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RESEARCH PAPER

Impact of Teaching Methods on Student's Learning in General Science in Secondary Schools

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ABSTRACT

Learning is the achievement of knowledge through study or being educated an object that is difficult to manage or comprehend. Study entitled "Impact of teaching methods on students learning in general science in secondary schools". Objectives of study were to study teaching methods in general science and to analyze impact of teaching on student learning in general science at secondary schools. Study was quantitative type, descriptive in nature and survey method was used to collected data by developing a questionnaire. Simple random cluster sampling technique was used. Population of the study comprised teachers and students of secondary schools. It has been concluded that impact of teaching methods is highly comprehendible to science teachers by knowing role of lecture and group discussions. It is recommended that science labs, lab equipment and experiment material should be provided in secondary school labs. Practical work should be promoted and modern teaching methods should be introduced to reduce burden of students to get better learning in general science.

Keywords: Teaching Methods, General Science Learning

Introduction

Study has been carried out to distinguish the impact of teaching methods on students learning in general science at secondary schools. The objective is to sort out some way to show science as effective educational procedures. Stimulating students in science content requires instructors to assist students with considering themselves to be researchers rather than passively observe others people accomplishing the work of science," Ferro, D, M. (2019). The calculated idea of science and showing strategies utilized for science subjects additionally make learning hardships (Atilla et al. 2013). The interdisciplinary idea of science is the same reason for learning hardships (Tekkaya et al., 2006).

According near about researcher the overcrowd classroom effect the teaching method and learning challenges. The review evaluated the learning hardships in science at secondary schools and will track down solutions for powerful learning. The point is to decide workable showing methodologies for science learning at optional level. Along these lines, the assertion of the issue is, Impact of teaching method on students learning in general science in secondary schools (Gimba, et al. 2017).

Literature Review

According to the Education Act, students must be given the chance to ask and explore questions about nature and people based on their own knowledge and current events as part of the curriculum for the subjects of general sciences. Also, teaching would give students the chance to find answers to their questions through hands-on studying, like real-world research. This would help them improve their skills. This means that teachers' knowledge, skills, and dedication are very important for the school's mission to be accomplished (Skolverket, 2018).

Teacher need to know more about how their students think. This lets them adapt their teaching methods and strategies to the cognitive level of their students in many ways, like using assignments, modeling and motivational sets (Blake & Pope, 2008). The implication for the teacher is that what they know about the student's learning process and expectations doesn't matter much unless they know when the student is ready to tackle a certain concept. Most of the time, the teacher finds that the students can't understand the ideas because they are too abstract." Again, we find ourselves in adapted waters where the smart person believes that development leads to knowledge and that it is a course that is fundamental to the individual and cannot be meaningfully judged by others." This part of a teen's growth lasts from age 12 until they are adults. From now on, the child can think in a logical way and show long-term self-interest.

In the Swedish school system, biology, physics, and chemistry are all part of something called NO (science-based subjects). Biology is important to society in many ways, such as health, the use of natural resources, and the environment. Physics is important for society in areas like energy sources, medical care, and forecasting the weather. This knowledge gives each person the tools they need to help society grow in a way that is sustainable. The more you know about chemistry, the better it is for your health, your wallet, and the progress of health and environmental technology. So, the idea is that students' education is more important and has a wider range of meanings. For example, teachers must help students learn information that prepares them for life, work, and how to participate in democracy (Skolverket, 2017).

History of General Science in Islam

In the Middle East, where the Arab Caliphate was just being formed, Greek philosophy was given as a gift to find some support. With the spread of Islam in the 7th and 8th centuries, a time of Islamic scholarship lasted until the 14th century. Some things helped pay for this scholarship. Because everyone spoke Arabic, they could talk to each other without a translator. Islamic scholars had access to Greek and Roman texts from the Byzantine Empire as well as Indian sources of knowledge. This gave them a base of facts on which to build. Also, there was the Hajj, which brought people and new ideas from all over the Islamic world together. This made relationships easier to understand.

