

**INFLUENCE OF SCHOOL VEGETABLE GARDENS ON THE
STUDENTS AND TEACHERS OF THIRUVANANTHAPURAM
DISTRICT: AN EXPOSITORY ANALYSIS**

by

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(2015-11-111)

THESIS

**submitted in partial fulfillment of the
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**DEPARTMENT OF AGRICULTURAL EXTENSION
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2017

DECLARATION

I, hereby declare that this thesis entitled “**INFLUENCE OF SCHOOL VEGETABLE GARDENS ON THE STUDENTS AND TEACHERS OF THIRUVANANTHAPURAM DISTRICT: AN EXPOSITORY ANALYSIS**” is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

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Certified that this thesis entitled “**INFLUENCE OF SCHOOL VEGETABLE GARDENS ON THE STUDENTS AND TEACHERS OF THIRUVANANTHAPURAM DISTRICT: AN EXPOSITORY ANALYSIS**” is a record of research work done independently by Mr. Dilip, S. (2015-11-111) under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him.



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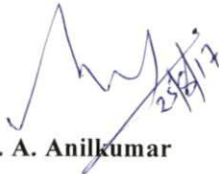
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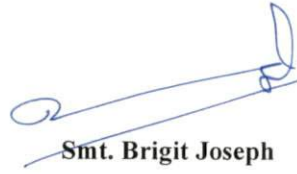
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LIST OF ABBREVIATIONS AND SYMBOLS USED

VFPCK	Vegetable and Fruits Promotion Council Kerala's
e.g.	Example
et al.	Co- workers
FAO	Food and Agricultural Organization
DOA	Department of Agriculture
DPI	Directorate of Public Instruction
B.A./B.Sc.	Bachelor of Arts/Bachelor of Science
M.A./M.Sc.	Master of Arts/Master of Science
B.Ed./M.Ed.	Bachelor of Education/Master of Education
B.Com/M.Com	Bachelor of Commerce/Master of Commerce
M.Phil./Ph.D.	Master of philosophy/Philosophiae Doctor
KSCSTE	Kerala State Council for Science, Technology and Environment
DOECC	Department of electronics and Accreditation of Computer Classes
PTA	Parent-Teacher Association
EARTH	Education And Resiliency To Horticulture
F	Frequency
%	Percentage
NSS	National Service Scheme
NCC	National Cadet Core
MDMS	Midday meal scheme

Introduction

CHAPTER I

INTRODUCTION

Young people increasingly are isolated from the land and deprived of the joys and responsibilities it teaches.

—*Alice Waters*

To a great degree we are a de-placed public for whom our immediate places are no longer sources of food, water, livelihood, energy, materials, friends, recreation, or sacred inspiration.

—*David Orr*

A school garden is an innovative teaching tool and strategy that lets students incorporate hands-on activities in a diversity of multidisciplinary, standards-based lessons. The vegetable garden engages students by providing an energetic environment for them to observe, discover, experiment, nurture, and learn. It is a livelihood laboratory where lessons are internalized from real-life experiences rather than textbook examples, thus, allowing students to become active participants in the learning process. Through the garden, students gain an understanding of ecosystems, knowledge of plant and appreciation for food origins and nutrition. At the same time, they learn practical horticultural skills that last a lifetime.

The school vegetable garden movement originated in Europe and got widely popularized in United States in the 1890s. Vegetable gardens skimmed up at schools all over the country during the early 20th century, more recently, the popularity of school gardens as an educational tool steadily grew as a way to teach healthy eating behaviours and increase hands-on learning experiences in inter or multi disciplinary lessons.

Vegetables are an important source of food and nutrition. Vegetable production constitutes roughly two-third of the total production of horticulture crops. Although India is the second largest producer of vegetables in the world, our productivity levels are appallingly low. In case of Kerala, more than 70 per cent of our vegetable requirement is met from our neighbouring states like Tamil Nadu, Karnataka and Andhra Pradesh. Kerala also has the limitation of land for agriculture owing to the high rate of fragmentation of land due to population pressure, increasing nucleotide family structure, and other demo-ecographic positioning (Thomas, 2004). One best way to address the issue of vegetable shortage is to scale up its production in schools using the vast acre of under or unused lands and the immense young energy. To address this, many projects have been initiated by Kerala Government. Vegetable and Fruits Promotion Council Kerala's (VFPCCK) plans to develop vegetable gardens in 1,000 schools within three months as part of its agri@schoolprogramme aimed at cultivating interest in agriculture among school children. The concept is 'A Vegetable Garden in my school' for children, said a press release from VFPCCK. The area covered by the vegetable gardens will be determined by the availability of land. According to estimates, between two and 15 cents of land will be used for vegetable gardens in schools. It is estimated that 600 tons of vegetables can be produced from the 1,000 gardens in schools. (The Hindu, 2006).

A total of 2,400 schools were selected for school vegetable garden project 'vithuvandi' in the year 2013-2014. Around 99.906 hectares of school land were used and yielded 1,028 tons of vegetables." (The Hindu, 2015). Around 100 schools in Thiruvananthapuram is undertaking vegetable gardening in the district. Harnessing the infrastructural and human resources for agricultural development of this productive arena will open up a new gate for agricultural development in the state in terms of satisfying the internal requirement of vegetables and other horticultural produces.

Agricultural activities have produced a variety of educational benefits in primary school students. It has deepened the recognition of the importance of feeling

nature, enhanced the ability of self-control and widened the understanding toward work. At disabled children's schools and in classes of disabled children, agricultural activities have immensely contributed to the development of these children, academically and socio psychologically. Kerala Agricultural University also supports agricultural school outreach programmes through its extension system and student social bodies like National Service Scheme with an aim to improve the knowledge, skill, attitude and understanding of the school children on agriculture with special reference to vegetable gardens. There is a growing movement globally for the "greening" of schoolyards through gardens at school sites, and much enthusiasm for the potential of garden-based learning in promoting healthy youth development (Hedley *et al.* 2004). Hence, the present study on influence of school vegetable gardens on the students and teachers of Thiruvananthapuram district: An expository analysis is very important.

The detailed study towards the managing and maintenance of school vegetable gardening and garden activities. was taken up with the following objectives:

- I. To study the influence of vegetable gardens in terms of attitudes.
- II. To assess level of knowledge on vegetable gardening, delineating the benefits, training needs.
- III. To identify the constraints and strategies as perceived by the school students and teachers.

1.1 SCOPE AND IMPORTANCE OF THE STUDY

Kerala state, which covers only 1.18 per cent of the total land area of India, supports over 3.5 per cent of the country's population. The state has a population density of 819 persons per sq. km. being the highest in India. Under the shrinking per capita land availability, coupled with the intricacies of the global and market

economy, agricultural systems are facing its own challenges. This phenomena, even though challenging, highlights the importance of this production system as the scope of commercial agriculture is decreasing day by day in Kerala owing to the continuous trend of decreasing land availability for agriculture because of high population density in Kerala. Therefore a viable production strategy to overcome the disadvantages of land holding size lies in proper planning and maneuvering of the available but idled space (Thomas, 2000) especially catering to the needs of School student farmer concept. It will aid in technology change and improvement in any sphere, increases economic returns and enhance development process of the state.

The General Education Department, Kerala (2013) has reported it administers school education from primary level to the secondary level covering as many as 14,479 schools with 4539033 students and 188379 teachers. This is a huge potential untapped fully and effectively. Harnessing the infrastructural and human resources for agricultural development of this productive arena will open up a new gate for agricultural development in the state in terms of satisfying the internal requirement of vegetables and other horticultural produces.

There is a growing movement globally for the “greening” of schoolyards through gardens at school sites, and much enthusiasm for the potential of garden-based learning in promoting healthy youth development (Hedley *et al.*, 2004). There are multiple rationales for the value of schools gardens, chiefly as outdoor “learning laboratories,” as aesthetically pleasing spaces for children to play, and, most recently, as places to promote the consumption of fresh produce among a youth population with markedly elevated rates of obesity and type 2 diabetes (Ozer, 2006).

Vegetable and Fruits Promotion Council Kerala’s (VFPCCK) plans to develop vegetable gardens in 1,000 schools within three months as part of its agri@school programme aimed at cultivating interest in agriculture among school children. According to estimates, between two and 15 cents of land will be used for

vegetable gardens in schools and it is estimated that 600 tones of vegetables can be produced from the 1,000 gardens in schools. (The Hindu, 2006)

Agricultural activities have produced a variety of educational benefits in primary school students. It has deepened the recognition of the importance of feeling nature, enhanced the ability of self-control and widened the understanding toward work. At disabled children's schools and in classes of disabled children, agricultural activities have immensely contributed to the development of these children, academically and socio psychologically (Konoshima, 1995). Kerala Agricultural University also supports agricultural school outreach programmes through its extension system and student social bodies like National Service Scheme with an aim to improve the knowledge, skill, attitude and understanding of the school children on agriculture with special reference to vegetable gardens.

However, there has been little rigorous research on the effects of school gardens on the awareness, knowledge, attitude and beliefs of different actors in school especially the school children or on the factors that promote the sustainability of these programs. Hence this study on school vegetable gardens would be of significance.

1.2 LIMITATIONS OF THE STUDY

The research was part of the post graduate programme which is done in a short period and therefore there were limitations in finance, and other resources. The area of study was confined to only 130 respondents with 10 students and 3 teachers each from 10 schools in Thiruvananthapuram district, hence generalizing the results of the research becomes impractical. The data were collected by personal interview with the school students and teachers, hence chances of un-willful bias exists. In spite of the above limitations the researcher took every effort to make the research objective, systematic and reliable.

1.3 ORGANIZATION OF THE THESIS

The entire thesis is presented in five chapters:

The 'introduction' chapter which is the first, explains the importance of the topic, objectives, scope and limitation of the study. Second chapter, 'Review of literature' deals with the read-through that includes previous works and findings in accordance with the objective of study. Third chapter 'methodology' describes the sampling design, the study area, measurement of independent and other variables, method of data collection and statistical tools used. Fourth chapter 'results and discussion' explains the results of the study with inferences and the 'summary' chapter which is the final one summarizes the salient findings of the work that is done and explains the implications based on the results of the study. At the end, the references, abstract and appendices of the thesis are given.

Review of Literature

CHAPTER - II

REVIEW OF LITERATURE

This chapter 'review of literature' provides information from previous study that helps in ruling out the problem area and that which provides a source for developing a theoretical frame work for the study. It also helps the researcher, to get familiar with the observed procedures of the research and the feasible results presented in the area. Such a vital review of literature helps the researcher to internalize the conceptual frame work of the study. In this study, school gardens and its influence on the students and teacher's attitude towards school gardening is elucidated in the following section.

- 2.1 Concept of school vegetable garden
- 2.2 Influence of school gardening on student's attitude.
- 2.3 Attitude of teachers towards school gardening.
- 2.4 Personal, socio-economic and psychological profile of students and teachers
- 2.5 Perception of students and teachers regarding benefits of school gardening.
- 2.6 Constraints experienced by the school students and teachers

2.1 CONCEPT OF SCHOOL VEGETABLE GARDEN

A school garden is an educational tool of influential environment. Through gardening activities, students become responsible to learn and be caretakers. They comprise of an occasion to undertake agricultural practices on a small scale, with the responsible of self-learning.

Mussen (1977) concluded that vegetable garden activities and the dealings with growing plants strengthen the knowledge of student's sentimental behaviours.

Riley (1979) stated that learning from experiencing, seeing and moving means that children must understand their atmosphere through imagination, interpretation of reality and discovery.

Cavaliere (1987) in a study on 'children today' stated that children who participated in the vegetable garden learned to like healthy foods.

Bitgood (1989) believed that students can learn about school garden as much or more on a field trip in place of learning with in the classroom.

Braun *et al.* (1989) stated that a school garden might not be as difficult task to create and maintain as one would think the kinds of problems in school-yard garden like constructing and protecting are not impossible.

Barker (1992) states that school gardening is an experiential gardening programmes for students sponsored by a school as an extension of the curriculum.

Bilton (1993) in a study concluded that the vegetable garden available throughout a teaching session alleviated many of the problems that teachers reported.

Heffernan (1994) in a study on 'the children's garden project at river farm' concludes that educators were interested in school gardening programmes and the use of horticultural practices in the classroom.

Vegetable gardening can facilitate student interaction with teachers, parents, and volunteers, primarily through growing plants and discovering the relationships between people, plants and wildlife (Alexander *et al.* 1995).

Marturano (1995) reported that in a relatively short time, school vegetable garden project provided unmistakable conformation to all the students that they could succeed in school.

Campbell *et al.* (1997) reported that in today's society many are not aware where our food comes from. School vegetable gardens are a wonderful way to utilize

the school grounds as a classroom, the true source of their food and reconnect students with the natural world as a great way to encourage healthy living.

Skelly and Bradley (2000) in a study stated that teachers who worked in schools with vegetable garden programmes had higher place of work confidence and increased “general fulfillment at that school on being a teacher.”

Portillo (2002) in a study on ‘an assessment of agricultural knowledge of sixth school teachers’ reported that straightforward teachers with some agricultural training are more likely to use school vegetable gardens as a learning tool.

Pothukuchi (2004) in a study on ‘a youth “nutrition garden” in southwest Detroit’ reported that after gardening, students have an increased interest in eating fruit and vegetables, possess an increase for working with neighborhood adults.

Klemmeret *al.* (2005) in a study on ‘the effect of school gardening programme on the science achievement of elementary students’ reported that students who have school garden programmes incorporated into their science educational programme score significantly higher on science achievement tests than students who are taught by entirely traditional classroom methods.

O’Callaghan (2005) in a study on ‘creating a school gardens programme in the challenging environment of Las Vegas’ reported that successive studies of principals in vegetable gardening schools with respect to potential issues and obstructions to school gardening prompted the enlisting of a community based teachers to provide training and coordinate the gardening programmes.

Gross and Lane (2007) in a study on ‘exploring accounts of own gardens and gardening’ reported that gardening during childhood exposures children to healthy food, moderate exercise, and positive social interactions and can regularly lead to a lifetime experience in gardening.

Ratcliffe *et al.* (2011) in a study on middle school-aged students indicated that school gardening may increase the variety of vegetables eaten.

The Canberra times (2015) reported that in recent years, gardens have become a popular addition to many schools to encourage children to eat healthier. The garden activities for student's behaviour at home and in the classroom improved and promoted the habit of eating more fruits and vegetable and also generated interest among the students to cook and taste.

2.2 INFLUENCE OF SCHOOL GARDENING ON STUDENT'S ATTITUDE

Allport (1935) in a study on 'Attitudes in Murchisons' reported that attitude is a mental and impartial condition of status sorted out through involvement.

Thurstone (1946) defined attitude as the degree of positive or negative affect on school vegetable garden activities associated with some psychological objects.

Katz and Scotland (1959) in a study on 'a preliminary statement to a theory of attitude, structure and change' reported that attitude is an inclination or disposition to evaluate an object or the symbol of the object.

Singh and Singh (1970) in a study on 'a multi – variate analysis of adoption behaviour of farmers' reported that high scores on attitude is a tendency or disposition to evaluate an object or the symbol of the object.

Johnson and Johnson (1979) explained that the emphasis on hands-on experiences in school garden also increased opportunities for students to work together in groups to "explore, share information, generate alternative ideas, invent tests to try out each other's ideas, and sharpen inferences through discussion".

Spooner and Simpson (1979) in a study on 'attitude of elementary teachers toward science and science teaching' reported that neutral or negative attitudes

towards science itself might be basic in nature that school teachers had little opportunity for using the garden as a tool to teach science.

Shannon and Chen (1988) in a study on 'a three-year school-based nutrition education study' reported that greater improvement in nutritional attitudes by students with gardening and nutrition in the garden, had a positive effect on students.

Hackman and Wagner (1990) in a study on 'the senior gardening and nutrition project' reported that students with gardening improved nutritional attitudes.

Fredericks *et al.* (1993) reported that the students are given opportunities to make their own judgments on school vegetable garden and select learning behaviour according to their interest and needs.

Miller (1993) reported that students imitate others by learning new behaviours on garden activities and that the effect of environmental influence will cognitively act as an intermediated construct.

Canaris (1995) in a study on 'integrating gardening and nutrition education into the total curriculum' reported that students take pleasure in learning and show positive attitudes towards education through involvement in school vegetable gardens.

Milton *et al.* (1995) reported that vegetable gardening programme helped to show that outdoor learning releases students from the pressures of reading, writing, and teacher approval, to discover new interests and capabilities within themselves and a positive attitude toward vegetable gardening activities.

Campbell (1996) observed that activity based environmental instruction that allowed for interaction between students and living systems resulted in an increase in positive attitudes toward the environment.

In a study on 'improving environmental attitudes of children through hands-on learning' it was reported that students involved in the outdoor activity of school gardening had more positive attitudes to gardening regardless of the time spent. Students also learn the importance of caring for natural resources. A garden of native plants or drought-tolerant plants, for example, provides an excellent opportunity to teach students about water conservation. The students will be enabled to observe and in-turn will help them in choosing the right plants. The study concluded that the students participating in gardening project had higher positive environmental attitudes than the control group. (Waliczek and Zajicek, 1996; Skelly and Zajicek, 1998).

Avramidis *et al.* (2000) in a study on 'student and teachers' attitudes towards the inclusion of children with special educational needs in the ordinary school' reported that one of the main difficulty to the accomplishment of putting together students with important disabilities and teachers has been recognized as more of teacher's attitudes.

Waliczek *et al.* (2001) in a study on 'the effect of school gardens on children's interpersonal relationships and attitudes toward school' found that school students learning from their experiences in garden has significantly more positive attitude toward school when focused with a garden programme.

Smith and Molsenbocker (2005) in a study on 'impact of hands-on science through school gardening in Louisiana public elementary schools' reported that students in science classes complete work as part of the garden curriculum who were given abundant time to had better achievement scores than students who learn in the garden and were given little or no time.

Lautenschlager and Smith (2008) in a study on 'an evaluation of inner-city youth garden programme participant's dietary behaviour and garden and nutrition

knowledge' reported that student attitudes and self-efficacy were measured before and after exposure of vegetable garden programme.

McBeth and Volk (2010) in a study on 'a baseline study of middle grade students in the united states' reported the strong attitude of students towards importance of knowing where food comes from and how to produce it.

2.3 ATTITUDE OF TEACHERS TOWARDS SCHOOL GARDENING

Vygotsky (1978) deduced that learner enthusiastically constructs new knowledge centered on previous knowledge on vegetable gardening, gardening skills and garden experiences. The duty of the teacher is to act as a chaperon for the learner through the zone of proximal progress on vegetable garden and to help the student look at new ways of thinking and practicing gardening.

Newman (1985) states that whole gardening activities under the guidance of teachers in school improves reading and listening skills of students on environmental attitudes which support their use in all aspects of gardening.

Harvey (1990) resolute that vegetable garden in school is used as a teaching resource and enhanced knowledge level of students on botany improving their attitude towards the gardening activities.

Beisel (1991) reported that hands-on experiences in school garden also provide teachers excellent opportunities to go beyond the apparent and helps students in problem solving to a higher level.

Roberts (1993) specified that students make associations with real-life purposes, problems, and needs by using a variety of materials to extend learning to make it more meaningful as teachers organized objectives on vegetable garden around a definite theme with purpose.

Reichel (1994) reported that assessment is viewed by teachers as an important part of the teaching students on school gardening and the learning process becomes facilitative rather than as an end point.

Lineberger and Zajicek (2000) in a study on 'can a hands-on teaching tool affect students' attitudes and behaviours regarding 'fruit and vegetables' reported that perfect age to implement garden-enriched learning for students should be identified in order to achieve dependable transformation of attitudes.

Derman (2007) conducted study with 'student-teachers'. It was aimed to decide 'student-teachers' attitude towards teaching profession and self-sufficiency observations. Attitudes of the ones who are not satisfied were found to be higher.

2.4 PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL PROFILE OF STUDENTS AND TEACHERS

2.4.1 Age

Age is the number of years fulfilled by the school students and teachers at the time of data collection.

Monk (1995) utilized an integrated gardening curriculum while teaching first grade students and encouraged students to try these types of garden projects with their respective classes, irrespective of their ages. She observed that a sense of ownership with responsibility emerged as one of the values they learned when facilitated for gardening activities in schools as years progressed. Through such collective experiences, the children learned to work together as their learning and curiousness for new things continued.

Waliczek and Zajicek (1996) reported that age was found to be of no influence on environmental attitude scores of students participating in the school garden programme.

Lineberger and Zajicek (2000) commented that the younger students are the more acceptable and flexible and they accept school gardening as a new learning resource beyond the classroom.

Bissonnette and Contento (2001) reported some evidence of young students to investigate adolescent views about the environmental impact of food production practices with reference to organic and locally produced foods.

McAleese and Rankin (2007) in a study on 'garden-based nutrition education affects fruit and vegetable consumption in sixth-grade adolescents' reported that short-term nutrition education programme can improve vegetable and fruit consumption among students aged 10 to 13 years.

Generally, students select a career aligned with what they studied in schools. In the case of agriculture, the subject is not formally learned at school. one does gain exposure to farming when the fellow grows up involving on or near a farm. It is important for kids in primary school to play in soil and agriculture gives them excellent chance to get their hands muddy. Seeing plants grow and yield fruits will be excellent experiential learning and will trigger an interest among students in farming. Also, this can give children an appreciation and understanding of agriculture and food from a young age (Sathya, 2017).

2.4.2 Education

Education refers to the extent of formal learning possessed by the school vegetable garden respondent at the time of interview. In case of students, education was just a measure to understand the 'chronological level or standard' of students engaging in school vegetable gardening programmes.

Viju (1985) stated that the education level of students was seen influencing their knowledge level and their attitude towards gardening which in turn influenced their adoption level.

Blair *et al.* (1991) in a study on ‘dietary, social and economic evaluation of the Philadelphia urban gardening project’ reported that school gardens may be actual tools for imparting teaching on nutrition education to students.

Sheffield (1992) in a study on ‘effects of an interdisciplinary garden-based curriculum’ stated that the use of a garden-based curriculum for students is an effective way to increase learning and understanding in school and the learning of the same should start in early ages of their schooling.

Mary *et al.* (1994) in a ‘study on vegetable garden found that youth’s attitude was positive and significantly associated with their educational status.

Perry *et al.* (1998) in a study on ‘changing fruit and vegetable consumption among students’ reported that female students may be more interested to nutrition and health education because they are more worried about physical appearances.

Simmons (2000) observed that secondary students from eleventh standard who undertake ‘outdoor vegetable gardening’, scored higher in 72 per cent of the academic appraisals when compared with students ailing from traditional schools.

Truong (2008) stated that education is an important factor that affects adoption of new technologies in any type of farming system.

According to Johnson *et al.* (2010), the negative influence of education was explained as, when educational level of individuals go beyond high school, it affected the use of futures, options and/or cash contracts negatively in all forms of vocation.

2.4.3 Secondary Occupation

Secondary occupation means the other vocations undertaken by the respondents other than their main source of regular income. In this study secondary occupation is any other vocation undertaken by the school teacher other than teaching which supplements their primary income. Review specifically for secondary

occupation and specifically for teachers are not extensively available hence general review is presented below.

Oommen (2007) reported in his study on 'mode of viewer preference of vegetable garden programmes through various channels of television' that 53% of teacher's respondents had secondary occupation like vegetable gardening.

Kafle (2011) stated that teachers occupation did not have any influence on organic vegetable production, be it primary or secondary occupation.

Beevi (2014) in a study on 'radio listening behaviour of farm families in the digital age' reported that percentage of youngsters accepting agriculture as secondary occupation is less due to having higher education and non-availability of land for economic cultivation.

2.4.4 Dwelling place

Dwelling place in this study refers to the place where the respondents lives together with family and the same was measured in terms of being in rural or urban in nature.

Several reports underline the importance of vegetable gardening in urban areas especially with special reference to success of sustainable urban life designed, carved and maintained by people of the same dwelling units or area. There studies also report the interest of educated adults to involve in agriculture in urban settings than to practice the same in rural areas. (Harvey, 1990 and Bradley, 1995).

Wals (1994) observed there are divergent perceptions among urban, rural and suburban youth on issues of nature and the garden environment and this has led to different interpretations.

2.4.5 Distance

Distance in this study refers to the total travel distance of teachers and students from home to school and vice versa.

Panther *et al.* (2008) reported that young students living nearer to school are more likely to walk to school and also involve in extracurricular activities than the students living away from school.

Davison *et al.* (2008) in a study concluded that the distance has been recognized as an indicator of physically fitness for school students and teachers by walking every day from home to school.

2.4.5 School garden size

School garden size in this study refers to the area under cultivation undertaken by the school students and teachers and the same is measured in cents. Important research findings from various authors are presented below.

