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PROCESS SKILLS OF HIGHER SECONDARY STUDENTS

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ABSTRACT
The main objective of the study is to find out the level of acquisition of Process Skills in Biology of higher secondary students in Kanniyakumari district with respect to gender, locality of institution and type of stream. The sample size for the study comprised of four hundred and twenty one higher secondary students from Kanniyakumari district. The test of process skills in Biology (2019) developed and validated by the investigator was used to collect data. The findings of the study indicated a significant difference between male and female higher secondary students in their process skills in biology. Also, a significant difference is found between higher secondary students from the rural and urban locality as well on the students of Biology and Maths-biology stream in their process skills in biology.

Key Words: *Process Skills in Biology, gender, type of steam, higher secondary students.*

Introduction
Science Process Skills are the core skills that underpin the conceptual framework of scientific knowledge. Rapid skill development is more significant in this age of digitalization. Individuals who are skilled decision-makers and can actively solve problems in the scientific and technological domains of all occupations are in high demand nowadays. Scientists employ Science Process Skills (SPS) to construct knowledge, think about challenges, and conclude. The basic and integrated skills work together to build total reasoning and thinking skills.
Biological studies are designed to provide students with a deeper understanding of life and living organisms, including their structure, function, growth, evolution, distribution, identification, and taxonomy.. Biology is a branch of science structured to equip students with the knowledge of relevant concepts and scientific skills.
Also, it aimed to help build skills such as problem-solving, communication, critical thinking, and objective reasoning to prepare students for a self sustaining career in the global economy. Students should be proficient in biology so they can contribute to society in a valuable way. To achieve these objectives, the teaching approach should encourage students to assume responsibility and control over their learning.. Thus students should become masters of their learning thereby controlling what, how, why and when they learn. As a subject, biology provokes intellectual curiosity, enhances sensitivity to fragile ecosystems, and promotes critical thinking. Biological science teaching should emphasize the importance of valuing nature and protecting the planet.
Biological science education is essential for comprehending our surroundings and is a necessary resource for any society's technological innovation. It is believed that scientific attitude and science process skills contribute significantly to the development of affective skills and are fundamental to biological science education and to the lives of students pursuing biological science education, determining their success. Students in the higher secondary must therefore be provided with appropriate direction and support to develop scientific mindsets, a positive attitude toward science learning, and science process skills. Science process skills foster a significant increase in subject matter understanding and science content knowledge, arguing that science content and science process skills should be taught collectively as they complement each other.
The science process skills have profound influence on the students in learning and in utilizing science to the optimum level in academic career and personal life. These process skills are the tools that learners can use to explore the world around them and build knowledge. Process skills are a set of skills that are crucial for every learner's success, not just in science activities, but also in everyday life. As a result, this study is intended to examine the degree of process skills in Biology among higher secondary students in Kanniyakumari district with reference to gender, locality of institution and type of stream.

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Objectives of the Study

1. To find out the level of acquisition of Process Skills of higher secondary students.
2. To find out whether there is any significant difference among higher secondary students based on gender in their process skills.
3. To find out whether there is any significant difference among higher secondary students based on the locality of Institution in their process skills.
4. To find out whether there is any significant among higher secondary students based on the type of stream in their process skills.

Hypotheses

1. There exists a significant difference between male and female higher secondary students in their process skills in Biology**.**
2. There exists a significant difference between rural and urban higher secondary students in their process skills**.**
3. There exists a significant difference between higher secondary students of Biology and Maths-Biology stream in their process skills**.**

Methodology

The investigator adopted normative survey method for the study. Data were collected from a sample of four hundred and twenty one higher secondary students from different schools of Kanniyakumari District in Tamil Nadu State using a random sampling technique. Test on Process Skills in Biology(2019) is used for collecting data. The test was framed using thirteen dimensions namely (observation, classification, communication, quantification, measurement, inference, prediction, formulation of hypothesis, data interpretation, control and identification of variable, define operationally and experimentation) with fifty eight multiple choice questions with four options for each statement. The reliability of the test was established using the Test-Retest method and was found to be 0.79. Content validity and construct validity of the test were established. The data were analyzed using percentage analysis and t test.

