

**CONSTRUCTION OF CULTURALLY  
INCLUSIVE SELF LEARNING MODULE ON  
BIOLOGY FOR VIII<sup>th</sup> STANDARD IRULA  
TRIBAL STUDENTS**

*Dissertation*  
*submitted to the University of Calicut*  
*in partial fulfillment of the requirements for the Degree of*  
**MASTER OF EDUCATION**

*by*  
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UNIVERSITY OF CALICUT  
2019 - 2021**

## **DECLARATION**

I, **POORNIMA.K**, do hereby declare that this dissertation entitled, “**CONSTRUCTION OF CULTURALLY INCLUSIVE SELF LEARNING MODULE ON BIOLOGY FOR VIII<sup>th</sup> STANDARD IRULA TRIBAL STUDENTS**” is a record of original research work done by me under the supervision and guidance of **Dr. HASSANKOYA M.P.**, Associate Professor in Natural Science, Farook Training College, Kozhikode and has not been submitted by me in this university or any other university for the award of any Degree/Fellowship or Recognition before.

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## **CERTIFICATE**

I, **Dr. HASSANKOYA M.P.**, do hereby certify that this dissertation entitled “**CONSTRUCTION OF CULTURALLY INCLUSIVE SELF LEARNING MODULE ON BIOLOGY FOR VIII<sup>th</sup> STANDARD IRULA TRIBAL STUDENTS**” is a record of bonafide study and research carried out by **POORNIMA.K** of M.Ed. Programme (2019-2021) under my supervision and guidance and has not been submitted by her for the award of any Degree, Diploma, Title or Recognition before.

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# CHAPTER I

## INTRODUCTION

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- ❖ Need and Significance of the Study
  - ❖ Statement of the Problem
  - ❖ Definition of Key Terms
  - ❖ Objectives of the Study
  - ❖ Methodology
  - ❖ Scope and Limitations of the Study
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Indigenous education specifically focuses on teaching indigenous knowledge, models, methods and content within formal or non-formal educational systems. The growing recognition and use of indigenous methods can be responds to the erosion and loss of indigenous knowledge through the process of colonialism, globalization and, modernity. Indigenous communities are able to reclaim and revalue their languages and traditions and in so doing, improve the educational success of indigenous students, thus ensuring their survival as a culture. Increasingly there has been a global shift toward recognizing and understanding indigenous models of education as a viable and legitimate form of education. However, members of indigenous communities celebrate diversity in learning and see this global support for teaching traditional forms of knowledge as success .Indigenous people, also known in some regions as first people, first Nations, aboriginal peoples, or Native peoples, or autochthonous people, are ethnic groups who are the original or earliest inhabitants of an area in contrast to group that have settled, occupied or colonized the area more recently.

Our present text books are prepared on state level often fails to integrate the cultural perspective of the locality. The terms used, examples provided and illustrations are not culturally inclusive. Inclusiveness is a global trend in the contemporary education. It is assumed that a culturally inclusive text may have a positive impact on the students understanding and helps to develop their knowledge, positive attitudes and cultural understanding. Review of related literature reveals that cultural construction opens the doorway for coming to understand there are multiple science perspectives in which western science is only one among thousands of Indigenous Knowledge systems (Aikenhead,

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2006a). Science is not value neutral, but rather, is tied to and defined by social and cultural norms. Incorporating Aboriginal perspectives in school science is not only imperative to generating interest and relevance for Aboriginal students; it will also broaden all people's worldview and understanding of our interconnected relationship with the earth and environment. From this worldview, Indigenous epistemologies although diverse, consider knowledge as action and wisdom with elements of spirituality and empiricism – a holistic approach that seeks harmony with nature for survival (Aikenhead & Huntley, 1999). Hence, incorporating Aboriginal perspectives in school science has the potential to resolve social, cultural, and environmental crises that impact all humanity. Many tribal students enter class with deep admiration for the natural world and their cultural heritage but fail to see the connection between those values and the material they learn in science classes (Oatman, 2015). Hence, by implementing an interdisciplinary sustainability education model that includes these topics within standard Science, Technology, Engineering, and Math (STEM) courses there is an opportunity to tap into the students' interests and desires and hopefully allow them to better engage with science material.

Modules are essentially self-contained, self-instructional packages, with learning paced by each student according to his/her individual needs and ability. A module covers either a single element of subject matter content or a group of content elements forming a discrete unit of subject matter or area of skill. A module has clearly defined, objectives; preferably in behavioral form (Daries, 1981). Taneja (1989) defined module as a unit of work in a course of instruction that is virtually self-contained and a method of teaching that is based on the

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concept of building up skills and knowledge in discrete units. A module is a set of learning opportunities organized around a well - defined topic which contains the elements of instruction, specific objectives, teaching learning activities, and evaluation using criterion - referenced measures (UNESCO, 1988). There is increasing recognition of the importance of using indigenous (traditional) knowledge for contextualizing school science instruction because it forms part of students' prior experiences and source of information that they carry to school learning.

Districts of Kerala, especially in the districts of Wayanad (37.36%), Palghat (10.89%) and Kasargode (8.33%), constituting 56.58% of the entire tribal population of Kerala (GOK. 2005: 344). Tribal's in Kerala (known in Malayalam as the Adivasis) are the tribal population found in the Indian state of Kerala. Most of the tribal's of Kerala live in the forests and mountains of Western Ghats, bordering Karnataka and Tamil Nadu. Tribal's in Kerala are officially designated as "Scheduled Tribes" for affirmative action purposes Kerala Public Service Commission, Government of Kerala, lists thirty-six of Scheduled Tribes in Kerala. Tribal's in Kerala are classified by Scheduled Tribes Development Department, Government of Kerala into three sub-sets (Particularly Vulnerable, Marginalized and Minorities). Irular community is distributed in Palakkad District and they are mainly concentrated in Attappadi region. They are also found in Tamil Nadu. They have a dialect of their own called 'Irula bhasha', which has more affinity to Tamil. Their traditional social organization is endowed with various functionaries, namely; 'Ooru Moopan' (Chieftain), Bhandari' (Treasurer), 'Kuruthala' (assistant to Chieftain) 'Mannukaran' (Soil expert), 'Marunnukaran'

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(healer) etc. These positions are hereditary and succession is by the son. This traditional institution plays a decisive role in the social control mechanism of Irular community.

Earlier Irular were hunters, gatherers and shifting cultivators. Now they have become experts in settled Agriculture and also work as agricultural laborers. Irular community has attractive songs and dances which tell about their forest, cultivation, emotions etc. They have been empowered through 'Thaikula Sangham', exclusively for women and 'Ooruvikasana Samithi' organised under the Attappadi Hills Area Development Society. Education is in fact, an input not only for economic development of tribes but also for inner strength of the tribal communities which helps them in meeting the new challenges of life. It is an activity, or a series of activities, or a process which may either improve the immediate living conditions or increase the potential for future living. It is the single most important means by which individuals and society can improve personal endowments, build capacity levels, overcome barriers, and expand opportunities for a sustained improvement in their well-being.

Gautam (2004) in his article found that high "dropout" rates among tribal children He analyzed that due to wrong medium of instruction, the appointment of non-tribal teachers in tribal areas and communication gap between the teachers and tribal children are the causes of high dropout rates in tribal schools. Linguistic problems also a cause for dropout rates. Linguistic problems:-Tribal languages, except a very few, belong to Austro-Asiatic language family and are different from dominant non tribal languages of India which belong either to the Indo

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European or the Dravidian family. In most of the time tribals face acute problems in language. Hence the present study is significant for tribal students.

### **Tribal Education**

Every society wants to train and educate its children and youth in such a way that they will become effective citizens and achieve economic independence in community. Education of scheduled tribe is a vital component of the overall strategy of securing equality and social justice in the country like India, a substantial proportion of the total population belongs to socially disadvantaged sections continues to be on the priority list of the country's development agenda. Education in tribal areas has always been a matter of great concern and the lack of it has always had a negative impact on the development of tribal people. Primary Education as well as continuation of education in high schools in the rural and remote areas has always suffered due to lack of institutional facilities, non availability and absence of teachers, lack of appropriate text books etc.

Education in the tribal areas has in the traditional sense always been something more than literacy and was largely confined to cultural accomplishments. The process of education for tribal people had an intrinsic relationship with culture, traditional crafts, socio economic conditions as well as specific local conditions of people who live in those areas. Several factors for the educational backwardness among the tribes like, socio economic problems are the major problems in tribal education (D.C. Sah, 2004).

Isolation from the main stream of the society and culture, their technological, economic, social, political and educational backwardness in

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comparison to non-tribal, superstition among the tribal parents and instability of family life due to the frequent changes of spouses are major problems for the slow growth of tribal education. The psychological problems include the sense of insecurity, lack of interest, motivation, aspiration and ambition in the life and low level of intelligence among tribal children etc. They are the major impediments found to be coming in their way of education.

The major hindrances are being geographical barrier and inaccessibility of tribal village, poor quality of teaching. Problems of medium of instruction, irrelevant curriculum and text books, more number of single teacher schools, uneven teacher student's ratio have resulted in high dropout rates, wastage and stagnation and ultimately resulted in slow growth of tribal education.

The government recommended that crores of rupees for the education of tribal people in five year plans. The govt. appointed a commission under the chairmanship of Dhebar in 1960-61 for finding out the condition and problems of tribal people. The Commission observed that adequate arrangements have not yet been made for the education of Scheduled tribes. It requested the central education ministry to study these problems for doing the needful towards education of these people. It considered the residential ashram schools useful for children of tribes, because they serve as centre of social and cultural education of these children. It recommended the expansion of such schools throughout the whole country. The commission also recommended that the teachers appointed in tribal areas should be acquainted with life style and indigenous language of tribes. Teachers appointed to teach tribes should be fully conversant with their culture. This would probably help them to communicate fluently with students. Primary education for

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tribal children should be given through their mother tongue. Suitable books should be published for this purpose in mother tongue. Kothari commission (1964-66) also given welcoming suggestions for various levels of education of tribal children. In this context the investigator feels that there is a gap in tribal education especially it lack culturally inclusiveness.

### **Need and Significance of the Study**

Cultural inclusiveness addresses and supports the needs of people from diverse cultures and values their unique contributions. It involves ongoing awareness raising where negotiations and compromise may be necessary. Embedding cultural inclusiveness will increase the students learning experience. It also addresses the different learning styles of diverse students. A culturally inclusive curriculum reflects the cultural linguistic diversity of society. Researchers have brought up the importance of language revitalization efforts to preserve Native culture. The extinction of Native languages has been brought up as one of the reasons that revitalization efforts are necessary. For Indigenous learners and instructors, the inclusion of indigenous methods into schools often enhances educational effectiveness by providing an education that adheres to an Indigenous person's own inherent perspectives, experiences, language, and customs, thereby making it easier for children to transition into the realm of adulthood For non-Indigenous students and teachers, such an education often has the effect of raising awareness of individual and collective traditions surrounding Indigenous communities and peoples, thereby promoting greater respect for and appreciation of various cultural realities. In terms of educational content, the

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inclusion of Indigenous knowledge within curricula, instructional materials, and textbooks has largely the same effect on preparing students for the greater world. There is value in including Indigenous knowledge and education in the public school system. Students of all backgrounds can benefit from being exposed to Indigenous education, as it can contribute to reducing racism in the classroom and increase the sense of community in a diverse group of students. There are a number of sensitive issues about what can be taught (and by whom) that require responsible consideration by non-Indigenous teachers who appreciate the importance of interjecting Indigenous perspectives into standard mainstream schools. Concerns about misappropriation of Indigenous ways of knowing without recognizing the plight of Indigenous Peoples and "giving back" to them are legitimate. Since most educators are non-Indigenous, and because Indigenous perspectives may offer solutions for current and future social and ecological problems, it is important to refer to Indigenous educators and agencies to develop curriculum and teaching strategies while at the same time encouraging activism on behalf of Indigenous Peoples. One way to bring authentic Indigenous experiences into the classroom is to work with community elders. They can help facilitate the incorporation of authentic knowledge and experiences into the classroom. Teachers must not shy away from bringing controversial subjects into the classroom. The history of Indigenous people should be delved into and developed fully. There are many age appropriate ways to do this, including the use of children's literature, media, and discussion.

Incorporating Indigenous ways of learning into educational practices has potential to benefit both Indigenous and non-Indigenous learners.

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The skills needed in modern curriculum include: collaboration, creativity, innovation, problem-solving, inquiry, multicultural literacy, etc. Indigenous ways of learning incorporate all these skills through experiential and holistic methods. Additionally, aboriginal education styles align with 21st century skills though involving teachers and students as co-constructors of education, and by valuing the interconnectedness of content and context. Indigenous practice also increases communication, comprehensive, achievement, attitude and performance skill in tribal students. Five common elements in how sustained improvements in outcomes for Indigenous students have been achieved in education: Building respectful and trusting relationships with Indigenous communities, Setting out a deliberate and specific intent to improve, Taking action on several fronts, at system and local levels, Positively affecting sufficient numbers of individual Indigenous students; and Continuing to apply effort over a sustained period of time.

Indigenous, and because Indigenous perspectives may offer solutions for current and future social and ecological problems, it is important to refer to Indigenous educators and agencies to develop curriculum and teaching strategies while at the same time encouraging activism on behalf of Indigenous Peoples.

Many concepts and content area in biology studies are unfamiliar to tribal children. They are facing the difficulties to capture the objective. Indigenous knowledge has been ignored and dismissed from science curricula for several years. It may be seen to be at odds and limits of scientific knowledge. Some people also consider indigenous knowledge should not be given since it will

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prevent the non-indigenous community (Aikenhead & Ogawa, 2007). The current science curriculum is a representation of Western worldviews that seldom forget social activity in the real-life environment and might be alien to some of the pupils (De Beer & Whitlock, 2009). This problem has an impact on the imbalances in societies where cultural values and local wisdom are abandoned. There is an also even alienation to the knowledge itself. This further influences the moral, social, cultural, and natural crisis that has caused the humanitarian crisis (Herusatoto, 2012; McInnes, 2017).

In the context of education, the most efficient way of strengthening indigenous knowledge is integrating the knowledge into school science (Aikenhead, 2006; Meyer & Crawford, 2011; Regmi & Fleming, 2012; Zinyeka, 2013; Zinyeka, Onwu, & Braun, 2016). It is a challenge for educators and researchers to promote lessons and curricula to stay in synergy with the demands of the times without having to abandon local values. Teachers need to recognise that the indigenous knowledge and classroom scientific knowledge can synchronise and be support for each other (Regmi & Fleming, 2012). The addition of indigenous knowledge in the curricula is an essential element of contemporary science education. Indigenising curriculum refers to the integrating of indigenous knowledge into the school science curriculum (Moyo & Kizito, 2014), incorporating an audible native voice (Acton, Salter, Lenoy, & Stevenson, 2017). The introduction of indigenous knowledge into science school might present science more appropriate for a student in the culturally different classroom (De Beer & Whitlock, 2009), could have a definite impact on students enthusiasm in

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science (Kasanda et al., 2005), and help them appreciate as well as maintain alive the native knowledge (Ngiasike, 2011).

A culturally inclusive module is developed by altering the content to accommodate learner preferences. This includes introducing terms which are familiar and indigenous. Similarly add examples which are common and locally available to students. The illustrations are simplified with diagrams taking in to considerations of the cultural background. In this context it is essential to develop learning materials like primers, modules, training manuals, self learning materials etc. on the basis of the linguistic and cultural context. In this study the investigator took up humble attempt to develop module for tribal students in Kerala from the selected areas in biology text book of 8th standard on the basis of linguistic and cultural context of tribal's. The cultural context could be made care of and through comparison and contrast, the objectives could be realized. A review of literature has shown that similar module have not been developed in the Kerala context.