The Islamic scientists gave experiments a lot more importance than the Greeks did. In mathematics, the Indian idea of an algorithm is named after the Persian Muhammad ibn Musa. The word "algebra" comes from the beginning of the title of one of his books, al-Jabr. Al-Razi, a Persian scholar, made contributions to chemistry. Al-Battani, a Sabian mathematician who lived from 850 to 929, made contributions to astronomy and math. In the field of astronomy, Al-Battani improved on Hipparchus' measurements, which were kept in the Greek version of Almagest. Al-Battani also made the way the precession of the earth's axis was measured more accurate. Arab alchemy was not very good as a science, but it did influence Roger Bacon, who brought the empirical method to Europe after reading a lot of Arabic literature, and Isaac Newton, who came up with the scientific method.

Most people can guess the importance of content knowledge (CK) as a requirement for pedagogical content knowledge (PCK). But because CK and PCK don't have a good relationship, most PCK representations lack instructive control. As a result, the education stimulates by annoying to construct a theoretical model that comprises knowledge of students' learning difficulties (KSLD) as a viable construction between CK and PCK using the theoretical framework (Pressley et al., 1981).

Definition of General Science

According to Mariam Web Star, a subject or course of study in school or college in which the parts of several sciences are studied. Science is what you learn from doing

experiments and putting together information. There are many different scientific fields. Astronomy, Physics, Chemistry, Social Sciences, Natural Sciences, and a lot more. Science is the way people learn about the world and how it works by figuring out how nature and the world work naturally. "The net of science protects the experiential universe: what is it made of fact and why does it work this way?" (Gould, 1997).

What is a Teaching Method?

Teaching methods are the different ways that teachers help students learn, and activities are the different ways that these methods are used. Guided teaching is a method of teaching. First, the teacher helps learning by setting an example and giving support. They take the time to ask questions and get answers. Then, students practice using these skills both together and on their own. The teacher uses formative assessment to see if the students are getting it. This example shows how to set up what the teacher wants the students to do and how to keep them on task. If the teacher chooses a different way to teach, like a traditional lecture, the students will want to process what was said in the lecture and use the principles right away. This is hard to do and wouldn't work as well as it could. Using the right teaching method brings lessons to life and encourages students to get involved with the material and learn new skills and knowledge (Frigg et al. 2014).

Importance of Teaching Methods

It's not always easy to see how science affects our daily lives, but the truth is that science affects a lot of what we do every day. Science is an important part of our lives, whether it has to do with our health and well-being, choosing paper over plastic at the grocery store, or telling a child why the sky is blue. More than ever, teachers need to use lesson plans that encourage and inspire kids to like science and maybe even follow it in college and in their careers. Science is the systematic study, through observation and experimentation, of the structure and behavior of the physical, social, and natural worlds. It's important for social development, innovation, and global competitiveness. It's important for the world to keep developing science, whether that means finding new ways to treat cancer and other diseases or putting together and finding new collections (McKinney et al. 1983).

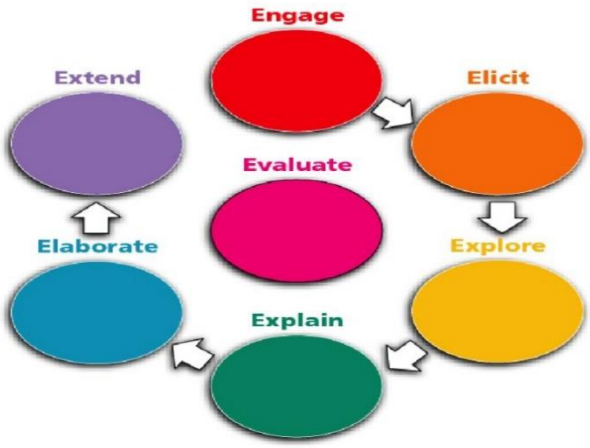
Why it's Important to Learn Science

Aside from the potential inventions, learning science has other benefits, such as helping us learn how to ask questions, gather information, form and test our ideas, explain problems, and use what we learn. Even more, science is a great way to build confidence, improve communication skills, and make sense of the world around us, which is becoming more and more shaped by science and technology (Bransford, et al. 2000)

Science also involves a lot of talking with other people and helps kids learn to be patient and determined. Finding answers to their endless "why" questions push kids to look into and process their own ideas instead of just accepting what other people say. Even though it's easy to agree with another child's answer or pull out a smartphone and do a quick internet search to find out why leaves fall off plants, a healthy dose of uncertainty can help children learn more about the world around them and ask some of its interesting questions. (Bransford, et al. 2000).

