



ORIGINAL ARTICLE

Research Study of Students' Beliefs, Goals and Motivation for Studying Physics at Undergraduate Level

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ABSTRACT

Student's interest in physics seems to be decreasing at all levels of education. This problem is likely to be influenced by physics teaching and learning processes. Teachers' beliefs influence teaching strategies whereas students' beliefs, goals and motivation influence learning strategies. The investigation of factors influencing teaching and learning will provide useful information for improving the teaching and learning of physics. This research aims to explore physics teachers' beliefs about teaching and learning physics, students' beliefs, goals and motivation for studying physics at undergraduate level. A questionnaire was administered to students of undergraduate level students in our college. Questionnaires were administered to students who enrolled in B.sc Non-medical and B.sc computer science courses at Pggc-11 Chandigarh during session 2015-16.

Key words: *Physics teaching and learning processes, beliefs, goals and motivation*

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INTRODUCTION

Science is the study of natural phenomena and it develops descriptions and explanations of the world around us. Science has been developed systematically since the seventeenth century and now has an important influence on all aspects of our lives through technology, health, the environment and the economy. Physics is a very important branch of science that considers physical phenomena. Physics is "the oldest and most basic of the sciences is the science of matter and energy and of the relation between them" (Mulligan, 1991, p.1). Physics includes studies of phenomena such as light, sound, mechanics and thermodynamics and develops models of these phenomena, many of which are mathematically based. Students consider physics to be an abstract and difficult subject and often achieve poor grades. While the world is developing rapidly through the application of science and technology, there is a problem of the students' diminishing interest in physics, at all levels of education (Fischer & Horstendahl, 1997). Indian education is also facing this problem. Students study physics where it is a required subject in the curriculum, however, fewer and fewer students in colleges and universities select physics as their major subject. Unfortunately, any substantial studies about this problem have not been reported. This problem is a great challenge for all science educators. The models of teaching in science and physics must be reformed and improved. The traditional didactic model of teaching is based on the assumption that knowledge is transferred from the teacher to students. Teachers provide intact knowledge as an input to the students and the output is the students' score on the examination. The ultimate goal of this model of teaching is the equality between input and output (Johnstone, Watt, & Zaman, 1998). Psychological research has focused for many years on the mind of learners.

This research has led to the introduction of better pedagogy based on new theories, such as generative learning and constructivism (Osborne & Wittrock, 1983). Motivation should play a more important role in teaching physics, if we are to maintain students' interest in the subject. Teachers always teach physics emphatically in the cognitive domain; however, the teaching and learning of physics should also involve emotion, motivation and commitment (Woolnough, 1998).

PURPOSE

The purpose of this study is to investigate: (a) physics teachers' beliefs about teaching and learning and the effect these have on their teaching behaviours; (b) students' beliefs about teaching and learning, goals and motivation for studying physics and the effect these have on students' learning behaviours; and (c) the influence of (a) and (b) on classroom environment, opportunities for learning and students' attitudes to physics.

LEARNING PROCESS

Learning is the process that causes permanent change in an individual's knowledge or behaviour (Woolfolk, 2001). Modern learning theories emphasise that learners must be actively engaged in the learning process (Deci & Ryan, 1985; Deci, Vallerand, Pelletier, & Ryan, 1991). Anecdotal evidence suggests that the traditional method of teaching physics in Rajabhat universities, students are obedient; they study by listening to the lecturer and taking notes quietly. There are very few students who take part in arguing or discussing ideas in the class, consequently students do not develop good understandings of physics concepts and get low grades as the final result.

MOTIVATION

Ferguson (2000) defines motivation as a dynamic internal process that energizes and directs action and action tendencies; it pushes or pulls the individual. Environmental antecedents and goals provide sources of motivation. Motivation has an energizing effect. Anyone who is highly motivated will be more alert and responsive and exert more effort in actions (Ferguson, 2000). Woolfolk (2001) concludes that student motivation to learn is both a trait and a state. It involves approaching academic work to get the best results from it and engaging actively in the process. In the classroom, teachers should set appropriate tasks that affect motivation. Tasks have attainment and intrinsic values for students. Students often avoid risky and ambiguous tasks. Strategies that encourage motivation to learn should improve students' confidence and reduce their fear of failure. In education, motivation is very important for effective learning. There are many theories and techniques of motivation involved with the teaching and learning process. A very important notion is that motivation in education is based on teachers' ability to challenge and encourage students to take on an active role in their learning (Ferguson, 2000).

PROBLEM STATEMENT

Students perceive physics to be a very difficult, mathematical and abstract subject. Most students get poor grades, lose interest and have negative attitudes to physics. Research is needed to investigate the relationships between; instructors' beliefs about teaching and learning physics, and students' beliefs, goals and motivation for learning physics; on the teaching and learning of physics.