### **Statement of the Problem**

The problem is titled as **“Construction of Culturally Inclusive Self Learning Module on Biology for Standard VIII<sup>th</sup> Irula Tribal Students.”**

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## **Operational Definition of Key Terms**

### **Self-learning Module**

“A self-learning module is defined as a set of learning opportunities systematically organized around a well-defined topic which contains the element of instructions.”

In the present study it provides learning activity to learners when a group education or individual session is not possible.

### **Construction**

Construction is defined as the process, art, or manner of constructing something.

### **Culturally Inclusive**

Culturally inclusive is an approach one where students and staff alike recognize, appreciate and capitalize on diversity so as to enrich the overall learning experience.

In the present study it encourages all individuals -regardless of age, gender, ethnicity, religious affiliation, socio economic status, sexual orientation or political beliefs-to develop personal contacts and effective inter cultural skills.

### **Biology**

The science of life; that branch of knowledge which treats of living matter as distinct from matter which is not living; the study of living tissue. It has to do with the origin, structure, development, function, and distribution of animals and plants.

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### **Irula Tribal Students**

Irula are Dravidian ethnic group inhabiting the area of the Nilgiris Mountains, in the state of Tamil Nadu and Kerala, India.

### **Variability of the Study**

Construction of culturally inclusive self-learning module on biology

### **Objectives**

Major objectives of the study are;

1. To analyses the present curriculum on the basis of culturally inclusive approach on biology.
2. To identify the problems faced by Irula tribal students to learn biology.
3. To construct a culturally inclusive self-learning module on biology for VIII<sup>th</sup> standard Irula tribal students.

### **Methodology**

It is the description of the procedure of techniques adopted in research or investigation. The decision about the method depends upon the nature of the problems selected and kind of data required for its solution.

### **Methods**

With the guidance from the supervising teacher, investigator collected data from journals, articles, and books in order to reach the objectives of the study. The investigator had discussions sometimes with the tribal community. From the

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reviews and discussions investigator understood that the tribal community facing many problems in the educational process to methodology.

The existing system of teaching learning process is based on the cultural basis of the genera students. They are unfamiliar to the tribal children. The investigator identified the need to develop module based on the tribal's prerequisites

The proposed study adopts content analysis method. The first step is the content of the 8<sup>th</sup> class biology will be analyses to study the culturally inclusive approach. Preparation of culturally inclusive self -learning module on biology by analyzing the terms which is not understood by Irula tribal students.

Major steps for the construction of module are;

1. Title of the module
2. Introduction
3. Objectives
4. Activities
5. Conclusion
6. Task/ Assignment

### **Sample**

Sample will be comprised of 30 Irula tribal students and 30 teachers worked under tribal schools in Kerala. Total 60 sample.

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## **Tools Used for the Study**

The following tools are used for the present study:

1. Opinionnaire on culturally inclusive approach for students (Koya.H.M.P&Poornima,k2021)
2. Opinionnaire on culturally inclusive approach for Teachers (Koya.H.M.P&Poornima,k2021)
3. Construction of culturally inclusive Self-learning module (SLM) on VIII<sup>th</sup> standard biology (Koya.H.M.P&Poornima,2021)

## **Data Collection Procedure**

The data will be collected from the Irula tribal students at secondary level who are studying in various schools and teachers working under tribal schools through opinionnaire and collect feedback from biology expert teachers.

## **Statistical Techniques**

The data was analyzed and interpreted using percentage analysis

## **Scope and Limitations of the Study**

Teaching –learning process will be meaningful and effective if only it is contextualized. The curricular components and teaching methods which are crucial to classroom teaching are said to be quite alien to the marginalized tribal system. When life related anecdotes and experiences and skill are brought into the classroom, learners will be interested in the content and the learning process. It is with this assumption that the investigator developed a few modules to teach

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biology in tribal school context. It is hoped that other teachers in the field will take into account the framework as the suggestions put forward in this study.

**The Limitations of the Study are:**

- ❖ The modules are prepared for VIII<sup>th</sup> standard only
- ❖ The modules are prepared only for very few topics.
- ❖ The modules are prepared only for Irula tribal students
- ❖ Without much exposure to tribal culture, the modules have been prepared by the investigator.
- ❖ The investigator could not conduct an in-depth study.

**Organisation of the Research Report**

**Chapter-I:** This chapter includes introduction, need and significance, statement of the problem, operational definition of key terms, objectives, methodology and scope and limitations of the study.

**Chapter-II:** This chapter presents the theoretical overview and Review of related literature relevant for the present study.

**Chapter-III:** This chapter describes methodology of the study. The modules developed are presented as such.

**Chapter-IV:** This chapter given an Analysis of the modules prepared for tribal students.

**Chapter-V:** This chapter describes summary, conclusions and suggestions for further research in the area.

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## **CHAPTER II**

# **REVIEW OF RELATED LITERATURE**

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❖ Conceptual Overview

❖ Review of Related Studies

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## **REVIEW OF RELATED LITERATURE**

The review of literature gives exact picture about the related work done by other scholars. It helps in knowing the difficulties encountered by the scholars also fining out remedial measures to escape from the pitfalls and it would be necessary for the conclusions and determination of the significance of the proposed study.

This chapter is presented in to two sections.

- 1) Theoretical overview
- 2) Related studies.

Education is considered as the bedrock of all socio- economic development of the country. In order to promote education to all children irrespective of caste, creed, religion, sex and others and also realizing democratization of education as birth right to all, the govt. of India made several attempts from time to time to achieve the universalization of education to all. Learning is influenced by the factors relating to environment of the learner. Family, culture, society and modern facilities are some of the environment factors. Considering the tribal students their environment is quite different from that of the normal school students. The tribal are children of nature and their life style is conditioned by the ecosystem.

Educational process is fundamentally a cultural process. Social constructivism encourages the leaner at his versions of the truth, influenced by his

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background culture. This helps the learner shape the knowledge and truth that the learner creates, discovers and attains in the learning process. In the context of tribal education, finding a balance between preserving tribal cultural identify and mainstreaming for economic prosperity means building education programmes that ensure a tribal Childs success in mainstream school. Major goals of SSA include “Bridging all gender gap and social category gaps in primary stage and at elementary education level and focus on elementary on satisfactory quality with emphasis on education for life”.

Recognizing that the education system is currently designed dominant group. These needs to be investment in creating support mechanisms. That supplements the integration of tribal children to formal education system. The cognitive qualities of tribal children have to be viewed and evaluated taking in to consideration of their ecological and cultural context because of difference in the demands of tribal ecology, the patterning of their cognitive abilities shows considerable variation from those of other groups.

## **Culturally Inclusiveness: Theoretical Overview**

### **Culturally Inclusive Curriculum**

A culturally inclusive curriculum reflects the cultural, linguistic and religious diversity of society. Students learn in a supportive environment free from prejudice and discrimination. Opportunities are available for students to identify as Australian and explore cultures and beliefs that may be different from their own.

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- ❖ Culturally inclusive practice encompasses curriculum content and pedagogy at classroom level. Materials and examples challenge stereotypes to avoid prejudice and bias. Teaching and learning activities provide students with equal opportunities to learn, share experiences and succeed at school. differentiate the curriculum to suit all learners, including students learning English as an Additional Language or Dialect
- ❖ use a wide variety of texts, pictures, videos and experiences
- ❖ reflect upon the cultural, linguistic and religious diversity of students and consider all students when planning lessons
- ❖ identify and examine bias in words and visual images
- ❖ Incorporate appropriate assessment practices.

### **Culturally Responsive Pedagogy**

**Culturally responsive pedagogy** is a student-centered approach to teaching in which the students' unique cultural strengths are identified and nurtured to promote student achievement and a sense of well-being about the student's cultural place in the world. Culturally responsive pedagogy is divided into three functional dimensions: the institutional dimension, the personal dimension, and the instructional dimension.

The institutional dimension of culturally responsive pedagogy emphasizes the need for reform of the cultural factors affecting the organization of schools, school policies and procedures (including allocation of funds and resources), and

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community involvement. The personal dimension refers to the process by which teachers learn to become culturally responsive. The instructional dimension refers to practices and challenges associated with implementing cultural responsiveness in the classroom.

Given that a majority of teachers hail from a middle class European-American background, the biggest obstacle to successful culturally responsive instruction for most educators is disposing of their own cultural biases and learning about the backgrounds of the students that they will be teaching. The processes necessary for preparing to teach in a culturally responsive classroom can be broken down into three general categories: exploring one's own culture, learning about other cultures, and learning about students' cultures.

Before seeking out knowledge about the cultures of the diverse students that they will be teaching, educators must first investigate their own heritage, upbringing, and potential cultural and racial biases. A common side effect of being raised in the dominant European-American culture is the self-perception that "I'm an American; I don't have a culture."

### **Culturally Responsive and Inclusive Curriculum**

**Culture**, One definition of culture is "Broadly, culture is a collection of information that is (a) nongenetically transmitted between individuals, (b) more or less shared within a population of individuals, and (c) maintained across some generations over a period of time."

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Culture is often thought of in terms of ethnic or national groups, but we can also look at cultures, within or beyond ethnic groups, in terms of race, gender, sexuality, abilities, or class. These are only a few ways to look at culture, there are many more. A person may belong to many cultures and so these ways of looking at culture will naturally intersect. It is important to examine invisible cultures within a classroom. Geneva Gay states that how do we become culturally responsive teachers. Culturally responsive teaching can be defined as using cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant and effective for them. It teaches to and through the strengths of these students. Culturally responsive teaching is the behavioral expression of knowledge, beliefs, and values that recognize the importance of racial and cultural diversity in learning. It is contingent on a set of racial and cultural competencies summarized by Teel and Obidah (2008) they include

- ❖ Seeing cultural differences as assets
  - ❖ Creating caring learning communities where cultural different individuals and heritages are valued
  - ❖ Using cultural knowledge of ethnically diverse cultures, families, and communities to guide curriculum development, classroom climates, instructional strategies, and relationships with students
  - ❖ Challenging racial and cultural stereotypes, prejudices, racism, and other forms of intolerance, injustice, and oppression
-

- ❖ Being change agents for social justice and academic equity
- ❖ Mediating power imbalances in classrooms based on race, culture, ethnicity, and class
- ❖ And accepting cultural responsiveness as endemic to educational effectiveness in all areas of learning for students from all ethnic groups.

Researchers have found that culturally responsive classrooms motivate students to learn. "The essentials of this motivational framework are that it 1), respect diversity; 2) engages the motivation of a broad range of students; 3) create a safe, inclusive, and respectful learning environment; 4) derives teaching practices from across disciplines and cultures; and 5) promotes equitable learning.

Culturally inclusive curriculum highlights the following:

**Know your students: Learning** about our individual students is critical in how we design our curriculum and deliver it. As instructors, it is our duty to learn the behaviors, backgrounds, and challenges our students face so we are better equipped to address them. An effective way to learn about students is to break the ice with them in the first few class meetings. This can be accomplished by brief survey questions, student inventories, interviews, or questions that can be tailored to be increasingly sophisticated depending on student level. Questions might include information about students' likes and dislikes, personal interests, responsibilities outside of school, and especially their opinions about courses and/or teachers they have perceived to be effective or ineffective. With more mature students, we may ask questions about their experience with racial incidents

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inside or outside of an academic environment. Very often students will share personal experiences that have deeply affected them. Eliciting this kind of information can assist educators in better meeting their students' needs. In addition to breaking the ice at the beginning of the semester, it is also essential to engage in regular check-ins with our classes. Sometimes during a semester or school year, situations may change. Students may end up homeless, deal with a parent remarrying or divorcing, or cope with their own life-changing circumstances. The more we know about them, the better we can empathize with their situation and provide them with assistance.

### **Transform Your Pedagogy and Curriculum**

Teachers are now more mindfully revisiting how to facilitate lessons that are culturally responsive due to the critical need in our changing times. While districts begin to work toward meaningful changes, there are specific steps teachers can take to transform both course curriculum and pedagogical practices.

In the area of curriculum, a number of different strategies can be implemented in terms of three areas: course content, methodology, and assessment.

#### **Cultural Course Content**

First, when it comes to content, materials and readings used in the classroom should reflect the diversity of the students in class and the diversity of the contributors in the field of study or discipline. Teachers should also recognize how their choices of readings, examples, analogies, videos, and other content may

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be biased or may reinforce stereotypes. Curriculum should also be reviewed to ensure there are no hidden forms of oppression, and activities used in class should be created to be mindful of the impact they may have on students.

### **Meaningful Methodology**

Second, pedagogy should be inclusive which means that course work should be meaningful for students, designed to encourage them, effectively meet their needs, and invite collaboration. Teachers should ensure that varied and frequent active learning techniques are being used. This can include discussions, group work, experiential learning, debates, presentations, and team projects, to name a few. Activities and lessons should be presented in multiple ways to address the varied learning styles of students, and learning support or scaffolding should be incorporated to gradually build upon the skills that students have acquired. Giving students an opportunity to reflect on what they have learned can provide insight into their progress and areas that may need more attention, but it can also reinforce learning and help them make connections to their own life experiences.

### **Multiple Measurements in Assessments**

Finally, in the area of assessment, we can use multiple measures to assess student learning and acquisition of knowledge. Students should be invited to share knowledge in multiple ways which include not only traditional tests but low-stakes quizzes, quick writes, homework, responses to class questions, and group discussions, as well authentic assessments such as life history interviews, personal

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stories, autobiographical journaling, and portfolios to demonstrate and personalize learning. Students should be allowed to accumulate grade points in a number of different ways, not just through midterms and a final. Finally, teachers should clearly communicate the purpose of assignments and activities, and the knowledge and skills that will be gained by doing these.

### **Respect and Reinforce Student Culture**

Each student comes to our classroom with a set of behaviors, beliefs, and characteristics that make that student unique. Coupled with this are the value systems, languages, religious beliefs, and ways of life that also contribute to their self-identity. By valuing each student's culture, we contribute to their self-concept, which in turn influences their academic success. It is also imperative to validate a student's culture by connecting their outside experiences, daily life, and background knowledge to what is occurring in the classroom in terms of the interactions and the learning that is taking place. There are a number of ways that teachers can embrace culture in the classroom.

Sharing and listening is an important way to validate culture. Students should be encouraged to listen effectively, and this is something a teacher can model in terms of good listening skills. Students should be given opportunities to share their feelings, beliefs, values, and perspectives, and they should be taught to receive and embrace this information, while still honoring the differences of their classmates. Activities and learning opportunities that allow students to celebrate both their own culture and those of others should be incorporated into lessons.

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Teaching methods and instructional practices are another way to support and validate a student's culture and language. Include readings, videos, poems, songs, and other materials where students will see and hear people who look like them. Inviting guest speakers to class or joining an online event is another way to embrace culture and a student's background. Spend time understanding your students so you can teach to different cultural backgrounds and interests. Also, be sure to incorporate universal design wherever possible to accommodate the needs of all students.

### **Involve Family and Community**

Making a classroom more culturally responsive means engaging families and communities in the academic lives of students. Research has shown when parents and communities are involved, students are more likely to attend school regularly, complete homework, earn better grades, have better social skills, maintain better relationships with their parents, and have higher self-esteem. Involvement can occur several different ways, including parenting, communicating, volunteering, learning at home, and decision making, and collaborating with the community.