Thomas (2000) reported the necessity of bringing more medicinal plants by way of herbal gardens in Kerala and one way to facilitate its expansion is by making use of unused land available in schools and similar institutions. This has become necessary due to the pressure on land by way of defragmentation and increase in population, and hence decrease in land area for agriculture in general.

Raghu *et al.* (2014) stated that farm size is considered as one of the most reliable and consistent factor that exhibited positive statistical significance with adoption.

2.4.6 Area under vegetable garden cultivation in school

Area under vegetable garden cultivation is operationalized as the area utilized for cultivating vegetables in schools which was measured in cents.

Meedhu (2012) reported that the students who have already tasted success with vegetable cultivation at their school are gearing up to play their part in making the State self-sufficient in vegetables as part of the Integrated Vegetable Cultivation Drive launched by the Agriculture Department. It is expected that with the successful implementation of the project in at least 6,000 hectares in schools and households of students would result in the production of approximately 72,000 tonnes of vegetables

Kochi edition of 'The Hindu' reports that the Vegetable and Fruits Promotion Council Kerala (VFPCCK) was to develop vegetable gardens in 1,000 schools with the theme 'A Vegetable Garden in my school' within three months as part of its agri@schoolprogramme aimed at cultivating interest in agriculture among school children. According to estimates presented by VFPCCK, between two and 15 cents of land will be used for vegetable gardens in schools. It is estimated that 600 tonnes of vegetables can be produced from the 1,000 gardens in schools from an approximate area of 150 acres (The Hindu, 2012).

2.4.7 Social orientation

Social orientation refers to the theory that explains why a person has particular behaviour, relationship and adaptation with other people and/or society in general. Social orientation in this study refers to the respondents participating in civic affairs within school or out of school.

Kaplan's (1973) study found that people who involve in garden activities received aesthetic pleasure through gardening. It provided an opportunity for actors (students and teachers) to relax and also provided a sense of social orientation. In all, gardening was perceived as a valuable way to spend time.

Younisset *al.* (1997) reported that student's "crowd" membership significantly denotes to service and civic engagement. The "school" crowd, which endorsed studying, getting good grades, and belonging to school clubs, did additional social service than other forms of crowds.

The results on personality assessment of individuals points to the fact that regardless of the “objective” task performed, the individual’s orientation toward the situation had a strong effect on the way social presence affected performance. A positive orientation toward social manifestation carried a significant performance benefit compared to a negative social orientation (Uziel, 2007).

2.4.8 Extent of volunteering

Volunteering in this study refers to the extent of voluntary participation for community service work inside or outside school.

Hodkinson and Weitzman (1996) reported that youth are four times more likely to volunteer if they are asked to do garden activities.

Melchior (1997) reported that at the high school level, the comparison group averaged 29 hours volunteering in the last 6 months for extracurricular activities as versus 57 hours for the service-learning participants.

Johnson *et al.* (1998) found that 68% of students did no volunteering in any of the study years and majority of volunteers reported 1-5 hours per week.

Benson *et al.* (1999) reported that 50% of respondents said they contributed at least one hour per week of volunteer service in school garden activities.

Scale *et al.* (2000) reported that service is less a spontaneous outcome of personal motivation and volunteering. The more result in volunteer service of student’s network and organizational resource is available in school.

2.4.9 Political orientation/Civic engagement

Political orientation/civic engagement is defined as that which characterizes the thinking of a group or nation and in this study it refers to the degree the respondents have participated in any issues that are political or civic oriented.

Younisset *al.* (1997) established that one thing that significantly related to service and civic engagement of students was “crowd” membership and it was reiterated by the fact that the “school” crowd, which endorsed studying, getting good grades, and belonging to school clubs, did more social service than other crowds.

Billig (2002) reported that community service and service-learning in U.S. schools has grown in popularity over the last two decades, in part as a response to beliefs about the importance of political orientation as a means for civic engagement of students apart from academic curriculum.

Wheeler (2002) testified that civic activism will address societal problems and works toward social change.

2.4.10 Social participation

Social participation refers to one's degree of participation in a community or society. In this study social participation refers to the degree of participation of teachers and students in personal, social and community development programmes.

As part of an ‘Earth Science’ course, Kern and Carpenter (1986) resolute that students involving in outdoor field activities, scored significantly better in higher-order learning than students who did not participate in outdoor learning over the same unit.

Kleinbard (1997) stated that social participation of youth enable young people to engage in “responsible, challenging action that meets genuine needs, with prospect for planning and decision making influencing others.

When Jayapalan (1999) reported a non-significant relationship between social participation and extent of adoption, Sindhu (2002) in a study reported that the respondents are likely to lose interest in active participation within and outside social system among vegetable growers.

In a study on 'growing minds' Robinson and Zajicek (2005) that student participation in a yearlong garden programme helped students widen and refine teamwork, life and self-understanding skills. For the success of school garden projects garden programs should also include home and community components (McAleese and Rankin. 2007).

Ratcliffe *et al.* (2011) observed that community events like gardening allowed students in the garden group to model behavioursto their peers and family and social setup.

2.4.11 Gardening experience

Garden experience is operationalized as the experience of the students and teachers in gardening at home before or after involving in the school vegetable gardening activities. Relevant statements cited by different authors are presented below.

Chinchu (2011) in a study conducted among vegetable and banana respondents concluded that only 13% were having an experience in vegetable or banana cultivation for five or less than five years.

Zanuet *al.* (2012) reported that farming experience showed a positive and significant relationship with the adoption of improved technologies by the respondents.

Lieberman and Hoody's (1998) and Emekauwa (2004) reported that 3 years of place-based learning focused on local ecology-nature trails, soils, geology, butterfly gardens, and school interactions with subject experts resulted in overall development of the individual.

2.4.12 Level of excitement

Excitement is a feeling or situation of full of activity, joy, exhilaration, or happiness. Level of excitement in this study is the level of interest of students and

teachers to get involved with happiness in vegetable gardening in schools. Relevant statements cited by different authors are presented below.

Sarver (1985) reported that the students were very excited to learn and assist each other and cooperate in all aspects of gardening from seed to marketing.

Neer (1990) reported that a small group of students (Juniors and High school) were more excited in growing vegetables in school garden. As a result of this involvement, it was reported that a few youngsters and their families have started container gardens at home.

Monk (1995) reported that based on the teaching and training the students were excited to establish garden in school.

2.4.13 Factors of influence towards the school gardening

Factors of influence is a decisive factor thought by some (students or teachers) to affect individual tendencies and distinctiveness in a particular direction and in this study it refers to the school gardening.

May (1969) based on his study concluded that people act based on their influence on past experience and knowledge; therefore, if a person has limited knowledge and experience about a topic, it may affect the individuals perception.

Washington and Rodney's (1984) in their study among school students, reported that parents tends to steer students away from agricultural and natural resources careers to favour their thoughts to me only inclined to academic activities. However, Bandura (1986) reported that gardens may enhance a school's curricular, physical, and social learning environments in ways that are predicted by influence of children's knowledge, attitudes and preferences and consumption of vegetables.

Schuster and Costantino (1986) reported that the sources of influence related to exposure to agriculture included prior experiences, relatives in agricultural work, radio broadcasts, TV programmes, and literature however,

Ellibee (1990) opined that urban students have little interaction with agriculture, rural students have more interaction with agriculture.

Scofield (1995) reported that students and parents experiences with the agriscience courses have the potential to influence their attitudes towards agriculture and subsequent career decisions by adding a new factor with the gardening skills knowledge of that school's students (Walton *et al.* 2010).

2.4.14 Awareness

Level of awareness in this study refers to the extent or level to which students and teachers are aware about the different practices in establishing and maintaining school vegetable garden.

Schuster and Costantino (1986) reported that lack of awareness about vegetable garden as an important constraint in adoption of school garden.

Harbstreet and Welton (1992) in a study involving 1000 secondary agricultural education students found that awareness about agriculture activities in school are 'limited'

Coulson *et al.* (1998) found that 44 per cent of their sample to be aware of additives in food, especially food colourings. Awareness on gardening related aspects appeared to increase with age, particularly between the ages of 5-6 years and 7-8 years.

Buddhibhuvanewari (2005) reported that majority of respondents had medium level of awareness (46.00%), followed by low (31.00%) and high level (22.00%) of awareness on ecofriendly management practices in vegetable cultivation.

Okunlola (2010) stated that awareness is the first stage of adoption before the respondents develop an interest for technology use in gardening activities and later decides on adoption.

The Hindu (2015) reported the Kerala Agricultural University (KAU) programme to support farming operations in schools through 'Krishisree', an agricultural orientation programme for higher secondary students to be implemented by the KAU. The programme is aimed at promoting agriculture and driving home the importance of food safety and nutritional security and would be implemented throughout the State.

2.4.15 Knowledge

Knowledge is operationalized in this study as the amount of information derived through different sources available in schools for better understanding of school students and teachers on vegetable gardening and the behavioural transformation therein.

Piaget (1951) observed that "children's knowledge of the world changes as their cognitive system develops. As the knower changes, so does the known experience is always filtered through the child's current ways of understanding". Piaget enumerated each stage of knowing is a period of time in which the child's thinking and behaviour reflects a certain kind of basic mental organization. He explained that the stages proceed in a particular order, and no stage can be skipped. As a child moves through a stage, or to another stage, through the process of learning, he or she strives to maintain a state of equilibrium. A child constructs meaning through assimilation and accommodation (Raines and Canady, 1990).

Schuster and Costantino (1986) reported that lack of knowledge about vegetable garden as important problem in adoption of garden. In a study on 'Harvesting a curriculum' Nelson (1988) reported the way a school-yard garden helped bind subjects together in the students' minds and hands on experiences with

agriculture have been shown to create a significant increase in a student's knowledge and interest in agriculture (Perritt and Morton, 1990).

(Watson and Konicek, 1990., Fredericks *et al.* 1993 and Roberts, 1993) reported that learning does not always mean searching for the "right" answer, but rather the learning process itself is the knowledge acquired and the process involved in the construction of his or her knowledge as he or she explores a topic or area of one's choice thereby enabling associations with real-life purposes, problems, and needs.

There are now major gaps between research and practice with respect to school gardens. There is great enthusiasm and commitment in the field, and much anecdotal evidence regarding positive impact. Further research is needed to provide stronger tests of school gardens within the domains of individual and school functioning discussed here and to identify best practices and processes associated with meaningful effects and long-term sustainability. It is important that inquiry on school gardens extend beyond nutrition to the potential effects on the psychosocial and academic development of youth and on the school as a setting for development (Higgins and Sad, 1997; Waliczek, *et al.*, 2001 and Ozer, 2006). Learning by doing is a common descriptor of experiential learning. Learning by doing, learning in real-life context, learning through projects, and learning by solving problems are what Knobloch (2003) calls the four pillars of experiential learning in agricultural education.

Wasescha and Ness (1998) reported that the participants gained experience and knowledge about organic farming and nutritional benefits from the fruit and vegetables that they grow. Kuhlemeier *et al.* (1999) reported students lack knowledge about agriculture through large-scale survey of 9000 secondary school students in the Netherlands.

Contento *et al.* (1995) reported that school gardens provide opportunities for hands-on learning activities that are vital in nutrition education when Skelly and Zajicek (1998) reported that students gained most of their environmental knowledge at school rather than at home or through the media. Graham *et al.* (2005) in a study on 'School gardens as an effective nutritional tool to promote healthful eating habits' reported that school gardens can positively impact choices of children's food by improving their preferences for particular vegetables and enabling an increasing their nutrition knowledge.

2.4.16 Mass media exposure

Diversified collection of media technologies that reach a large audience via mass communication methods is referred to as mass media exposure and it takes place through a variety of outlets. In this study mass media exposure is operationalised as to the source and frequency the respondent school students and teachers are exposed to different mass communication media for drawing information on different aspects school gardening activities.

Krishnamurthy *et al.* (1998) found that mass media participation was relatively higher in case of adopters (83.00 %) as compared to the non adopters. Nagoormeeran and Prince (1999) revealed that 72.00 per cent of respondents were found to have medium to high degree of exposure of mass media channels like news paper, television, journal, on shrimp farming, meeting and exhibitions organised by government and private companies.

Telecommunication revolution information is available to every stakeholder. Mass media like television, radio, internet, telephone and fax are widely used to obtain up to date information and technology (Khokhar, 2003 and Roy, 2004).

Banerji (2005) in a study on 'Challenges faced in communication by rural market in India' testified that television is major information source for rural masses for any stakeholders with increase in TV coverage and ownerships.

2.4.17 Training

Training is a process by which someone is taught the skills that are needed for an art, profession, or job. A needs assessment is a systematic process for determining and addressing needs, or "gaps" between current conditions and desired conditions or "wants". In this study the number of trainings the respondents attended and the subject area of training required by the respondents was studied under the variable training.

Dobbs (1996) in a survey in the year 1995 of teachers indicated a high level of interest in the use and promotion of school gardening programmes. Many of the responding teachers requested additional training in this subject area.

According to FAO (2004), at the national level, a school garden programme, should be initiated: for institutional arrangements which bring together and coordinate key players, especially Ministries of Education, Agriculture and Environment, to facilitate the development of a national policy framework and implementation guidelines, and provide technical support for programme planning and implementation. It further emphasis the need for training of teachers, school canteen cooks and volunteers from within the community in the planning and management of school gardens and in their use for teaching and school feeding, as well as the preparation of practical training guidelines.

Teacher training in the use of a garden-based curriculum, and the implementation of a school gardening programme will reduce many barriers on the march to garden-based education. Linkages with environmental education (e.g. through tree planting, organic production, integrated soil fertility and pest management, etc.) can also be established. Tree planting in schools can be promoted for various purposes, such as for shade, fruit production or even for harvesting of natural pesticides (e.g. neem). Composting and household waste management could be a useful area of learning through training and involvement which would also encourage community involvement. The inclusion of training courses in bookkeeping

and marketing into teaching related to school gardens, will increase business skills and contribute to an improved understanding of the economic value of small-scale agriculture (Ham *et al.*, 1989 and FAO, 2004).

Use of IT in agriculture will promote interest among students to gather information on gardening. Tadasad and Shreedhar (2006) reported that more than 60 per cent of the students, who were using computers, had not received any formal training in the use of computers. At the same time, more than 18 per cent had learnt computers as part of their curriculum.

2.5 PERCEPTION OF STUDENTS AND TEACHERS REGARDING BENEFITS OF SCHOOL GARDENING

We could have Chez Panisse food in the cafeteria and the kids wouldn't eat it. The key is learning how to grow the very fruits and vegetables they reject at the family dinner table. This may sound like a cliché by now, but it's true. If they grow it, they'll eat it.

— Marsha Guerrero, executive director of *The Edible Schoolyard*.

Assembling the sense of the world around, articulating one's interpretation and apprehension, raising questions and sharing ideas are all critical aspects of learning. There are so many fascinating dimensions to explore with the children. Seeing connections and reflecting upon them will expand the capacity of the brain by helping students bind with 'rootedness' to the earth. Heightened awareness, body-kinesthetic abilities, interpersonal skills, linguistic and intellectual abilities, as well as aesthetic and artistic sensibilities are fruits of being close to nature (Seshan, 2014). This 'back to nature' form of learning, through the initiation of school gardening project thus assumes greater significance.

Neer (1990) said that he gardened with children who were near their normal age level in schools with severe physical handicaps and other disabilities. He

observed remarkable changes in students after a year of gardening. A teenage girl who was totally blind was more relaxed, could make spontaneous speech and was able to talk about her feelings more comfortably in the garden than in the classroom. A small group of junior high students often bicker among themselves in school, but offer help to each other while tending the garden”.

Many teachers use the garden as a laboratory to introduce students to scientific methods through plant-related experiments and nutrition education across the curriculum and increase physical activity opportunities for students during the school day (Bunn, 1986., Alexander, North, and Hendren, 1995 and Canaris, 1995).

Waters (1993) reported that teachers are also the beneficiaries of a multitude of sources of information on gardening with children provided by the professional horticulture community.

Lytle and Achterber (1995), Harmon (2011) McAleese and Rankin (2007) and Robinson and Zajicek (2005) affirmed that fwill encompass opportunities for students to taste and learn about produce through gardening activities.

As per the concept note released by FAO (2004) school gardens, both urban and rural, can have several interrelated objectives, including:

- increasing the relevance and quality of education for rural and urban children through active learning and through introduction of agriculture and nutrition knowledge and skills, including life skills, into the curriculum;
- providing school children with practical experience in food production and natural resource management, which serve as a source of innovation they can take home to their families and apply in their own household gardens and farms;
- improving school children’s nutrition by supplementing school feeding programmes with a variety of fresh micronutrient and protein-rich products, and increasing children’s knowledge of nutrition, to the benefit of the whole family.

Also, a review of school garden programmes over the past thirty years shows that the functions of school gardens can be classified as “educational” and “economic/food security”.

Educational aims

- Increasing the relevance and quality of education for rural and urban children by introducing into the curricula important life skills.
- Teaching students how to establish and maintain home gardens and encourage the production and consumption of micronutrient-rich fruits and green leafy vegetables.
- Providing active learning by linking gardens with other subjects, such as mathematics, biology, reading and writing.
- Contributing to increasing access to education by attracting children and their families to a school that addresses topics relevant to their lives.
- Improving children’s attitudes towards agriculture and rural life.
- Teaching environmental issues, including how to grow safe food without using pesticides.
- Teaching practical nutrition education in order to promote healthy diets and lifestyles Educational aims.
- Providing students with a tool for survival at times of food shortages.

Economic and food security aims

- Familiarizing school children with methods of sustainable production of food that are applicable to their homestead or farms and important for household food security.
- Promoting income-generation opportunities.
- Improving food availability and diversity.
- Enhancing the nutritional quality of school meals.

- Reducing the incidence of malnourished children attending school Economic and food security aims.
- Increasing school attendance and compensating for the loss in transfer of “life skills” from parents to children due to the impact of HIV/AIDS and the increasing phenomenon of child-headed households.

Lohr and Pearson (2005) reported that in addition to science, the garden provides opportunities to teach mathematics, history-social science, English-language arts, and visual and performing arts. Yet a small but growing body of evidence suggests that garden-based education may be an effective method to improve students’ test scores (Klemmer, Waliczek, and Kajicek, 2005), and lessons in the school garden may be exchanged for regular classroom instruction time, rather than acting as a supplementary activity.

2.6 CONSTRAINTS EXPERIENCED BY THE SCHOOL STUDENTS AND TEACHERS

A constraint, in simple term is a limit or restriction. In this study constraints are those limiting or restricting components in the process of developing and maintaining vegetable garden in schools.

Eberling (1977) stated that school gardening puts pressure on teachers as they already are saturated with teaching requirements, and they are very restricted by the inadequate amount of time they have to work with the students.

The lack of awareness and knowledge about vegetable garden was an important constraint in adoption of school garden as reported by Schuster and Costantino (1986).

Monroe and Kaplan (1988) found that, the limitations of exploring fewer major issues, the unknown degree of project success, and the potential classroom and community constraints” make it difficult for sustainable continuance of the programme. Learning by doing may not be the most effective strategy in at least

some cases. FAO (2004) pointed out that in the South, even though school-based food production has been the main orientation the same has faced many difficulties and has generally proved to be unsustainable.

Methodology

CHAPTER - III

METHODOLOGY

This chapter comprises the details of methodology used in the present investigation and is furnished under the following heads.

- 3.1 Research design
- 3.2 Locale of the study
- 3.3 Sampling procedure
- 3.4 Selection and operationalization of concept and measurement of variables
- 3.5 Method of data collection
- 3.6 Statistical techniques used

3.1 RESEARCH DESIGN

Interpreting the different components of a study in a coherent and logical way so as to effectively address the research problem requires a sound research design. Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to the research question and control variance. Research design is the systematic frame work that has been created to seek answers to the research question (Kerlinger, 1983).

Different categories of school vegetable garden dimension and variables (both independent and dependent) contained in the objectives of the study were identified through literature search. Such identified variables were included in the study after discussion with subject matter specialists and focus group discussion. Survey method was employed to gather data on profile characteristics and others details of the respondents.

A direct survey approach was followed for recording the primary data from the respondent at the field level, based on the ex-post facto research design. According to

Singh (2006) an ex-post facto research is one in which investigators attempt to trace an effect that has already occurred to its possible causes.

Ex post-facto research is a systematic enquiry in which the scientist does not have direct control over the variables because their manifestation has already occurred or because they are inherently not manipulative (Kerlinger, 1983). Thus research design of the study is based on the ex-post facto approach in finding out the cause effect relationship of the variables involved in the study.

3.2 LOCALE OF THE STUDY

Thiruvananthapuram district widely known as the educational capital is purposively selected for the study (Fig 1). Many Government, Aided and Unaided schools are maintaining vegetable gardens through the funding of State Government and the service support extended by 'Department of Agriculture Development and Farmers' Welfare', Kerala. It was understood after discussion with Directorate of Public Instruction (DPI), around 100 schools in Thiruvananthapuram were undertaking vegetable gardening in the district. Hence, Thiruvananthapuram, district was purposively selected for the study.

3.3 SAMPLE AND SAMPLING PROCEDURES

3.3.1 Selection of respondents

10 best performing schools in vegetable gardening was purposively selected in consultation with the officials of Directorate of Public Instruction (DPI) of the district. The respondents were then selected from these schools. The study comprised of two categories of respondents *viz.*, school students, and school teachers in charge of the programme.

The selected schools from Thiruvananthapuram district is given in table 1.

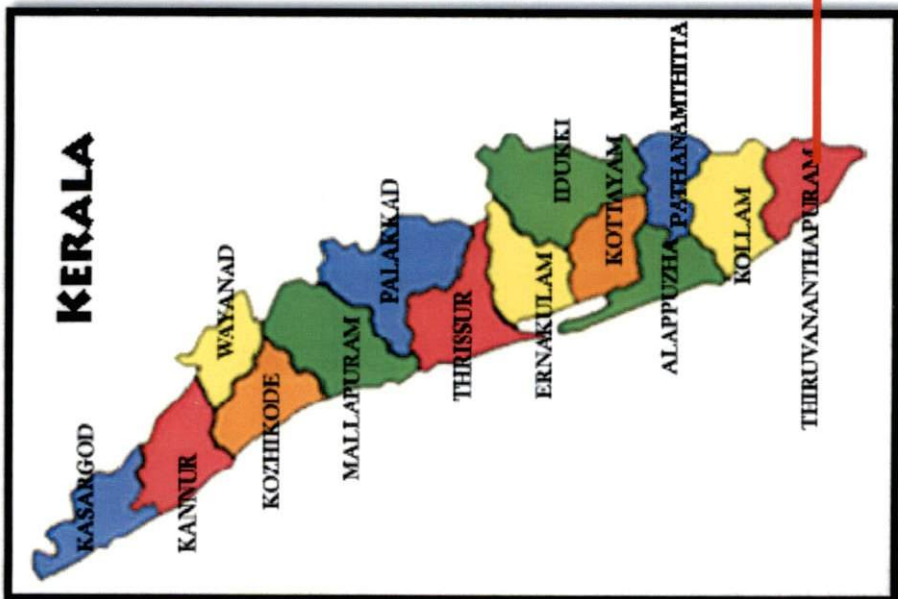


Fig 1. Location map of study area

Table: 1 List of selected schools.

Sl. No.	List of School Name	Respondent (N=130)	
		Students	Teachers
1	Government High School, Vazhamuttom, Thiruvananthapuram.	10	3
2	M G M Vidya Mount Public School, Edavilakom, Thiruvananthapuram.	10	3
3	Government Girls High Secondary School, Cotton Hill, Vazhuthacaud, Thiruvananthapuram	10	3
4	Government High School, Pappanamcode, Thiruvananthapuram	10	3
5	B N V V Higher Secondary School for Boys, Thiruvallam, Thiruvananthapuram	10	3
6	SreeSethu Parvathi Bhai High School, Kadakkavoor, Thiruvananthapuram	10	3
7	St. Mary's Higher Secondary School, Pattom, Thiruvananthapuram	10	3
8	Government Girls Higher Secondary School, Attingal, Thiruvananthapuram	10	3
9	S N V Government Higher Secondary School, Kadakkavoor, Thiruvananthapuram	10	3
10	St. Joseph's Higher Secondary School, Palayam, Thiruvananthapuram.	10	3
	Total	100	30

Ten active volunteers who were actively participating in the school vegetable gardening activities were selected randomly from 10 schools after consulting the respective school teachers. Thus a total of 100 student respondents were selected for the study. Thirty school teachers who were involved with the school vegetable gardening activities from the study district were randomly selected for the study. Thus, a total of 10 schools were selected for data enumeration and a total of 130 respondents were selected for meeting the objectives of the study.