Educational Technique

Educational method was exploited to expand effect of educational methods on students learning in general science and overcome learning difficulties in 2009 (Taber, 2009).



source: www.google.com

Problem-Based Learning

Problem-based learning is a way to learn and understand more by focusing on specific problems in a scenario. The process-based approach focuses on giving students practice or hands-on activities to help them learn how to do things. These things can be done inside or outside the school classroom. The teacher should help the students learn how to pay closer attention to things or events as they use their senses to find out more about them. The teacher should describe what the students have seen to make sure that the information they get is good. Grouping (classifying) and observing are two things that show how process-based learning works. For example, figuring out what things and events have in common and what makes them different, like identifying common weeds in the environment, figuring out what diseases are affecting crops in their environment, or figuring out what types of buildings are in their environment and how they are different from each other (Wirantaka, & Hanif., 2022).

Lab Experiment Method

The laboratory method is when a group of students or an individual student does things like watch a process, product, or event. The laboratory method can be used to practice or learn how to do things like read and run experiments. Experiments can be used to test hypotheses, confirm what is known, and find out what is not known. It helps students learn how to manipulate things, helps them learn in a more realistic way, helps them remember things better, builds their confidence, and helps them become more interested in and skilled in science. The method helps students use their minds to do things like observe, make assumptions, measure, and look at data. The benefits of this method might not be fully realized if there aren't enough facilities and tools to make it work well (Frigg, 2010).

Lecture Method

This method is the one that teachers use most often. This means that the students should sit quietly and listen to what is being said about the subject. The teacher does all of the talking, and the students don't say much or anything at all. The lecture isn't often used to teach and learn in high school classrooms. Most of what goes on in tertiary institutions where there are more than 200 students in a class is lecturing. This is a well-organized talk about a topic given by the teacher with little or no help from the students. The teacher is in charge of planning, putting together, and giving the lecture, while the students listen. When the subject is too general, a teacher would have no choice but to give a lecture. It saves time and covers more topics, but students usually forget the most important parts of the lesson. The students don't do much in class, and the class is dull, so there isn't much room for them to learn scientific skills (Brown & Campione, 1990)

Method of Discussion

Discussion is just talking about a topic from different points of view, and the teacher's job is to keep things on track. There should be a difference between discussion and lecturing in a science classroom. This is because discussion assumes that each student has a history that gives him a point of view. When this method is used, the teacher and the student talk back and forth about what they think. The discussion method can be used to start a lesson, which will get the students involved. It helps people get along with each other and gives students a sense of confidence by having the teacher and students talk about their ideas often. It lets the teacher get feedback on what was taught, and it gives the students a chance to say what they know about a certain topic. But it can't be used very often because it's hard to cover everything on the syllabus and not all topics naturally lead to discussions. Since the discussion method has to start with a question, the teacher needs to know a lot about the topics being talked about so that they don't ask questions that aren't clear (Brown et al. 1990)

Teaching Methods Based on Teachers

This way of teaching is all about telling, learning, and remembering information. The student doesn't have much to do because they only ask questions or answer questions. Most of the time, students just listen and take in the information. Everything that happens in the classroom revolves around the teacher (Bonwell, C. & Eison.,1991).

Teaching Methods Based on Students

This process focuses on what students want, need, are interested in, and can do. Students take part in activities that help them improve their skills and abilities. The classroom is a good place to be if you want to be flexible. The teacher and the students look at the different parts of the problem together. The teacher's job is to set up a problem, give the students the tools and resources they need, and help them figure out what the problem is, make hypotheses, clarify and test those hypotheses, and come to conclusions.

Lecture-Cum-Discussion Method

This way of teaching is a mix of the lecture method and the discussion method. This is very helpful in building an active verbal interaction between the teachers and students. In this method role of teacher is that, get students involved in the discussion and make sure they don't lose interest, plan and get ready for the discussion ahead of time, and back up your ideas with facts and examples, if possible, give time before hand so that, the discussion becomes productive and don't take over the conversation. Instead, start it by setting goals, summarizing, mediating, and making things clear. Other methods are also elaborated as under (Climer, et al. 2013).

Laboratory Method

This method is often thought of as a hands-on and mind-on way to teach science, in which students get to try out things that are related to what they are learning. The students can do this method on their own or in small groups.