Educators should communicate with families, not just when there is a discipline issue, but when something positive occurs. Open and honest communication with families can lead to greater trust and develops a nurturing relationship which allows teachers to ask questions and learn more about their students and their backgrounds. Reaching out before the school term begins and providing ways parents can communicate with you can be very helpful. Teachers

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might even invite parents to complete an interest survey to better understand their students. Dialoging with parents about community or support resources to strengthen schools can not only lead to increased awareness but can also build the community relationships that are necessary to support students. Many schools also ensure translators are available for families and provide transportation vouchers to enable them to attend school meetings and events. Finally, making time for impromptu conversations and organic check-ins can enable families to feel more included and more comfortable.

### **Indigenous Knowledge: Significance**

Ogawa (1995) defines indigenous knowledge as “cultural-dependent collective intellectual perceiving of reality” where collective means to be held in an adequately similar form by people to provide effective communication, but independent of a particular mind. All people involved in indigenous knowledge from moderate to high levels in a community are experts. They are actors of their knowledge. Indigenous knowledge is manifested in practices and communicated orally, and at times through copying, illustration, painting, and other artifacts (Zinyeka et al., 2016). The pattern of indigenous knowledge is like the collective thinking of a place or region based on natural phenomena that incorporate human and non-human thought integration, such as the scientific knowledge rooted in the local culture (Alessa et al., 2016).

Indigenous science describes how the local environment runs through a scientific process that includes objective observation of natural phenomena and classifies as well as solves problems that are encompassed in all perspectives of

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native culture (Snively & Corsiglia, 2000). Characteristics of indigenous science combine local development and application, such as testing hypotheses, experiments, and problem-solving related to the socio cultural dynamics. The body of knowledge, equivalent to the peer-reviewed study, consists of a continuous living awareness of the nature such as agriculture, architecture, mathematics, climatology or climate change, astrology, medicine, plant varieties, etc.

RTE (2010) says” The teacher work towards a heterogeneous and democratic classroom where all the children participate as equal partner. To ensure 25% of reservation for children from disadvantaged and weaker sections school will have to disclose a list of children taken in this category and ensure that diversity is maintained”. The programme of schooling does not pay any attention to the ecological, cultural and psychological characteristics of tribal children. The education system of dominant nontribal population is very limited value in the tribal cultural milieu because it does not match with the life style of individuals and needs of the tribal community. The tribal children have very low levels of participation and success in school education programmes.

Eleventh five year plan has taken steps to promote tribal languages, culture and heritage through adaptation of pedagogical methods, community participation in school management and so on. The educational content should be molded in the relevant culture of the community. The curriculum should be culturally sensitive and provide children with economically viable options for life. The socio cultural milieu of the tribes has its distinctive characteristics including in many cases, their

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own spoken languages. This underlines the need to develop curriculum and instructional materials on the basis of tribal culture and regional languages. The curriculum at stages of education will be designed to create an awareness of rich cultural identity of tribal people and also of their enormous creative talent.

According to “National policy on education, (1986), socio cultural milieu of the scheduled tribes has its distinctive characteristics including, in many cases, their own spoken languages. This underlines the need the need to develop the curricula and devise instructional materials in tribal languages at initial stages, with arrangement for switching to the regional language”. The text books are mainly based on the dominant culture. Almost absence of tribal stories, folklores, tribal terms sacrifices of tribal heroes etc in the text books. As a child’s first exposure to education, there is a debate around the language used for instruction and communication. Tribal children have limited contact with the state language and tend to speak their local dialect. The use of tribal terms in text books and tribal language as medium of instruction in the initial years can develop a sense of comfort for the tribal child.

The National Curriculum Frame Work (2005) recommends the plurality of text books, meant create theoretical space for local specificity. Developing primers and dictionaries in the tribal dialect involving content from the local context can help improve the quality of teaching. There is also a growing focus on workbooks that supplement the learning process for children in various subjects, and to encourage children to undertake assignment outside the classroom, conduct science experiment at home with local materials, other teaching aids to make

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teaching more fun and creative include puppets, model making, singing, and drama. Education can include knowledge of agriculture in all its dimensions, skills of various vocations like capacity, crafts etc to enable the child to become independent in their own environment.

Children are taught by teachers who may or may not be from the tribal community. The presence of tribal teachers especially from tribal community has shown and improved school participation of tribal children, as these teachers understand and respect the culture with greater sensitivity. Assuming that the tribal teachers are more natural, fit, many state have appointed community teachers or Para teachers. However cases have indicated that special training on both course materials as well as appropriate conduct with tribal students has to be undertaken.

The govt. should provide learning aids, sufficient training for teachers and pedagogy on the basis of tribal culture. National policy Resolution (1968), suggests “More Effort should be made to equalize educational opportunities to promote social cohesion and national integration.” common school system as recommended by the Education Commission be adopted, the constitution of India gives due emphasis to the educational development of weaker sections of the society. In addition to developing culturally sensitive programmes of school education that ensure the dignity of tribal groups. Curriculum should incorporate programmes that sustain children in their respective environments. Instead of forcing them to move out such attempts can provide tribal children with culturally

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meaningful, ecologically valid and viable alternatives by reinforcing the dignity of their own culture and identity.

### **Tribal Education: Theoretical Overview**

Every society wants to train and educate its children and youth in such a way that they will become effective citizens and achieve economic independence in community. Education of scheduled tribe is a vital component of the overall strategy of securing equality and social justice in the country like India, a substantial proportion of the total population belongs to socially disadvantaged sections continues to be on the priority list of the country's development agenda. Education in tribal areas has always been a matter of great concern and the lack of it has always had a negative impact on the development of tribal people. Primary Education as well as continuation of education in high schools in the rural and remote areas has always suffered due to lack of institutional facilities, non availability and absence of teachers, lack of text books etc.

Isolation from the main stream of the society and culture, their technological, economic, social, political and educational backwardness in comparison to non-tribal, superstition among the tribal parents and instability of family life due to the frequent changes of spouses are major problems for the slow growth of tribal education. Extreme poverty, instability to afford the necessities of education, inadequacy of financial assistance for meeting the cost of boarding, lodging, books etc are some economic problems in the way of their education. The psychological problems include the sense of insecurity, lack of interest, motivation, aspiration and ambition in the life and low level of intelligence among

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tribal children etc. They are the major impediments found to be coming in their way of education.

### **Related Studies**

This part includes studies related with tribal and culturally inclusiveness.

Pande (1983) conducted an empirical of tribes in Orissa to understand the usefulness of education in the tribal life and to find out the nature of impediments and hurdles for all educational programmes meant for tribal people. Some of the major finding were the majority of teachers felt the syllabus unsuitable to the daily life of the tribal children. Teachers participating in workshops, seminars etc were very few.

Sujatha (2000) conducted a study on education among scheduled tribes. In this study she pointed out the problems of tribal education. It was also noted that in spite of constitutional guarantees and persistent efforts, tribal communities continue to lag behind the general population in education. The study revealed the reasons for this an external, internal and socio- economic and psychological. Internal constraints refers to problems associated with school system, content, curriculum, medium of instruction, pedagogy academic supervision, monitoring and teacher related problems.

Kamingo and Mahapatra (2003) conducted a study on “Tribal education in Rajagada: A Review of language, textbook and medium of instruction’. This paper discussed in detail the problems and issues related to the area of language, text book, medium of instruction and other issues directly or indirectly related to

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that. The article also pointed out that preparation of suitable text book for tribal children is a challenging task. Considering the textbook, the cover page, content and contexts are not local specific and related to the real life situation of the tribal and text book is not appreciated and adopted by tribal children. They made some suggestions regarding the problems tribal education.

Gautam (2003) published an article on “education of tribal children in india and the issue of medium of instruction a janshah experience. “In this paper he says that the issue of language is being debated in the context of tribal education. this paper examined the policy frame work of the states with regard to the medium of instruction in govt. schools in tribal areas is meeting the needs of sound education of tribal children in terms of posting of teachers, development of text book and curricula, training of teachers etc.

Nideeshkumar (2008) conducted a study on Dimensional problems of tribal Students in India with special Reference to Kerala state. In this study he pointed out that the facts affecting tribal education are Attitude of other students, social factors, lack of interest in formal education, lack of suitable teachers, lack of facilities, communication problems etc. He also found that the main causes for the lack of interest in formal education are the problems in curriculum. The tribal children are taught through the same books which form the curriculum of non-tribal children of the urban and rural areas of the rest of the state. Therefore the curriculum should be framed in the welfare of the tribal people.

Nundy & Bagai (2009) conducted a study on tribal education: A fine balance. In this study they pointed out that external and internal factors affect the

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tribal education. The main heads of the study were language of instruction, curriculum content, teacher training and pedagogy.

Michell et al., (2008) conducted a research study on “Learning indigenous science from place”. Research study examining indigenous based science perspectives in saskatchewan first nations and metis community contexts.

Rahman (2011) studied “The problems faced by teachers in constructivist pedagogy at secondary level tribal schools in Kerala”. He found that the tribal student facing the problems. In dimensions like teacher, learner and curriculum. From the curricular dimensions he made suggestions for the development of supplementary books on the basis of traditional knowledge and folklore of the tribal’s, creation of tribal relevant learning materials, inclusion of the activities related to the Socio- cultural background of the tribes and development of teaching learning materials and modules for the tribal students.

Erinosho (2013) conducted an empirical study on integrating indigenous science with school science to enhance learning: A Nigerian example to assess its effectiveness on learning of concept in science among secondary school students. Some of the major findings were teaching methods which incorporate indigenous scientific knowledge as the tool for providing experiential bases for formal science learning can be beneficial for reinforcing learning.

Sahu (2014) conducted a study on challenging issues of tribal education in India to analyze the status of tribal education with literacy rate, gross enrolment ratio, dropout rate and gender parity index in India. some of the major findings

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were the percentage of literacy of tribes was only 8.54percent in 1961 which has increased to 63.1 percent in 2011.the gross enrolment ratio is higher in class 1 to 5 which is 137.2 for ST boys and 136.7 for ST girls. The gender parity index for ST children is almost same as all categories of children except for XI to XII.

Haseena (2014) conducted a study on “scope of education and dropout among tribal students in Kerala-A study of scheduled tribes in Attappady” to examine the educational facilities available to the tribal students in higher education in Kerala and to find out the causes of dropout among tribal students in Kerala. Some of the major findings were Emphasis should be on quality and equity rather than quantity as has been the case in the past. In order to make education effective and sustainable, building partnership between the community and the government is important.

Booth (2014) conducted a study on “teaching Aboriginal curriculum content in Australian High schools” to understand what influences teachers choice of content and approach to teaching aboriginal studies. Some of the major findings were this study identified four key issues that affected the teaching of Aboriginal curriculum content by non-Aboriginal teachers. These factors are: time management, school culture, teacher interest and preconceived ideas of both teachers and students.

Corm (2014) conducted a study on Inclusion of Indigenous Knowledge System (IKS) – A Precondition for Sustainable Development and an Integral Part of Environmental Studies. In this study he point out that the importance of including participatory and inclusive methodologies, whereby one recognize the

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different worldviews and epistemologies as integral parts of environmental studies and development work. These approaches are able to enhance a critical and reflective consciousness, making the various actors aware of and conscious about their local heritage, environmental knowledge and how to include scientific knowledge as a potential and important contribution to sustained development.

Thangadurai P.S. (2015) conducted a study on “Empowerment of tribal children of Attappady Kerala” to find out the various educational availability of tribal children, to analyze the educational problems; to find out needs of counseling for tribal children and thus empower the children belongs to scheduled tribe. Some of the major findings were after counseling they develop their self-esteem and self confidence and they gain so much and express the willingness to study well and achieve the goal in life.

Ekeke, Dorgu & Theresa (2015) conducted a study on” the curriculum and indigenous education for technological advancement” with focus on the curricula at various levels must be tuned to lubricate the wheels and make the hub of the Nigerian education system free and flexible enough to accelerate the attainment of the new aspirations of Nigeria towards the realization of Vision. The researcher find out that indigenous knowledge could contribute to solve existing problems and achieving the intended objectives. Moreover, because indigenous knowledge was generated from the local wisdom and culture, it fits to the local situation natively, and also it is very hard for others to imitate. Therefore, exploring the dominant factors for sharing, spreading, and transformation of indigenous

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knowledge is a key theme of vital importance to extension practice and theory research.

Thachil (2016) conducted a study on “socio-economic problems of Irula tribes in Attappady area “to study the demographic profile and socio-economic problems of Kerala. Some of the major findings were the study reveals that socio economic background of Irula community is in a very pathetic situation. Poverty, malnutrition, family liability, lack of interest in studies, lack of hostel facilities, poor medical facilities, social exclusion, discrimination, early marriage, inadequate transport facilities etc are the major lively hood issues of Irula community.

Panigrahi (2018) conducted a study on “the problems of tribal students in learning English as a second language in Odisha.” Some of the major findings were tribal students face innumerable problems in learning English.

Wilson (2020) conducted a study on “Indigenous Content in Curriculum: The Challenge”. Some of the major findings were Canada has strong Indigenous voices at every level of our economy. However, there is no ignoring the statistics of Indigenous disengagement with high school. Poor education increases exposure to many diseases of poverty such as housing insecurity, food insecurity, poorer health and higher incarceration levels.

Laya (1991) introduced a training programme for tribal youth in Andrapradesh in 1991, called “yuvaparichai”, in the seven districts of Andraradesh. The aims of the training module was to develop analytical capacity

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for assessing their external and internal environment impacting on their own communities, develop confidence and capacity to articulate their interest and perspective there by participating in decision making process, develop skill to improve livelihoods challenge external pressures and to value self and community history with a critical appreciation of traditional knowledge systems.

Goble (2004) prepared a CIMC guide to developing self –paced learning.

Yao R.F (2016) prepared *Creating Learning Environments for Indigenous Students through Cultured-based Math Modules*. The main purposes of this one-year case study are to create learning environments for indigenous students through culture-based mathematics instructional modules, and what teachers' responds are in two tribes. The researcher leads sixteen in-service teachers and seven pre-service teachers to enter two indigenous tribes- "Cado" and "Jayama", and design culture-based math modules for indigenous students of tribal elementary schools.

Saheedali (2018) prepared a module to enhance the performance in teaching mathematics among perspective teachers at primary level to find out the extend of mathematics content knowledge, attitude towards mathematics, mathematic aptitude among perspective teachers at primary level. Some of the major findings were prospective teachers at primary level have a low level of mathematics content knowledge at the entry level of their training programme.

Sreeja (2020) prepared a teacher training module on enhancing teaching skill of primary school teachers in an inclusive setting.

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In Kerala SIET has developed bilingual language materials at district level in Kasargod, Wayanad, Malappuram and Palakkad.

Orissa took the initiative to develop a comprehensive strategy for education of tribal children.

## **Conclusion**

The review helped the investigator to understand that the previous studies are mainly about the problems of dialect, content, language and the teacher training in the tribal schools. Lack of prerequisite related to class room activities for tribal students become silent members in the classroom. Realizing the fact that the tribal students still face many difficulties in a constructivist classroom, the investigator took up present study to develop culturally inclusive self learning module for tribal students from the biology text book in VIII<sup>th</sup> std.