3.4 SELECTION AND OPERATIONALIZATION OF CONCEPT AND MEASUREMENT OF VARIABLES

3.4.1 Independent variables

Different categories of technological dimensions and variables (both independent and dependent) contained in the objectives of the study were identified and included through literature search. After discussion with subject matter specialists 30 independent variables were identified for the study. These variables were subjected to judges rating by 30 judges (Appendix- I). The judges were extension specialists of Kerala Agricultural University, officials from other Agricultural Universities and lead teachers of schools with vegetable garden. The judges were asked to indicate the degree of relevance of each variable on a five point continuum indicating the relevance from maximum relevance to least relevance with scores ranging from five to one respectively. The final variables were selected based on criteria of mean relevancy score which was calculated by summing up all the scores obtained by each variable and dividing it by the total number of judges that responded. Those variables which had scores more than mean score were selected and included for the study. The list of independent variables with their measurement technique is presented in table 2.

Table 2: List of independent variables and their measurement

Sl. No	Independent variables	Measurement
1	Age	Actual chronological age and classification based on census report(2011)
2	Education	Score of one each completed level of class and categorisation of same using the method of Thomas (2004)
3	Secondary occupation	Additional income during occupation other than teaching.
4	Dwelling place	Whether the respondents live in a rural or urban area

5	Distance	Actual distance in 'km' for the respondents to travel from home to school.
6	School vegetable garden size	Actual school vegetable garden area in cents.
7	Social orientation	Arbitrary scale developed for the study.
8	Extent of volunteering	Scale developed by Melchior (1997) with slight modification
9	Political orientation	Scale developed by Wheeler (2002) with slight modification
10	Social participation	Arbitrary scoring procedure developed for the study.
11	Level of excitement	Scale developed by Monk (1995) with slight modification
12	Knowledge	Teacher made statements developed for study for measuring the knowledge source and Knowledge source effectiveness
13	Awareness	Scale developed by Mathialagan and Senthikumar (2012) with slight modification
14	Mass media exposure	An arbitrary scale developed for the study
15	Training	Arbitrary scoring procedure developed for the study.
16	Benefits of school vegetable garden	An arbitrary scale developed for the study from statements derived from 'EARTH' programme.

3.4.1.1 Age

Age was operationally defined as the number of years completed by the respondent at the time of investigation.

- a) In case of teachers, this was measured as the total number of years completed by the respondent at the time of interview and was classified based on census report, 2011 in case of teachers.

Age category	Years	Score
Young age	Less than 35 years	1
Middle age	35 to 55 years	2
Old age	More than 55 years	3

- b) Students were categorized based on the frequency under each age.

Age category	Frequency	Percentage
12		
13		
14		
15		
16		

3.4.1.2 Education

Education refers to the extent of formal learning possessed by the school vegetable garden respondent at the time of interview. The scoring procedure adopted by Thomas (2004) with slight modification was used for the study and is as follows. One score was added to every successful completion of formal schooling and the respondent were categorized based on their level of education. School student's education was categorised based on the frequency under each class of study.

Sl. No	Items	Frequency	Percentage
1	7 th standard		
2	8 th standard		
3	9 th standard		

School teacher's education were categorised based on the frequency under each degree attained by the teachers at the time of interview. The frequency were recorded under degrees like BA./B.Sc./B.Com, MA./M.Sc./M.Com, B.Ed., M.Ed., M.Phil. and Ph.D.

Sl. No.	Items	Frequency	Percentage
1	BA./B.Sc./B.Com.		
2	MA./M.Sc./M.Com.		
3	B.Ed.		
4	M.Ed.		
5	M.Phil.		
6	Ph.D.		

3.4.1.3 Secondary occupation

Secondary occupation means the other vocations undertaken by the respondents other than their main source of regular income. In this study, secondary occupation is any other vocation undertaken by the school teacher other than teaching which supplements their primary income.

Category		Frequency	Percentage
Primary occupation	Teaching		
	Other		
Secondary occupation	Agriculture		
	Businesses		
	No secondary occupation		

The respondents were grouped into different categories based on their job expressed as frequency and percentage.

3.4.1.4 Dwelling place

Dwelling place in this study refers to the place where the respondents live together with family and the same was measured in terms of being rural or urban in nature. The respondents were grouped into different categories and expressed as frequency and percentage.

Category	Frequency	Percentage
Rural		
Urban		

3.4.1.5 Distance

Distance in this study refers to the actual travel distance of teachers and students from home to school and vice versa.

The respondents were grouped into different categories and expressed as frequency and percentage.

Category (Distance in Km)	Frequency	Percentage
Less than 3 km		
3 to 6 km		
More than 6 km		

3.4.1.6 Social orientation

Social orientation in this study refers to the respondents participating in civic affairs within school or outside school. The respondents were grouped into different categories and expressed as frequency and percentage.

Category	Frequency	Percentage
Regular		
Sometimes		
Never		

3.4.1.7 Extent of volunteering

Extent of volunteering in this study refers to how often the respondents volunteered work for community service with or without relation to school. Extent of volunteering in this study for students and teachers were measured in terms of their involvement in school vegetable gardening and expressed as hours per week. The respondents were grouped into different category viz., high and low with weighted mean values as a measure of check.

3.4.1.8 Political orientation/civic engagement

Political orientation/Civic engagement is defined as that which characterizes the thinking of a group or nation and it refers to the degree the respondents have participated in any issues that are political or civic oriented. The respondents asked whether they have participated in any political oriented programme and responses

were obtained as Yes/No. For those who responded Yes were asked to mention their involvement in the four programme mentioned below as Yes/No and their frequency and percentage were together worked out.

Whether respondents have participated in any political oriented programmes?

Yes – 1

No - 0

If the respondents tick Yes, the response for the statements as given below was sought.

Programmes	Frequency	Percentage
Actively involvement in Politics		
Boycott a product or service and demonstrate publicly for a cause		
Environment protection campaign		
Food security programmes		

3.4.1.9 Social participation

In this study social participation refers to the degree of participation of teachers and students in personal, social and community development programmes. The respondents were grouped into different categories and the score were expressed as frequency and percentage.

Category	Score	Frequency	Percentage
Regular	3		
Occasionally	2		
Never	1		

3.4.1.10 Gardening experience

Gardening experience is operationalized as the experience of the students and teachers in gardening at home before or after involving in the school vegetable

gardening activities. The responses were sought from students and teachers for questions with Yes/No choice and the score obtained from them was expressed as frequency and percentage.

Did your family have a garden at home before you started involving in the school vegetable garden activities?

Yes - 1

No - 0

With reference of different gardening types, the respondents can possess more than one type of garden.

Category	Frequency	Percentage
Ornamental garden		
Kitchen garden		
Herbal garden		
Vegetable garden		
Mixed farm garden		

3.4.1.11 Level of excitement

Level of excitement in this study is the level of interest of students and teachers to get involved with happiness in school vegetable gardening. The responses of students and teachers were sought for the questions given below with designate values and each of the expressed values were transformed in terms of frequency and percentage.

- Are you really excited to come to school for participating in the vegetable garden activities?

Yes - 1

No - 0

- Student's involvement in garden activities?

Daily - 3

Once in 2/3 days - 2

Once in a week - 1

- How excited are you to participate in school garden activities?

Very excited - 3

Moderate - 2

Not excited - 1

3.4.1.12 Factors of influence

In this study, factors of influence refer to decisive factor thought by some (students or teachers) to affect individual tendencies and distinctiveness in a particular direction. Level of encouragement, purpose of involvement, personal and socio-psychological factors, economic factors and technological factors were the subcomponents designating factors of influence (Appendix II). These factors were measured by assuming a maximum score for individual statement of four and a minimum score of one. The total score was commuted for the statement under each continuum (Appendix III) and the same for each statement was expressed as frequency and percentage.

Category	Frequency	Percentage
Strongly Agree		
Agree		
Disagree		
Strongly Disagree		

3.4.1.13 Awareness on enabling factors

Level of awareness (basically on enabling factors) in this study refers to the extent or level to which students and teachers are aware about school vegetable gardening activities. Seven statements finalized through focus group discussion after review of literature were administered to the respondents to measure their level of awareness on school vegetable gardening. Awareness was measured in a five-point continuum from most aware to least aware with an assumed score value of 5 to 1 respectively. The maximum score a respondent could obtain was 35 and the minimum score was 7. Three class limits were then fixed viz. ≤ 16 , 17 to 26 and 27 to 36 and the scores obtained by each individual was summed and were then categorized into high, medium and low with reference to their level of awareness on school vegetable gardening.

Category	Score
Most aware	5
More aware	4
Aware	3
Less aware	2
Least aware	1

3.4.1.14 Knowledge

Knowledge is operationalized in this study as the amount of information derived through different sources available in schools for better understanding of school students and teachers on vegetable gardening and the behavioural transformation therein.

The ‘teacher made test’ was used to measure the variable knowledge. 10 items (as listed in appendix II) were finalized after judges rating to measure knowledge source and the level of effectiveness of each source in terms of the information available to students on vegetable gardening. Each respondent was awarded a score ‘one’ for the response ‘available’ and zero value for the response ‘not available’. The total score for knowledge material as marked by the respondent was calculated by summing up the scores for each statement. The maximum score that a respondent could obtain was 10 and the minimum was zero.

For each knowledge material/source item available to the students, its effectiveness was scored by assigning a value of ‘3’, ‘2’ and ‘1’ for ‘very effective’, ‘effective’ and ‘not effective’ respectively.

Category	Score
Very effective	3
Effective	2
Less effective	1

The maximum score that a respondent could obtain was 30 and the minimum was 10. Based on the mean value and standard deviation the respondents were categorized into high, medium and low with respect to knowledge source effectiveness of respondents on school vegetable gardening.

3.4.1.15 Mass media exposure

In this study mass media exposure is operationalised as to the source and frequency the respondent school students and teachers are exposed to different mass communication media for drawing information on different aspects of school gardening activities.

The mass media exposure was measured in terms of the type of media the respondents rely on to seek information and the relative usefulness/effectiveness of the source of information.

In case of the source of information the respondent student was asked to assign a score of 1 for the different source of information. Based on the total score obtained for each item, the source of information was ranked and presented as given below.

Sl. No.	Items	Total score	Rank
1	News paper		
2	Television		
3	Magazines		
4	Radio		
5	Mobile advisory services		
6	Kiosks		

In case of extent of effectiveness of the mass media, the measurement was done as given below.

Sl. No.	Items	Very effective (3)	Effective (2)	Less effective (1)
1	News paper			
2	Television			
3	Magazines			
4	Radio			
5	Mobile advisory services			
6	Kiosks			

There were 6 components considered under the mass media source. The total score was obtained by summing up the values for different mass media sources. The maximum score obtainable by a respondent was 18 and minimum 6. Based on the standard deviation and mean value, the respondents were categorized as high, medium and low.

3.4.1.16 Training

In this study the number of trainings attended by the respondents and the subject area of training required by the respondents was studied under the variable training.

a) Training received from expert

It refers to the number trainings received by the respondents from experts on school vegetable garden cultivation. The actual numbers of trainings received by the respondents were recorded and the same was then categorized based on the duration of training undergone by the respondents.

The same was then expressed as frequency and percentage.

Category	Frequency	Percentage
No training		
One training		
Two trainings		
Three or more trainings		

b) Training need

It refers to the training needs of respondents in school vegetable gardening and the training need of each respondents were worked out in three-point continuum, wherein '3' indicates 'very much', '2' indicates 'much', '1' indicates 'not much', for the corresponding statement.

Question	Very much (3)	Much (2)	Not much (1)
Do you require training on vegetable gardening from experts?			

The total score was computed and the respondents were categorized into 'low, medium and high' category of training needs.

Further, the respondents were administered with items eliciting their responses on the areas of training in vegetable garden as given below.

Sl. No.	Training need	Students (N=100)		
		Very Much (3)	Much (2)	Not much (1)
1	Production			
2	Protection			
3	Value addition			
4	Marketing activities			

The total score of individuals were taken for each items and the subject area of training required by the respondents was worked out.

The results were expressed as frequency and percentage on each area of training required by all the respondents of study

3.4.1.17 Perception of students and teachers regarding 'benefits' of school vegetable gardening

Benefits, in this study is a process by which the students and teachers assemble the sense of the world around, articulating one's interpretation and apprehension, raising questions and sharing ideas are all critical aspects of learning in the process of getting involved with school vegetable gardening.

Eight statements finalized through focus group discussion and after review of literature highlighting the benefits of school vegetable gardening. These statements were administered to the respondents. Benefits were measured in a three-point continuum from high benefit, medium benefit and low benefit with an assumed score value of 3, 2 and 1 respectively. The maximum score a respondent could obtain was 24 and the minimum score was eight. Three class limits were then fixed viz. 8 to 14, 15 to 20 and 21 to 26 and the scores obtained by each individual was summed and were then categorized into high, medium and low with reference and their perception on benefits of school vegetable gardening. Also, the respondents score for statements depicting benefit of school vegetable garden were worked out and presented.

3.4.2 Area, type of vegetable crops and other components in the school vegetable gardens.

3.4.2.1 School vegetable garden size

Area under vegetable garden cultivation is operationalized as the actual area utilized for cultivating vegetables in 10 schools which was measured in cents.

First the total area of school was documented and the distribution of schools based on total area was categorized as given below:

Category (area in cents)	N= 10 Schools	
	Frequency	Percentage
Less than 250		
250 to 500		
More than 500		

Then, the total area of school was documented with detailed enumeration of area under buildings, playground, garden land and unused area with intermittent perennial non-commodity crops. Also, the mean school vegetable garden area was worked out.

3.4.2.2 Crops grown in school vegetable garden

The crops grown as a part of the school vegetable gardening were enumerated and documented. The crops and its occurrence in the respective schools were worked out and was expressed in terms of frequency and percentage.

Crops	10 SCHOOLS	
	Frequency	Percentage %

3.4.2.3 Type of garden

In this study the observation and documentation of the different types of garden like outdoor garden, raised bed garden, indoor garden, container garden, greenhouse garden, mixed cropped vegetable garden and sole vegetable cropped garden maintained in the respective schools were done. The number of gardens for 10 schools in total was expressed as frequency and rank position of each type of gardens based on its numerical dominance.

Types of garden	10 SCHOOLS	
	Frequency	Rank

3.4.2.4 Types of fencing

In this study fencing refers to the structure that encloses a school for the safety of the students and protection of the resources owned by the schools, and is usually constructed with different materials like, rocks, bricks, boards, wire, rails or netting. The types of fencing were documented for the 10 schools and the same was expressed in frequency and percentage.

Types of fencing	Frequency	Percentage
Live		
Brick Wall		
Wire		
Mesh netting		
Mud wall		
Combinations		

3.4.2.5 Frequency of irrigation

Frequency of irrigation was operationally defined as the extent to which irrigation water was available in the school vegetable garden and the extent of area irrigated using this available water. It was worked out based on the schedule of irrigation on weekly basis. The same was then expressed as frequency and percentage.

Schedule of irrigation per week

Irrigation schedule	10 SCHOOLS	
	Frequency	Percent %
Hose		
Daily		
Twice a week		
Thrice a week		
Weekly		

3.4.2.6 Method of irrigation

This was measured based on the type of irrigation methods adopted for school vegetable gardening. The frequency and percentage was worked out as given below:

Method of irrigation.

Irrigation methods	10 SCHOOLS	
	Frequency	Percent %
Hose		
Sprinkler irrigation		
Drip irrigation		
Basin irrigation		
Others, if any		

The score for methods of irrigation was obtained by the school students and teachers. The score that could be obtained by a respondent was 4 and 1 as maximum and minimum respectively. Based on the score, respondents were grouped into different categories as frequency and percentage.

3.4.2.7 Water resources

Water resources are operationally defined as the different sources of water available in the school for providing water for use in vegetable garden. It was measured based on water resources available in the school for gardening activities and the same was expressed in frequency and percentage as given below.

Source of irrigation water	Frequency	Percentage
Well		
Pond		
Pipe (Public water system)		

3.4.2.8 Financial support

Financial support operationally defined as the various means of financial support available in the school for developing and maintaining school vegetable garden. The responses were expressed as frequency and percentage as given below.

- Whether any financial support for purchasing implements and inputs?

Yes = 1

No = 0

- If Yes, who supports

Category	Frequency	Percentage
Government		
School management		
NGO's		
Commodity Boards		
Scientific institutions like KSCSTE, DOECC, KBB/PTA		

3.4.3 Dependent variable

3.4.3.1 Student and teacher's attitudes towards gardening and garden activities

Attitude of school students and the teachers was the main dependent variable of the study. The attitude of school students as a result of managing and maintaining the vegetable gardens and the attitude of school teachers towards vegetable gardens was measured using procedures developed in the EARTH [Education And Resiliency To Horticulture] programme with slight modification.

Scale consisted of 14 statements of which 9th, 10th, 11th, 12th, 13th and 14th were negative for students and the scale consisted of 14 statements of which 10th, 11th, 12th, 13th and 14th statement were negative for teachers.

Attitude Statements for the students and teachers are given in appendix II.

The respondents were asked to state their response on a four-point continuum ranging from 'strongly agree', 'agree', 'disagree' and 'strongly disagree'.

Category	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

The score obtained for the fourteen statements were cumulated to obtain the attitude score of the respondent. The score that could be obtained by a respondent was 56 and 14 as maximum and minimum respectively. Based on the score respondents were grouped into different categories viz., high, medium and low.

3.4.4 Constraints experienced by the school students and teachers with suggestions for refinement on school vegetable gardening

Based on discussion with school students and teachers involved in school vegetable gardening and also through relevant literature search, some of the constraints faced by them were identified. A list containing such constraints as given below was prepared and incorporated in the final interview schedule.

Sl. No.	Items	Score			
		4	3	2	1
1	High input cost				
2	Non availability of labour				
3	High labour cost				
4	Inadequate capital				
5	Lack of student's interest				
6	Uneconomic holding				
7	Lack of technology				
8	Lack of knowledge about gardening				
9	Scarce water resource				
10	Non availability of credit				
11	Poor storage facility				

12	Lack of teacher's involvement				
13	Lack of student's participation				
14	Non availability of implements				
15	Lack of protection implements				
16	Lack of extension service				
17	Lack of time				
18	Lack of motivation				
19	Poor economic status				
20	Surplus but insufficient for marketing				
21	Wild animals destroy produce				
22	Less profit				
23	Lack of proper training				
24	Difficult to work				
25	Pilferation				

The reaction to each constraint was obtained on a four-point continuum namely most important, important, less important and least important with the score 4, 3, 2 and 1 respectively. Mean rank cumulative index for each constraint was worked out and the constraints were ranked and catalogued. The suggestions for refinement of the school vegetable garden to address the constraints were also collected from the students and teachers and these were prioritized followed by focus group discussions.

3.5 METHOD OF DATA COLLECTION

An interview schedule was prepared in English with two sections specifically for 100 students and 30 teachers for data collection. A pretesting was carried out to evaluate the interview schedule in a non-sample respondent group. Suitable modifications were made on the basis of evaluation and final interview schedule was prepared. The respondents were interviewed and responses obtained from the school students and teachers were entered in the schedule in appropriate column. Later master table was prepared in excel sheets and the data was subjected to various statistical tools for drawing interpretations of information generated.

3.6 STATISTICAL TOOLS USED

The following statistical tools were employed or used in this study.

3.6.1 Mean

The respondents were grouped into categories with reference to the mean as check of the selected independent variables. After grouping the respondents into categories, their percentages were worked out.

3.6.2 Percentage analysis

This descriptive analysis measure was used for simple comparisons. It explains the distribution of school students and teachers. For calculating percentages, the frequency of the particular cell was multiplied by hundred and divided by the total number of school students and teachers. It was corrected into two decimal points.

3.6.3 Standard deviation

This measure was used to categorize the dependent and independent variables of school students and teachers. Standard deviation is a measure of the amount of dispersion of a data set.

3.6.4 Standard error

Standard error is used to measure statistical correctness of an approximate in the standard deviation results of school students and teachers.

3.6.5 Correlation analysis

Correlation analysis was used to describe the relationship between profile characteristics of respondents and attitude towards school students and teachers on vegetable gardening. It is used to find the out the extent of relationship between dependent variable and independent variables. Significance of correlation was tested for 5 per cent and 1 per cent level of significance.

Results & Discussions

CHAPTER - IV

RESULTS AND DISCUSSIONS

This chapter deals with the results and discussion based on the analysis of data obtained after survey research. The results and discussions are presented under the following heads.

- 4.1 Distribution of students and teachers based on independent variables
- 4.2 Distribution of students and teachers based on dependent variables
 - 4.2.1 Attitude of students and teachers towards the managing and maintenance of school vegetable garden and gardening activities.
 - 4.2.2 Correlation between the attitude with the Selected Characteristics of the respondents.
 - 4.2.3 Distribution of students and teachers based on attitude and its relation test for significance in attitude of students between schools.
- 4.3 Constraints experienced by the students and teachers on school vegetable garden and gardening activities.
- 4.4 Suggestions for refinement on school vegetable gardening.

4.1 DISTRIBUTION OF STUDENTS AND TEACHERS BASED ON THEIR INDEPENDENT VARIABLES

The distribution of students based on their independent variables selected through judges rating are presented below.

4.1.1 Age

Age was operationally defined as the number of years completed by the respondent at the time of investigation. This was measured as the total number of

years completed by the respondents, viz., students and teachers at the time of interview. The frequency and percentage under the respective age category of students and the classification of teachers age based on census report, 2011 are presented in table 3 and table 4 respectively.

Table 3. Distribution of students according to their age.

Category (age)	Students (N= 100)	
	Frequency	Percentage
12	2	2.00
13	23	23.00
14	33	33.00
15	28	28.00
16	14	14.00
Mean = 14		
Standard deviation = 2.603543		
Standard error = 0.823313		

A perusal of Table 3 illustrates the distribution of students based on their age. From the table, it was evident that majority of the student respondents (33.0 %) belonged to the age 14 followed by 28.0 per cent of the respondents in age 15 and 23.0 per cent in the age 13. The mean age of the students involved in school gardening activities was 14 years.

Table 4. Distribution of teachers according to their age

Category	Teachers (N=30)	
	Frequency	Percentage
Above mean age	17	56.77
Below mean age	13	43.23
Mean age = 43.23		
Standard deviation = 7.166		
Standard error = 1.308		

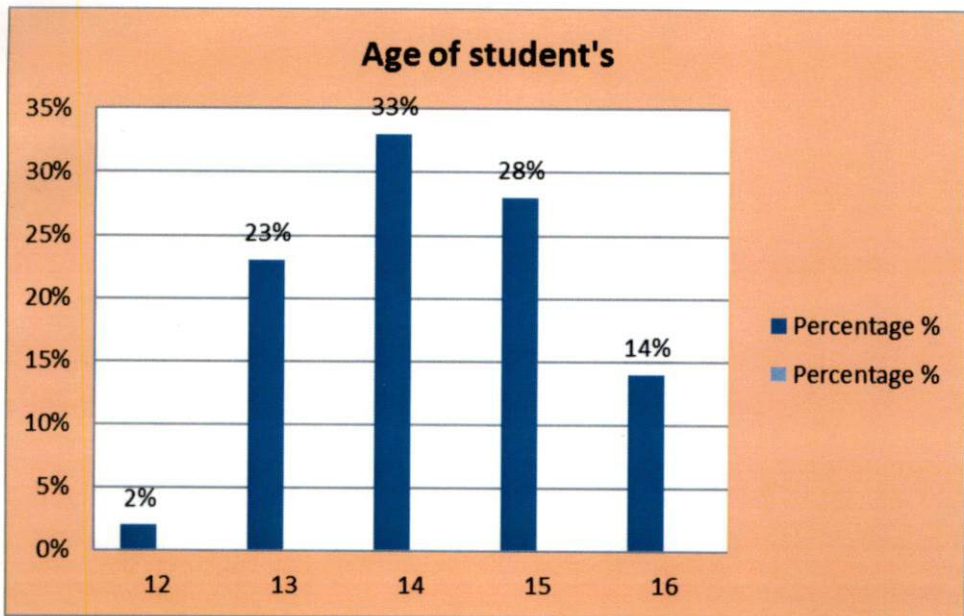


Fig. 2. Distribution of students based on their age

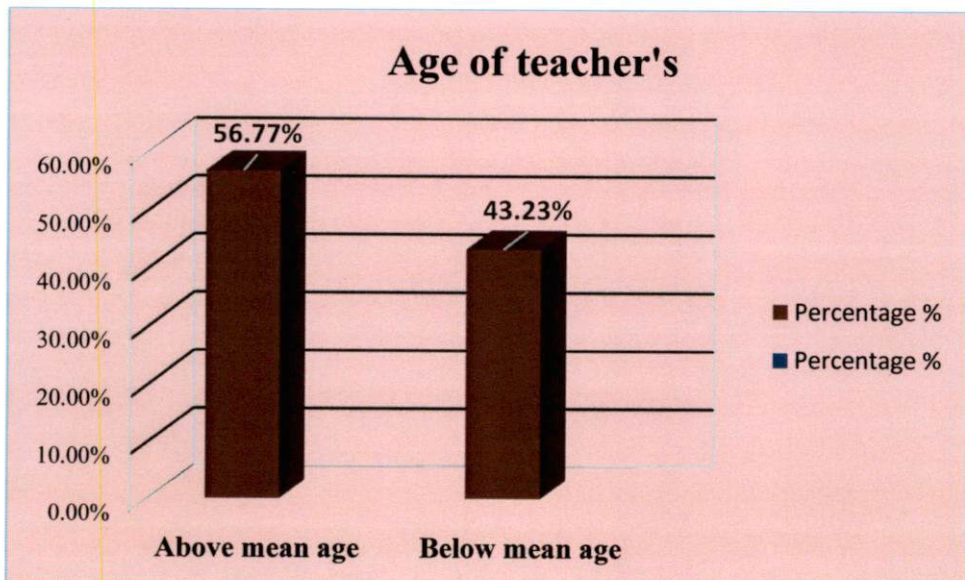


Fig. 3. Distribution of teachers based on their age

A perusal of Table 4 point to the distribution of teachers based on their age. From the table, it was evident that majority of the teacher respondents (56.77 %) belonged in the 'above mean age' category and 43.23 per cent belonged in the 'below mean age' with mean as the check.