Observation Method

With this method, the student just watches and learns. The result of this process is information about a way of thinking about nature that stay in your mind. Students learn a lot about how to observe by having good experiences that are all carefully sorted and processed in their minds.

Project Method

Pragmatism is the philosophy that this method is based on. This method focuses on building a whole unit around an activity that can be done in or outside of school. This means that the students do the activity over time, either as a group or on their own. Kinds of projects are like, Producer Project, Consumer Project, Problem Project and Drill Project.

Problem-Solving Method

In a problem-solving method, kids work on problems to learn. This lets the students learn new things by having to figure out how to solve problems. The students should be able to observe, understand, analyze, interpret, find solutions, and do applications that help them understand the concept as a whole. This method helps people learn how science works. This method helps you come up with ideas for how to learn concepts.

Material and Methods

Study was survey and descriptive in nature. The quantitative as well as qualitative (QUAN-qual) method was used. The explanatory sequential technique was used. Population of study comprised head teachers, Teachers and students of secondary school. Simple random and cluster sampling technique was used. Sample of study included 12 secondary schools head teachers, 48 school teaches and 180 students of 9th and 10th classes. Questionnaire was developed for data collection. Validity of research tool was ensured through the experts opinion. Reliability of the research tool was calculated through Cronbach's Alpha. Researcher was personally involved in data collection. Data was analyzed by using SPSS software. Study was delimited to all optional schools of Tehsil Saidabad, to figure out challenges in science and causes and viable solutions for successful learning among auxiliary level understudies. Researche ethics were strictly followed by seeking permission from the institution head to conduct research, getting consent from the respondents to obtain data, and keeping confidentiality of respondents. Factors included in the tool were Introduction and Role of Science, Our life and chemistry, Bio-chemistry and Bio-technology, Human Health, Diseases, Causes and prevention, Environment and Natural Resources, Energy, Current Electricity, Basic Electronics, Science and technology, Space and Nuclear Programme of Pakistan.

Results and Discussion

Table 1
Comprehending the history of science through discussion methods

Sr. No.	Respondents	Stat.	Responses						Mean	SD
			SDA	DA	UD	A	SA	Total		
1	Teacher	*f*	4	5	1	18	20	48	3.94	1.28
		%	8	10	2	38	42	100		
2	Students	*f*	31	32	6	63	48	180	3.36	1.47
		%	17	18	3	35	27	100		
Total		***f***	**35**	**37**	**7**	**81**	**68**	**228**	**3.65**	**1.37**
		%	**13**	**14**	**2**	**36**	**35**	**100**		

Table 1 represents that 36% of respondents agreed, 35% respondents strongly agreed, 14% of respondents disagreed, 13% strongly disagreed and 2% of the respondents were undecided. Collectively, 71% (36%+35%) of the respondents were agreed that they comprehend the history of science through discussion method. Mean value was 3.65, standard deviation was 1.37 and supported the statement.

Table 2
Understanding the concept of science in Islam through lecture

Sr. No.	Respondents	Stat.	Responses						Mean	SD
			SDA	DA	UD	A	SA	Total		
1	Teacher	*f*	1	0	1	22	24	48	4.42	0.74
		%	2	0.0	2	46%	50%	100		
2	Students	*f*	16	29	14	64	57	180	3.65	1.31
		%	9	16	8	36	31	100		
Total		***f***	**7**	**29**	**15**	**86**	**81**	**228**	**4.035**	**1.025**
		%	**6**	**8**	**5**	**41**	**40**	**100**		

Table 2 represents that 41% of respondents agreed, 40% of respondents strongly agreed, 8% of respondents disagreed, 6% strongly disagreed and 5% of the respondents were undecided. Collectively 81% (41%+40%) of the respondents were agreed that they understand the concept of science in Islam through lecture. Mean value was 4.035, standard deviation was 1.025 and supported the statement.