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## **CHAPTER III**

# **METHODOLOGY**

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- ❖ Objectives of the Study
  - ❖ Tools Used for the Study
  - ❖ Sample Used for the Study
  - ❖ Data Collection Procedure
  - ❖ Statistical Techniques Used
  - ❖ Modules Developed
-

Methodology of research involves the procedure or technique adopted in research study. The success of research work largely depends up on the suitability of the method, the tools and techniques that the researcher follow to gather data. Hence methodology is vital importance in every research work. The study requires the collection of relevant data and statistical processing of collected data with a review to obtaining answers to the stated objectives.

The present study was titled, “construction of culturally inclusive self-learning module on biology for VIII<sup>th</sup> Standard Irula tribal students”.

Methodology of the study has been described under the following heads.

- A. Objective of the study.
- B. Tools used for the study
- C. Sample used for the study
- D. Data collection procedure
- E. Statistical techniques used
- F. Design of the study.
- G. Preparation of the module.
- H. Validity of the SLM

Each of the above has been described below in details.

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## **Objectives of the Study**

Major objectives of the study are;

1. To analyses the present curriculum on the basis of culturally inclusive approach on biology.
2. To identify the problems faced by Irula tribal students to learn biology.
3. To construct a culturally inclusive self-learning module on biology for VIII<sup>th</sup> standard Irula tribal students.

## **Tools Used for the Study**

The following tools are used for the present study:

1. Opinionnaire on culturally inclusive approach for Irula tribal students  
(Koya.H.M.P & Poornima .K, 2021)
  2. Opinionnaire on culturally inclusive approach for Teachers  
(Koya.H.M.P & Poornima. K, 2021)
  3. Construction of culturally inclusive Self-learning module (SLM) on biology for VIII<sup>th</sup> Standard Irula tribal students (Koya.H.M.P & Poornima.K, 2021)
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### **Description of Tools**

An opinionnaire for teachers and Irula tribal students were used for the study.

Best (1993) in his book “Research in Education” defines an opinionnaire as follows: “the information that forms attempt to measure the attitude or belief of an individual is known as an opinionnaire”.

For the construction of most valid and reliable tool, proper planning is essential. Hence the investigator made an extensive study in the educational status of tribal students. The investigator prepared separate opinionnaire for teachers and tribal students with almost care under the guidance of supervising teacher, with friends and teacher educators who have undergone B.Ed and M.Ed course and with teachers working in different schools.

### **Self Learning Module**

According to Malcom Knowles, self-learning is defined as: “a process by which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, and evaluating learning outcomes”.

Self-paced learning modules are useful for more than one purpose. For example, they can facilitate learning for individualized or self-paced instruction. They can also supplement traditional instruction in order to provide more thorough and/or additional training.

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Major steps for the construction of module are;

1. Title of the module
2. Introduction
3. Objectives
4. Activities
5. Conclusion
6. Task/ Assignment

### **Sample Used for the Study**

The sample was conducted on a representative sample of 30 secondary school Irula tribal students studied under different schools and 30 teachers worked under tribal schools. Total 60 sample.

#### **a) Opinionnaire on difficulty to teach biology for teachers worked under tribal schools.**

Opinionnaire on difficulty to teach biology for teachers worked under tribal schools Consists 25 items including 19 positive and 11negative statements. Examples for opinionnaire are lam not satisfied with the current SCERT text book.

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**b) Preparation of items**

A number of statements both positive and negative items were written consisting of difficulty of teachers to teach biology. The purpose of the opinionnaire was to understand the difficulty of teachers to teach biology. For example difficulty in illustration, explanation and transacting the content. The preparation of the items focused on the areas of learning, group activities, etc. The prepared statements were then discussed with supervising teacher for ensuring the relevant of each statement; it improves its language and removes ambiguity in wording.

**c) Opinionnaire on difficulty to learn biology for tribal students**

Opinionnaire on difficulty to learn biology for tribal students consists 25 items including 22 positive and 8 negative statements. Examples for opinionnaire are the terms used in the biology text book are not familiar to tribal students.

**d) Preparation of items**

A number of statements both positive and negative items were written consisting of problems faced by tribal students to learn biology. The purpose of the opinionnaire was to understand the difficulty of students to learn biology. For example difficulty to understand terms used in the biology text book and difficulty to understand cartoons in the text book etc. The prepared statements were then discussed with supervising teacher for ensuring the relevant of each statement; it improves its language and removes ambiguity in wording.

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Table 1.

*Breakup of the final sample of teachers*

<b>Sl. No.</b>	<b>Subject of Specialization</b>	<b>No. of Individuals</b>
1	Lady Teachers	17
2	Gents teachers	13
3	Total (N)	30

Table 2.

*Breakup of the final sample of students*

<b>Sl. No.</b>	<b>Subject of Specialization</b>	<b>No. of Individuals</b>
1	Students-boys	16
2	Students-girls	14
3	Total (N)	30

### **Data Collection Procedure**

As a first step, the investigator collected list of tribal schools .the investigator contacted the teacher educators and students individually and explained the nature and confidentiality of the study and made items convinced. Then copies of opinionnaire were given for students and collected back and collected the response from teachers through Google form. The investigator collected the data about the opinion of teachers worked under tribal schools on difficulty to teach biology and opinion of tribal students on difficulty to learn biology who are studying in various schools.

Further self-learning module will be developed by the investigator and collect feedback from teachers then SLM will be administered to SCERT biology expert teachers.

### **Scoring and Consolidation of the Data**

Separate opinionnaire were prepared and supplied to teachers and students. The score sheet was prepared in a mode of two point scale (agree &disagree) and hence each teacher educator and students can mark his/her responses according their choice. The final forms of (English version) opinionnaire are given as appendix.

### **Statistical Techniques Used**

Analysis of the collected data and its interpretation can be done only with the help of statistical technique .the major statistical technique used for analyzing the data is percentage analysis

### **Design of the culturally inclusive Self learning module**

The investigator prepared 11 modules under the following structure.

- ❖ Learning outcomes
  - ❖ Introduction.
  - ❖ Content.
  - ❖ Learning activities
-



- ❖ Self assessment.
- ❖ Follow- up activities
- ❖ Summary.

### **Learning Outcomes**

This is intended to give the learning outcomes of each topic. How the selected topic could be converted into irula tribal terms that will be the basis for setting the learning outcomes. For example the tribal term used for pisciculture is **thenkunni vivasayam**. Through this module the students achieve different cognitive learning skills such as remembering, understanding, applying, analyzing, evaluating, and creating. To make the classroom environment more culturally inclusive.

### **Introduction**

Here specific direction is given to the students about how to approach the topic and hints regarding the activities involved and the strategies presented.

### **Content**

The content part is the investigation of text content and the related activities. Along with a brief explanation of the key points, the process of integration of tribal terms and activities is also illustrated. The normal content is different from artificial module, normal content is based on non indigenous context but the artificial module is based on the indigenous context. For example

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the tribal terms used for vanam is **kadu**. The tribal terms used in each module is highlighted as bold.

### **Follow –up Activities**

It describes the follow up activities, which will again give feedback and scope for other activities that the student can adopt.

### **Self Assessment**

It is a feed back for the students. By reflecting on these questions, the student could understand whether they have assimilated the terms presented.

### **Summary**

Summary is the sum-up of the module in brief. Hence the realization of the objectives set for each module is established and the relevance of the evaluation activities also is emphasized.

### **Validity of the SLM**

For this study Face validity is established

According to Ellen Johnson Face validity refers to the extent to which a test appears to measure what it is intended to measure. A test in which most people would agree that the test items appear to measure what the test is intended to measure would have strong face validity. For example, a mathematical test consisting of problems in which the test taker has to add and subtract numbers

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may be considered to have strong face validity. The test items appear, at face value, to measure what one is seeking to measure.

The SLM was sent to expert in the teaching field for analyzing and collecting feedback. They have analyzed this SLM and suggested some recommendations on the basis of recommendations investigator prepare SLM.

### **Preparation of the Module**

This module involves the following sections:

List of main topics and sub topics

#### **Process**

The investigator prepared module for the Irula tribal students on linguistic perspective of the tribal's.

The steps followed by the investigator to develop the module are given below.

1. From the review the investigator identified the existing curriculum does not cater the cultural-linguistic context of the tribal.
  2. The need to develop module based on the tribals prerequisite was identified.
  3. Analyzed the biology text book and hand book of VIII<sup>th</sup> standard.
  4. Select two chapters from the biology text book
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5. The content is then divided into small topics suited for the module.
6. Strategies are developed to suit the prerequisites of irula tribal people.
7. Preparation of modules based on different topics.

**Topic identified from VIII<sup>th</sup> standard biology source book**

**Topic 1: Biotic abiotic factors/ components of ecosystem**

**Subtopics**

- 1) Biotic factors
- 2) A biotic factors
- 3) Biosphere
- 4) Ecosystem

**Topic 2: tropic level**

**Sub topics**

- 1) Producers
- 2) Consumers'
- 3) Product
- 4) Primary consumers
- 5) Secondary consumers
- 6) tertiary consumers

**Topic 3: food chain and food web**

**Sub topics**

- 1) food chain
  - 2) food web
  - 3) deference between food chain and food web
-

**Topic 4: Ecological interaction**

**Sub topics**

- 1) predation
- 2) parasitism
- 3) competition
- 4) mutualism
- 5) commensalism

**Topic 5: divers' ecosystem**

**Subtopics**

- 1) Forest
- 2) Ocean
- 3) Tundra
- 4) Wetland
- 5) Grass land
- 6) Desert

**Topic 6: In situ conservation**

**Sub topics**

- 1) Wild life sanctuary
- 2) Community reserve
- 3) Biosphere reserves

**Topic 7: ex-situ conservation**

**Subtopics**

- 1) Zoo logical garden
  - 2) Botanical garden
-

- 3) Gene bank

**Topic 8: crises in the agricultural sector**

**Subtopics**

- 1) Crop loss
- 2) Lack of space
- 3) Environmental destruction and health issues
- 4) Exploitation by middle men
- 5) Climate change
- 6) Fall in price
- 7) Cost of production

**Topic 9: microbes that provide fertilizers**

**Subtopics**

- 1) Microbial fertilizers

**Topic 10: integrated pest management**

- 1) Integrated pest management

**Topic 11: waste management and sustainable agriculture**

**Subtopics**

- 1) Composting
- 2) Biogas production
- 3) Poultry folder production
- 4) Production of fish feed

**Topic 12: Reaping diversity**

**Subtopics**

- 1) Live stock management
-

- 2) Poultry farming
- 3) Sericulture
- 4) Pisciculture
- 5) Floriculture
- 6) Apiculture
- 7) Cuniculture
- 8) Mushroom culture
- 9) Horticulture

**Topic 13: New Technology based farming**

**Subtopics**

- 1) Poly house farming
- 2) Precision farming
- 3) Terrace cultivation
- 4) Grow bag cultivation
- 5) Vertical farming

**Topic 14: cultivation without soil**

**Subtopics**

- 1) Hydroponics
  - 2) Aeroponics
-

## **Modules Developed**

According to Husen (1985), “A module is a set of experiences designed to facilitate the learners demonstration of specified objectives”

A module contained the following elements:

- ❖ Learning outcomes
- ❖ Introduction.
- ❖ Content.
- ❖ Learning activities
- ❖ Self assessment.
- ❖ Follow-up activities
- ❖ Summary.

A module usually stands for a sub part or sub system of the instructional programme, it may include a series of activities like reading a book, watching film, discussion in group, working in laboratory, writing some assignments etc.

### **Module -1**

#### **Topic: Components of Ecosystem**

##### **Learning Outcomes**

- ❖ Present the diagrammatic picture of an ecosystem
  - ❖ Students write what is seen in the picture in their own native language.
  - ❖ Student develop positive attitude towards ecosystem
-



- ❖ To familiarize indigenous terms and examples.
- ❖ To make the classroom environment more culturally inclusive

### **Introduction**

This module is designed for familiarizing components of an ecosystem and also biosphere and ecosystem.

### **Content**

There are two components of ecosystem biotic and abiotic factors. Abiotic factors are also essential for the existence of the living world which comprises of animal, plant and microorganisms.

Abiotic factors-sunlight, air, water, soil

### **Activity 1**

Presents a picture of an ecosystem in the classroom and students to write what are seen in the picture in their native languages.

### **Activity 2**

Students divide the whole classes into small groups and list the components of an ecosystem into living things and nonliving things.

For Example: Living things- Plant, birds etc.

Non living things - Soil etc.

The equivalent indigenous terms are provided below

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Ajeeviya gadakangal- **mannu,vayu,surya oli**

Geevamandalam (Geevamandalam)

It is the part of earth where life exists. It extends to soil, atmosphere and water.

Ecology

Ecology is the study of interaction between organisms and also between organisms and their surroundings. These branches of study include different types of ecosystems, interaction between organisms, environmental protection.

**Self assessment:**

Discuss how are a biotic factors are useful to biotic factors

**Follow-up activities**

Write more examples for biotic and a biotic factors.

**Summary**

This module present following points

- ❖ Components of ecosystem
  - ❖ Abiotic and biotic components
-

## **Module-2**

### **Topic: Food chain and food web**

#### **Learning Outcomes**

- ❖ To establish the importance of food chain and food web in an ecosystem.
- ❖ To familiarize the tribal terms used for food chain and food web.
- ❖ Students develop positive attitude towards an ecosystem.
- ❖ To make the classroom environment more culturally inclusive
- ❖ To familiarize indigenous terms and examples.

#### **Introduction**

This module describes food chain, food web and various trophic levels in food web.

#### **Content**

Food chain: A food chain is a linear network of links in a food web starting from producer organisms and ending at predator species. Each level of a food chain represents a different trophic level. Food web is the natural interconnection of food chain. Sun is the primary source of energy in the living world. Green plant convert light energy to chemical energy thorough photosynthesis. This energy gets transferred to other organisms through food chain.

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### **Producers**

Plants that perform photosynthesis are called producers while organisms that depend on plants directly or indirectly for food are called consumers.

### **Primary consumers**

The consumers that directly depend on plants are called primary consumers.

### **Secondary consumers**

Organisms that feed on primary consumers are called secondary consumers.

### **Tertiary consumers**

Organisms that feed on secondary consumers are called tertiary consumers.

Tertiary consumers-Eagle, Snake

Secondary consumers-Frog, Calotes

Primary consumers-Grass hopper, Rabbit

Producers-paddy, Grass

### **Activity I**

Show the video clipping of food chain and food web and students to tell about what are seen in this video clips by using their tribal languages. Students in

---

groups draw flowchart based on the predation of food chain .Give explanation about food chain and food web.

## **Activity II**

An incomplete diagram of various trophic level is given and students to complete the diagram by using their tribal terms.

The equivalent indigenous terms are provided below

Green plants convert light energy to chemical energy through photosynthesis. This energy gets transferred to other organisms through food chain. Plants that perform photosynthesis are called **Undakkukavar** while organisms that depend on plants directly or indirectly for food are called **Thingavar**. The consumers that directly depend on plants are called **Onnamath thingavar**. Organisms that feed on primary consumers are called **randamath thingavar**. Organisms that feed on secondary consumers are called **munnamath thingavar**.

**munnamath thingavar- Othy (Eagle), Pampu (Snake),**

**randamath thingavar- kappe (frog), paru (Calotes)**

**Onnamath thingavar- Mutry (Grass Hopper), masal (Rabbit)**

**Undakkukavar- pullu (Grass).**

## **Self Assessment**

Discuss the important of food web in an ecosystem.

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### **Follow up Activities**

Find out more examples for food chain and write various trophic levels of organisms in the food chain.