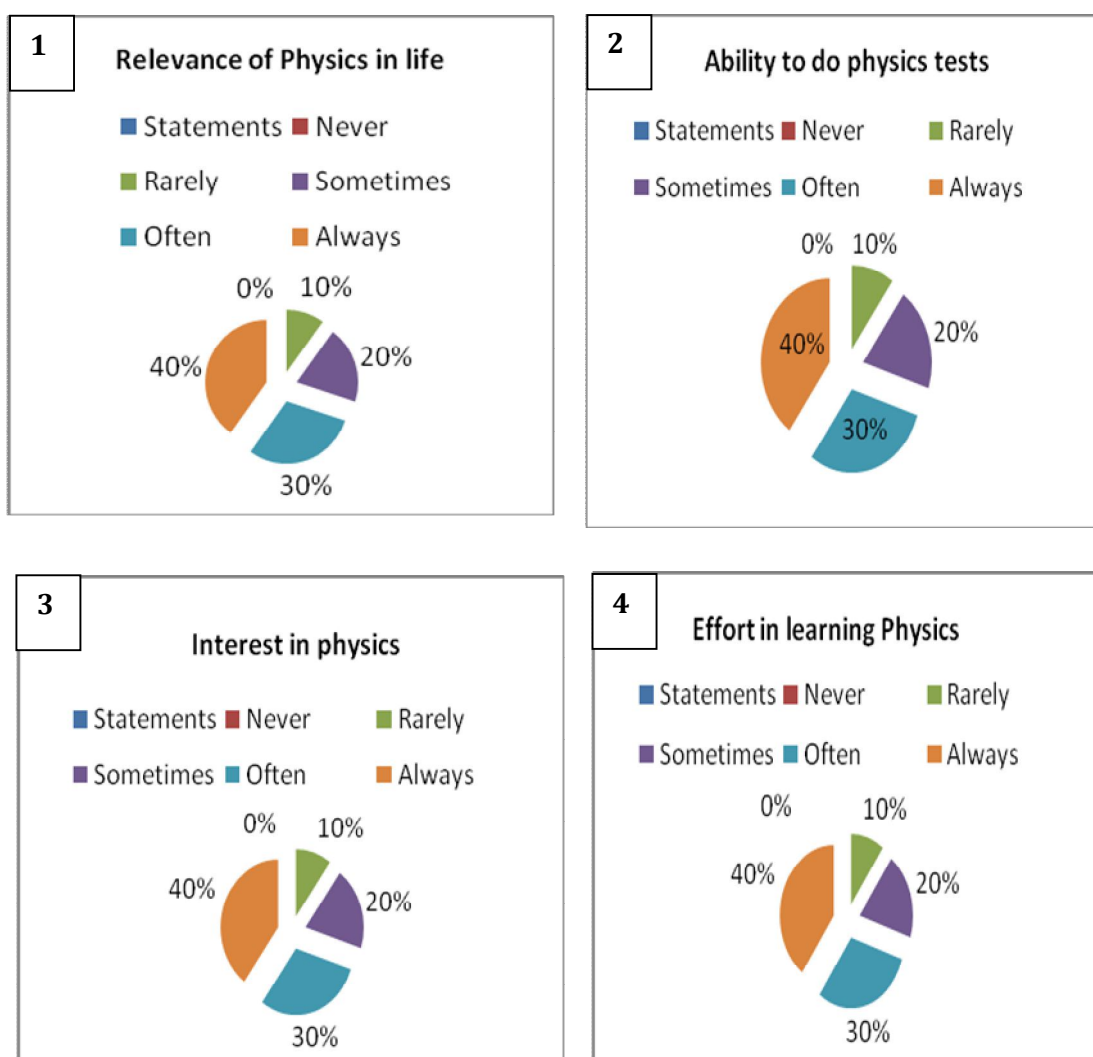
PHYSICS MOTIVATION QUESTIONNAIRE

Three questionnaires were constructed and used in this research. The construction of these questionnaires started from an analysis of research variables, and then developed items relating to these variables.

1. The physics relevance to my life
2. Ability to do more in physics tests.

3. Learning physics is interesting.
4. Getting a good physics marks is important to me.
5. I put enough effort into learning physics.
6. I use strategies to learn physics well.
7. Learning physics will help me get a good job.
8. It is important that I get 85%and above in physics.
9. I am confident I will do well on physics tests.
10. Knowing physics will give me a career advantage
11. I spend a lot of time learning physics.
12. Learning physics makes my life more meaningful.
13. I am confident I will do well on physics labs and projects.
14. I believe I can master physics knowledge and skills
15. I prepare well for physics tests and labs
16. I am curious about discoveries in physics
17. I enjoy learning physics.
18. I think I will get 85% in physics.
19. I am sure I can understand physics.
20. I study hard to learn physics.
21. My career will involve physics.
22. Scoring high on physics tests and labs matters to me.
23. I will use physics problem-solving skills in my career

