Knowledge of Plant Kingdom among Students with Special Needs at Secondary Level – An analysis

Mrs. T. Premalatha, Special Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore-43
* Dr. K. Sambath Rani, Special Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore-43

Abstract

Plants represent a significant part of life science tutoring in schools. There are still lessons in botany, even though the plant no longer holds scientific significance and is now primarily viewed as a historical concept in everyday contexts. However, biology is one of the disciplines in which students have a lot of misconceptions because it includes abstract and concrete concepts together (Galvin et al., 2015). This research seeks to determine and evaluate knowledge of plant kingdom among students with special needs (Visual impairment, hearing impairment, Mild intellectual disabled, learning disabled and hyperactive problem) at the secondary level (VI to IX standard) under the age group of 11,12, & 13 years and their ability to classify plants. The study adopted experimental method with 30 students as samples. The investigator used a questionnaire (with 60 questions from plant kingdom – algae, fungi, bryophytes, pteridophytes, gymnosperms & angiosperms) as an exploratory tool. The data gathered was analysed through SPSS using descriptive analysis, independent t-tests, and ANOVA. The findings envisaged that students with Visual Impairment have the peak average score and the students with learning disability have the least mean score in the knowledge of plant kingdom at the secondary level. The outcome showed that even if the school plan nurture

 https://doi.org/10.5281/zenodo.14219947

teaching plant in the area of classification, students encounter challenges with understanding and applying knowledge and skills related to plant kingdoms.

Key words: Plant Kingdom, Visual Impairment, Hearing Impairment, Mild Intellectual Disabled, Learning Disabled.

Introduction

The pupils can acquire knowledge about flora if tasks involve direct contact with elements of the plant world. Flora plays a pivotal participation in our routine yet "poor awareness of plants seems to be inversely related to their importance" (Lewis 4). They constitute the predominant manufacturer of nutriment clients and endow various goods. Association with the habitat is indispensable when explaining biology for students to develop an in-depth perception of the subject matter (Rachmatullah, Ha, 2018; Sampson, Clark, 2008). When teaching people, it's important to avoid treating plants as if they were animals, and not to misrepresent them as living beings with animal-like characteristics. (Amprazis et al., 2019). Plant systematics is a complex empirical discipline that involves naming, classifying, and elucidating the relationships among plants. It is the most fundamental because organisms cannot be addressed scientifically until some classification has been established to identify and assign names to them. Life sciences curriculum should equip students with the knowledge and skills needed to comprehend the natural world in their daily lives. The significance of studying biology currently increases because of the profound influence of innovative equipment on the day today lives of people everywhere (Lappan, 2000). Although there are advantages, integrating students with special needs requires careful consideration, as they need appropriate learning materials, tangible resources, and experienced practitioners to ensure an effective and meaningful educational practice and student development. (Feltrin, 2007; Maciel, 2000)

 https://doi.org/10.5281/zenodo.14219947

Section 2

The Imperative for Plant Research

Plant Investigation is crucial in many fields. Understanding plants and conducting experiments are essential for tackling environmental challenges like deteriorating natural resources and the advancement of renewable energy sources and comprehending the full impact of environmental destruction. The National Research Council's (NRC) Commission on Life Sciences highlighted the significance of plant research incorporating the notion—, "Research on plants enriches our intellectual life and adds to our knowledge about other life processes. The results of research on plant systems also can teach us how to approach problems in agriculture, health, and the environment." The Concern of Insufficient Focus on Plants in Education Despite the undeniable value of plants, botanical associations, instructors, and researchers are worried that plant studies are being increasingly excluded from the biological curriculum. Research reveals that high school students generally lack knowledge and appreciation for plants, a phenomenon termed "botanical illiteracy." Furthermore, the number of high school students who enroll in higher education botany curricula and pursue plant science pursuit has been steadily decreasing (Carter 43). At the same time, there has been a reduction in fundamental plant research since— "an important responsibility of an academic community is education and training that will provide a steady stream of new investigators" (NRC 31). As one of the scientists remarked, "On the whole, botany has not kept pace with the expansion of other sciences" (Greenfield 1).