### **Summery**

Though this module present the following points

- ❖ Food chain and food web
- ❖ Various trophic levels.

## **Module -3**

### **Topic: Ecological interactions**

### **Learning Outcomes**

- ❖ To make learner recognize to the ecological interactions.
  - ❖ To enable the learner realize the important of the ecological interactions in an ecosystem.
  - ❖ To familiarize the tribal terms for predation, parasitism, competition, mutualism and commensalism.
  - ❖ To make the classroom environment more culturally inclusive
  - ❖ To familiarize indigenous terms and examples.
-

## Introduction

This module describes the type of ecological interactions and also describes the tribal terms used for each type. Create an awareness among the students about the importance of an ecological interaction.

## Content



Deer and tiger



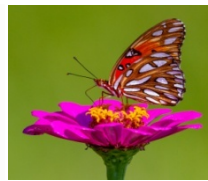
Mango tree and vanda



Mango tree and loranthus



Paddy and weeds



Flower and butterfly

## Predation

Beneficial to one but harmful to the other. Prey becomes the food of the predator. E.g. - Paddy and weeds

## Parasitism

Beneficial to one and harmful to the other. The parasite depends on the host for nutrition. Eg- Mango tree & Loranthus

---

### **Competition**

Harmful to both in the beginning. Then beneficial to the one who wins.

### **Mutualism**

Beneficial to both the organisms. Eg- Flower and butterfly

### **Commensalism**

Beneficial to one and is neither beneficial nor harmful to the other.  
Eg-Mango tree and Vanda.

There are many interactions in nature that we do not see or realize. These interactions maintain the balance and stability of the ecosystems. Food relations are visible instances of interaction among organisms. The ecosystem becomes more stable as the diversity of ecological interactions and abiotic factors increases.

### **Activity I**

Students divide the whole classes into small groups. Give the picture of different ecological interactions for each group. Then students write what are seen in the picture by using their tribal terms. Point outs there are many interactions in nature that we do not see or realize. These interactions maintain the balance and the stability of the ecosystems.

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## Activity II

Shows an incomplete chart of ecological interactions and students complete the incomplete chart, and then explain the content by using tribal terms.

The equivalent indigenous terms are given below

### Irapidutham

Beneficial to one but harmful to the other. Prey becomes the food of the predator. Eg-Deer (**man**) and tiger (**puli**)

### Paradhajeevanam

Beneficial to one and harmful to the other. The parasite depends on the host for nutrition. Eg- Mavu(**mangai maram**) & Ithilkkanni (**ottukodi**)

### malsaram (potti)

Harmful to both in the beginning. Then beneficial to the one who wins. Eg- cheetah (**seethe puli**) and simham (**singa**)

### Mutualism

Beneficial to both the organisms. Eg-pashu (**madu**) and kakka(**kakke**).

### Commensalism

Beneficial to one and is neither beneficial nor harmful to the other. Eg- mavu (**mangai maram**) and maravazha.(**kallu vale**).

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### **Self Assessment**

Discuss the importance of ecological interactions in our ecosystem.

### **Follow up activities**

Collect different examples for ecological interactions and write tribal terms used for it.

### **Summary**

Through this module present the following points.

- ❖ Different ecological interactions
- ❖ Importance of ecological interactions in an ecosystem.

## **Module 4**

### **Topic: Different Types of Ecosystems**

#### **Learning Outcomes**

- ❖ To become aware of the different ecosystems through a comparison of the tribal terms used for each ecosystems.
  - ❖ To understand the importance of biodiversities
  - ❖ Learner develop positive attitude towards an ecosystem
  - ❖ To make the classroom environment more culturally inclusive
  - ❖ To familiarize indigenous terms and examples.
-

## **Introduction**

This module describes different types of ecosystems and biodiversities. Explain the tribal terms used for each ecosystem and also the importance of biodiversities.

## **Content**

The ecosystem becomes more stable as diversity of ecological interactions and abiotic factors increases. There are diverse ecosystems these are forest, ocean, grass land, tundra, wetland, and desert.

## **Biodiversity**

Biodiversity includes all the diverse organisms that inhabit the earth along with their ecosystems. Biodiversity includes various levels like ecosystem diversity, species diversity and genetic diversity. This term which denotes the richness of the biosphere was first used by a British environmentalist, Walter. G. Rosen in 1985.

## **Importance of biodiversity**

- ❖ Availability of essential materials - Food, Medicine, Fuels, Construction materials.
  - ❖ Ecological Services - Soil formation, Prevention of soil erosion, O<sub>2</sub> - CO<sub>2</sub> balance , Availability of fresh water , Control of flood , Climate control.
-

- ❖ Auxiliary Services - Nutrient cycling, Pollination, Biological control, Seed dispersal.
- ❖ Cultural Services -Aesthetics ,Recreation , Study ,Rituals and their practice

### **Activity I**

Showing the video clip of different ecosystems. The students tell the name of each ecosystem by using their tribal terms and write the animals found in each ecosystem. Give the explanation for ecosystems and biodiversities.

### **Activity II**

Students write what are the benefits of conserving the biodiversity and what are the services provided by biodiversity.

The equivalent indigenous terms are given below

### **Divers ecosystems**

- ❖ vanam (**kadu**)
  - ❖ samudram (**kadal**)
  - ❖ pulmedu(**pullu medu**)
  - ❖ Tundra
  - ❖ thanneerthadam(**thanni thada**)
  - ❖ maruboomi (**maruboomi**)
-

### **Importance of biodiversity**

- ❖ Availability of essential materials- bakshanam(**choru**) marunnu(**marunth**)  
Fuels, Construction materials.
- ❖ Ecological Services - sudhajala labyatha(**suthamana thanni**)
- ❖ Auxiliary Services - Nutrient cycling, Pollination, Biological control,  
vithuvitharanam (**vethe vitharanam**)
- ❖ Cultural Services -Aesthetics, Recreation, Study, achara anushtanangal  
(**kalacharam**).

### **Self Assessment**

Collect the pictures of different ecosystems and list out the organisms found there.

### **Follow up activities**

Discuss the need for conserving biodiversity.

### **Summary**

Present the following points through this module.

- ❖ Different ecosystems
  - ❖ Biodiversities
  - ❖ Benefits of conserving biodiversity.
-

## **Module 5**

### **Topic: Lost Links**

#### **Learning Outcomes**

- ❖ To make learner aware about the lost species.
- ❖ To make learner recognize what are the reason for species extinction.
- ❖ To make positive attitude towards animals.
- ❖ To aware about protection of an ecosystem.
- ❖ To make the classroom environment more culturally inclusive
- ❖ To familiarize indigenous terms and examples.

#### **Introduction**

This module describes what the lost species in our earth are. Create awareness among the students about the reason for species extinction.

#### **Content**

Dodo, a kind of flightless bird, was common in the island of Mauritius. Other species which have become extinct include passenger pigeons which flew in lakhs along the North American skies and the Quagga, a wild zebra variety from the southern part of Africa. Examples for some extinct species are passenger pigeon, quagga etc.

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There are many organisms on the verge of extinction due to several reasons. Some examples are given below.



Saraca indica (Ashoka tree )



Nilgiri Tahr



Malabar hornbill



Maramanjil (Tree Turmeric)



Lion-tailed macaque

### Activity I

Showing the picture of some extinct species and students write the tribal names used for the species and reasons for extinction.

The equivalent indigenous terms are given below

Some of the examples for extinct species (**Nasith pona jeevika**)

- ❖ Dodo
- ❖ Sanjari pravu (**pravu**)
- ❖ Quagga (**zeebra**)

Some of the organisms on the verge of extinction are

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Ashoka maram ( **ashoka maram**)

Malabar veruk

**varayadu (vareyadu)**

Simhavalan kurangu (**singavalan korangu**)

Malamuzhakki vezhambal

Maramanjil (**melaimanja**).

### **The reason for species extinction**

- ❖ Destruction of ecosystems

### **Self Assessment**

Discuss the importance of protecting the biodiversity and the organisms on the verge of extinction.

### **Follow up activities**

Collect the picture of different organisms on the verge of extinction and list out the tribal terms used for each organism. And also prepare an album

### **Summary**

Through this module presents the following points

- ❖ Examples for lost links.
  - ❖ The reason for species extinction.
-



## **Module 6**

### **Topic: in-situ and ex-situ conservation**

#### **Learning Outcomes**

- ❖ To make awareness about: in-situ and ex-situ conservation.
- ❖ To familiarize the tribal terms used for each in-situ and ex-situ conservation.
- ❖ To make positive attitude toward animals.
- ❖ To make the classroom environment more culturally inclusive.
- ❖ To familiarize indigenous terms and examples.

#### **Introduction**

This module describes the in-situ and ex-situ conservations. Familiarize the tribal terms used for each in- situ and ex-situ conservation.

#### **Content**

##### **In-situ conservations**

###### ❖ **Wild Life Sanctuary**

These are forest areas declared as protected areas to prevent the extinction of wild lives by protecting the ecosystem. Peppara, Periyar, Wayanad etc., are examples of wild life sanctuaries in Kerala.

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❖ **National Parks**

National Parks are designed to protect wild lives along with the protection of historical monuments, natural resources and geographical features of an area. Eravikulam, Silent Valley, Anamudi Shola, Mathikettan Shola and Pambadum Shola are the national parks in Kerala.

❖ **Community Reserves**

Community reserves are areas protected with the participation of the public. These are ecologically important places located in populated areas. The Kadalundi Community Reserve spread over the districts of Malappuram and Kozhikode is an example.

❖ **Biosphere reserves**

These are vast regions designed with an aim to protect world's important ecosystems, biodiversity and genetic resources. Biosphere reserves like the Nilgiris and Agasthyarkoodam include areas belonging to Kerala too.

❖ **Sacred groves**

These are small areas of biodiversity protected in regions inhabited by human beings. Due to changes in life style many of these which were highly bio-rich have been destroyed. Only a few are remaining now. Sacred groves play an important role in the conservation of water in the region too.

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❖ **Ecological hotspots**

Ecological hotspots are areas rich in endemic species but facing the threat of habitat destruction. Each hotspot is ecologically a very important area of biodiversity. Out of the 34 hotspots all over the world, 3 of them are in India. They are the Western Ghats, North-Eastern Himalayas and the Indo-Burma region.

**Ex-situ conservation**

❖ **Zoological gardens**

Zoological gardens are conservation centres where different varieties of animals are protected and housed separately and where necessary arrangements are made available for their reproduction. They also function as conservation centre's of organisms which have become extinct in wild. There are zoological gardens at Thiruvananthapuram and Thrissur in Kerala.



❖ **Botanical gardens**

These are wide research centres where rare and important plants of diverse species are protected. We can identify many plants and get more information about them by visiting a botanical garden. Jawaharlal Nehru Tropical Botanical Garden and Research Institute (JNTBGRI) at Palode in

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Thiruvananthapuram and Malabar Botanical Garden (MBG) at Olavanna in Kozhikode are examples.



### ❖ Gene Banks

These are research centres with facilities to collect seeds and gametes to preserve them for a long time. Organisms can be recreated out of them whenever required. Rajiv Gandhi Centre for Biotechnology at Thiruvananthapuram is an example.

### Activity I

Showing the video clip of in-situ conservations and ask to the students tell the name of each in- situ conservations by using their tribal terms. Students write the animal's found in each in-situ conservations. Explain in-situ conservation.

### Activity II

Showing the video clip of ex-situ conservations ask to the students tell the name of each in- situ conservations by using their tribal terms. Students write the animal's found in each ex-situ conservations. Explain ex-situ conservation.

The equivalent indigenous terms are given below

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### **In-situ Conservations**

- ❖ Wild Life Sanctuary
- ❖ National Parks
- ❖ Community Reserves
- ❖ Sacred groves
- ❖ Ecological hotspots

Animal found in situ conservations

Ana (**Ane**), varayadu (**vareyadu**), simhavalan kurangu (**singavalan korangu**) etc.

### **Ex-situ conservations**

- ❖ Zoological gardens
- ❖ Botanical gardenukal (**poonthotam**)
- ❖ Gene Banks

### **Self Assessment**

Collect the picture of in-situ conservations and list out the organisms found there.

### **Follow up activities**

Discuss the need for conserving In-situ and Ex-situ conservations.

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Collect the pictures of in-situ and ex-situ conservations and make an album.

### **Summary**

Presents the following points through this module

#### **In-situ conservations**

- ❖ Wild Life Sanctuary
- ❖ National Parks
- ❖ Community Reserves
- ❖ Sacred groves
- ❖ Ecological hotspots

#### **Ex-situ conservations**

- ❖ Zoological gardens
  - ❖ Botanical gardens
  - ❖ Gene Banks
-

## **Module 7**

### **Topic: Crises in the agricultural sector**

#### **Learning Outcomes**

- ❖ To make learner awareness about the Crises in the agricultural sector.
- ❖ To enable the learner realize what are the obstacles faced by farmers today.
- ❖ To familiarize tribal terms for each Crises in the agricultural sector.
- ❖ To make positive attitude towards agriculture.
- ❖ To make the classroom environment more culturally inclusive.

#### **Introduction**

This module describes the obstacles faced by farmers today and also describes the tribal terms used for each Crisis in the agricultural sector. create an awareness about it.

#### **Content**

##### **Crises in the agricultural sector**

- ❖ fall in price
  - ❖ crop loss
  - ❖ environmental destruction and health issues climate change
-

- ❖ lack of space
- ❖ cost of production

### **Activity I**

The students write about what the obstacles faced by farmers today. Each student group list out the obstacles faced by farmers by using tribal terms.

The equivalent indigenous terms are given below

### **Crises in the Agricultural Sector**

- ❖ vilanashtam (**velenashtam**)
- ❖ crop loss(**vellame nashta**)
- ❖ environmental destruction and health issues climate change
- ❖ Sthala parimithy (**Adaprashna**)
- ❖ Ulpadhana chilavu (**undakuka selavu**)

### **Self Assessment**

Examine the possibilities to overcome the issues of farmers.

### **Follow up activities**

List out more obstacles faced by farmers.

---



## **Summary**

Presents the following points through this module.

Obstacles faced by farmers:

- ❖ fall in price
- ❖ crop loss
- ❖ environmental destruction and health issues climate change
- ❖ lack of space
- ❖ cost of production

## **Module 8**

### **Topic: Integrated Pest Management-IPM**

#### **Learning out comes**

- ❖ To make the learner realize the importance of the Integrated Pest Management.
  - ❖ To make the learner realize the advantages of Integrated Pest Management.
  - ❖ To familiarize the tribal terms used for Integrated Pest Management
  - ❖ To make the classroom environment more culturally inclusive
-

## **Introduction**

This module intended to understand the importance of Integrated Pest Management and the advantages of Integrated Pest Management.

## **Content**

### Integrated Pest Management-IPM

The basic principle of Integrated Pest Management is not the destruction of pests totally. Instead it tries to prevent the multiplication of pests and to limit their number without loss of crop. This eco friendly method ensures pest control without disturbing the environment. This is done by reducing the use of chemical pesticides and encouraging the application of biopesticides, natural enemies of pests, mechanical pest control etc.

## **Activity I**

Start the lesson asking about how to control the pest in farm.

Different groups list out the points.

## **Activity II**

Show the video clip of integrated pest management. Ask the students to write the advantages of Integrated Pest Management.