This level of favourable condition prevailing in school vegetable gardening activity can be explained in terms of the judicious and well planned initiatives of the school authority that focuses on the overall development of the young students without compromising the academic quality. The table 3 clearly illustrates that the choice of students for the gardening activities is mainly through the involvement of students who are either 13, 14 or 15 years. Also, the results highlight the importance of outdoor activities of kids being extended to these types of gardens at very young age as it will invoke sensitivity towards nature by knowing and feeling the plants. It will also enable them to learn activities that they can do and enjoy in garden like watering, harvesting, weeding etc. This calls for an adequate policy and support system that ensure better knowledge on vegetable garden activities for students and teachers to motivate them to take pride in school through their voluntary involvement in school vegetable gardening. The results are in agreement with the finding of Lineberger and Zajicek (2000) and McAleese and Rankin (2007).

4.1.2 Education

Education refers to the extent of formal learning possessed by the school vegetable garden respondents at the time of interview. The scoring procedure adopted by Thomas (2004) with slight modification was used for the study and is as follows. One score was added to every successful completion of formal schooling which highlights the current year of study. The respondents were categorized based on their level of education and their results are presented in table 5.

Table 5. Distribution of students according to their education

Category	Students (N=100)	
	Frequency	Percentage
7 th	40	40.00
8 th	40	40.00
9 th	20	20.00
Mean = 7.8		
Standard deviation = 0.752		
Standard error = 0.0752		

The distribution of students based on their standard of study represented in table 5 shows that 40 % each of students belonged to 7th and 8th standard respectively whereas only 20 % of students from 9th standard was engaged in vegetable gardening. The distribution of teachers based on their educational status is represented in table 6.

Table 6. Distribution of teachers according to their education

Category	Teachers (N=30)	
	Frequency	Percentage
BA/BSc/B.Com	13	43.34
MA/MSc/M.Com	15	50.00
B.Ed./M.Ed.	100	100.0
M Phil	2	6.67
PhD	0	0

It can be observed that 100 per cent of teachers are B.Ed./M.Ed. holders. When 43.34 per cent of the teachers were B.A./B.Sc. graduates, it was found that 50 per cent of teachers were post graduates either in science or humanities. Only 6.67 per cent of the teachers have M Phil. Qualification and none of the teachers interviewed did possess doctorates.

The table 5 clearly illustrates that the selection of students for the gardening activities is mainly focusing on 7th and 8th standards, may be a deliberate choice made

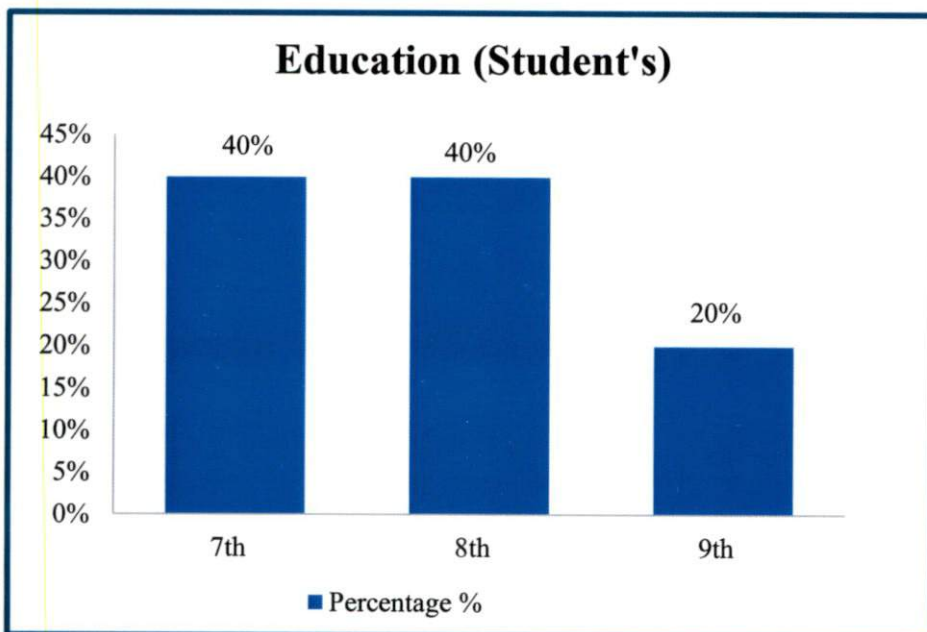


Fig. 4. Distribution of students based on their education

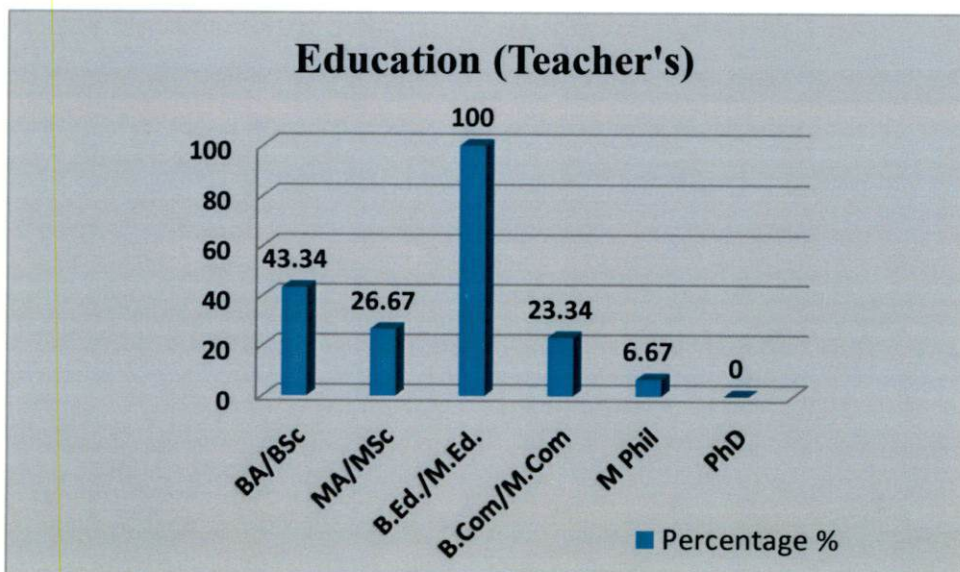


Fig. 5. Distribution of teachers based on their education

by the schools. It is because sixth standard students may be too young and 9th and 10th standard students are deliberately avoided so as to focus their full attention on their board examination. Also, the results highlight the importance of outdoor activities of kids being extended to these types of gardens as it will invoke sensitivity towards nature by knowing and feeling the plants. Either the students or the school authorities carefully prefers students belonging to lower classes for school gardening activities, as students of higher classes (9th and 10th) tend to focus more on studies. Also, it was heartening to observe that the majority of the teachers were highly educated and their commitment for the overall individual personality of the students can be effected positively, through activities such as school gardening. The result that majority of the respondents possess high level of education is in conformity with the studies of Truong (2008), Johnson *et al.* (2010) and Singh *et al.* (2010).

4.1.3 Secondary Occupation

The variable secondary occupation was only applicable for the respondent group of teachers. In this study, secondary occupation is any other vocation undertaken by the school teacher other than teaching which supplements their primary income. The teachers were grouped into different categories and the results are illustrated in Table 7.

Table 7. Distribution of teachers according to their secondary occupation

Category		Teachers (N=30)	
		Frequency	Percentage
Primary occupation	Teaching	30	100.00
	Other	0	0
Secondary occupation	Agriculture	12	40.00
	Business	2	6.67
	No secondary occupation	16	53.33

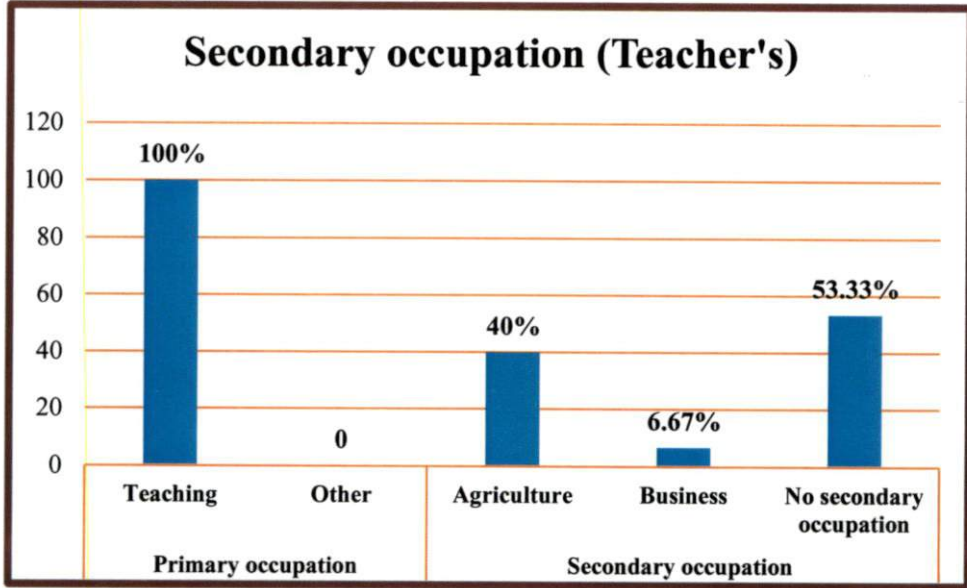


Fig. 6. Distribution of teachers based on their secondary occupation

From Table 7, it was seen that teaching was the primary occupation of teachers and 53.33 per cent of the teachers were not having secondary occupation followed by less than half of the teachers (40%) had agriculture as their secondary occupation. About 6.67 per cent of the teachers had some small business as their secondary occupation.

Hence it was concluded that agriculture as secondary occupation is less. The results are in agreement with the findings of Kafle (2011) and Beevi (2014). The results also points out of the facts 53.33 per cent of teachers having no secondary occupation can be persuaded to do agriculture through training cum sensitization programmes.

4.1.4 Dwelling place

Dwelling place in this study refers to the place where the respondents (students and teachers) live together with family and the same was measured in terms of being rural or urban in nature. The students and teachers were grouped into different categories and the results are presented in Table 8.

Table 8. Distribution of students according to their dwelling place

Category	Students (N=100)		Teachers (N=30)	
	Frequency	Percentage	Frequency	Percentage
Rural	61	61.00	11	36.67
Urban	39	39.00	19	63.33

Results from Table 8 revealed that 61 per cent of the students lived together with family in rural area and the rest in urban area. On the contrary, about 63.33 per cent of the teachers lived together with family in urban area and the rest in rural area.

Therefore, it was concluded that majority of students studying in the school hails from rural area where as majority of teachers are from urban area. The results

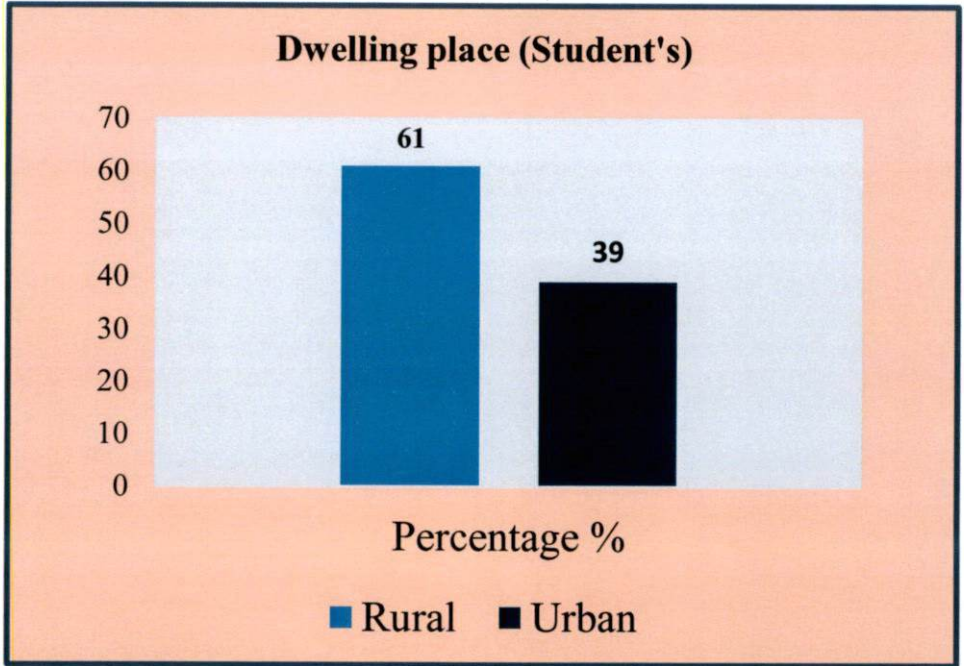


Fig. 7. Distribution of students based on their dwelling place

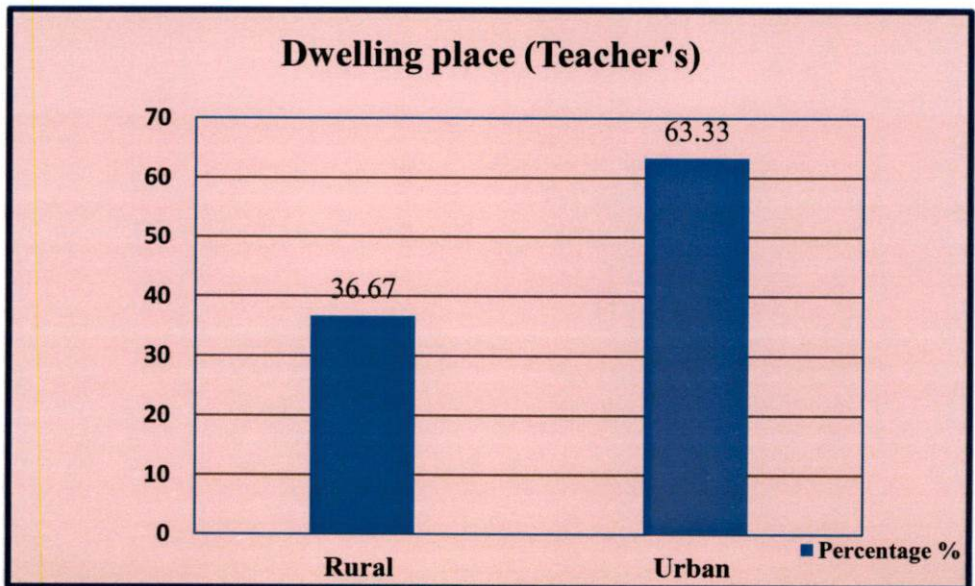


Fig. 8. Distribution of teachers based on their dwelling place

may be an indirect indication of the poor economic status of many school students whose parents could either be farmers or labourers.

4.1.5 Distance

Distance in this study refers to the total travel distance of students and teachers from home to school and vice versa. The respondents (students and teachers) were grouped into different categories and the results are presented in Table 9.

Table 9. Distribution of students and teachers according to their distance from home to school

Category	Students (N=100)		Teachers (N=30)	
	Frequency	Percentage	Frequency	Percentage
Less than 3 km	45	45.00	6	20.00
3 to 6 km	42	42.00	9	30.00
More than 6 km	13	13.00	15	50.00
Mean	3.45		7.23	
Standard deviation	2.318		5.489	
Standard error	0.2318		1.002	

On analyzing the Table 9, it was found that 45 per cent of the students travelled from home to school in less than 3 km followed by 42 and 13 per cent of the students travelled from home to school in 3 to 6 km and more than 6 km respectively. It was noticed that 50 per cent of the teachers had to travel more than 6 km from home to school followed by 30 and 20 per cent of the teachers travelling '3 to 6 km' and 'less than 3 km' respectively from home to school.

Therefore, it was concluded that most of the students travelled from home to school in a distance less than 3 km but most of the teachers travelled more than 6 km to reach to school from home. Young students living nearer to school are more likely to walk to school and also involved in extracurricular activities than the students

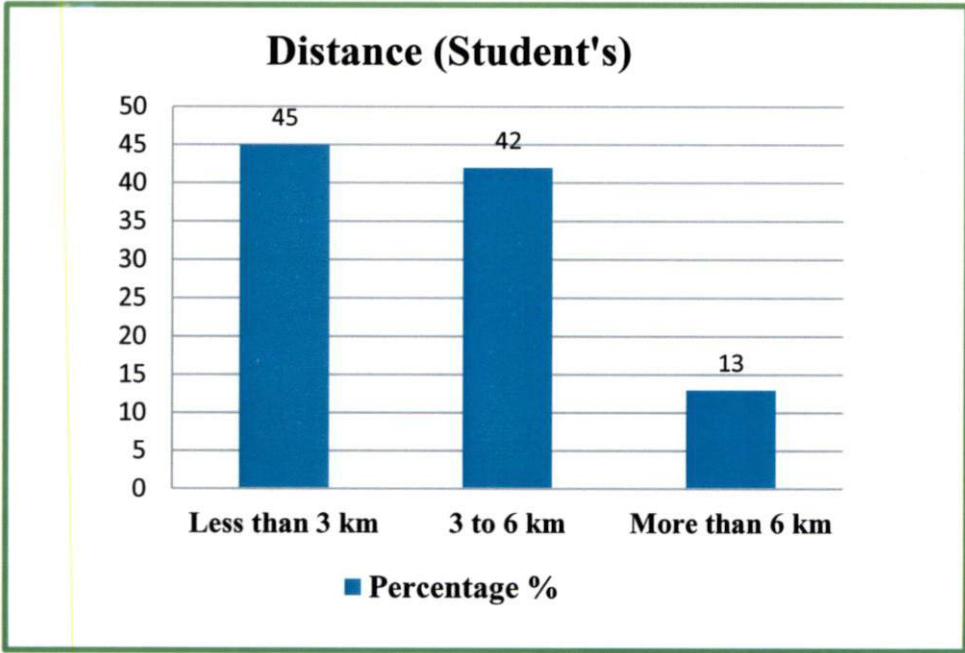


Fig. 9. Distribution of students based on their distance from home to school

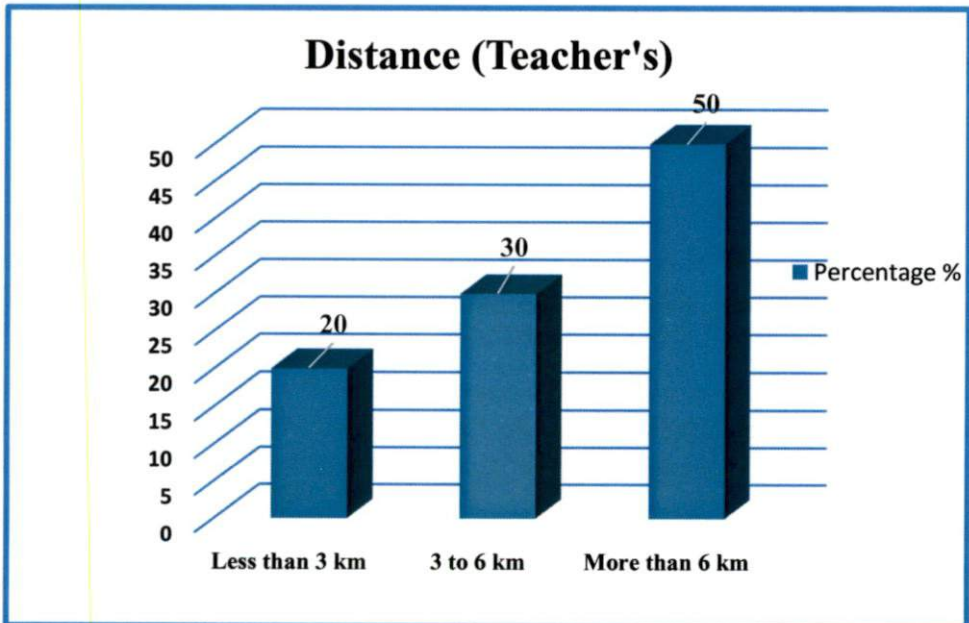


Fig. 10. Distribution of teachers based on their distance from home to school

living away from school. The results are in conformity with the findings of the study done by Panter *et al.* (2008) and Davison *et al.* (2008).

4.1.6 Social orientation

Social orientation in this study refers to the students and teachers participating in civic affairs within school or out of school. The respondents (students and teachers) were grouped into different category and the results are depicted in Table 10.

Table 10. Distribution of students and teachers according to their social orientation

Category	Class limits	Students (N=100)		Teachers (N=30)	
		Frequency	Percentage	Frequency	Percentage
Low	<4	17	17.00	3	10.00
Medium	≥4 to <5	54	54.00	27	90.00
High	≥5 to <6	29	29.00	0	0
Mean		4.19		4.433	
Standard deviation		0.800		0.6789	
Standard error		0.0800		0.1239	

From Table 10, it was found that 54 per cent of the students had medium level of social orientation followed by 29 per cent of the students with high level of social orientation and 17 per cent of the students with low level of social orientation.

The distribution of teachers based on their social orientation represented in table 10 showed that 90 per cent of the teachers were with medium level of social orientation followed by 10 per cent of the teachers with low level of social orientation.

Hence it can be concluded that the social orientation of the majority students ranged from medium to high and that of the majority teachers were medium level. The result supports the findings of Younis *et al.* (1997) and Uziel (2007). However, on comparing the mean value of social orientation, it could be seen that teachers had a high mean score (4.43) as against students (4.19). This is a clear indication that

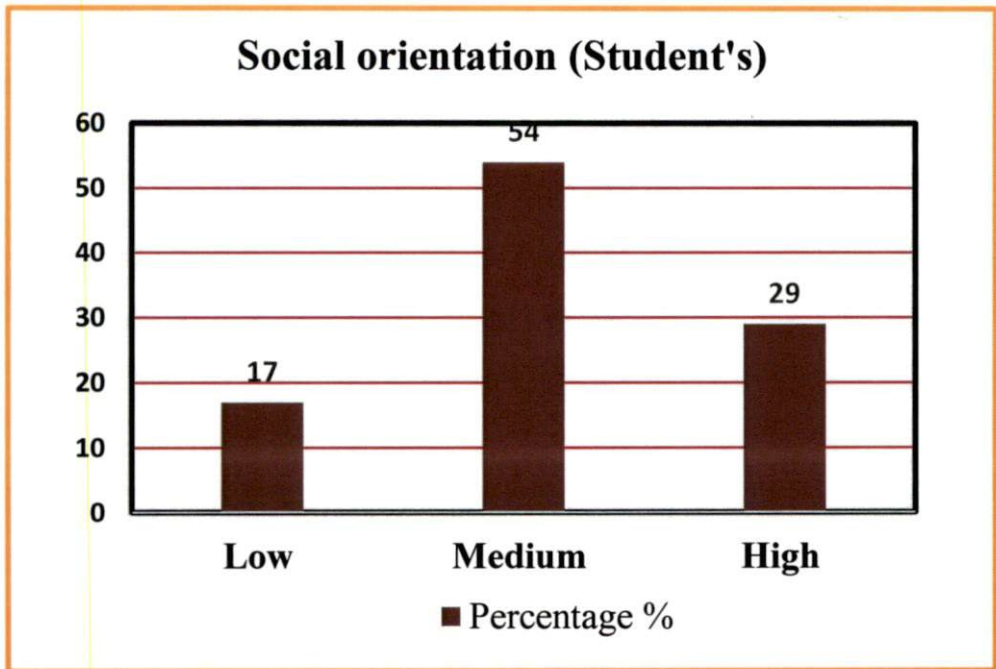


Fig. 11. Distribution of students based on their social orientation

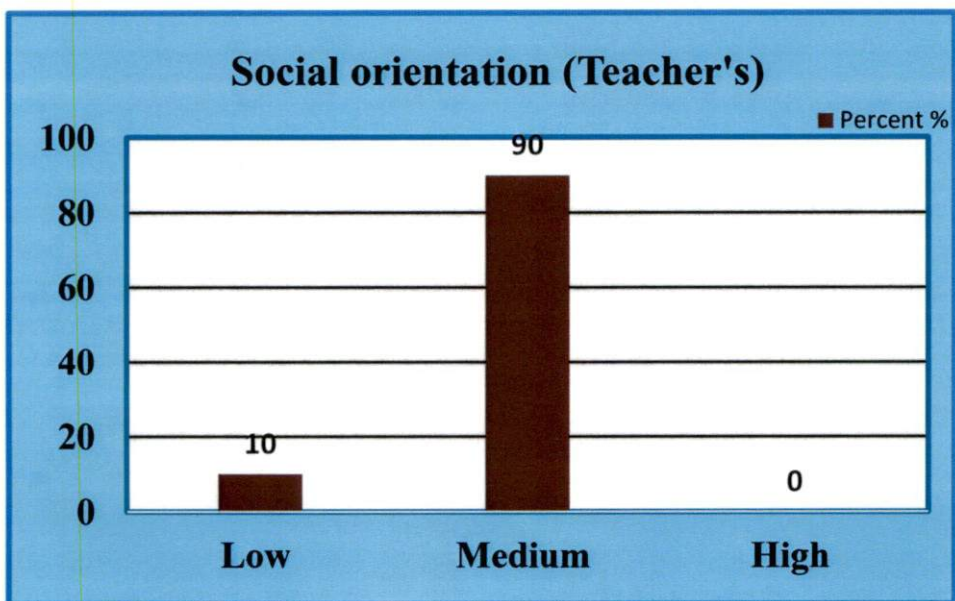


Fig. 12. Distribution of teachers based on their social orientation

teachers are actively involved in more civic affairs rendering different types and nature of community services.