Table 3
Introduction and Role of Science

Sr. No.	Stat	Responses						Mean	SD
		SDA	DA	UD	A	SA	Total		
1	*f*	35	37	7	81	68	228	3.65	1.37
	%	13	14	2	36	35	100		
2	*f*	7	29	15	86	81	228	4.035	1.025
	%	6	8	5	41	40	100		
3	*f*	15	31	24	76	82	228	3.975	1.125
	%	6	10	8	34	42	100		
4	*f*	29	27	15	81	76	228	3.65	1.235
	%	10	10	7	36	37	100		
5	*f*	35	75	50	25	26	228	2.72	1.27
	%	19	32	25	14	10	100		
6	*f*	40	76	40	42	30	228	2.695	1.22
	%	17	32	24	16	11	100		
7	*f*	44	73	46	37	28	228	2.52	1.175
	%	22	34	23	12	9	100		
Total	***f***	**210**	**349**	**202**	**434**	**401**	**1596**	**3.32**	**1.20**
	%	**12%**	**23%**	**12%**	**26%**	**25%**	**100%**		

Table 3 represents that 26% of the respondents agreed, 25% of respondents strongly agreed, 23% of respondents disagreed, 12% of the respondents strongly disagreed and 12% of the respondents were undecided. Collectively, 51% (26%+25%) of the respondents were agreed with the factor. Mean value was 3.32, standard deviation was 1.20 and supported the factor.

Table 4
Science and Technology

Sr. No.	Stat	Responses						Mean	SD
		SDA	DA	UD	A	SA	Total		
1	*f*	36	36	11	88	47	228	2.13	2.61
	%	11	17	4	40	27	100		
2	*f*	14	38	19	82	75	228	3.98	2.03
	%	4	11	6	39	40	100		
3	*f*	30	82	37	39	40	228	3.56	2.56
	%	18	32	17	18	15	100		
4	*f*	15	27	11	99	76	228	4.15	2.03

	%	4	8	3	40	43	100		
5	*f*	33	86	27	56	26	228	2.46	2.55
	%	16	38	13	22	11	100		
6	*f*	25	40	15	10	48	228	2.43	2.29
	%	8	12	5	47	28	100		
7	*f*	17	35	16	82	78	228	2.78	2.06
	%	5	11	5	35	44	100		
8	*f*	22	69	39	55	43	228	2.96	2.38
	%	7	24	12	26	31	100		
9	*f*	31	38	48	68	41	228	3.82	2.51
	%	12	14	17	35	22	100		
10	*f*	34	21	12	87	74	228	4.74	2.23
	%	10	6	5	44	35	100		
11	*f*	22	91	35	53	22	228	3.28	2.31
	%	16	40	15	20	9	100		
12	*f*	23	54	25	69	53	228	3.67	2.17
	%	11	24	8	30	27	100		
Total	***f***	**355**	**638**	**302**	**788**	**653**	**2736**	**3.330**	**2.166**
	%	**10%**	**20%**	**10%**	**33%**	**27%**	**100%**		

Table 4 represents that 33% of the respondents agreed, 27% of respondents strongly agreed, 20% of respondents disagreed, 10% strongly disagreed and 10% of the respondents were undecided. Collectively, 60% (33%+27%) of the respondents were agreed with factor. Mean value was 3.330, standard deviation was 2.166 and supported the factor.

Findings

It has been found form the results of the study that, teachers comprehend the history of science, concept of science in Islam, contribution of Muslim scientists, contribution of Pakistan scientists, science text card, role of science and technology in our life and impact of teaching methods. Furthermore, students know about the latest scientific inventions and are well aware about the role of Science & Technology like, fiber, radioactivity, satellites, radars, x-rays, electrocardiogram and computerized tomography by receiving knowledge form teachers through lectures, discussions, making projects, peer-to-peer learning-teaching process and through the group work in science labs.

Conclusion

This study will be beneficial for teachers to understand insight of teaching method in general science, to gain knowledge for the learning challenges, reasons of hardships in science viable solution for settle these troubles and to get knowledge students as well as educator. It uncovered learning troubles, reasons of challenges in science and viable solution for tackle these hardships.

Recommendations

- Science Lab equipment should be provided so that students can learn in practical life.
- Practical and group work should be promoted to overcome the burden of students.
- Modern teaching methods should be promoted to students learning in general science.
- Multi-media like projectors, A.V aids and science charts should be provided for better understanding and learning.
- Science subject expert should be selected according to the strength of students.

- Learning friendly environment should be provided to students so that, they can recall and improve knowledge.
- The effective science learning environment must be provided to produce an atmosphere for the most effective science learning.
- Appropriate organization should be promoted the conceptual learning and practical work.

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