The equivalent indigenous terms are given below

Integrated Pest Management-IPM

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The basic principle of Integrated Pest (**poochi**) Management is not the destruction of pests totally. Instead it tries to prevent the multiplication of pests and to limit their number without loss of crop. This eco friendly method ensures pest control without disturbing the environment. This is done by reducing the use of chemical pesticides and encouraging the application of biopesticides, natural enemies of pests, mechanical pest control etc.

### **Self Assessment**

List out different measures for Integrated Pest Management.

### **Follow up activities**

Examine the extent of benefits of Integrated Pest Management for future.

### **Summary**

The points described in this module are integrated pest management, the advantages of integrated pest management

## **Module 9**

### **Topic: Reaping diversity**

#### **Learning Outcome**

- ❖ To familiarize with a few farming methods that can be chosen on the basis of their nature and scope.
  - ❖ To make positive attitude towards agriculture.
  - ❖ To familiarize the tribal terms used for farming methods.
  - ❖ To make the classroom environment more culturally inclusive
-

## **Introduction**

This module aim to understand the concept different farming methods such as Livestock management, Poultry farming, Sericulture, Pisciculture, Floriculture, Apiculture, Cuniculture, Mushroom culture, Horticulture, and Medicinal plant cultivation.

## **Content**

### **Livestock management**

Rearing cattle for milk, meat and agricultural purposes. Important varieties of cattle Cow : Jersey, Holstein Friesian, Vechoor Buffalo : Murrah, Niliravi, Bhadawari Goat : Thalassery, Jamnapari, Boer.

### **Poultry farming**

Rearing birds for egg and meat. Chicken varieties: Athulya, Gramalekshmi, White Leghorn Duck varieties : Muscovy, Chara, Chemballi Quill varieties : Japanese, Bob white.

### **Sericulture**

Rearing silkworms for the production of natural silk is called sericulture. Silk is formed from the special glands of the larvae of the silk moth. Mulberry silkworm, Tussar silkworm, Muga silkworm etc., are the major varieties

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### **Pisciculture**

The scientific way of rearing fish in natural water bodies, paddy fields or artificial tanks, is pisciculture. Varieties such as Pearl spot, Rohu, Catla etc., are reared for food and Gold fish, Guppy etc., are reared for ornamental purposes. Important prawn varieties reared are Naran, Kara etc.

### **Floriculture**

Cultivation of flowering plants on a commercial basis. Jasmine, Marigold, Chrysanthemum, Rose, Orchid, Anthurium etc., are flowers of commercial demand.

### **Apiculture**

Scientific rearing of honey bees. Honey is a product of medicinal and nutritional value. Varieties of honey bees like Kolan, Mellifera, Njodiyan etc., are reared commonly.

### **Cuniculture**

Scientific way of rearing of rabbits. Varieties like Grey giant, White giant etc., are reared for meat. Ankora is reared for fur.

### **Mashroom Culture**

Scientific way of growing mushroom. Mushroom is a nutritious and tasty food item. Button mushroom (Palkoon), Oyster mushroom (Chippikoon) etc., are commonly cultivated mushroom varieties.

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## **Horticulture**

Scientific cultivation of fruits and vegetables. Besides indigenous varieties, exotic varieties like Litchi, Rambutan, Durian etc., are cultivated in our land.

## **Medicinal plant cultivation**

The Indian system of medicine 'Ayurveda' exists completely depending on medicinal plants. The popularity of Ayurveda and the destruction of natural ecosystems have raised the importance of medicinal plant cultivation. Basil, Aloe, Neem, Adathoda, Sida (Kurunthotti), Vettivera (Ramacham), Aegle marmelos (Koovalam), Plumbago (Koduveli) etc., can be grown in crop fields.

## **Activity I**

Write the different types of farming methods in your place and write what are the tribal terms used for each farming methods. Showing the video clips of few farming methods and ask students to tell their local name used for each farming method.

## **Activity II**

Provides an incomplete chart of few farming methods and asks students to complete the chart.

The equivalent indigenous terms are given below

- ❖ Kannukali paripalanam (**madu valarth**)
-

- ❖ Pakshi paripalanam (**paravei valarth**)
- ❖ Sericulture (**pattu nool puzhu valarth**)
- ❖ Pisciculture(**meen valarrth**)
- ❖ Floriculture(**poovu valarth**)
- ❖ Apiculture(**then kunni valarth**)
- ❖ Cuniculture (**masal valath**)
- ❖ Horticulture (**kai kari vellame**)
- ❖ Mushroom culture (**kika vellame**)

### **Medicinal plant cultivation (marunth mara valarth)**

The Indian system of medicine ‘Ayurveda’ exists completely depending on medicinal plants. The popularity of Ayurveda and the destruction of natural ecosystems have raised the importance of medicinal plant cultivation. Thulasi (**tholusi**), katarvazha (**sothukathala**), vep (**veppa maram**), Adalodakam(**velikkonne**), kurunthotty (**maaru chedi**), Ramacham (Ramacham), koovalam (Koovalam), koduveli (Koduveli) etc., can be grown in crop fields.

### **Self assessment**

Collect the picture of different farming methods

### **Follow up activities**

List out the products of each farming method

Collect the picture of each farming methods and prepare an album.

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## **Summary**

The points described in this module are different farming methods and the local names used for each farming methods such as Livestock management, Poultry farming, Sericulture, Pisciculture, Floriculture, Apiculture, Cuniculture, Horticulture, Mushroom.

## **Module 10**

### **Topic: New Farming Techniques**

#### **Learning Outcomes**

- ❖ To make learner familiarize with some new farming techniques.
- ❖ To familiarize the tribal terms used for each farming techniques.
- ❖ To make positive attitude towards farming.
- ❖ To make the classroom environment more culturally inclusive

#### **Introduction**

This module aims to understand Climate change is another important crisis in the agricultural sector. The unpredictable climate adversely affects traditional farming methods. Some of the new farming techniques that are used to overcome these challenges. And also the tribal terms used for the farming techniques.

#### **Contents**

Polyhouse Farming: Polyhouse is a special kind of arrangement in which a crop field is completely or partially covered by transparent polyethene sheets.

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Since the temperature and moisture in the polyhouse is constantly regulated, growth of plants becomes rapid. Nutrients are dissolved in water and are supplied on plants through drip irrigation. Pest infestation will also be less because the sides of the polyhouse are covered with net. Although the expense is high in the beginning, crop yield is many times greater than that of the regular field. Precision Farming: In this method of farming, the nature of soil, quantity of elements in the soil, pH value of soil, presence of water etc., in the crop field are tested using modern technology, and appropriate crops are selected for cultivation. By covering the soil using polythene sheet, we can effectively control weeds and also limit irrigation.

### **Activity I**

Starts the module talking about the crisis in the agricultural sector and asks students to write what are the new farming techniques that are used to overcome these challenges, brief description about that farming and also write the local terms used for the farming techniques.

### **Activity II**

Showing the video clip of some of the new farming techniques and students to write the local names used for each farming methods.

The equivalent tribal terms are given below

Polyhouse Farming :(Nelsary **vivasaya**) Polyhouse is a special kind of arrangement in which a crop field(**vivasaya ada**) is completely or partially covered by transparent polyethene sheets (**tar payi**). Since the temperature

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(**choodu**) and moisture (**nanavu**) in the polyhouse is constantly regulated, growth of plants (**chedi**) becomes rapid. Nutrients are dissolved in water (**thanni**) and are supplied on plants through drip irrigation. Pest infestation will also be less because the sides of the polyhouse are covered with net (**vele**). Although the expense is high in the beginning, crop yield is many times greater than that of the regular field. Precision Farming (**thattu vivasaya**): In this method of farming, the nature of soil, quantity of elements in the soil, pH value of soil, presence of water etc., in the crop field are tested using modern technology, and appropriate crops are selected for cultivation. By covering the soil using polythene sheet, we can effectively control weeds (**kalei**) and also limit irrigation.

### **Self assessment**

Discuss what the advantages of adopting modern agricultural practices are.

### **Follow up activities**

Conduct a field visit to the nearest Polyhouse Farming and Precision Farming and find out the methods used for that farming.

### **Summary**

The main points included in this module are Polyhouse Farming and Precision Farming.

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## **Module 11**

### **Topic: the farming methods without soil**

#### **Learning Outcomes**

- ❖ To make learner familiarize with some new farming techniques without soil
- ❖ To familiarize the tribal terms used for each farming techniques.
- ❖ To make positive attitude towards farming.
- ❖ To make awareness about the importance of new framing techniques.
- ❖ To make the classroom environment more culturally inclusive

#### **Introduction**

This module is intended to understand the Science has proved that cultivation is possible in the absence of soil, the farming methods to overcome the obstacles in lack of space ,availability of seed , ignorance of nurturing And also to familiarize the tribal terms used for the farming methods.

#### **Content**

Hydroponics: In hydroponics, plants are grown in nutrient solution. In aeroponics, plants are grown in such a way that their roots grow into air and nutrients are sprayed directly, on roots. Terrace cultivation, Grow bag cultivation, Vertical farming.

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## **Activity I**

Starts the module by asking about can grow the plants without soil. Write a brief description of their view points about it. And write how to overcome the obstacles such as lack of space, availability of seed, and ignorance of nurturing.

The equivalent indigenous terms are given below

Hydroponics: In hydroponics, plants are grown in nutrient solution (**vala thanni**). In aeroponics, plants are grown in such a way that their roots grow into air and nutrients (**vala**) are sprayed directly, on roots. Terrace cultivation (**odu vivasaya**), Grow bag cultivation, Vertical farming.

## **Self assessment**

What are the advantages of hydroponics.

## **Follow up activities**

Discuss about how are modern agricultural practices helpful in reducing crop loss due to climate change.

## **Summary**

Through this module the following points are present

- ❖ Hydroponics
  - ❖ Aeroponics,
  - ❖ Terrace cultivation
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- ❖ Grow bag cultivation
  
- ❖ Vertical farming.

The total structure of the module is given in appendix

## **CHAPTER IV**

# **ANALYSIS AND INTERPRETATION OF DATA**

- 
- ❖ Objective of the Study
  - ❖ Analysis and Interpretation
-

## **ANALYSIS AND INTERPRETATION OF DATA**

This chapter includes the analysis and interpretation of the collected data on the basis of objectives of the study. Any module developed will be meaningful if only it analyze the purpose for which it was designed. To have a clear picture of the study, the objective setup for the study is restated below.

### **Objectives**

1. To analyses the present curriculum on the basis of culturally inclusive approach on biology.
2. To construct a culturally inclusive self-learning module on biology for VIII STD Irula tribal students.
3. To identify the problems faced by Irula tribal students to learn biology.

### **Major Analysis**

The analysis of the data and conclusion of results are presented under 3 dimensions. They are

- a. Analysis of the response of students regarding difficulties to learn biology
- b. Analysis of the response of teachers regarding difficulties in teaching
- c. Analysis of the module developed

For analyzing the data, the statistical technique namely percentage analysis is used.

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**a) Analysis of the Response OF Students Regarding Difficulties TO Learn Biology**

Analysis of the response of students regarding difficulties to learn biology is quantitatively scored and presented below as table -3

Table. 3

*Response of Students and Percentage Regarding Difficulties to Learn Biology*

<b>Question No:</b>	<b>Question</b>	<b>No: of agree</b>	<b>%</b>	<b>No: of disagree</b>	<b>%</b>
1	I feel difficult to understand terms used in the biology textbook.	27	90	3	10
2	Tribal students are not familiar with the examples provided in the SCERT text book.	27	90	3	10
7	In my opinion the teachers teaching examples only included in the SCERT textbook.	21	70	9	30
8	I feel difficult learning biology.	11	36.6	19	63.3
9	I feel that content of the biology text book must be simplified.	28	93.3	2	6.66
10	I am able to participate effectively in group activities.	16	53.3	14	46.66
11	The terms used in the text book are familiar to me.	13	43.3	17	56.6
12	I feel difficult to comprehend the pictures given in the text.	17	56.66	13	43.33
13	In my opinion the follow up activities suitable to our locality resources.	6	20	24	80
14	I am satisfied with the current SCERT textbook.	4	13.33	26	86.66
15	In my opinion the teaching emphasize process skills in science.	14	46.66	16	53.33
16	The teachers conduct the same experiments in the text.	28	93.33	2	6.66
20	The teachers criticize the local languages used by tribal students in the science class.	14	46	16	53.33
21	Tribal students are unable to fully	24	80	6	20



	comprehend classroom teaching and activities.				
22	I conduct science experiments at home with local materials.	5	16.66	25	83.33
23	I conduct cultural programmes in our classroom.	15	50	15	50
24	In my opinion the teachers encourage cultural programmes in the classroom.	21	70	9	30
25	In my opinion there is a need of community teachers in schools.	28	93.33	2	6.66
3	I feel difficult to follow in the class room.	25	83.33	5	16.66
4	In my opinion local names are given for specimen in the SCERT text book.	0	0	30	100
5	In my opinion the text including local examples for explaining concept.	0	0	30	100
6	In my opinion the teachers using local languages and words when teaching.	2	6.66	28	93.3
17	In my opinion the teachers provide options to conduct experiments.	6	20	24	80
18	In my opinion the teachers provide enough opportunity for field work in science Classes.	16	53.33	14	46.66
19	In my opinion the teachers provide opportunities to conduct role play based on Scientific Concepts.	11	36.66	19	63.33

Students  $N = 30$ .

Table.3 shows that 90% of students responded that they feel difficult to understand terms used in the biology text book while 90% of students responded that they are not familiar with the examples provided in the SCERT text book, 70% of students agreed that the teachers teaching examples only included in the SCERT text book. 63% of students did not agree to the statement that I feel difficult learning biology, on the basis of 93% of students they feel that content of

the biology text book must be simplified.46.6% of students disagree to the statement that I am able to participate effectively in group activities.56.6% of students did not agree to the statement that The terms used in the text book are familiar to me. On the basis of the response of 56% of students, they feel difficult to comprehend the pictures given in the text. 80% of the students did not agree to the statement that in my opinion the follow up activities suitable to our locality resources.86% the students did not agree to the statement that I am satisfied with the current SCERT textbook. 53% of students responded that teaching did not emphasize process skills in science.93% of students says that the teachers conduct the same experiments in the text. 53% of the students did not agree to the statement that the teachers criticize the local languages used by tribal students in the science class. 80% of the students responded that they are unable to fully comprehend classroom teaching and activities.83% of the students did not agree to the statement that I conduct science experiments at home with local materials but 50% of students responded that they conduct cultural programmes in their classroom. While 50% of the students responded that they did not conduct cultural programmes in their classroom. On the basis of response of 70% of students the teachers encourage cultural programmes in the classroom.93% of students responded that there is a need of community teachers in school.83% of students says that they feel difficult to follow n the classroom.100% of students did not agree to the statement that In my opinion local names are given for specimen in the SCERT text book. 100% of students responded that the text book did not including local examples for explaining concept. 93% of students disagree with the statement that in my opinion the teachers using local languages and words

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when teaching. 93% of students did not agree to the statement that in my opinion the teachers provide options to conduct experiments. 53% of students says that in my opinion the teachers provide enough opportunity for field work in science Classes, where as 63% students says that teachers did not provide opportunities to conduct role play based on Scientific Concepts.

The data in the table 3 reveals that the students stressed that it was absolute necessary to construct the self learning module for Irula tribal students and majority of the students responded that some of the terms including in the current SCERT biology text book are not familiar to them it also point out most of the students are not satisfied with current SCERT biology text book.