4.1.7 Extent of volunteering

Extent of volunteering for students and teachers were measured in terms of their involvement in school vegetable gardening and was expressed as hours per week.

The respondents (students and teachers) were grouped into different category and the results are presented in the Table 11, 12 and 13.

Table 11. Distribution of students and teachers according to their extent of volunteering (work in school).

Category (hours/week)	Students (N=100)		Teachers (N=30)	
	Frequency	Percentage	Frequency	Percentage
High	60	60.00	18	60.00
Low	40	40.00	12	40.00
Weighted mean	165 min/week		165 min/week	
Lower value	120 min/week		120 min/week	
Higher value	240 min/week		240 min/week	

From perusal of the table 11, it was observed that 60 per cent of the students and teachers belonged to high 'extent of volunteering' work inside the school, with special reference to school vegetable gardening and 40 per cent of the students and teachers belonged to low 'extent of volunteering' work inside the school.

Apart from extent of volunteering work in school, observations were recorded for 'number of days' per week of involvement of students in school gardening activities and the results are given in table 12.

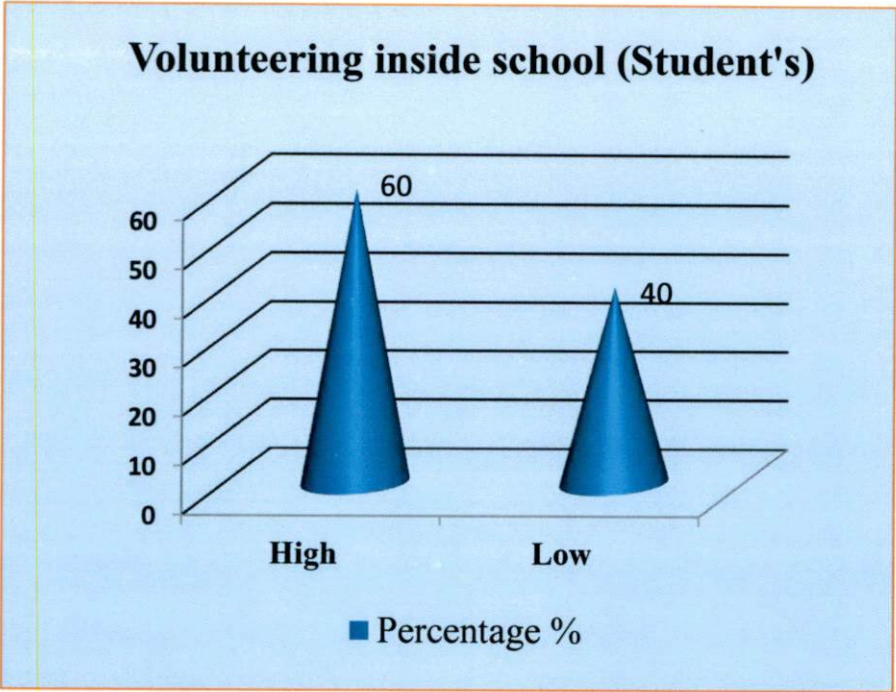


Fig. 13. Distribution of students based on their volunteering

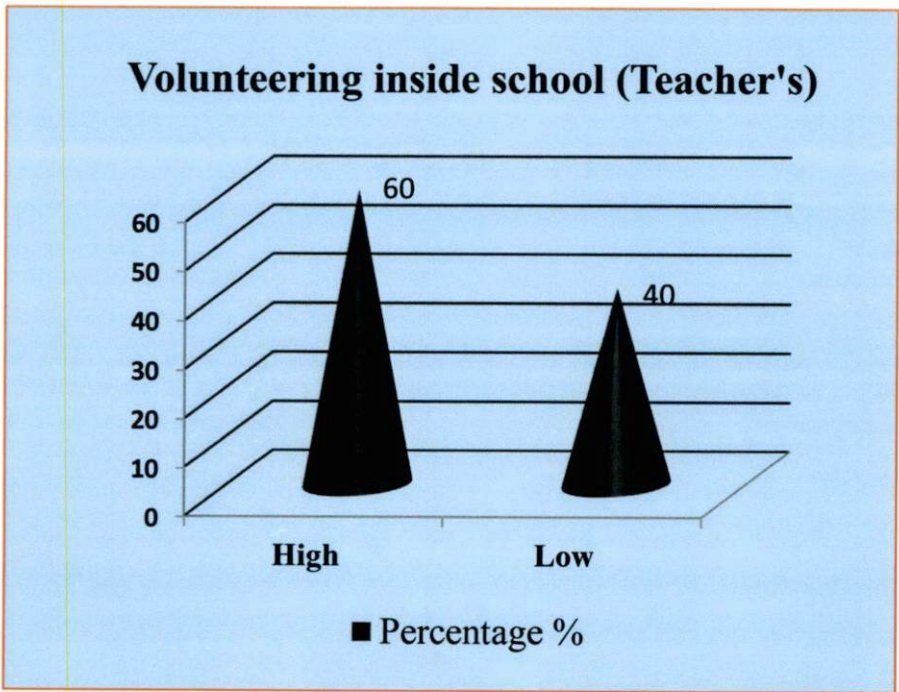


Fig. 14. Distribution of teachers based on their volunteering

Table 12. Distribution of students according to their number of days involved per week

No. of days/week	Frequency (N=10)	Percentage
2 days	2 school	20.00
3 days	7 school	70.00
4 days	1 school	10.00
Total	10 school	100.00

Result of the study showed that 70 per cent of schools involved in 3 days per week undertake vegetable gardening activities followed by 20 per cent of schools involved in 2 days per week and 10 per cent involved in 4 days per week.

Therefore, it was concluded that majority of the students voluntarily worked 3 days per week in school vegetable gardening. Also, it can be interpreted that majority of the schools (70%) has planned school vegetable gardening for 3 days per week.

Table 13. Distribution of students and teachers according to their extent of volunteering (work out of school).

Category (hours/week)	Students (N=100)		Teachers (N=30)	
	Frequency	Percentage	Frequency	Percentage
High	18	18.00	19	63.33
Low	82	82.00	11	36.67
Weighted mean	64.8min/week		174 min/week	
Lower value	30 min/week		60 min/week	
Higher value	120 min/week		240 min/week	

From Table 13 it was identified that extent of volunteering of school students was low (82 %) for work outside the school in vegetable gardening whereas 63.33 per cent of the teachers fell in the category of 'high level of volunteering work' outside the school with reference to vegetable gardening activities.

The results are even more interesting, that the weighted mean of 'extent of volunteering' (work out of school) demonstrated that teachers involve in vegetable

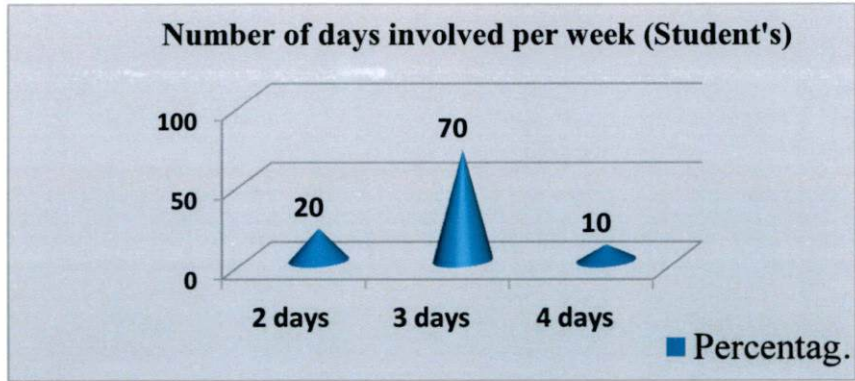


Fig. 15. Distribution of students based on their number of days involved per week

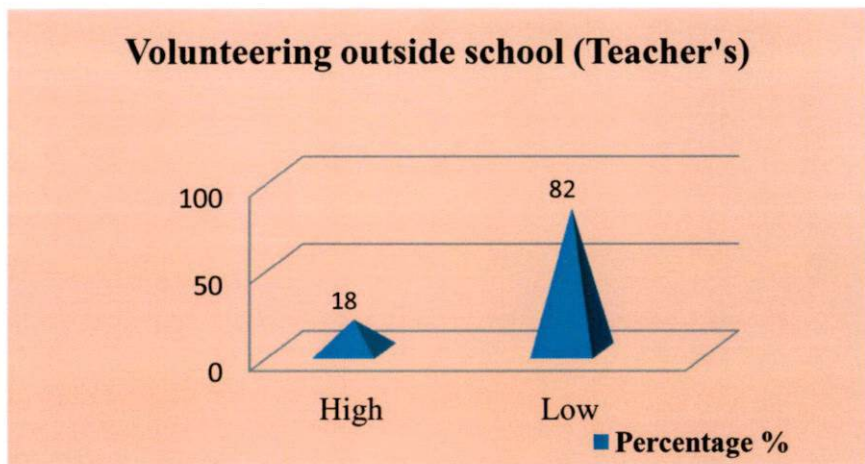


Fig. 16. Distribution of students based on their volunteering outside school

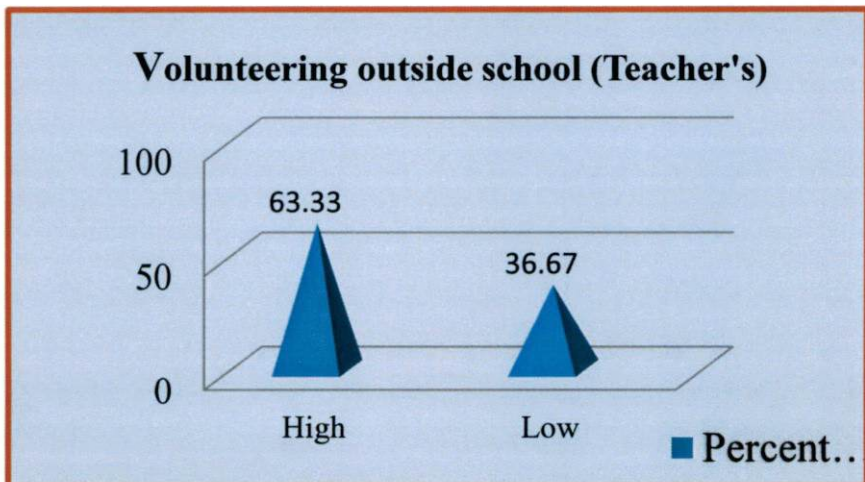


Fig. 17. Distribution of teachers based on their volunteering outside school

gardening for (174 min/week) as against students who involve for 64.8 minutes/week. This could be due to the voluntary participation of teachers in their respective home garden for safe food and nutritional requirements and also with the urge for deriving additional income through agricultural activities. The results are similar to the findings of the study done by Benson *et al.* (1999).

4.1.8 Political orientation/Civic engagement

Political orientation/Civic engagement is defined as that which characterizes the thinking of a group or nation and it refers to the degree the respondents (students and teachers) have participated in any issues that are political or civic oriented. The students and teachers were grouped into different categories and the results are projected in Table 14.

Table 14. Distribution of students and teachers according to their participation in political orientation programmes

Sl. No.	Category	Students (N=100)		Teachers (N=30)	
		Frequency	Percentage	Frequency	Percentage
1	Active involvement in Politics	0	0	3	10.0
2	Boycott a product or service, and demonstrate publicly for a cause	9	9.00	2	6.67
3	Environment protection campaign	60	60.00	13	43.34
4	Food security programmes	31	31.00	12	40.00

From Table 14, it was inferred that with respect to political orientation, 100 per cent of students were politically oriented, of which 60 percent of students participated in 'environment protection campaign' followed by 31 per cent

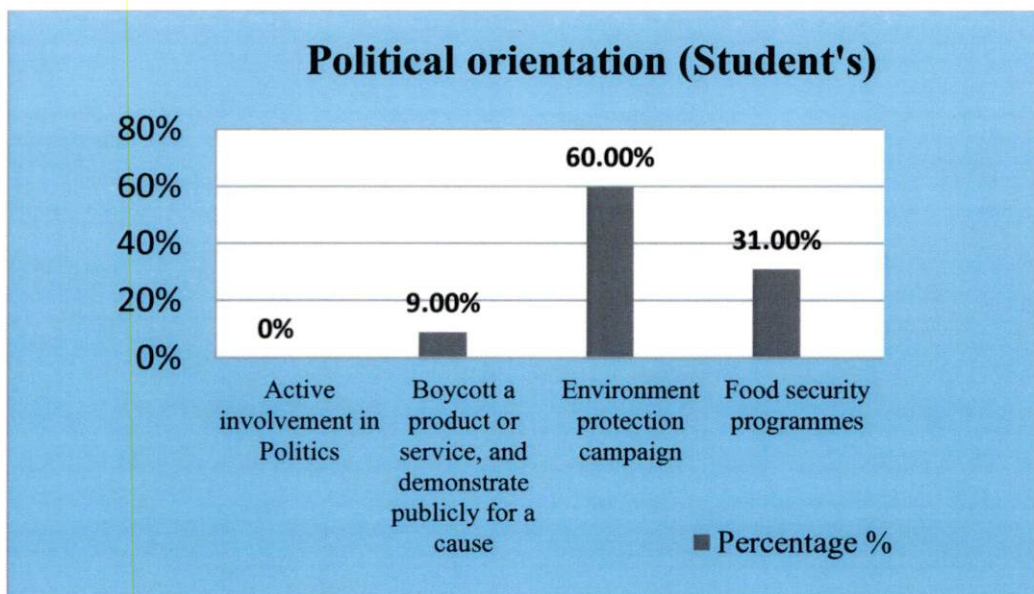


Fig. 18. Distribution of students based on their participation in political orientation programmes

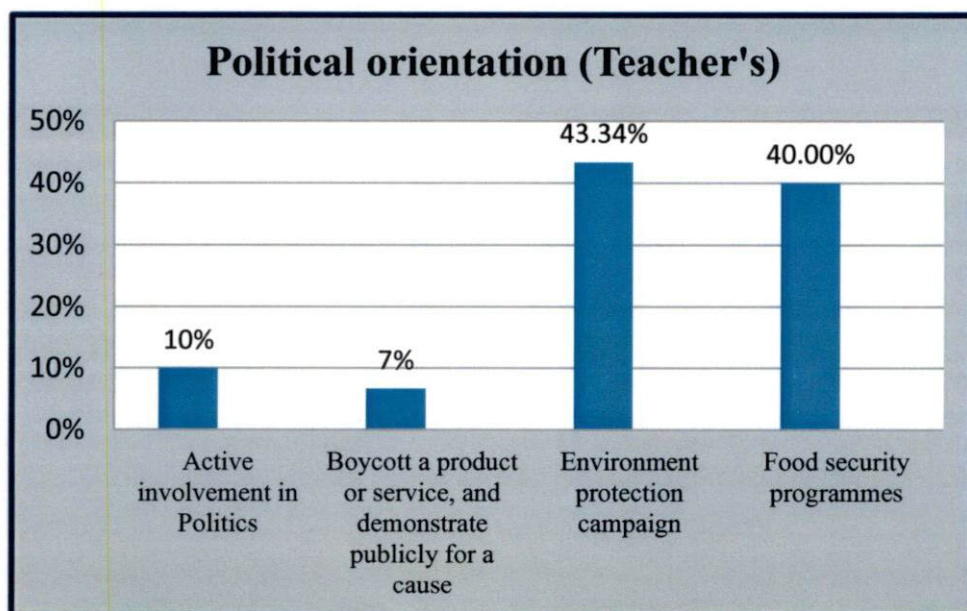


Fig. 19. Distribution of teachers based on their participation in political orientation programmes

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participated in various 'food security programmes' and 9 per cent of the students participated in boycott a product or service, and demonstrate publicly for a cause. The most important thing noticed is that no student respondent actively participated in politics.

In case of teachers, the results revealed that 43.34 per cent of the teachers participated in environmental protection campaign followed by 40 per cent of the teachers participated in food security programmes and 10 per cent of the teachers were actively involved in politics. About 6.67 per cent of the teachers participated in boycott of a product or service, and demonstrate publicly for a cause.

Therefore, it was concluded that majority of the students and teachers participated in environment protection campaign. The results are in conformity with the findings of the study done by Younisset *al.* (1997). The results also indicated the strong commitment of both teachers and students to socio-political issues.

4.1.9 Social participation

The variable social participation was included in the study for the student respondent group only. In this study, social participation refers to the degree of participation of students in personal, social and community development programmes. The respondents (students) were grouped into different categories and the results are presented in Table 15.

Table 15. Distribution of students according to their social participation

Category	Class limits	Students (N=100)	
		Frequency	Percentage
Low	9 to 12	19	19.00
Medium	13 to 15	47	47.00
High	>15	34	34.00
Mean = 14.23			
Standard deviation = 2.453			
Standard error = 0.2453			

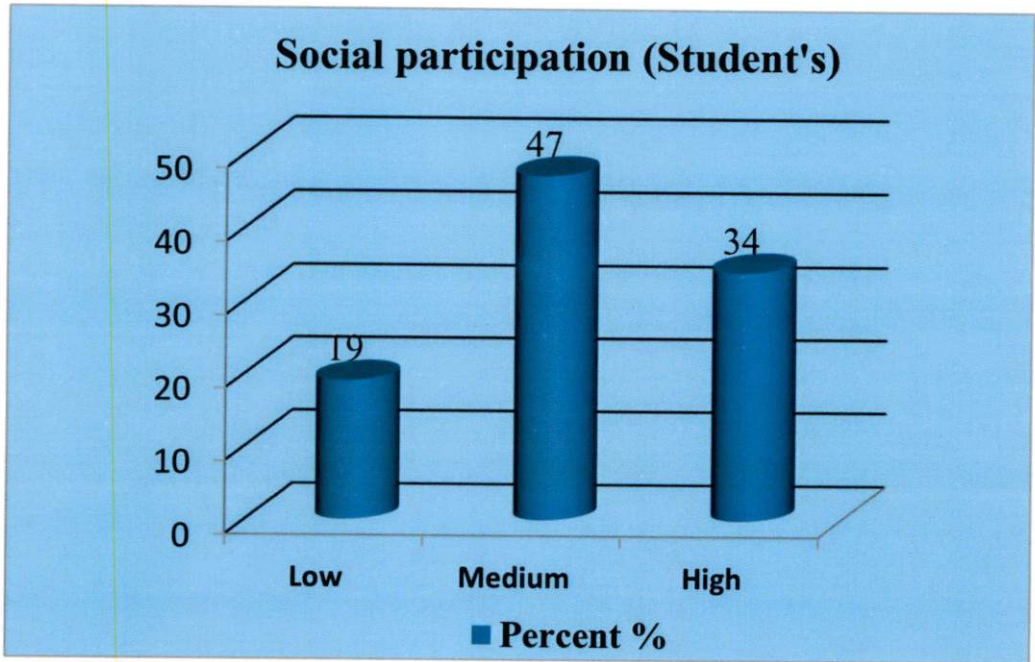


Fig. 20. Distribution of students based on their social participation

On analyzing the Table 15, it was inferred that majority (47 %) of the students belonged to the medium level of social participation followed by 34 and 19 per cent of the students in the high and low level of social participation group respectively.

Therefore, it was concluded that majority of the students ranged from medium to high level of social participation who get themselves involved in school's activities like sports, drama, arts, literary activities, social clubs, NSS and NCC. The results are in line with the findings of the study done by Kleinbard (1997), Sindhu (2002) and Robinson and Zajicek (2005).

4.1.10 Gardening experience

Gardening experience in this study refers to students and teachers previous experience in vegetable gardening at home before involving in school vegetable garden. The respondents (students and teachers) were grouped into Yes/ No category and the results are illustrated in Table 16.

Table 16. Distribution of students and teachers according to their gardening experience

Category	Students (N=100)		Techers (N=30)	
	Frequency	Percentage	Frequency	Percentage
Yes	80	80.00	27	90.00
No	20	20.00	3	10.00

On analyzing Table 16, it was inferred that 80 per cent of the students and 90 per cent of teachers had vegetable garden at home before involving in school vegetable gardening. However, the experience of the students should only be viewed in the minimum sense as their role is trivial in nature.

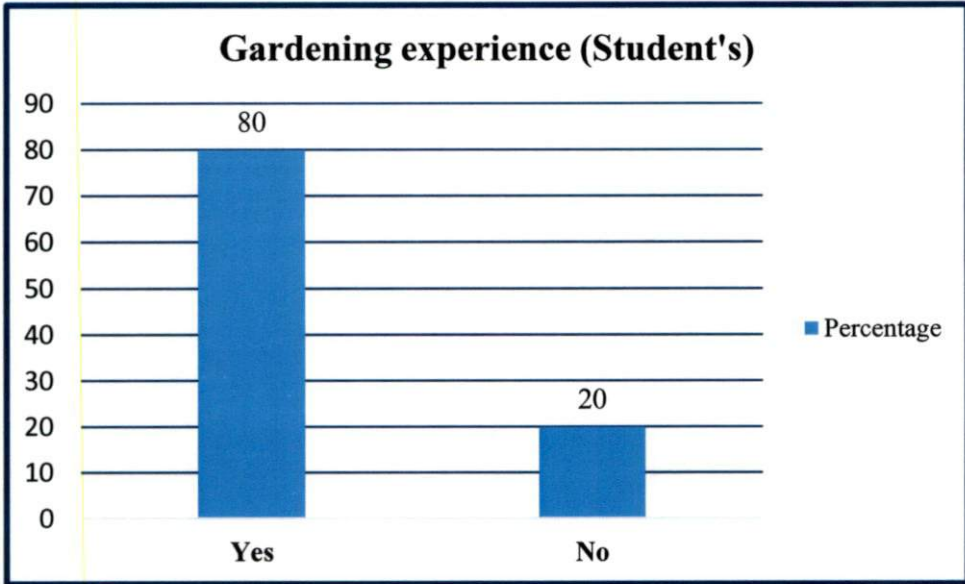


Fig. 21. Distribution of students based on their gardening experience

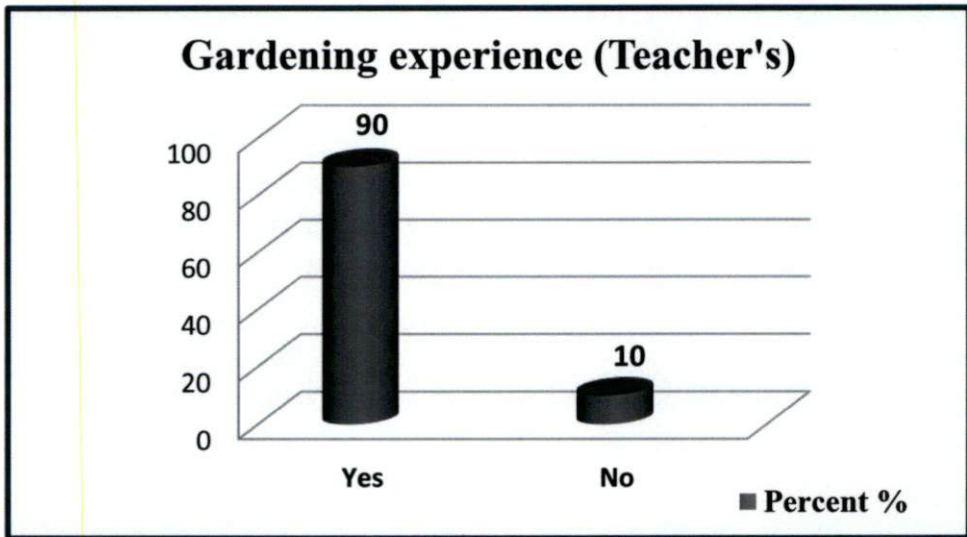


Fig. 22. Distribution of teachers based on their gardening experience

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Apart from gardening experience of teachers, the type of garden maintained in their home was enumerated and the results are presented in table 17.