Objectives

The primary focus areas of this research is to

1. Identify children with special needs at the secondary level in State schools, aided schools, and private sector schools

 https://doi.org/10.5281/zenodo.14219947

2. Find out the current knowledge of the students with special needs about the plant kingdom
3. Find out the existing knowledge on algae, fungi, bryophytes, pteridophytes, gymnosperms, and angiosperms among children with special needs
4. To compare the knowledge of plant kingdom concerning gender, age, class, and type of disability

Hypothesis

1. There is a considerable divergence in the level of understanding of plant kingdom among students with special needs based on class
2. There is a notable discrepancy in the level of knowledge of plant kingdom among special students based on type of school
3. There is a marked variation in the knowledge of plant kingdom among students with special needs based on gender
4. There is a significant difference in the knowledge of plant kingdom among students based on type of disability

Review of Literature

Karakaya, F., et al. (2023) sought to investigate secondary school students' understanding of organisms within the fungi kingdom. The study was conducted as a case study involving 52 pupils at intermediate level from the Central Anatolian area of Türkiye during the 2022-2023 educational year. The findings revealed that students had faulty perceptions and limited insight regarding the categorization of fungi, their nutrition, ecological roles, and their impact on human life. Based on these findings, it is advocated to explore learning materials, instructional approaches, and teacher practices which contribute to learners misunderstandings concerning fungi.

 https://doi.org/10.5281/zenodo.14219947

Zuhriah Shana (2020) assessed the impact of interacting activities concerning tenth-grade students' scholastic accomplishment in science. The outcomes showed a notable refinement in attainment of performance metrics of the experimental group relative to the control group. Therefore, it is advised that students have frequent opportunities to participate in practical lessons during secondary education. This recommendation includes ensuring that schools are equipped with all necessary materials and equipment to facilitate effective practical work in their laboratories.

Meneghetti. G et al (2017) set out to analyse the potency and value of pedagogical laboratory in facilitating Biology instruction in primary schools, specifically exploring the potential for including discussions on the Kingdom of Fungi. The focus was on a didactic project related to the Kingdom of Fungi, emphasizing classification and morphology. The results indicated that students gained a thorough understanding of the concepts covered and, despite some challenges, developed a more critical perspective on the subject, showing notable improvement when using the laboratory approach compared to traditional teaching methods. Additionally, introducing the Kingdom of Fungi sparked significant interest among students, underscoring the importance of incorporating this crucial biological topic into the primary school curriculum.

Yangın, S., et al (2014) sought to identify prospective teachers' misunderstandings regarding plant classification and assess how pre-service education programs impact their grasp of these biological concepts. To compare misconceptions between prospective teachers at the outset and culmination of their university education, the study was implemented as a cross-sectional approach involving 78 first-year and 84 fourth-year students. The findings revealed that both groups held misconceptions and substantial confusion about concepts such as cryptogams, seed flora, higher plants, bryophytes, non- flowering seed plants, covered seed

 https://doi.org/10.5281/zenodo.14219947

plants, fruits, and vegetables. Moreover, pre-service education did not appear to significantly improve the accuracy of prospective teachers' understanding of plant classification.

Yangin, S. (2013) conducted individual interviews with 54 first-year students from the Department of Classroom Teaching to identify and address any alternative understandings they had about plant classification and diversity. The findings revealed that students had misconceptions regarding these topics. To correct these misunderstandings, the 'Porphyrios Tree,' a tool resembling a flowchart, was employed. In consequence, a significant number of student teachers' incorrect interpretations of botanical grouping were effectively addressed using this approach.

Renata de Souza et al, (2012) introduced a practical teaching tool for the Fungi Kingdom, a crucial biological topic involving diseases and biotechnological aspects. This material, made from parchment paper and other basic supplies that can be easily sourced at school or home, is noted for its simplicity and affordability. Its primary advantage is its ease of preparation and low cost, making it accessible for creating educational resources on various topics. To assess its effectiveness, the material was tested with blind students, demonstrating its potential for teaching this intricate subject as well as other mycological and biological concepts. To verify if blind students could recognize fungal structures after the lesson, the material was presented in a randomized order. Remarkably, the students were able to identify all the fungal structures depicted in each model, even when they were presented out of sequence.