**b) Analysis of the response of teachers regarding difficulties in teaching biology**

Analysis of the response of teachers regarding difficulties in teaching biology is quantitatively scored and presented below as table- 4

Table. 4

*Response of teachers and percentage regarding difficulties in teaching biology*

<b>Question No:</b>	<b>Question</b>	<b>No: of agree</b>	<b>%</b>	<b>No: of disagree</b>	<b>%</b>
1	I am satisfied with the current SCERT Text book.	24	80	6	20
2	In my opinion Tribal students are not familiar with the examples provided in the SCERT text book.	15	50	15	50
3	In my opinion Tribal students are feeling difficulty to follow in the class room.	18	60	12	40
4	I prefer to use local languages and examples when transacting the	19	63.3	11	36.6

5	content. In my opinion the tribal students participate well in the group activities.	13	43.3	17	56.6
6	I usually provide them with activities that foster their creativity.	15	50	15	50
7	I am aware of the tribal issues and their corresponding cultural background.	21	70	9	30
8	I usually teach using the hand books prepared in local language for tribal students.	15	50	15	50
9	I usually provide activities related to the socio cultural background of the tribal students in the classroom.	16	53.3	14	46.6
10	Training programmes helps me to understand the socio cultural problems faced by the tribal students.	18	60	12	40
11	In my opinion the content of the text book is appropriate for tribal students.	14	46.6	16	53.3
12	In my opinion some more terms used in the text need some explanation to understand in the tribal context.	22	73.3	8	26.6
13	I think the specimens mentioned in biology text are available in the tribal area.	12	40	18	60
14	In my opinion the content in the text book is rigid in the tribal context.	19	63.3	11	36.6
15	I think the SCERT text book provides enough provision to substitute the experiments by using local resources available.	20	66.6	10	33.3
16	The cartoons given in the text need some illustrations to understand the concept.	19	63.3	11	36.6
17	In my opinion the text content needs some changes to fit in the Tribal context.	15	50	15	50
18	Students often find difficult to comprehend the pictures given in the text.	16	53.3	14	46.6
19	Students find difficulty to do assignment given in The text.	16	53.3	14	46.6

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20	The follow up activities given in the text are not appropriate to the tribal context.	16	53.3	14	46.6
21	Tribal students are unable to fully comprehend classroom teaching and activities.	18	60	12	40
22	Teachers find it difficult to follow CCE in the classroom.	8	26.6	22	73.3
23	Teachers encourage tribal students to conduct cultural programmes in the classroom.	16	53.3	14	46.6
24	I think the tribal students conduct science experiments at home with local materials.	25	83.3	5	16.6
25	There is a need for community teachers in school.	10	33.3	20	66.6

Teachers  $N=30$

Table 4 shows that 50% teacher educators responded that Tribal students are not familiar with the examples provided in the SCERT text book while 50% teacher educators disagree with this statement. 80% teacher educators agree to the statement that I am satisfied with the current SCERT Text book but 20% teacher educators disagree with this statement. On the basis of response of 60% teacher educators, Tribal students are feeling difficulty to follow in the class room. 63.3% teacher educators says that they prefer to use local languages and examples when transacting the content but 36.6 % teacher educators says that they are not prefer to use local languages and examples when transacting the content. 56.6 % teacher educators disagree to the statement that In my opinion the tribal students participate well in the group activities. 50% teacher educators agree to the statement that I usually provide them with activities that foster their creativity but 50% teacher educators did not agree to this statement. 70% teacher educators says that they are aware about the tribal issues and their corresponding cultural background, 30% teacher educators says that they not aware about the tribal issues

and their corresponding cultural background. 50% teacher educators agree to the statement that I usually teach using the hand books prepared in local language for tribal students, while 50% teacher educators did not agree to this statement. 53.3% teacher educators responded that they usually provide activities related to the socio cultural background of the tribal students in the classroom, but 46.6% teacher educators responded that they did not provide activities related to the socio cultural background of the tribal students in the classroom. 60% teacher educators agreed that Training programmes helps them to understand the socio cultural problems faced by the tribal students while 40% teacher educators responded that Training programmes did not helps them to understand the socio cultural problems faced by the tribal students. 53.3% teacher educators responded that the content of the text book is not appropriate for tribal students. 73.3% teacher educators agreed that some more terms used in the text need some explanation to understand in the tribal context. 60% teacher educators disagree to the statement that I think the specimens mentioned in biology text are available in the tribal area. 63.3% teacher educators says that the content in the text book is rigid in the tribal context. 66.6% teacher educators responded that the SCERT text book provides enough provision to substitute the experiments by using local resources available but 33.3 teacher educators responded that the SCERT text book did not provides enough provision to substitute the experiments by using local resources available .63.3% teacher educators agreed that The cartoons given in the text need some illustrations to understand the concept. 50% teacher educators disagree to the statement that in my opinion the text content needs some changes to fit in the Tribal context. 53.3% teacher educators says that the

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Students often find difficult to comprehend the pictures given in the text. 53.3% teacher educators responded that Students find difficulty to do assignment given in the text .53.3 % teacher educators responded that the follow up activities given in the text are not appropriate to the tribal context. 60% teacher educators says that the Tribal students are unable to fully comprehend classroom teaching and activities. 73.3% teacher educators say that Teachers did not find it difficult to follow CCE in the classroom. 53.3% teacher educators responded that Teachers encourage tribal students to conduct cultural programmes in the classroom. 83.3% agree to the statement that I think the tribal students conduct science experiments at home with local materials. 66.6% teacher educators responded that There did not need for community teachers in school.

The data in the table 4 reveals that teachers stressed that the Tribal students are not familiar with the examples provided in the SCERT text book and some more terms used in the text need some explanation to understand in the tribal context. Majority of the teachers opined that the Tribal students are feeling difficulty to follow in the class room.

### **Details of the Module Developed**

The analysis of modules is based on the certain criteria like indigenous language and terms included. It also takes into consideration the local examples, illustrations and local resources. The activities emphasize the culturally inclusive nature to the extent possible. A description of each module and it's culturally inclusiveness is analyzed in the following.

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### Analysis of the Details of the Module Developed

Details of the each module developed are given in table-5.

Table-5

*Details of the module developed, Topic- Components of Ecosystem*

No.	Content	Activity	Follow up activities
1	a) Introduction to the topic ecosystem	Presents a picture of an ecosystem in the classroom and students to write what are seen in the picture in their native languages.	
	b) components of an ecosystem	Students divide the whole classes into small groups and list the components of an ecosystem into living things and nonliving things.  For Example: Living things- Plant, birds etc.  Nonliving things- Soil etc.	Write more examples for biotic and a biotic factors from local resource.

#### Interpretation

By using the indigenous terms for the topic components of an ecosystem the students become interested in the activities. They are actively participating in each activity. The activity on more examples for biotic and a biotic factors as part of follow up activities help to make the learner familiar with the different examples for biotic and a biotic factors.



Table-6

*Details of the module developed, Topic- Food chain and food web*

No.	Content	Activity	Follow up activities
1	a) introduction to the food chain and food web	Show the video clipping of food chain and food web and students to tell about what are seen in this video clips by using their tribal languages. Students in groups draw flowchart based on the predation of food chain .Give explanation about food chain and food web.	Find out more examples for food chain and write various trophic levels of organisms in the food chain.
	b) various tropic levels	An incomplete diagram of various trophic level is given and students to complete the diagram by using their tribal terms.	

### **Interpretation**

The learning activity on topic the food chain and food web helps the learner become interested in the activities because of the video clipping. By using the indigenous terms for the topic food chain and food web students easily capture the content. The collection of more examples will help the students to learn science meaningfully.

Table-7

*Details of the module developed, Topic- Ecological interactions*

No.	Content	Activity	Follow up activities
1	a) introduction to ecological interactions	Divide the whole classes into small groups. Give the picture of different ecological interactions for each group. Then students write what are seen in the picture by using their tribal terms. Point out there are many interactions in nature that we do not see or realize.	Collect different examples for ecological interactions and write tribal terms used for it.
	b) ecological interactions	Shows an incomplete chart of ecological interactions and students complete the incomplete chart, and then explain the content by using tribal terms.	

**Interpretation**

The topic ecological interaction helps to understand the important of ecological interactions in an ecosystem. The images of ecological interactions provide direct experience to the learner. By using the indigenous terms for the

topic ecological interaction the students easily capture the content. The learning activities provide learning by doing experience. Through these activities the students understand every species in an ecosystem depend each other.

Table-8

*Details of the module developed, Topic- different types of ecosystems*

<b>No.</b>	<b>Content</b>	<b>Activity</b>	<b>Follow up activities</b>
1	a) introduction to ecosystem	Showing the video clip of different ecosystems. The students tell the name of each ecosystem by using their tribal terms and write the animals found in each ecosystem. Give the explanation for ecosystems and biodiversities.	
	b) benefits of ecosystem	Students write what are the benefits of conserving the biodiversity and what are the services provided by biodiversity.	Discuss the need for conserving biodiversity.

**Interpretation**

The topic different type of ecosystems was introduced by showing the video clip of different ecosystems and indigenous terms for each ecosystem. This can arise motivation among the students. The indigenous terms helps the student

to familiarize the content well. The activities helped them to aware about what are the benefits of conserving the biodiversity and what are the services provided by biodiversity.

Table-9

*Details of the module developed, Topic- lost links*

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<b>No.</b>	<b>Content</b>	<b>Activity</b>	<b>Follow up activities</b>
1	a) Extinct species	Showing the picture of some extinct species and students write the tribal names used for the species and reasons for extinction.	Collect the picture of different organisms on the verge of extinction and list out the tribal terms used for each organism. And also prepare an album

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### **Interpretation**

The learning activity on the lost species helps to understand the extinct species in nature and reasons for extinction. By integrating the indigenous terms the tribal students easily capture the content well. The follow up activities helps to make them familiar with the different organisms on the verge of extinction and also indigenous terms.

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Table-10

*Details of the module developed, Topic- in-situ and ex-situ conservation*

No.	Content	Activity	Follow up activities
1	a) In-situ conservation	Showing the video clip of in-situ conservations and ask to the students tell the name of each in- situ conservations by using their tribal terms. Students write the animal's found in each in-situ conservations.	Discuss the need for conserving In-situ and Ex-situ conservations.
	b) Ex-situ conservation	Showing the video clip of ex-situ conservations ask to the students tell the name of each in- situ conservations by using their tribal terms. Students write the animal's found in each ex-situ conservations. Explain ex-situ conservation.	

**Interpretation**

The video clipping of in-situ and ex-situ conservation create awareness about different in in-situ and ex-situ conservation and also familiarize what are the animals found in in-situ and ex-situ conservation. By integrating the indigenous

terms students can easily capture the content well. The follow up activity helps to understand the need for conserving In-situ and Ex-situ conservations.

Table-11

*Details of the module developed, Topic- Crises in the agricultural sector*

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<b>No.</b>	<b>Content</b>	<b>Activity</b>	<b>Follow up activities</b>
1	a) Crises in the agricultural sector	The students write about what the obstacles faced by farmers today. Each student group list out the obstacles faced by farmers by using tribal terms.	List out more obstacles faced by farmers.

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### **Interpretation**

The learning activity on the topic Crises in the agricultural sector helps to understand the obstacles faced by farmers today. By the integration of tribal terms the students become interested in the activities and also help to familiarize the content well. The follow up activities helps to understand obstacles faced by farmers.

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Table-12

*Details of the module developed, Topic- Integrated Pest Management-IPM*

<b>No.</b>	<b>Content</b>	<b>Activity</b>	<b>Follow up activities</b>
1	a) Introduction to integrated pest management	Start the lesson asking about how to control the pest in farm	Examine the extent of benefits of Integrated Pest Management for future.
	b) Integrated pest management	Show the video clip of integrated pest management. Ask the students to write the advantages of Integrated Pest Management.	

### **Interpretation**

The learning activity on the topic Integrated Pest Management-IPM helps to understand how to control the pest in farm and also advantages of Integrated Pest Management.

Table-13

*Details of the module developed, Topic- Reaping diversity*

No.	Content	Activity	Follow up activities
1	a) Introduction to new farming methods	Write the different types of farming methods in your place and write what are the tribal terms used for each farming methods. Showing the video clips of few farming methods and ask students to tell their local name used for each farming method.	List out the products of each farming method
	b) Deferent farming methods	Provides an incomplete chart of few farming methods and asks students to complete the chart.	

### **Interpretation**

The introductory session “different types of farming methods in your place and the tribal terms used for each farming methods” helps to realize different farming methods and familiarize the local terms. It develops self confidence in learning. By the integration of tribal terms helps to understand the content well and provide an opportunity to learn in their own native language. The students become aware about the products of each farming method through follow up activity.



Table-14

*Details of the module developed, Topic- New farming techniques*

<b>No.</b>	<b>Content</b>	<b>Activity</b>	<b>Follow up activities</b>
1	a) Introduction to new farming techniques	Starts the module talking about the crisis in the agricultural sector and asks students to write what are the new farming techniques that are used to overcome these challenges, brief description about that farming and also write the local terms used for the farming techniques.	Conduct a field visit to the nearest Polyhouse Farming and Precision Farming and find out the methods used for that farming.
	b) New farming techniques	Showing the video clip of some of the new farming techniques and students to write the local names used for each farming methods.	

Table-15

*Details of the module developed, Topic- the farming methods without soil*

<b>No.</b>	<b>Content</b>	<b>Activity</b>	<b>Follow up activities</b>
1	a) Farming methods without soil: Hydroponics, aeroponics, Terrace cultivation, Grow bag cultivation, Vertical farming.	Starts the module by asking about can grow the plants without soil. Write a brief description of their view points about it. And write how to overcome the obstacles such as lack of space, availability of seed, and ignorance of nurturing.	Discuss about how are modern agricultural practices helpful in reducing crop loss due to climate change.

## **Interpretation**

The topic new farming techniques and the farming methods without soil helps to understand variety of farming methods. The introductory session “Starts the module talking about the crisis in the agricultural sector” helps to use their pre requisites. By the integration of indigenous terms the students understand the content easily. The follow up activities helps to aware about how to overcome the climate change in agriculture sector and also provide direct experience through field visit.

### **Benefits of culturally inclusive SLM**

A growing body of research shows that culturally responsive teaching practices can provide students with a range of social, emotional, cognitive and academic development of all students by:

Facilitating brain processing

Motivating and engaging students

Cultivating critical thinking and problem-solving skills

Strengthening students’ racial and ethnic identities

Promoting a sense of safety and belonging

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## CHAPTER V

# SUMMARY, FINDINGS, CONCLUSION AND SUGGESTIONS

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- ❖ Re-Statement of the Problem
  - ❖ Major Findings of the Study
  - ❖ Conclusion
  - ❖ Educational Implications of the Study
  - ❖ Suggestions for Further Research
-

## **SUMMARY, FINDINGS AND SUGGESTIONS**

This chapter highlights the significant stages of the study; this includes statement of the problem, conclusions, educational implications and suggestions for the further study.

### **Statement of the Problem**

The problem is titled as “**Construction of Culturally Inclusive Self Learning Module on Biology for VIII<sup>th</sup> Standard Irula Tribal Students.**”

### **Objective of the Study**

The objective of the study was

1. To analyses the present curriculum on the basis of culturally inclusive approach on biology.
2. To construct a culturally inclusive self-learning module on biology for VIII STD Irula tribal students.
3. To identify the problems faced by Irula tribal students to learn biology.