Table 17. Distribution of teachers according to different type of gardening at home

Category	Teachers (N=27)	
	Frequency	Percentage
Ornamental	2	6.7
Kitchen	2	6.7
Herbal	2	6.7
Vegetable	15	50.00
Mixed farm	6	20.00

On analyzing the Table 17 it was noticed that 50 per cent of the teachers had home grown vegetable garden followed by 20 per cent with home grown mixed farm garden, about 6.7 per cent with kitchen garden, ornamental garden and herbal garden respectively.

Therefore, it was concluded that majority of the students and teachers had prior experience in vegetable gardening at home, before they started involving in school vegetable gardening. The results are in disagreement with the findings of Zanu et al. (2012) and are in conformity with the studies done by Lieberman and Hoody (1998).

4.1.11 Level of excitement

The variable level of excitement, included in the study was only for respondent group of students. Level of excitement in this study is the level of interest of students and teachers to get involved with joy and pleasure in vegetable gardening in schools. The results are depicted in Table 18.

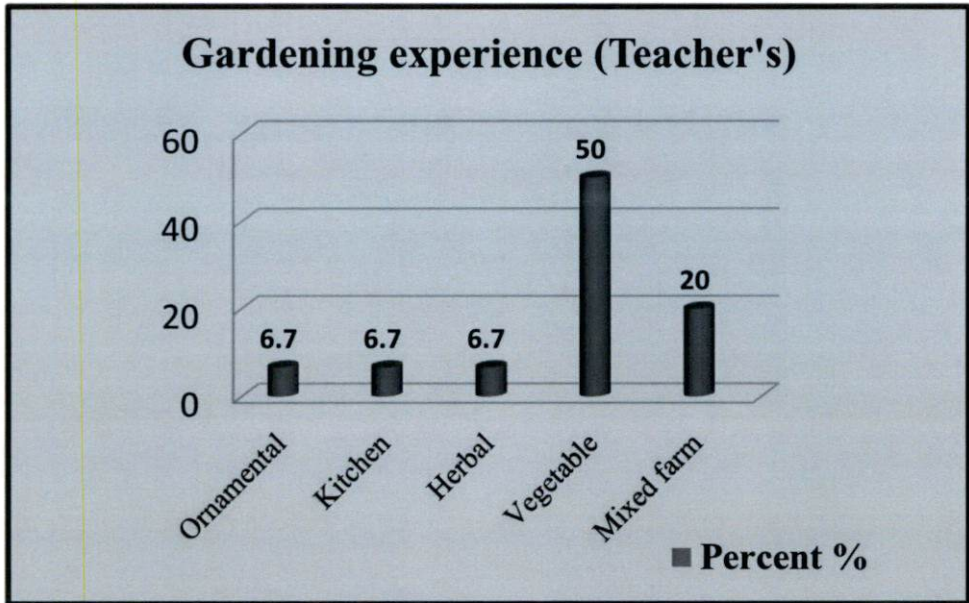


Fig. 23. Distribution of teachers according to different type of gardening at home

Table 18. Distribution of students according to their level of excitement

Sl. No.	Category	Students (N= 100)	
		Frequency	Percentage
1	Are you really excited to come school for participating the vegetable garden activities?		
	a) Yes	100	100.00
	b) No	0	0
2	Student's involvement in garden activities		
	a) Daily	22	22.00
	b) Once in a 2 to 3 days	67	67.00
	c) Once in a week	11	11.00
3	How excited are you to participate in school garden activities?		
	a) Very excited	92	92.00
	b) Moderate	8	8.00
	c) Not excited	0	0

It seemed from Table 18, that 100 per cent of the students were really excited to come to school for participating in vegetable gardening activities. About 67 per cent of the students participated in garden activities once in 2 to 3 days followed by 22 per cent of the students who participated in gardening activities daily and 11 per cent of students who participated in gardening activities once a week.

When 92 per cent of the students were very excited to participate in school vegetable garden activities only 8 per cent of the students expressed moderate excitement to participate in school vegetable garden activities.

Therefore, it can be concluded that majority of the students had participated once in 2 to 3 days and students were very excited to come to school and participate in school vegetable garden activities. The results are in disagreement with the findings of Neer (1990) and are in line with Monk (1995).

4.1.12 Factors of influence

Factors of influence is a decisive factor thought by some (students or teachers) to affect individual tendencies and distinctiveness in a particular direction and in this study it refers to the school gardening.

Level of encouragement, purpose of involvement, personal and socio-psychological factors, economic factors and technological factors were the subcomponents of developing factors of influence.

The actual score of each factor are presented in appendix III. The respondents (students and teachers) were then grouped into different categories and the results are illustrated in Table 19 and 20 respectively.

Table 19. Distribution of students according to their factors of influence

Category	Class limits	Students (N=100)	
		Frequency	Percentage
Low	47 – 50	5	5.00
Medium	51 – 54	40	40.00
High	≥ 55	55	55.00
Mean = 54.83			
Standard deviation = 2.3785			
Standard error = 0.23785			

It was observed from Table 19 that 55 per cent of the students belonged to high class limits with respect to factors of influence as derived from the five sub factors contributing to the total influencing factors on school vegetable garden followed by 40 per cent of the student's who belonged to medium and 5 per cent who belonged to low class limits.

Table 20. Distribution of teachers according to their factors of influence

Category	Class limits	Teachers (N=30)	
		Frequency	Percentage
Low	41 to 47	5	16.67
Medium	48 to 53	8	26.66
High	54 to 60	17	56.67
Mean = 52.70			
Standard deviation = 5.4781			
Standard error = 1.0001			

Table 20 revealed that 56.67 per cent of the teachers belonged to high class limits with respect to the scores attained for factors of influence on school vegetable gardening followed by 26.66 per cent of the teachers belonged to medium and 16.67 per cent to low class limits of factors of influence.

The results from appendix 'III' revealed that personal and socio-psychological factors and level of encouragement factors were of more influence to students, whereas purpose of involvement and level of encouragement were the influencing factors to teachers.

The results were in conformity with the findings of the study done by Ellibee (1990), Scofield (1995) and Walton *et al.* (2010).

4.1.13 Awareness

The variable awareness was only included for the respondent group of students. Level of awareness in this study refers to the extent or level to which students are aware about the school gardening activities with special reference to establishing and maintaining school vegetable garden.

The students were grouped into different category and the results are furnished in Table 21.

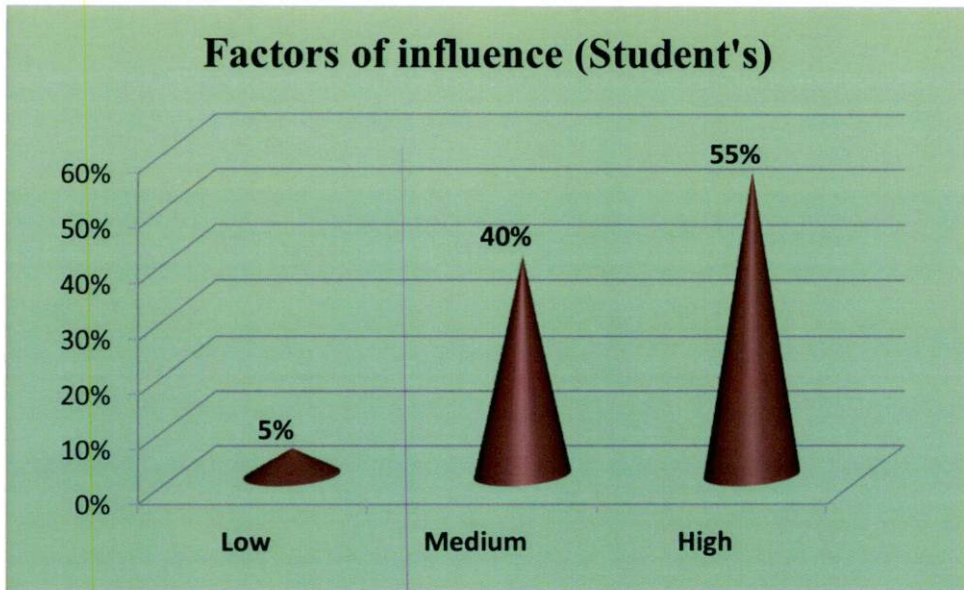


Fig. 24. Distribution of students based on their factors of influence

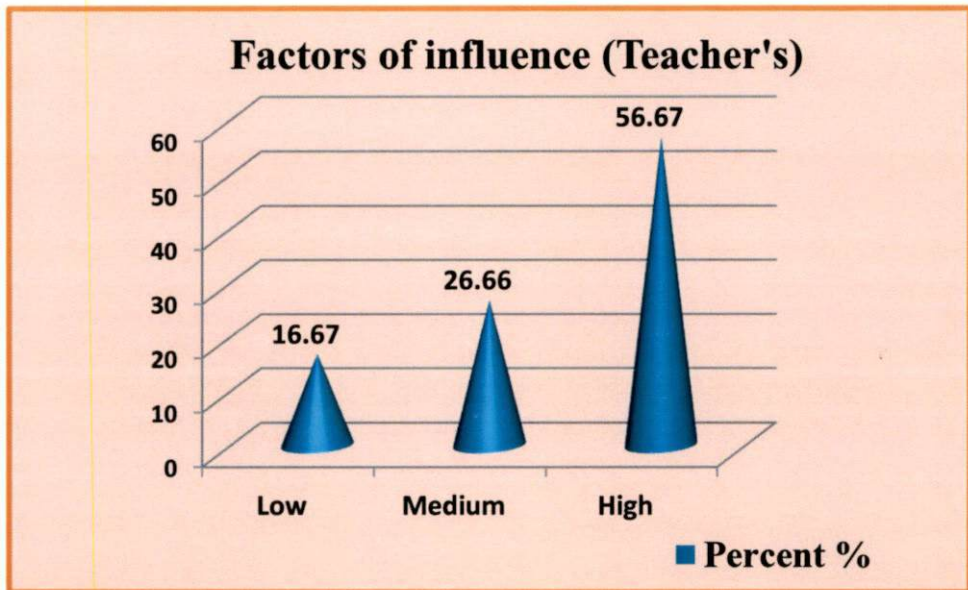


Fig. 25. Distribution of teachers based on their factors of influence

Table 21. Distribution of students according to their awareness

Category	Class limits	Students (N= 100)	
		Frequency	Percentage
Low	≤ 16	0	0
Medium	17 to 26	3	3.00
High	27 to 36	97	97.00
Mean = 31.55			
Standard deviation = 2.426			
Standard error = 0.2426			

The results of the data furnished in Table 21 showed that majority of the students had high level of awareness (97.00 %) followed by 3 per cent of the students with medium level of awareness. The high level of awareness of students on school vegetable gardening could be due to the deliberative attempt of government and school authorities with the motive not just to incite involvement but also to scale up safe vegetable production by bringing more and more unused land under vegetables.

Hence it can be concluded that majority of the students had high level of awareness in school vegetable gardening. The findings are contradictory to the reports of Coulson *et al.* (1996) and Buddhivhuaneswari (2005).

4.1.14 Knowledge

Knowledge is operationalized in this study as the extent of effectiveness of the different knowledge source on school gardening as perceived by school students and teachers on vegetable gardening and their behavioural transformation therein.

The students and teachers were grouped into different categories of based on the effectiveness of knowledge source and the results are elucidated in Table 22.

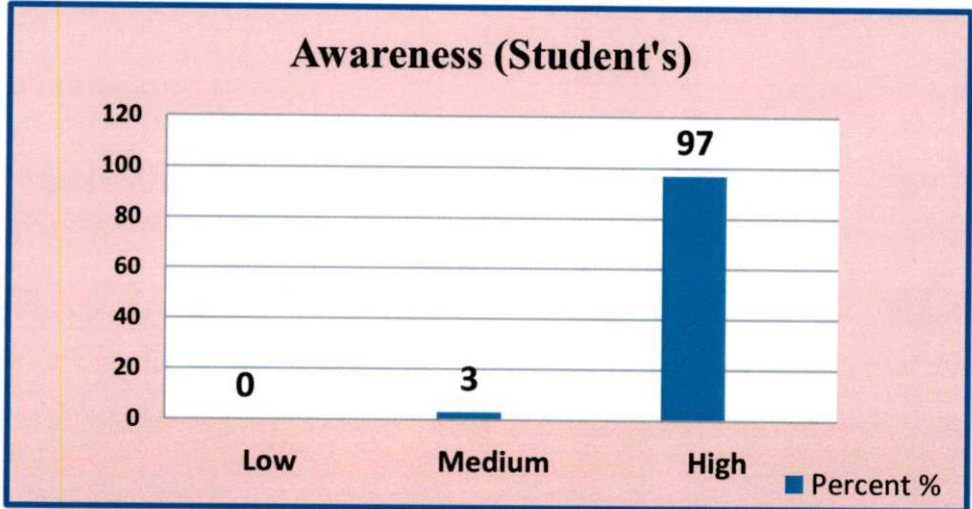


Fig. 26. Distribution of students based on their awareness

Table 22. Distribution of students and teachers according to their knowledge source effectiveness

Category	Class limits	Students (N= 100)		Teachers (N=30)	
		Frequency	Percentage	Frequency	Percentage
Low	0 to 10	26	26.00	11	36.67
Medium	11 to 20	71	71.00	16	53.33
High	21 to 30	3	3.00	3	10.00
Mean		12.61		13.1	
Standard deviation		3.3056		4.341	
Standard error		0.33056		0.7927	

From table 22 it was evident that 71.00 per cent of students had medium level of knowledge followed by 26.00 per cent of students with low level of knowledge and 3.00 per cent of students with high level of knowledge. In case of teachers 53.33 per cent of teachers had medium level of knowledge followed by 36.67 per cent of teachers with low and 10 per cent of teachers with high level of knowledge on school vegetable gardening activities.

However, it should be noticed that the mean knowledge score of teachers were more than that of students which was a clear indication of the overall high level of knowledge of teachers on school vegetable gardening.

Hence it was summarized that majority of the school students and teachers had medium level of knowledge on school vegetable gardening activities. This was presumably due to the high level of literacy and education among the students and teachers. The findings are contradictory to the reports of Zajicek (1998) and Graham *et al.* (2005).

4.1.15 Mass media exposure

Mass media exposure is operationalised as the source and frequency with which the respondent school students and teachers are exposed to different mass

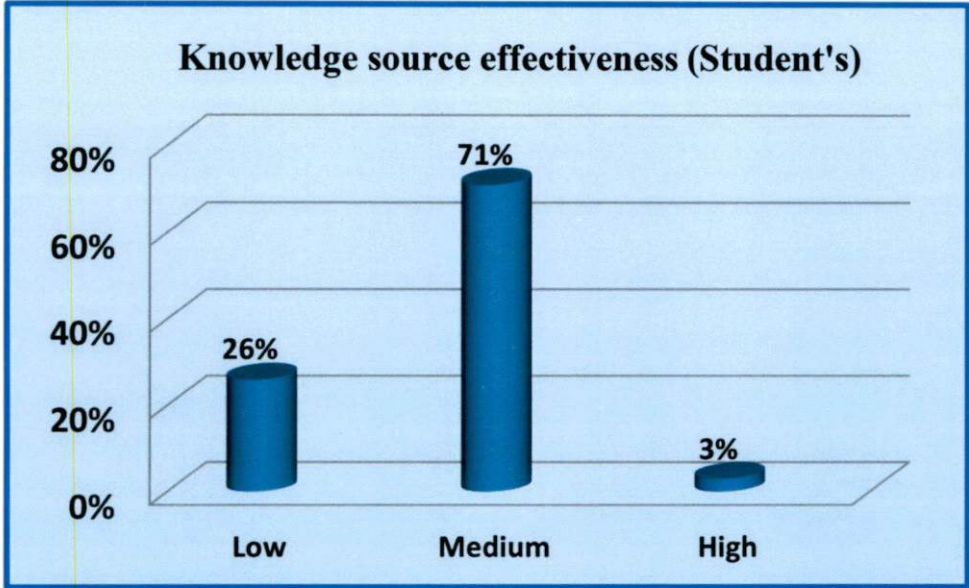


Fig. 27. Distribution of students based on their knowledge

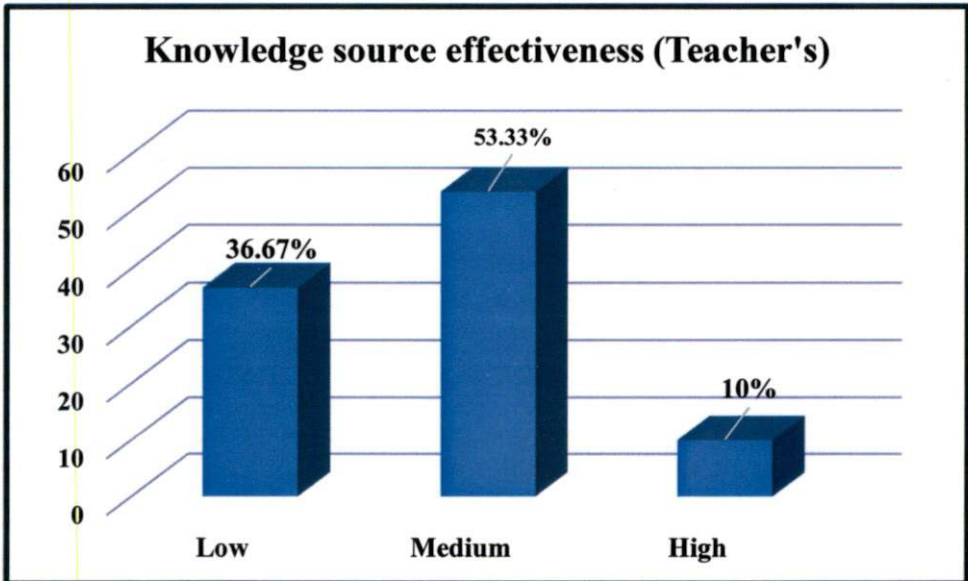


Fig. 28. Distribution of teachers based on their knowledge

communication media for drawing information on different aspects of school gardening activities. The students and teachers were grouped into different category and the results are presented in Table 23, 24, 25 and 26 respectively.

Table 23. Distribution of students according to their mass media utilization

Sl. No.	Items	Total score	Rank
1	News paper	271	1
2	Television	257	3
3	Magazines	190	5
4	Radio	196	4
5	Mobile advisory services	268	2
6	Kiosks	111	6

Table 23 revealed that majority of the students used newspaper as their main source of information with rank one, followed by television and mobile advisory services that ranked 2nd and 3rd positions respectively.

The results of categorization of students based on their total score are given in table 24.

Table 24. Distribution of students according to their mass media exposure

Category	Class limits	Students (N= 100)	
		Frequency	Percentage
Low	6 - 22	8	8.00
Medium	23 - 40	90	90.00
High	41 - 58	2	2.00
Mean = 30.63			
Standard deviation = 6.0913			
Standard error = 0.60913			

It was evident from Table 24 that 90 per cent of the students had medium level of mass media exposure followed by 8 per cent with low level and 2 per cent with high level of mass media exposure.

The distribution of teachers according to their mass media utilization is presented in table 25.

Table 25. Distribution of teachers according to their mass media utilization

Sl. No.	Items	Total score	Rank
1	News paper	80	1
2	Television	77	3
3	Magazines	57	5
4	Radio	62	4
5	Mobile advisory services	80	2
6	Kiosks	32	6

It was evident from Table 25 that the teachers used most commonly information sources like Newspaper, Mobile advisory services and Television in the decreasing order of usefulness.

The results of categorizing the teachers based on their total score are given in table 26.

Table 26. Distribution of teachers according to their mass media exposure

Category	Class limits	Teachers (N=30)	
		Frequency	Percentage
Low	6 - 22	0	0
Medium	23 - 40	29	99.00
High	41 - 58	1	1.00
Mean = 31.36			
Standard deviation = 5.7922			
Standard error = 1.057			

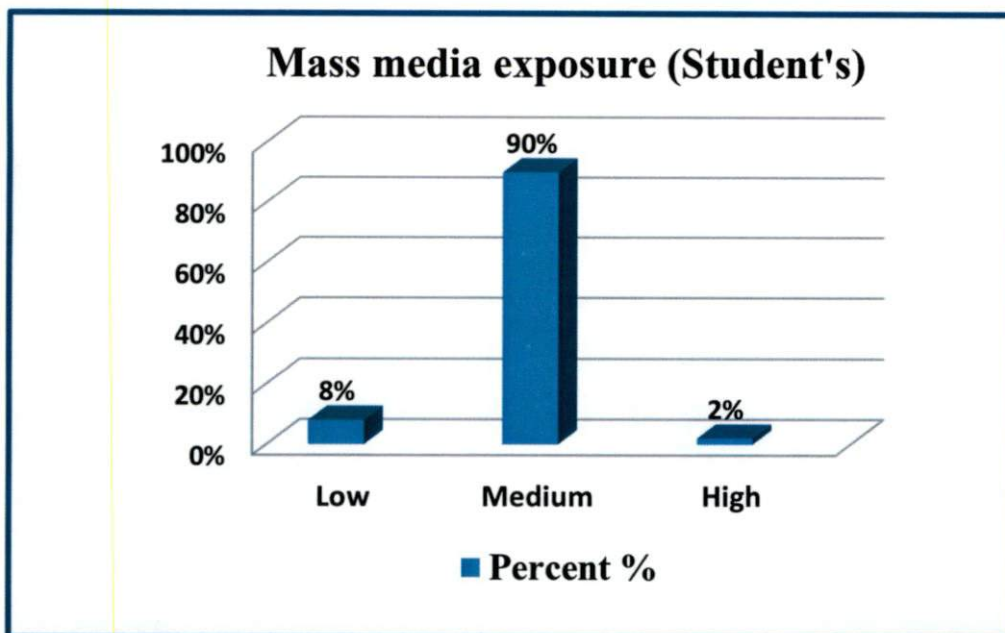


Fig. 29. Distribution of students based on their mass media exposure

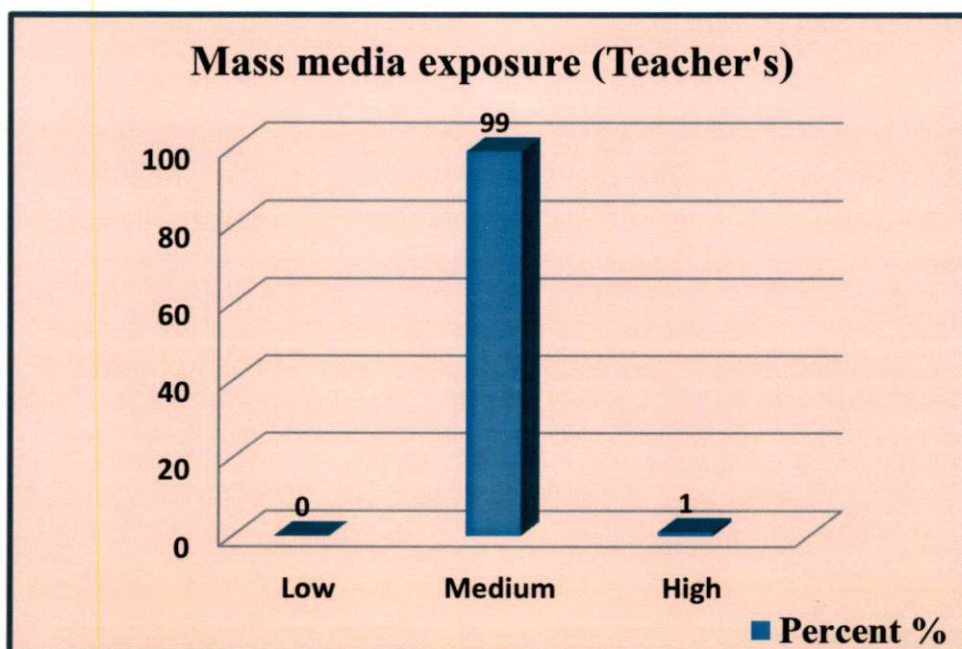


Fig. 30. Distribution of teachers based on their mass media exposure

It was evident from Table 26 that 99 per cent of the teachers had medium level of mass media exposure, whereas only one per cent teachers had high level of mass media exposure.