Methodology

The investigator conducted the study in various Government Schools, Aided Schools, and Matriculation schools in Tamil Nādu. In this study, the investigator selected a sample of 30 students in 6^{th}, 7^{th},$8^{th,}$ and 9^{th} standard., through the Random Sampling technique. The sample consisted of individuals with visual impairment, hearing impairment, learning disabled, mild

 https://doi.org/10.5281/zenodo.14219947

ISSN: 0369-8963

intellectually disabled and with hyperactive problem at the secondary level. The participants were 6 students with visual impairment,7 with learning disability, 6 with hearing impairment, 5 with mild intellectual disability, and the remaining 6 with hyperactive problem. The study adopted an experimental study method. The tool (questionnaire) was prepared by the investigator. Questionnaire was the main technique in gathering data. The questionnaire contains 60 one-mark questions from plant kingdom (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms, and Taxonomy) under various headings such as multiple choice, fill in the blanks, match the following, true or false and answer in a word. The data gathered was analysed through SPSS using descriptive analysis, independent t-tests, and ANOVA.

Section 3

Result and Discussion

Table 1: Mean and SD of Students' Knowledge of the Plant Kingdom Concerning Class

		Mean	S. D	No.	T	Df	Sig.
Class	6 to 7	17.20	6.76	20	0.361	28	Ns
	8 to 9	16.20	7.90	10			
Total		16.87	7.04	30			

Ns – Not significant

Critical value: 2.048

The student's understanding of the plant kingdom concerning class was analysed through descriptive statistics. The mean score for Class 6 to 7 is 17.20 that surpasses the average score of class 8 to 9. A t-test was administered to ascertain if there was a substantial variation in the mean results between the two cohorts. The t-test result was 0.361, that is below the threshold value of 2.048 using a 5% level of significance. Therefore, it is concluded that there is no

 https://doi.org/10.5281/zenodo.14219947

significant disparity in the average difference among two population, and the hypothesis is not supported.

Table 2: Mean and SD of Students' Knowledge in the Plant Kingdom Concerning Type School

		Mean	S. D	No.	T	Df	Sig.
Type of School	Government	17.35	7.75	20	0.525	28	Ns
	Private & aided	15.90	5.57	10			
Total		16.87	7.04	30			

The student's knowledge of the plant kingdom concerning the type of school was analysed through descriptive statistics. The mean score for Government schools is 17.35 which is higher than the Private and Aided schools. A t-test was used to assess whether the average ratings between the schools differed significantly. The calculated t-value of 0.525 is below the critical value of 2.048 at the 5% significance level. Consequently, it is concluded that there is no considerable variation between the mean scores of the two categories, Hence the assumption is not accepted.

Table 3 : Mean and SD of Students' knowledge in the plant kingdom concerning Gender

		Mean	S. D	No.	T	Df	Sig.
Gender	Boys	16.37	6.89	19	0.503	28	Ns
	Girls	17.73	7.54	11			
Total		16.87	7.04	30			

 https://doi.org/10.5281/zenodo.14219947

ISSN: 0369-8963

The student's knowledge of the plant kingdom concerning gender was analysed through descriptive statistics. The mean score for girls is 17.73 which is beyond the boys. The t-test was applied to check for significant differences in mean scores across genders. The t-value of 0.503 is beneath the threshold value of 2.048 at a 5% alpha level, indicating that there exist no significant differences in mean scores between genders, thus the hypothesis is not upheld.

Table 4: Mean and SD of Students' knowledge in the plant kingdom concerning Type of Disability

		Score		
		Mean	S.D	No.
Type of disability	HI	22.00	7.80	6
	VI	22.17	6.97	6
	Mild Intellectual Disability	13.60	3.13	5
	Learning Disabled	12.57	2.07	7
	Others	14.17	7.36	6
Total		16.87	7.04	30

Among different types of disability that includes VI, HI, Mild ID, LD and students with other hyperactive problem, the Visual Impairment group received the highest mean score of 22.17. The learning-disabled group attained the lowest mean score which is 12.57 indicating that there exists significant difference in the knowledge of plant kingdom within type of disability, thus accepting the hypothesis.

 https://doi.org/10.5281/zenodo.14219947

Table 5: ANOVA for Score of Type of Disability

	Squared Sum	Df	Mean Square	F	Sig.
Among Groups	552.886	4	138.221	3.915	*
Within Groups	882.581	25	35.303		
Total	1435.467	29			

*- Significant at 5% level

Critical value: 2.759

ANOVA was used to assess whether there were significant differences in mean scores between the disability groups. The computed F-value of 3.915 exceeds the cutoff value of 2.759 using a 5% level of significance. Consequently, it is feasible that there are significant differences in mean scores among the disability groups, supporting the acceptance of the hypothesis.