Fig. 1-8: Showing the different motivations for Physics studying



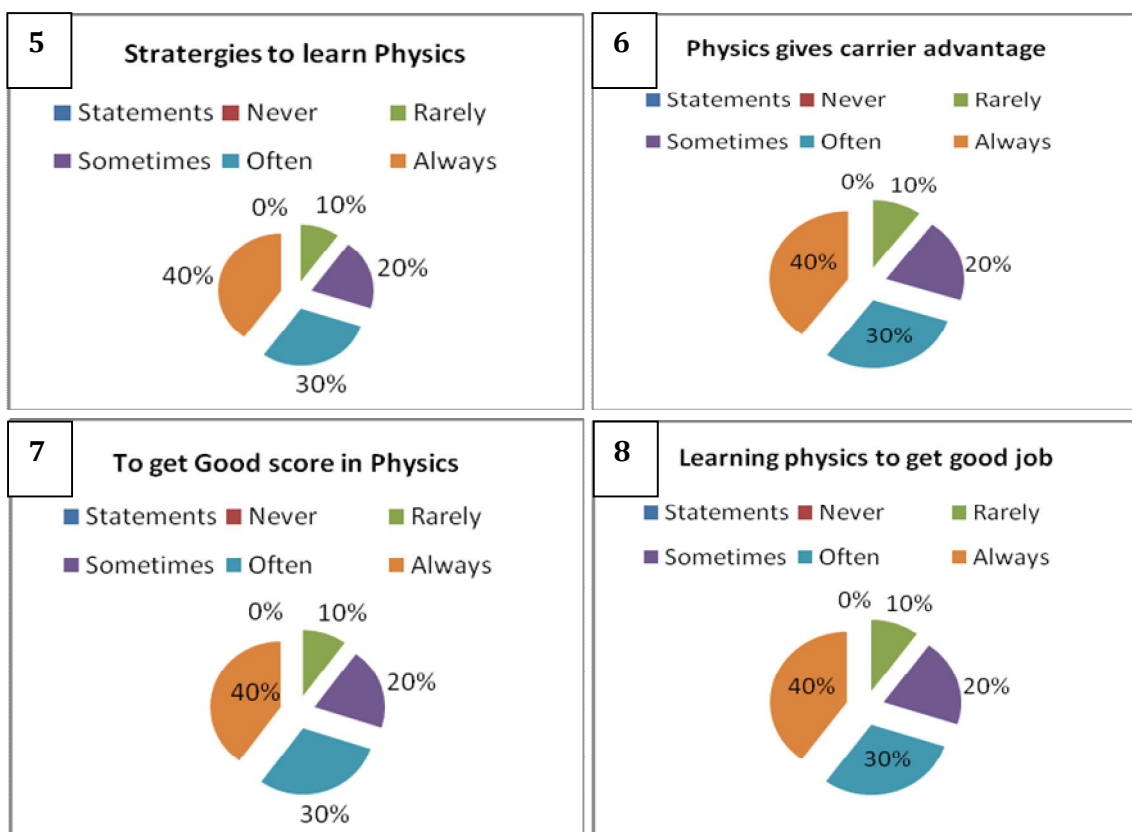


Table 1: Motivation for Studying Physics at Undergraduate Level

Statements	Never 0	Rarely 1	Sometimes 2	Often 3	Always 4
1	0	23	39	44	75
2	0	33	44	54	72
3	5	43	45	55	78
4	6	42	34	47	77
5	2	31	33	67	67
6	4	41	23	65	79
7	8	34	22	43	59
8	7	12	34	44	67
9	9	22	12	54	47
10	0	11	12	55	59
11	2	32	34	34	60
12	1	13	55	35	58
13	5	14	35	28	66
14	3	16	34	29	65
15	2	19	36	32	66
16	4	20	37	33	69
17	2	22	23	43	58
18	5	12	67	34	66
19	6	23	45	45	45
20	7	42	44	54	34
21	8	22	48	56	33
22	3	32	47	45	45
23	9	31	27	28	52
24	11	41	41	22	45
25	12	26	33	40	67

CONCLUSION

The findings of this study are:

1. I believe that students should understand and be able to apply physics; both knowledge transmission and constructivist approaches are effective teaching strategies; the limitations of their teaching are factors associated with students and administration, student-centred strategies are most effective for learning physics; and, motivations for studying physics are the intellectual challenge of the subject, good teaching, enhanced employment prospects and application of physics to real life situations.
2. I prefer to explain lessons, give notes and laboratory work to verify theories. These teaching strategies are influenced by their beliefs about knowledge transmission rather than their beliefs about constructivist and student centred strategies.
3. At pggc-11 Chandigarh students have high motivation in studying physics. They believe that: physics is difficult but interesting, giving clear explanations and student-centred activities are effective teaching strategies; the goal of studying physics is to pass examinations or get good grades; and, being attentive to the classes and hard working are effective learning strategies.
4. The students are passive learners because they have low motivation; their goal of studying is only to pass exams, and their belief that being attentive to the classes is an effective learning strategy.
5. The traditional didactic pedagogy and classroom environment limit opportunities for learning, and students' attitudes towards physics

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