Mass media exposure refers to sources from which students and teachers received various information related to school vegetable gardening activities. Majority of the students and teachers had medium level of acquiring information from mass media exposure. Also many studies have reported the dominant use of newspapers and television as the chief source of information for agricultural related activities. Therresults are in line with findings of Roy (2004), Banerji (2005), Jacob (2015) and Basheer (2016).

4.1.16 Training

Training is a process by which someone is taught the skills that are needed for an art, profession, or job.

A need assessment is a systematic process for determining and addressing needs, or "gaps" between current conditions and desired conditions or "wants".

The students and teachers were grouped into Yes/No category on the trainings received and the results are illustrated in Table 27 and 28.

Table 27. Distribution of students and teachers according to their training received

Category	Students (N= 100)		Teachers (N=30)	
	Frequency	Percentage	Frequency	Percentage
Yes	40	40.00	12	40.00
No	60	60.00	18	60.00

It was evident from Table 27 that 40 per cent of the students and teachers received training from experts and remaining 60 per cent of the students and teachers have not received training from experts. About 40 per cent of the students and

teachers who had undergone different number of trainings received from experts are represented in Table 28.

Table 28. Distribution of students and teachers according to their number of training received

Category	Students (N= 40)		Teachers (N=12)	
	Frequency	Percentage	Frequency	Percentage
One training	40	100.00	8	66.67
Two trainings	0	0	4	33.33
Three or more trainings	0	0	0	0

The results of the data furnished in Table 28 showed that all the students (100 %) attended one training programme. About 66.67 per cent of the teachers attended one training programme. However, 33.33 per cent of the teachers have attended two training programmes.

The results on training needs of students are presented in table 29.

Table 29. Distribution of students and teachers according to their training need

Category	Students (N= 100)		Teachers (N=30)	
	Frequency	Percentage	Frequency	Percentage
Yes	100	100.00	100	100.00
No	0	0	0	0

It seemed from the Table 29 that all the students and teachers in school required training about the vegetable garden activities. Therefore, it can be inferred that all students and teachers need training from experts with the perceived purpose of increasing their knowledge, skill, attitude and understanding about the vegetable gardening and garden activities in school.

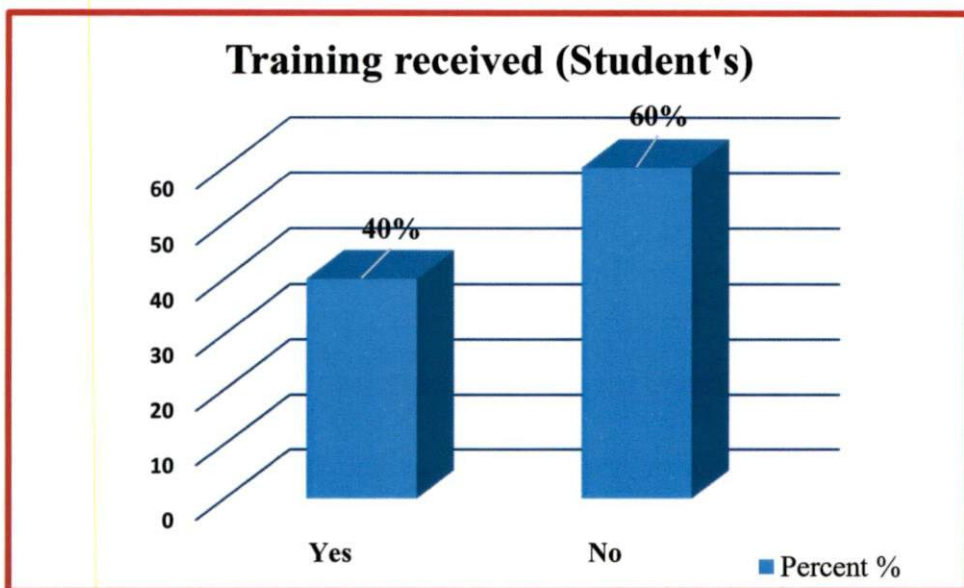


Fig. 31. Distribution of students based on their training received

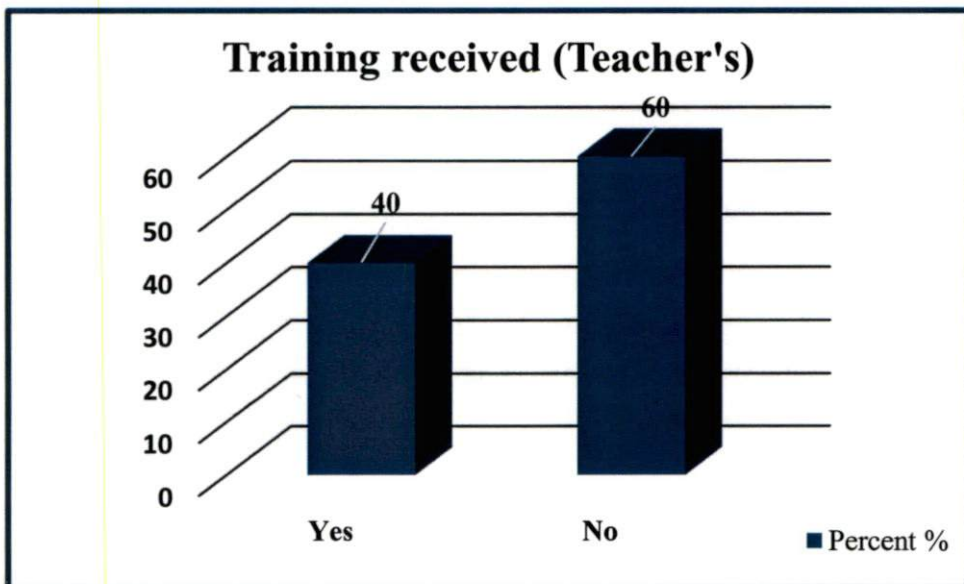


Fig. 32. Distribution of teachers based on their training received

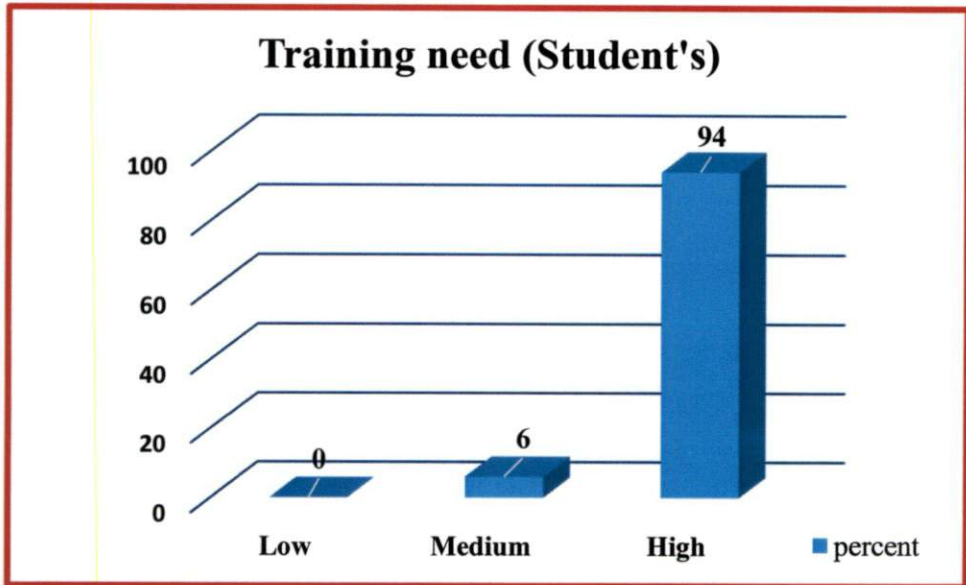


Fig. 33. Distribution of students based on their training need

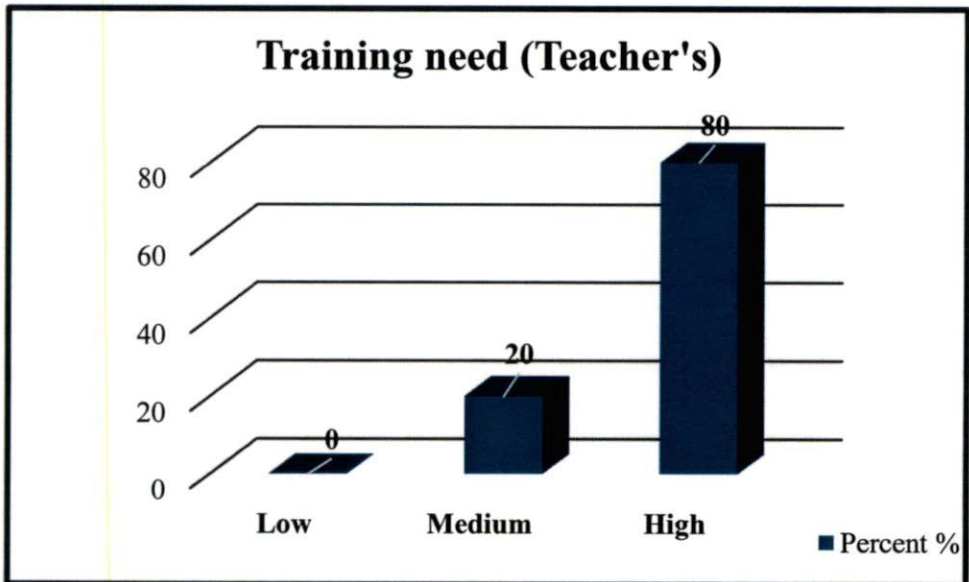


Fig. 34. Distribution of teachers based on their training need

Table 30 represents the subject area of training needs by both categories of respondents. The results are presented for both teachers and students together.

Table 30. Distribution of students and teachers based on their training need on different activities

Sl. No.	Training need	Students (N= 100)			Teachers (N=30)		
		Very much	Much	Not much	Very much	Much	Not much
1	Production	89	11	0	16	14	0
2	Protection	71	23	6	19	7	4
3	Value addition	52	31	17	14	16	0
4	Marketing activities	19	40	41	17	13	2

It was evident from Table 30 that 89 students needed more number of trainings from experts on production followed by 71 students who perceived need for more number of trainings on protection. About 52 students required training on value addition. However, in case of teachers, 19 teachers needed more number of trainings from experts on protection activities followed by 17 teachers who opined that more number of trainings on marketing activities should be imparted by experts.

Hence it could be concluded that majority of the students and teachers had high level of interest to receive training from expert and they need more number of trainings from experts on production and protection. The teachers preferred more training on protection aspects where they perceived it with importance as it enables them to equip the students with safe farming practices.

The result contradicts the findings of Jaganathan (2004) and is in conformity with the studies done by Tadasad and Shreedhar (2006).

4.1.17 Perception of students and teachers regarding 'benefits' of school vegetable gardening

Benefits is a process by which the students and teachers assimilate the sense of the world around, articulating one's interpretation and apprehension, raising questions and sharing ideas that are all critical aspects of learning. The respondents (students and teachers) were grouped into categories (Appendix IV) and the results are illustrated in Table 31 and 32.

Table 31. Distribution of students based on their perception on the benefits of school vegetable gardens.

Category	Class limits	Students (N= 100)	
		Frequency	Percentage
Low	8 - 14	1	1.00
Medium	15 - 20	22	22.00
High	21 - 26	77	77.00
Mean = 20.7			
Standard deviation = 2.484			
Standard error = 0.2484			

From Table 31 it was evident that 77 per cent of the students perceived high level of benefits from their engagement in vegetable garden followed by 22 per cent of the students who perceived medium level of benefits and only one per cent of the students perceived low level of benefits.

Table 32. Distribution of teacher's based on their perception on the benefits of school vegetable gardens.

Category	Class limits	Teachers (N=30)	
		Frequency	Percentage
Low	8 - 14	0	0
Medium	15 - 20	13	43.33
High	21 - 26	17	56.67
Mean = 20.2			
Standard deviation = 1.7100			
Standard error = 0.3122			

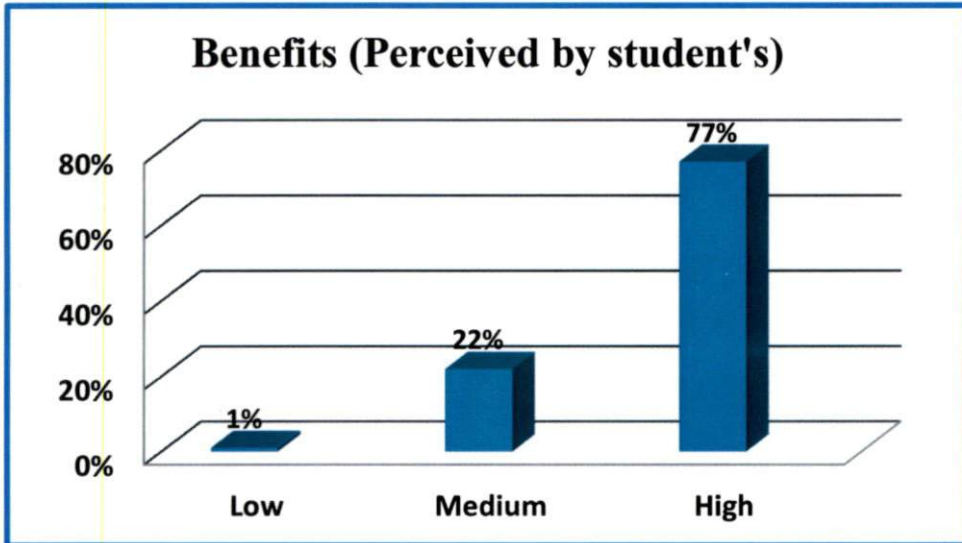


Fig. 35. Distribution of students based on their benefits

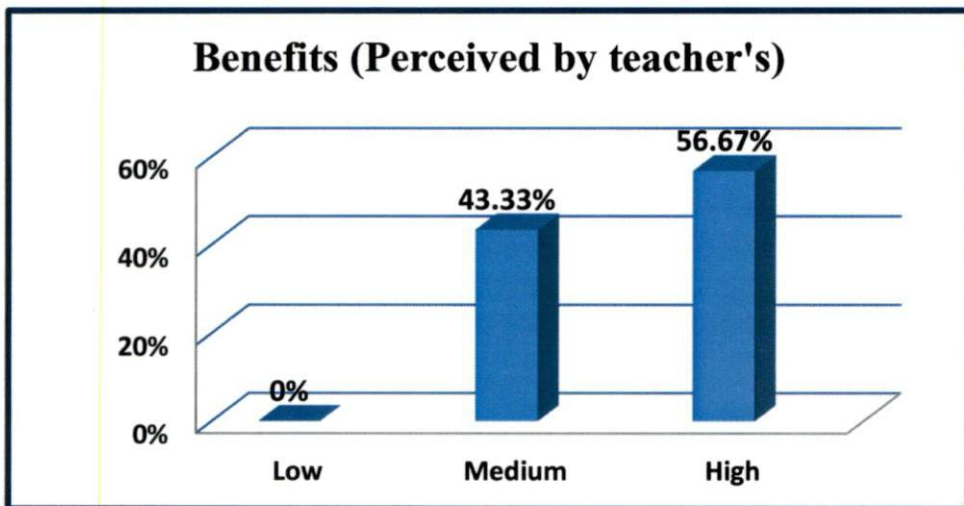


Fig. 36. Distribution of teachers based on their benefits

From Table 32 it was clear that 56.67 per cent of the teachers perceived high level of benefits from their experience with students on engaging in vegetable garden activities. 43.33 per cent of the teachers perceived medium level of benefits.

The perceived benefits of both teachers and students as expressed by statement with its frequency and percentage are analyzed and presented as appendix IV.

Hence, majority of students and teachers participated in school vegetable garden for gaining differential benefits. It improves the life skills and help to develop a sense of ownership and responsibility. Therefore, the school vegetable garden activities bring in a lot of benefits for students and teachers.

The result was in agreement with findings of McAleese and Rankin (2007) and Lohr and Pearson (2005).

4.1.18 School vegetable garden size

4.1.18. a Total area of school

Area under vegetable garden cultivation is operationalized as the actual area utilized for cultivating vegetables in 10 schools which was measured in cents. The results are illustrated in Table 33.

Table 33. Distribution of schools according to its total area

Category (area in cents)	10 Schools	
	Frequency	Percentage
Up to 250	6	60.00
251 to 500	2	20.00
More then 500	2	20.00

Area of the 10 school from Table 33 showed that 60 per cent of schools had total area up to 250 cents, 20 per cent of the school had 251 to 500 cents and 20 per cent of the school had more than 500 cents.

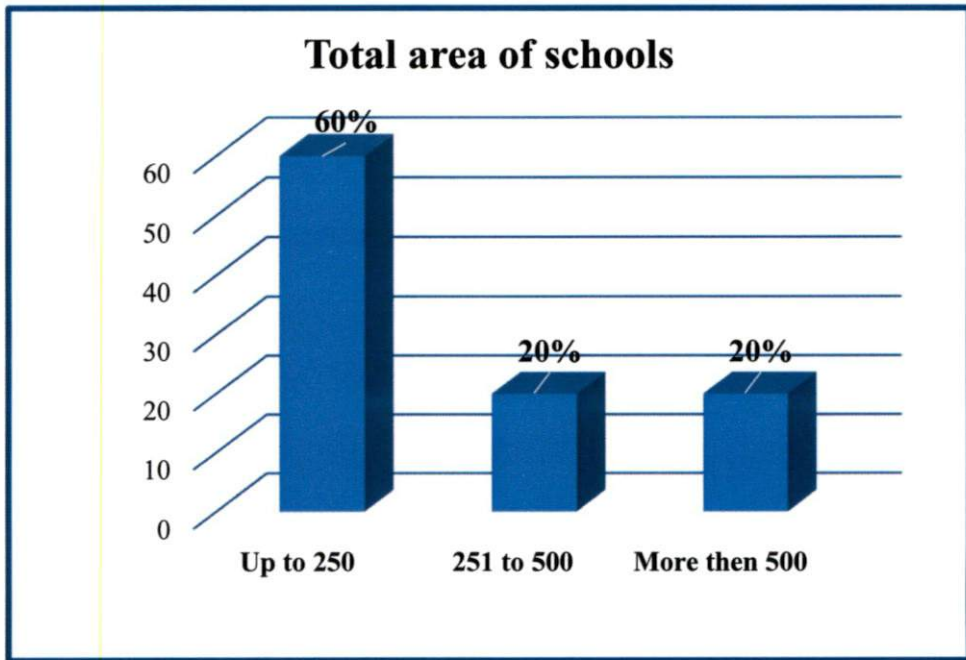


Fig. 37. Distribution of school according to the total area

4.1.18. b Area under school vegetable garden

School vegetable garden size in this study refers to the area utilized by the students and teachers in school vegetable garden activities. The land area utilization with different components and its area is presented in table 34.

Table 34. Distribution of area according to different component category

School	Building	Play ground	Vegetable Garden land	Garden land	Unused land	Total
1	75	70	18	30	37	230
2	80	60	22	35	53	250
3	75	100	25	63	332	595
4	85	45	10	25	35	200
5	90	50	20	40	50	250
6	65	50	10	30	35	200
7	160	125	25	65	75	450
8	255	100	20	115	410	900
9	200	100	15	40	45	400
10	50	40	20	25	15	150
Total	1135	740	185	458	1087	3625
Mean	113.5	74	18.5	45.8	108.7	362.5
SD	67.90	29.80	5.83	27.30	140.30	235.01
SE	21.47	9.42	1.70	8.634	44.36	74.00

Area of the school vegetable garden from Table 34, showed that the average school vegetable garden area was 18.5 cents and seven out of 10 schools were maintaining vegetable garden in an area of more than or equal to 20 cents. School 3 and School 7 were top in terms of area maintained for vegetable garden. The name of school with their address is annexed in appendix 'V'. The table clearly points to the fact that large area of unused lands are there in school's possession. By bringing unused land to garden land, it will promote school vegetable gardening activities. The results are in the line with finding of Thomas (1998) where the researcher proposed the idea of promoting herbal gardens through school resources.

4.1.19 Crops grown in school vegetable garden

The crops and its occurrence in the respective schools were worked out and were expressed in terms of frequency and percentage.

The responses were recorded from teachers and the results are demonstrated in Table 35.

Table 35. Distribution of school based on the crop grown in school vegetable garden

Category	10 SCHOOLS	
	Frequency	Percentage
Spinach	3	30.0
Okra	10	100
Cucumber	4	40.0
Bitter guard	2	20.0
Tomato	5	50.0
Drumstick	2	20.0
Brinjal	3	30.0
Cauliflower	4	40.0
Chilly	3	30.0
Beans	1	10.0
Banana	1	10.0
Amaranthus	6	60.0
Cowpea	5	50.0
Ash guard	2	20.0

It was evident from Table 35 that 14 different vegetables were grown in school vegetable gardens and the most dominant was okra (100.0%) followed by amaranthus (60.0%), tomato (50.0%), cowpea (50.0%) and cucumber (40%). Okra was grown by all the schools and 60 per cent of the schools cultivated amaranthus. These vegetables were comparatively easy to grow, manage and harvest and requires less physical work.

4.1.20 Type of gardens in schools

The number of gardens for 10 schools in total was expressed as frequency and rank position of each type of garden based on its numerical dominance is presented in Table 36.

Table 36. Distribution of schools based on the types of garden

Category	10 SCHOOLS	
	*Frequency	Rank
Outdoor garden	6	2.5
Raised beds garden	2	4.5
Indoor garden	1	6.5
Container garden	2	4.5
Greenhouse garden	1	6.5
Mixed cropped vegetable garden	8	1
Sole vegetable cropped garden	6	2.5

*Multiple responses

From Table 36 it was identified that majority (8 schools) maintained mixed crop vegetable garden followed by 6 schools that maintained outdoor gardens and 5 schools that maintained sole vegetable crop garden.

Hence it can be inferred that majority of the schools adopted the mixed crop vegetable garden. Different types of crops were grown in the mixed crop vegetable garden for consumption purposes in school. Majority of the produce were used by the school itself and was used in the midday meal scheme (MDMS) in the respective schools. However, the quantity was still inadequate. The results are in the line with findings of Pothukuchi (2004).

4.1.21 Fencing

In this study fencing refers to the structure that encloses a school for the safety of the students and protection of the resources owned by the schools. The types of

fencing were documented for the 10 schools and the same was expressed in frequency and percentage. The results are presented in Table 37 and 38.

Table 37. Distribution of schools based on the fencing

Category	10 SCHOOLS	
	Frequency	Percentage
Yes	7	70.00
No	3	30.00

From Table 37 it can be seen that majority of the schools had protective fencing. About 70 per cent of the schools had fencing for protective vegetable garden too followed by 30 per cent of the school not fully protected by fencing.

Materials used for fencing in schools are showed in the table 38.

Table 38. Distribution of schools based on the fencing materials

Category	7 SCHOOLS	
	Frequency	Percentage
Live	1	10.00
Brick wall	5	50.00
Wire	0	0
Mesh netting	1	10.00
Mud wall	0	0

From Table 38 it was identified that seven out of 10 schools had protective fencing of which 5 were made of brick walls and two were made by the combination of brick walls and live/mesh nettings.

Most of the schools used brick walls for protecting the school resources. The results are in line with findings of Braun *et al.* (1989).