Analysis and Interpretation

Table:1Percentage distribution level of Process Skills in Biology of higher secondary students

Process Skills in Biology	Count	Percent
Low	58	13.78
Moderate	295	70.07
High	68	16.15
Total	421	100

From the table1, it is inferred that 70.07 percentage of higher secondary students of Kanniyakumari district possess a moderate level of Process Skills, 16.15 percentage is with high level of Process Skills and 13.78 percentage is with low level of Process Skills.

Table-2 Gender wise comparison of Process Skills in Biology of higher secondary student

Gender	Mean	SD	N	t	p
Male	135.58	23.2	147		
7.31*	0.000				
Female	153.11	23.85	274		

*Significance at 0.01 level

From the above table 2, it is inferred that the calculated t value is 7.13($p<0.01$) which is significant at 0.01 level. Hence there exists a significant difference in the mean scores of male and female higher secondary students in their Process Skills in Biology. The mean score of female higher secondary students in their Process Skills in Biology is 153.11 which is higher than that of male whose mean score is 135.58. This result is in agreement with the findings of (Yuliskurniawati et al,2019; Tilakaratnea and Ekanayakeb,2017; and Ongowo,2017) which also indicates gender differences in their process skills in science. This result is in contradiction with the result of Lazarowitz & Huppert (2014) which indicated no gender differences in the process skills in science

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Table: 3Locality of Institution wise comparison of Process Skills in Biology of higher secondary students

Locality	Mean	SD	N	t	p
Rural	134.85	19.1	137		
				8.08*	0.000
Urban	152.85	25.4	284		

*Significance at 0.01 level

From the table 3, it is inferred that the calculated t value is 8.08($p<0.01$) which is significant at 0.01 level. Hence there exists a significant difference in the mean scores of higher secondary students from rural and urban area in their Process Skills in Biology. The mean scores of higher secondary students of urban area in their Process Skills in Biology is 152.85 which is higher than that of rural counterpart whose score is 134.85. This finding is in agreement with the findings of (Darmaji et al ,2020; Amoah et al 2018; Tilakaratnea and Ekanayakeb,2017; Ongowo,2017; Aydogdu,2017 Bassey and Amansr,2017; Zeidan and Jayosi,2014;) which revealed that there exists significant difference in the locality of institution in their process skills.

Table: 4Type of Stream wise comparison of Process Skills in Biology of higher secondary students

Type of Stream	Mean	SD	N	t	p
Biology	149	26.41	215		
				2.98*	0.001
Maths-Biology	144.3	23.22	206		

*Significance at 0.01 level

From the table 4, it is inferred that the calculated t value is 2.98($p<0.01$) which is significant at 0.01 level. Hence there exists a significant difference in the mean scores of higher secondary students from Biology and Maths-Biology stream in their Process Skills . The mean scores of Process Skills of higher secondary students from Biology stream is 149 which is higher than that of higher secondary students from the Maths-Biology stream which is 144.3.

Conclusion

After analysis and interpretation of the collected data, the level of process skills among the students of science stream is found to be moderate. Females are found to have high level of process skills than males. Also, students of urban locality are found to be with high level of process skills. Process skills of students from Biology stream are higher than that of their counter parts. Teachers of biological science are supposed to possess a deep understanding and knowledge of the subject. They must be familiar with the following topics: science process skill types, science process skill development methods, and science process skill assessment. More time should be taken to develop the necessary skills. Students should be taught how to observe, analyse, reason, and think for themselves. Teachers need to engage the students in different learning environments and learning experiences such as experiments, activities, field trip, multimedia theatre, role play, demonstration, group discussion and investigations etc inside and outside the classroom for developing process skills, and promote interest and attitude towards biology.A process skills approach is vital to the development of scientific inquiry, scientific thinking, intuitive thinking, scientific attitudes, and a genuine interest in science.

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