Conclusions

The study was carried out to analyse the knowledge of plant kingdom among students with special needs (VI, HI, Mild ID, Learning Disabled and Hyperactive problem) at the secondary level. The result showed that even though the students have learned plant kingdom we can see a lot of variations in the mean score. It was also found that the visually impaired students perform better than the other students with special needs. The learning disabled must be given more attention in the class. The teachers can provide a learning environment for those students who cannot understand the content and retain it. The students must get a deeper understanding of plant knowledge and its classification.

Recommendation for future study

Derived from the findings the following suggestions are put forward;

 https://doi.org/10.5281/zenodo.14219947

- Teachers should provide clear explanations of concepts that might be confusing to students during their lessons and continuously observe how students understand the material throughout the learning process.
- Along with the scientific terms included in educational framework, textual resources, supplementary tools, and training videos, Classical language equivalents ought to be offered. Furthermore, these materials should be used during the educational process to enhance effective learning in institutions.

Acknowledgements

First of all I would like to express my sincere gratitude to my supervisor, Dr.K Sambathrani , Head, Department of Special Education, Avinashilingam Institute for Home Science and Higher Education for Women, for her support and guidance to complete this research paper.

I am grateful to all my Bachelor of Education students, (2022 batch) Avinashilingam Institute for Home Science and Higher Education for Women, who helped me in collecting data for my research paper.

Lastly, I am thankful to my family for their understanding, encouragement, and support.

References

1. de Souza, R., Delou, C. M., Myriam, B. V., Machado, S., Rodrigues, C. R., & Castro, H. C. (2012). Blindness and fungi kingdom: a new approach for teaching a biological theme for students with special visual needs. *Creative Education*, *3*(05), 674.

http://dx.doi.org/10.4236/ce.2012.35100

2. Egner, T. L. (2006). Usage of plant examples in secondary school biology classes.

https://rdw.rowan.edu/cgi/viewcontent.cgi?article=1875&context=etd

3. Fernández-González, C., et al (2021). Teaching the Plant Kingdom Using Cooperative Learning and Plants Elements: A Case Study with Spanish Secondary School Students. *Journal of Turkish Science Education*, *18*(1), 17-31. https://eric.ed.gov/?id=EJ1303753

4. Karakaya, F., Bilgili, C., Soysal, N., & Yilmaz, M. (2023). Investigation of secondary school students learning about the fungi kingdom. *Turkish Journal of Education*, *12*(4), 227-242.

https://dergipark.org.tr/en/download/article-file/3293832

5. Meneghetti, G., Bramuzzo, S., Callegaro, E., Guidolin, L., Irato, P., & Santovito, G. (2017). The kingdom of fungi in primary school: an educational research in biology field. In *EDULEARN17 Proceedings* (pp. 102-110). IATED. 10.21125/edulearn.2017.1023

6. Sshana, Z.J., & Abulibdeh, E.S. (2020). Science practical work and its impact on students' science achievement. Journal of Technology and Science Education, 10(2), 199-215. https://files.eric.ed.gov/fulltext/EJ1272657.pdf

7. Yangın, S., Sidekli, S., & Gökbulut, Y. (2014). Prospective teachers' misconceptions about classification of plants and changes in their misconceptions during pre-service education. http://79.123.160.167/xmlui/bitstream/handle/11436/3215/yang%C4%B1n-2014.pdf?sequence=1&isAllowed=y

8. Yangin, S. (2013). Pre-Service Classroom Teachers'mislearnings of Classification of The Plant Kingdom And The Effect of Porphyrios Tree on Removing Them. *Journal of Baltic Science Education*, *12*(2), 178-190. https://www.ceeol.com/search/article-detail?id=1084414