### **Methodology**

With the guidance from the supervising teacher, investigator collected data from journals, articles, books in order to reach the objectives of the study. The investigator had collected data from teachers worked under tribal schools and Irula tribal students’ .from the review and collected data investigator understood that the Irula tribal community facing many problems in the educational process

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to methodology. The existing system of teaching learning process is based in the cultural basis of general students. They are unfamiliar to the tribal children and also not on the basis of the prerequisites of tribal children. The investigator identified the need to develop self learning module based on the tribal's prerequisites.

### **Sample Used for the Study**

The sample was conducted on a representative sample of 30 secondary school Irula tribal students studied under different schools and 30 teachers worked under tribal schools. Total 60 sample.

### **Tools Used for The Study**

The following tools are used for the present study:

1. Opinionnaire on culturally inclusive approach for Irula tribal students (Koya. H.M.P & Poornima K, 2021)
2. Opinionnaire on culturally inclusive approach for Teachers (Koya. H.M.P & Poornima K, 2021)
3. Construction of culturally inclusive Self-learning module (SLM) on biology for VIII<sup>th</sup> Standard Irula tribal students (Koya. H.M.P & Poornima K, 2021)

### **Statistical Techniques Used**

Analysis of the collected data and its interpretation can be done only with the help of statistical technique .the major statistical technique used for analyzing the data is percentage analysis.

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## **Major Findings of the Study**

The analysis of the data leads the investigator to the following

- ❖ The study reveals that On the basis of response of 60% teacher educators, Tribal students are feeling difficulty to follow in the class room.
  - ❖ 53.3 % teacher educators responded that the follow up activities given in the text are not appropriate to the tribal context.
  - ❖ 50% teacher educators responded that Tribal students are not familiar with the examples provided in the SCERT text book.
  - ❖ 50% teacher educators says that they did not teach using the hand books prepared in local language for tribal students.
  - ❖ 53.3% teacher educators responded that the content of the text book is not appropriate for tribal students.
  - ❖ 90% of students responded that they feel difficult to understand terms used in the biology text book.
  - ❖ 90% of students responded that they are not familiar with the examples provided in the SCERT text book.
  - ❖ 93% of students say that the content of the biology text book must be simplified.
  - ❖ 86% students say that they are not satisfied with the current SCERT textbook.
  - ❖ 80% of the students responded that they are unable to fully comprehend classroom teaching and activities.
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**About SLM**

Culturally inclusive self learning module was developed for VIII standard Irula tribal students. Indigenous terms, local examples and follow up activities are included in this module. It is hypothesized that it will have easily understandable for tribal students and it will create interest and self confidence on learning .The tribal students easily capture the content well.

Some of the highlighted values on difficulty to learn biology for Irula tribal students are given below table 16.

Table -16

*Summary of the analysis of the student's responses regarding difficulty to learn biology*

Question No:	Question	No: of agree	%	No: of disagree	%
1	I feel difficult to understand terms used in the biology textbook.	27	90	3	10
2	Tribal students are not familiar with the examples provided in the SCERT text book.	27	90	3	10
7	In my opinion the teachers teaching examples only included in the SCERT textbook.	21	70	9	30
9	I feel that content of the biology text book must be simplified.	28	93.3	2	6.66
11	The terms used in the text book are familiar to me.	13	43.3	17	56.6
12	I feel difficult to comprehend the pictures given in the text.	17	56.66	13	43.33
13	In my opinion the follow up activities suitable to our locality resources.	6	20	24	80
14	I am satisfied with the current SCERT textbook.	4	13.33	26	86.66

Students  $N = 30$

Some of highlighted values on difficulty to teach biology for teachers worked under tribal schools are given below table 17.

Table -17

*Summary of the analysis of the teacher's responses regarding difficulty to teach biology*

Question No:	Question	No: of agree	%	No: of disagree	%
3	In my opinion Tribal students are feeling difficulty to follow in the class room.	18	60	12	40
5	In my opinion the tribal students participate well in the group activities.	13	43.3	17	56.6
12	In my opinion some more terms used in the text need some explanation to understand in the tribal context.	22	73.3	8	26.6
13	I think the specimens mentioned in biology text are available in the tribal area.	12	40	18	60
14	In my opinion the content in the text book is rigid in the tribal context.	19	63.3	11	36.6
18	Students often find difficult to comprehend the pictures given in the text.	16	53.3	14	46.6
20	The follow up activities given in the text are not appropriate to the tribal context.	16	53.3	14	46.6

Teachers  $N = 30$ .



## **Conclusion**

Education as far as tribal students are concerned is a difficult task, as curriculum, content in the text book, language of instruction, and learning materials are unfamiliar to their cultural and linguistic context. In the present study the investigator tried to develop self learning module for selected topics in biology text book of VIII standard. This module is developed with focus on linguistic perspective of Irula tribal community. The chapters selected for this module are diversity for Sustenance and Let's regain our fields. The topics selected from this two chapters are Crises in the agricultural sector, Reaping diversity, new farming techniques, Cultivation without soil, components of an ecosystem, Ecological interactions, Diverse ecosystems, Importance of biodiversity, Lost links, In-situ and ex- situ conservation, etc.

All the module following a particular format viz, objectives, introduction, content, self assessment, follow up activities and summary. Objectives are the instructional objectives of selected topic. Introduction part includes the direction for handle the modules. The learning activities and content related to each topic is described in content part. Self assessment gives a sort of feedback. Evaluation section suggests for follow up of the module in brief.

## **Educational Implications**

Education is the process of acquiring the knowledge for betterment of the individual and society. The desired behavioral changes are acquired only through meaningful education in cultural context. Empowering the nation is possible by educating the humanity in a desirable way. The education of minorities is a vital

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component of the overall strategy of securing equality and social justice in the country. It is observed that well- planned, sustained and vigorous efforts should be ascertained for the development of the tribes.

### **Curriculum Level**

The educational system including curriculum, textbook, method of teaching, language of instruction etc are same both tribal and non-tribal children. Thus existing curriculum becomes irrelevant and meaningless to the tribal students. Most of the content, terms, examples and language used in the text book are found beyond their reach and goes over their heads. The method of teaching followed in school is not effective and interesting to the tribal students. There is a need for suitable curriculum for the functioning of schools in tribal areas. The curriculum should include the various aspects of tribal life and culture.

### **Teaching Methods**

Teachers working in tribal areas who do not possess knowledge about the tribal life and culture may be given training in these aspects. The teachers posted in tribal area should also acquire knowledge of tribal dialects. In biology teaching there is no consideration of the background of tribal. Most of the terms, Examples and pictures are alien to them. Meaningful learning is possible only through the context based teaching. All these factors call for immediate changes in the educational components according to the needs and conditions of the tribal children.

### **Co-curricular Level**

Organize programmes emphasizing indigenous culture. Organize science fair and exhibition incorporating local resources

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Publish bulletin and magazines in local language etc.

### **Collaboration with Community**

Organize curricular activities in association with community. The resources of the community can be better utilized for the benefit of school in a number of ways. Some of the curricular and co-curricular activities which highlight cultural inclusiveness are

- ❖ Planting herbal garden
- ❖ Labeling the plants and trees using scientific name of the school premises
- ❖ Conducting community farming
- ❖ Organizing celebrations of farming

### **Suggestions for the Further Research**

1. Similar study can be conducted to develop self learning modules for other topics in biology studies.
  2. Similar study can be conducted to develop self learning modules for other cast of tribal students.
  3. The modules can be developed for other subjects also.
  4. Context based module can be developed for other marginalized groups.
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# **APPENDICES**

# **APPENDIX I**

## **Module 5**

### **Topic: LOST LINKS**

#### **Learning out comes**

- ❖ To make learner aware about the lost species.
- ❖ To make learner recognize what are the reason for species extinction.
- ❖ To make positive attitude towards animals.
- ❖ To aware about protection of an ecosystem.
- ❖ To make the classroom environment more culturally inclusive
- ❖ To familiarize indigenous terms and examples.

#### **Introduction**

This module describes what the losts species in our earth are. Teacher should create awareness among the students about the reason for species extinction.

#### **Content**

Dodo, a kind of flightless bird, was common in the island of Mauritius. Other species which have become extinct include passenger pigeons which flew in lakhs along the North American skies and the Quagga, a wild zebra variety from the southern part of Africa. Examples for some extinct species are passenger pigeon, quagga etc.

There are many organisms on the verge of extinction due to several reasons. Some examples are given below.



Saraca indica (Ashoka tree )



Nilgiri Tahr



Maramanjil (Tree Turmeric)



Malabar hornbill



Lion-tailed macaque

### Activity I

Teacher showing the picture of some extinct species and ask students to write the tribal names used for the species and reasons for extinction.

Once the class activity is over teacher concluding the content by using tribal terms.

Some of the examples for extinct species(**Nasith pona jeevika**)

- ❖ Dodo
- ❖ Passenger pigeon(**pravu**)
- ❖ Quagga (**zeebra**)

Some of the organisms on the verge of extinction are

Saraca indica (Ashoka tree) (**ashoka maram**)

Malabar hornbill

Nilgiri Tahr (**vareyadu**)

Lion-tailed macaque (**singavalan korangu**)

Malabar civet cat

Maramanjil (Tree Turmeric) (**maleimanja**).

### **The reason for species extinction**

- Destruction of ecosystems

### **Self assessment**

Discuss the importance of protecting the biodiversity and the organisms on the verge of extinction.

### **Evaluation**

Collect the picture of different organisms on the verge of extinction and list out the tribal terms used for each organisms.

### **Summary**

Through this module the teacher presents the following points

- ❖ Examples for lost links.
- ❖ The reason for species extinction

## **APPENDIX II**

**FAROOK TRAINING COLLEGE, CALICUT**

**CULTURALLY INCLUSIVE OPINIONNAIRE**

**OPINIONNAIRE ON DIFFICULTY TO LEARN BILOGY FOR TRIBAL  
STUDENTS**

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**POORNIMA.K**

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### **Instructions**

- ❖ This is an opinionnaire. There are altogether 25 questions.
- ❖ I ensure you that this information provided by you will be used for only my research purpose

**Name of the student:**

**Name of the school:**

**Class:**

- 1) I feel difficult to understand terms used in the biology textbook.  
a) Agree      b) Disagree
- 2) Tribal students are not familiar with the examples provided in the SCERT text book.  
a) Agree      b) Disagree
- 3) I feel difficult to follow in the class room.  
a) Agree      b) Disagree
- 4) In my opinion local names are given for specimen in the SCERT text book.  
a) Agree      b) Disagree

- 5) In my opinion the text including local examples for explaining concept.
- a) Agree    b) Disagree
- 6) In my opinion the teachers using local languages and words when teaching.
- a) Agree    b) Disagree
- 7) In my opinion the teachers teaching examples only included in the SCERT textbook.
- a) Agree            b) Disagree
- 8) I feel difficult learning biology.
- a) Agree            b) Disagree
- 9) I feel that content of the biology text book must be simplified.
- a) Agree            b) Disagree
- 10) I am able to participate effectively in group activities.
- a) Agree            b) Disagree
- 11) The terms used in the text book are familiar to me.
- a) Agree            b) Disagree
- 12) I feel difficult to comprehend the pictures given in the text.
- a) Agree            b) Disagree
- 13) In my opinion the follow up activities suitable to our locality resources.
- a) Agree            b) Disagree
- 14) I am satisfied with the current SCERT textbook.
- a) Agree            b) Disagree
- 15) In my opinion the teaching emphasize process skills in science.
- a) Agree            b) Disagree



- 16) The teachers conduct the same experiments in the text.  
a) Agree                      b) Disagree
- 17) In my opinion the teachers provide options to conduct experiments.  
a) Agree                      b) Disagree
- 18) In my opinion the teachers provide enough opportunity for field work in science Classes.  
a) Agree                      b) Disagree
- 19) In my opinion the teachers provide opportunities to conduct role play based on Scientific Concepts.  
a) Agree                      b) Disagree
- 20) The teachers criticize the local languages used by tribal students in the science class.  
a) Agree                      b) Disagree
- 21) Tribal students are unable to fully comprehend classroom teaching and activities.  
a) Agree                      b) Disagree
- 22) I conduct science experiments at home with local materials.  
a) Agree                      b) Disagree
- 23) I conduct cultural programmes in our classroom.  
a) Agree                      b) Disagree
- 24) In my opinion the teachers encourage cultural programmes in the classroom.  
a) Agree                      b) Disagree
- 25) In my opinion there is a need of community teachers in schools.  
a) Agree                      b) Disagree

## **APPENDIX III**

**FAROOK TRAINING COLLEGE, CALICUT**

**CULTURALLY INCLUSIVE OPINIONNAIRE**

**OPINIONNAIRE ON DIFFICULTY TO TEACH BIOLOGY FOR  
TEACHERS WORKED UNDER TRIBAL SCHOOLS**

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**POORNIMA.K**

M.Ed. Student  
Farook Training College

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### **Instructions**

- ❖ This is an opinionnaire. There are altogether 25 questions.
- ❖ I ensure you that this information provided by you will be used for only my research purpose

**Name of the teacher:**

**Name of the school:**

1. I am satisfied with the current SCERT Text book.  
a) Agree                      b) Disagree
2. In my opinion Tribal students are not familiar with the examples provided in the SCERT text book.  
a) Agree                      b) Disagree
3. In my opinion Tribal students are feeling difficulty to follow in the class room.  
a) Agree                      b) Disagree
4. I prefer to use local languages and examples when transacting the content.

a) Agree                      b) Disagree

5. In my opinion the tribal students participate well in the group activities.

a) Agree                      b) Disagree

6. I usually provide them with activities that foster their creativity.

a) Agree                      b) Disagree

7. I am aware of the tribal issues and their corresponding cultural background.

a) Agree                      b) Disagree

8. I usually teach using the hand books prepared in local language for tribal students.

a) Agree                      b) Disagree

9. I usually provide activities related to the socio cultural background of the tribal students in the classroom.

a) Agree                      b) Disagree

10. Training programmes helps me to understand the socio cultural problems faced by the tribal students.

a) Agree                      b) Disagree

11. In my opinion the content of the text book is appropriate for tribal students.

a) Agree                      b) Disagree

12. In my opinion some more terms used in the text need some explanation to understand in the tribal context.

a) Agree                      b) Disagree

13. I think the specimens mentioned in biology text are available in the tribal area.

- a) Agree                      b) Disagree

14. In my opinion the content in the text book is rigid in the tribal context.

- a) Agree                      b) Disagree

15. I think the SCERT text book provides enough provision to substitute the experiments by using local resources available.

- a) Agree                      b) Disagree

16. The cartoons given in the text need some illustrations to understand the concept.

- a) Agree                      b) Disagree

17. In my opinion the text content needs some changes to fit in the Tribal context.

- a) Agree                      b) Disagree

18. Students often find difficult to comprehend the pictures given in the text.

- a) Agree                      b) Disagree

19. Students find difficulty to do assignment given in The text.

- a) Agree                      b) Disagree

20. The follow up activities given in the text are not appropriate to the tribal context.

- a) Agree                      b) Disagree

21. Tribal students are unable to fully comprehend classroom teaching and activities.

- a) Agree                      b) Disagree

22. Teachers find it difficult to follow CCE in the classroom.

- a) Agree                      b) Disagree

23. Teachers encourage tribal students to conduct cultural programmes in the classroom.

- a) Agree                      b) Disagree

24. I think the tribal students conduct science experiments at home with local materials.

- a) Agree                      b) Disagree

25. There is a need for community teachers in school.

- a) Agree                      b) Disagree