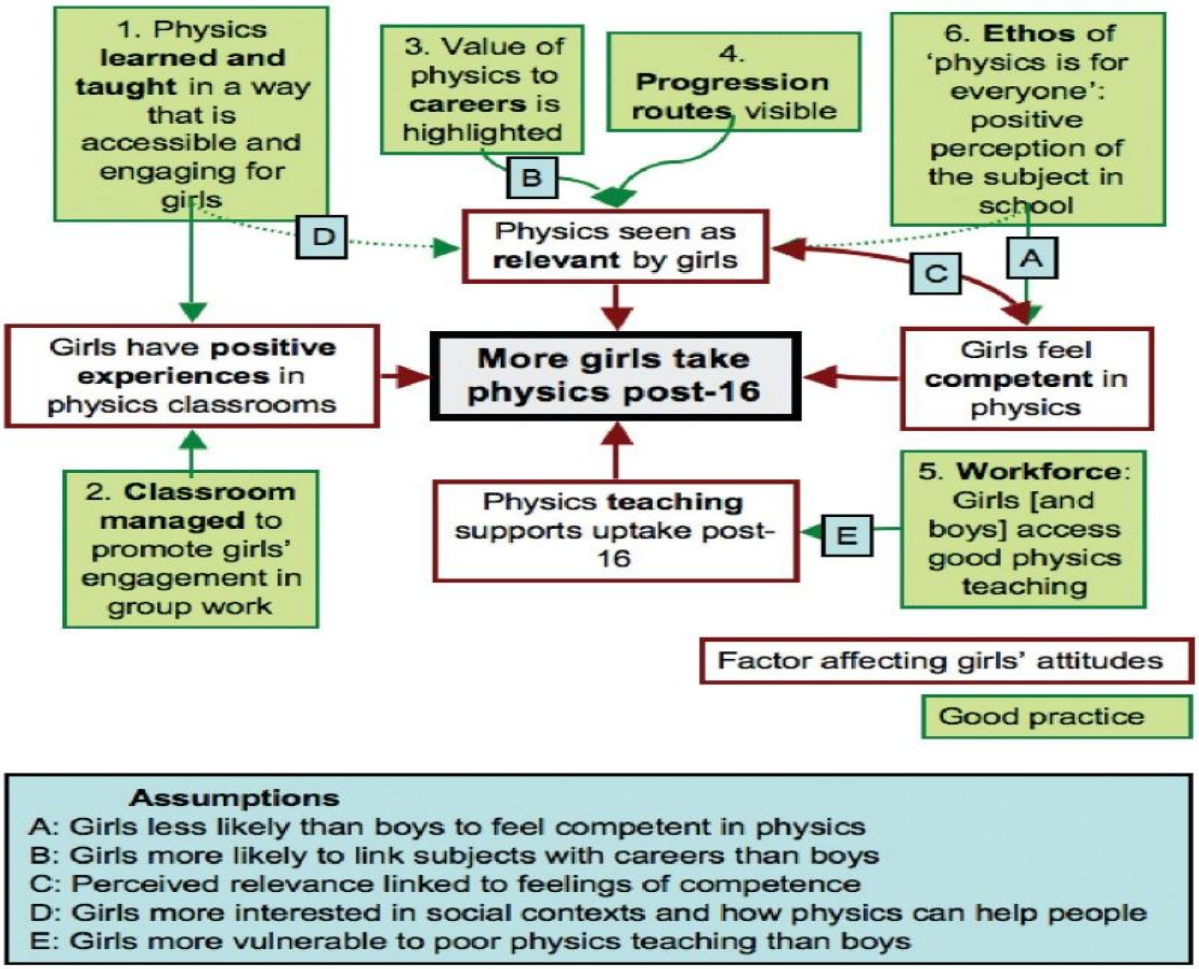

Fig.2. Research Based Pedagogies For Increasing Girls' Engagement With Physics

Conclusions

In order to increase girls' participation in physics-related careers, we need to engage them in secondary physics courses. Therefore, changing teachers' attitudes about girls' engagement with physics and equipping teachers with effective pedagogical strategies to address the problem should become one of the top priorities of the physics education community. This paper highlighted research literature on the reasons for girls' disengagement from physics and suggested four research based pedagogies that can help teachers to address this problem. As a physics education community, we have to support physics teachers in this process. Unless physics classrooms can be made welcoming to all students, the issue of girls' disengagement from physics will not be resolved and women-scientists, such as Dr. Fabiola Gianotti (the first female head of CERN), will remain a rare exception worthy of worldwide News coverage.

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