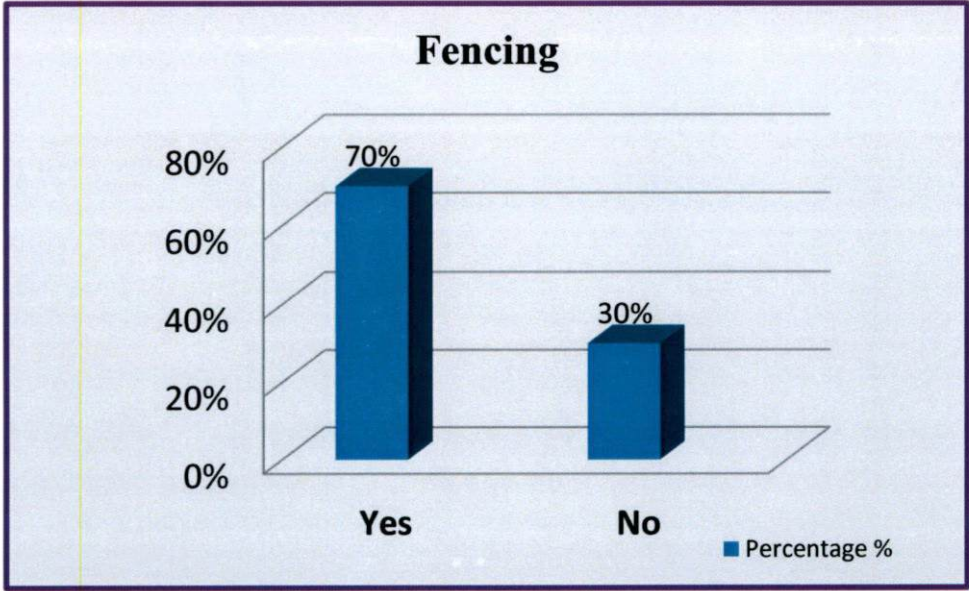


Fig. 38. Distribution of schools based on the fencing

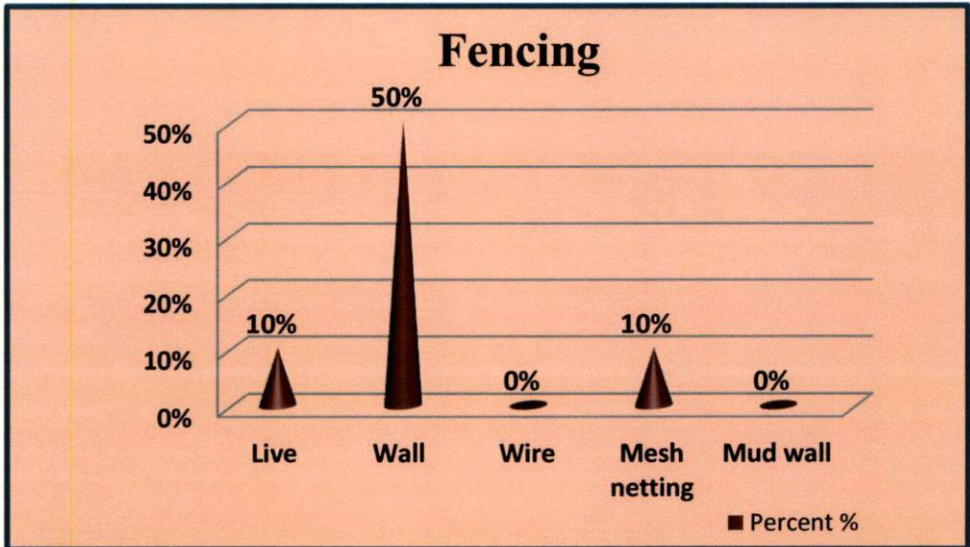


Fig. 39. Distribution of schools based on its fencing material

4.1.22 Frequency of irrigation

Frequency of irrigation was operationally defined as the extent to which irrigation water was available in the school vegetable garden and the extent of area irrigated using this available water. The results are illustrated in Table 39.

Table 39. Distribution of schools based on frequency of irrigation

Category	10 SCHOOLS	
	Frequency	Percentage
Daily	7	70.00
Twice a week	0	0
Thrice a week	3	30.00
Weekly	0	0

It was evident from Table 39 that 70.0 per cent of the schools were irrigating their vegetable garden daily and 30 per cent of the schools were irrigating thrice a week. It may vary in certain occasion based on the nature and types of vegetable grown in the school garden.

4.1.23 Methods of irrigation

This was measured based on the type of irrigation methods adopted for school vegetable gardening. The frequency and percentage was worked out as given below in table 40.

Table 40. Distribution of schools based on the type of irrigation

Category	10 SCHOOLS	
	Frequency	Percentage
Hose	10	100.00
Sprinkler irrigation	0	0
Drip irrigation	0	0
Basin	0	0

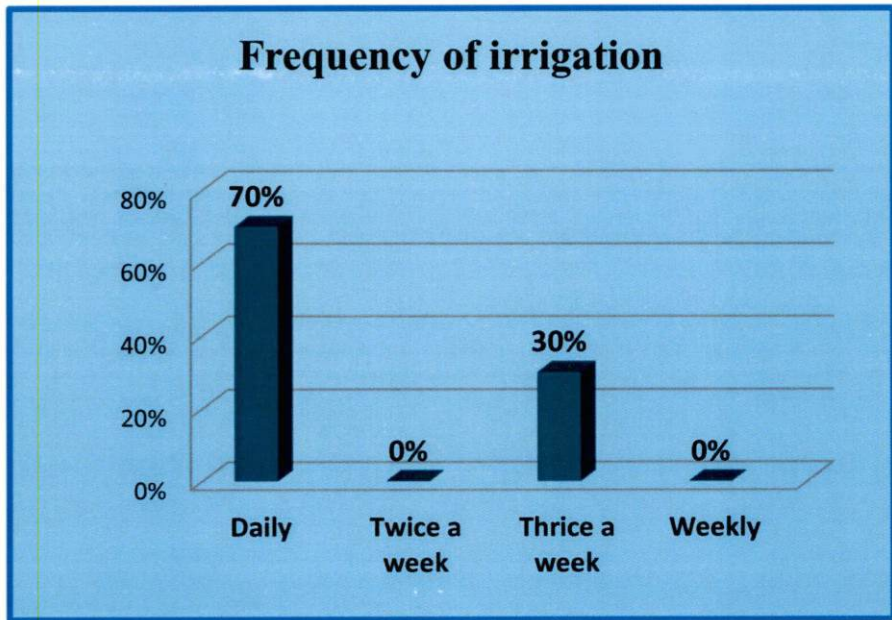


Fig. 40. Distribution of schools based on frequency of irrigation

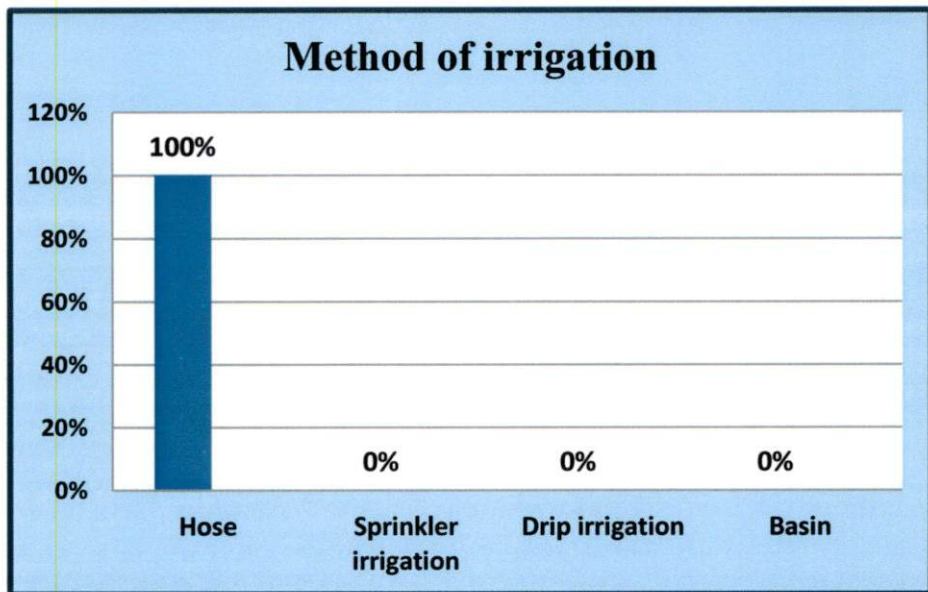


Fig. 41. Distribution of schools based on method of irrigation

It was evident from Table 40 that 100 per cent of the schools irrigated the school vegetable garden using hose. Hence, it can be suggested that there are prospects of educating the school teachers and students on modern types of irrigation like drip and sprinkler irrigation which are methods that will increase its efficiency.

4.1.24 Water resources

Water resources was measured based on water available in the school for gardening activities and the water resources were expressed in frequency and percentage as given below. The results are projected in Table 41.

Table 41. Distribution of schools based on the water resources

Category	10 SCHOOLS	
	Frequency	Percentage
Well	8	80.0
Pond	2	20.0
Pipe (Public Water System)	0	0

From the Table 41 it was evident that 80.0 per cent of the schools used well as their source of water for irrigation and 20 per cent of the schools used small man made pond as source water for irrigating school vegetable garden.

Water scarcity was experienced by all schools especially during summer season and today there is a situation where well and pond water dries up in summer especially during April and May months.

4.1.25 Financial support

Financial support is operationally defined as the various means of financial support available in the school for developing and maintaining school vegetable garden. The responses were expressed as frequency and percentage as given

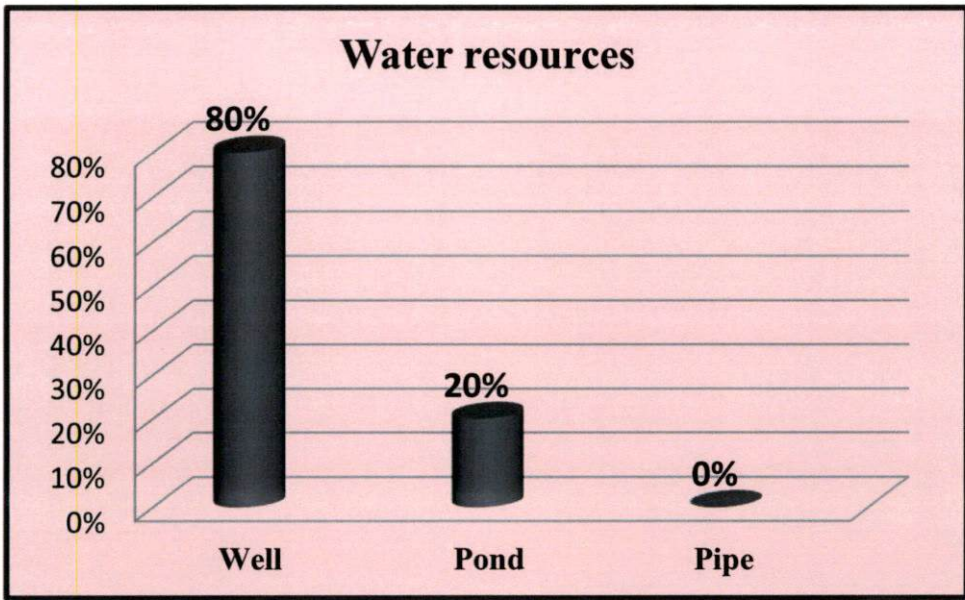


Fig. 42. Distribution of schools based on the water resources

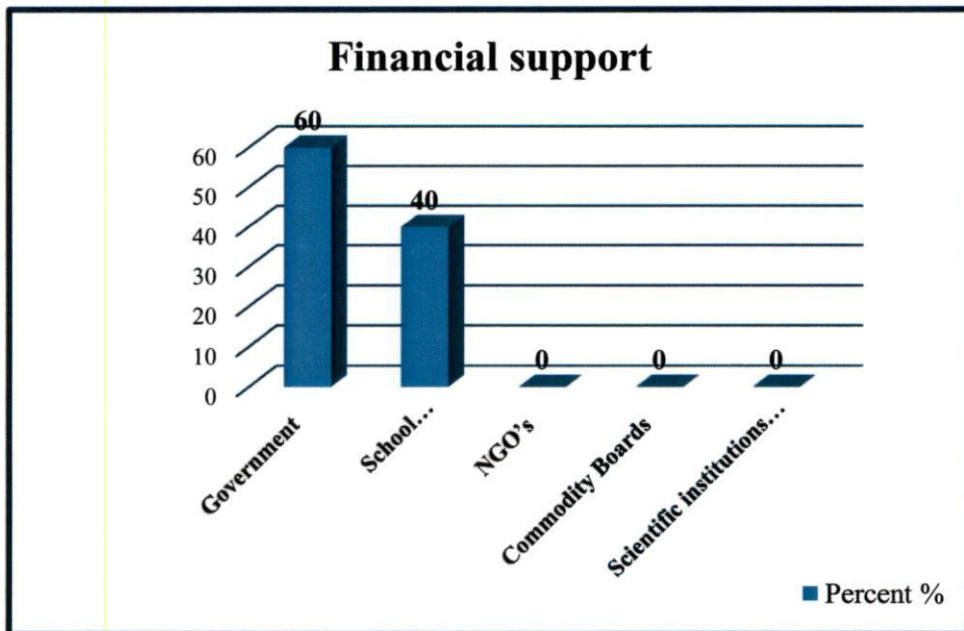


Fig. 43. Distribution of schools based on the financial support

below. The respondents (students and teachers) were grouped into different category and the results are demonstrated in Table 42.

Table 42. Distribution of schools based on the financial support

Category	10 SCHOOLS	
	Frequency	Percentage
Government	6	60.00
School management/PTA funds	4	40.00
NGO's	0	0
Commodity Boards	0	0
Scientific institutions like KSCSTE, DOECC, KBB	0	0

It was evident from Table 42 that 60.0 per cent of the schools got financial support from government and 40.0 per cent of the schools from school management or PTA funds.

Hence it can be inferred that majority of the schools got financial support from government for promoting school vegetable garden. Government policy should be supportive by providing incentives to all schools in Kerala where by more schools can be brought under vegetable cultivation especially by scaling up the unused land in schools for agriculture.

4.2 DISTRIBUTION OF STUDENTS AND TEACHERS BASED ON DEPENDENT VARIABLES

4.2.1 Students and teachers attitude towards the managing and maintaining school vegetable gardens.

Attitude of school students and the teachers were the main dependent variables of the study. The attitude of school students towards managing and maintaining of vegetable gardens and the attitude of school teachers towards

vegetable gardens were measured using procedures developed in the EARTH [Education And Resiliency To Horticulture] programme. The attitude statements are given in appendix VI.

The respondents (students and teachers) were grouped into different categories with mean value of the total attitude score as the check and the results are demonstrated in Table 43 and 44 respectively.

Table 43. Distribution of students based on their attitude

Category	Students (N=100)	
	Frequency	Percentage
Above mean	60	60.00
Below mean	40	40.00
Mean = 38.58		
Standard deviation = 3.294		
Standard error = 0.3294		

It was evident from Table 43 that majority of the student's attitude was above mean score (60%) as a result of the student's involvement in school vegetable garden activities as against 40 per cent of students who scored below mean score with respect to their attitude.

Table 44. Distribution of teachers based on their attitude

Category	Teachers (N=30)	
	Frequency	Percentage
Above mean	12	40.00
Below mean	18	60.00
Mean = 42.33		
Standard deviation = 1.8815		
Standard error = 0.3435		

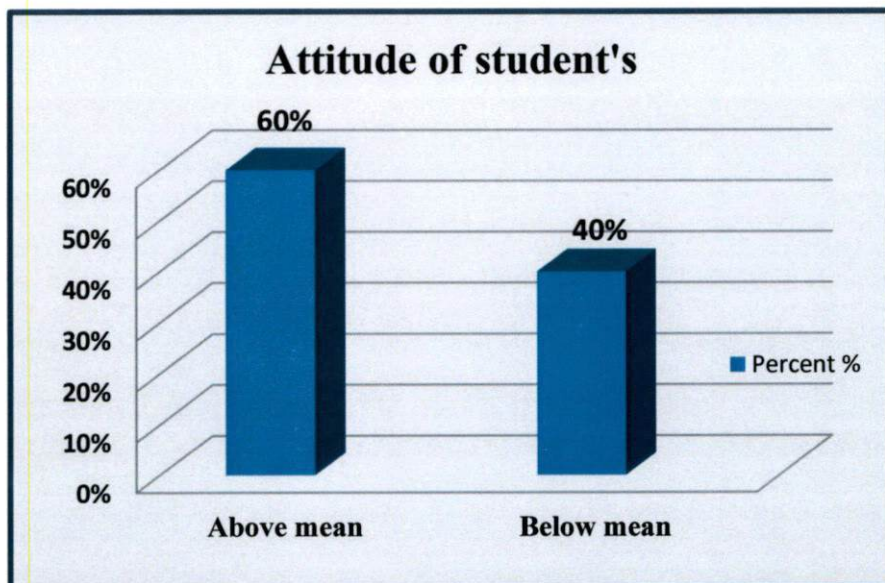


Fig. 44. Distribution of students based on their attitude

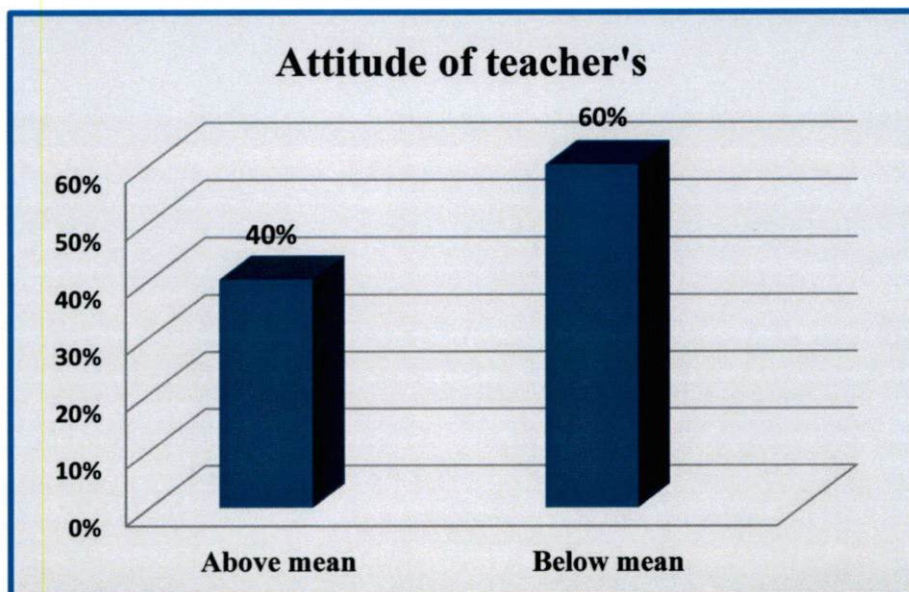


Fig. 45. Distribution of teachers based on their attitude

From Table 44 it was inferred that 40 per cent of school teachers fell in the category of above mean score attitude with respect to their school vegetable gardening activities followed by 60 per cent of the teachers who fell in the category of below mean score.

However, the overall mean attitude value of teachers was higher than that of students. Hence, it can be inferred that the attitude of majority of the students was influenced due to their engagement in school gardening activities. Majority of the teacher's attitude was below mean value (42.33).

However, the higher mean value of teachers attitude towards school gardening activities is an indication of the interest among teachers and this could be the reason that majority of the students attitude was influenced as a results of them engaging in school gardening activities.

Teacher's attitude was developed before involving in school vegetable gardening and garden activities.

The result was in confirmation with the findings of Fredericks *et al.* (1993), Waliczek *et al.* (2001) and McBeth and Volk (2010).

4.2.2 Relation between the attitude and profile characteristics of the students and teachers.

The influence of the independent variables on the attitude was found out using simple correlation analysis and the results are presented in Table 45.

Table 45. Correlation between attitude and other profile characters of students and teachers towards school vegetable gardening.

Sl. No.	Independent variables	Students (N = 100)	Teachers (N = 30)
1	Age	-0.321**	0.241
2	Education	-0.225*	0.388*
3	Dwelling place	-0.003	0.4475*
4	Distance	0.184	-0.076
5	Political orientation	0.084	0.379*
6	Social participation	0.135	-
7	Gardening experience	0.178	0.250
8	Factor of influence		
8.a	Level of encouragement	-0.013	0.177
8.b	Purpose of involvement	-0.208*	0.123
8.c	Personal & Social factors	-0.087	0.383*
8.d	Economic factors	-0.067	0.131
8.e	Technological factors	-0.191	0.372*
9	Awareness	0.069	-
10	Knowledge	0.004	0.131
11	Mass media exposure	0.042	0.417*
12	Training need	-0.392*	0.431*
13	Benefits	0.182	0.490**

(** 1% Significant level

* 5% significant level)

Table 45 highlights that out of 13 independent variables selected for the study, one variable namely age was negatively and significantly (at 1%) correlating with attitude of students engaged in school vegetable gardening. Three variables viz., training need, education and dwelling place were negatively and significantly (at 5%) correlating with student's attitude. However, variables like distance, political orientation, social participation, garden experience, level of encouragement, personal and social factors, economic factors, technological factors, awareness, knowledge, mass media exposure and benefits had no significant relationship with the attitude.

Negative and significant correlate value for age with student's attitude could be a reasonable finding as it is general that student's inclination to extra-curricular activities like gardening may decrease as age increases. This is because students will be more focused in their studies keeping an eye on academic excellence in board examination. Also, pressure from parents and school policies may also restrict students from such activities as they reach higher grades. Similar is in the explanation for negative significant correlation between education and (at 5%) attitude of students.

Students may have the tendency to abstain from school gardening activities for the reason that parents and teachers give more thrust for academic importance. Hence, purpose of involvement could be less and the finding that it is negatively and significantly correlating with attitude at 5% significant assumes importance.

Since teachers are the main actors of the programme, the students might not recognize training need as important and hence the finding that training need is negatively and significantly correlating with attitude of students (at 5% significance) holds correct. This need not be the reason alone. As the students were not trained or oriented properly, they might have developed a negative attitude.

The correlation between the attitude of school teachers with the profile characteristics, showed that education, dwelling place, political orientation, personal and social factors, technological factors, mass media exposure and training needs has showed a positive and significant relationship with the profile characteristics of teachers at 1% significance. Seven variables viz., teacher's age, distance, gardening experience, level of encouragement, purpose of involvement, economic factors and knowledge had no significant relationship with the attitude.

'Benefits' as a result of getting involved in school gardening activities are multifold. Teachers develop a sense of accountability and broaden the vision making education as a holistic approach there by bringing more benefits to the students. Students develop a sense of responsibility and also get sensitized to nature, the need

for producing own food that is safe and more over improvement in their overall physical and psychological health. Hence, the variable 'Benefits' directly and significantly correlating with the attitude of school teachers at 1% significance is of immense significance.

The results are in conformity to the findings of Seshan (2014) who reported heightened awareness, body-kinesthetic abilities, interpersonal skills, linguistic and intellectual abilities, aesthetic and artistic sensibilities as a result of involving oneself in school gardening. The result is also in conformity with the findings of Harvey (1990) who reported that vegetable garden in school is used as a teaching resource.

Many researchers have reported that education level had positive and significant association with adoption. Hence, the finding that education improves adoption of new technologies is in agreement to the findings of Troung (2008).

Identifying the importance of vegetable in diets, vegetable garden assumes significance and it can be opined that educated people involve in agriculture in urban settings than to practice the same in rural areas as reported by Harvey (1940). The results are in tandem with observations made by Bradley (1995).

Community service and service learning in school have become an important event along with formal education. This is as a result of political orientation and generally it is expected that the state citizen (in Kerala) are highly politically sensitive and finds it as a venue to express their social orientation as well. The study approves the findings of several researchers like Biling (2002) and Wheeler (2002).

The result that the variable knowledge having positive and significant relationship with attitude of teachers may be due to the positive minds of students and teachers developed as a result of plenty of knowledge materials in schools regarding gardening activities and hands on experience with agriculture. The knowledge gain as a result of these experiences creates a significant increase in students and teachers attitude toward gardening activities in school as reported in the studies by Perritt and Morton (1990).

4.2.2.1 Distribution of students in each school based on attitude by using Kruskal Walli's test

Table 46. Kruskal Walli's test for students in each school based on their attitude

Schools	Total score	Mean score	Rank
Government High School, Vazhamuttom, Thiruvananthapuram	525	52.50	4 th
M G M Vidya Mount Public School, Edavilakom, Thiruvananthapuram	361.5	36.15	8 th
Government Girls High Secondary School, Cotton Hill, Vazhuthacaud, Thiruvananthapuram	836	83.60	1 st
Government Girls Higher Secondary School, Attingal, Thiruvananthapuram	221.5	22.15	10 th
St. Mary's Higher Secondary School, Pattom, Thiruvananthapuram	653.5	65.35	3 rd
SreeSethu Parvathi Bhai High School, Kadakkavoor, Thiruvananthapuram	457.5	45.75	7 th
B N V V Higher Secondary School for Boys, Thiruvallam, Thiruvananthapuram	350.5	35.05	9 th
Government High School, Pappanamcode, Thiruvananthapuram	679	67.90	2 nd
S N V Government Higher Secondary School, Kadakkavoor, Thiruvananthapuram	471.5	47.15	6 th
St. Joseph's Higher Secondary School, Palayam, Thiruvananthapuram	494	49.40	5 th
Kw Calculated value	34.5		
Table value	16.92 (5%) 21.67 (1%)		

It is evident from Table 45 that Government Girls Higher Secondary School, Cotton Hill, Vazhuthacaud, Thiruvananthapuram students were having more attitude towards the vegetable gardening activities compared to other schools.

Test results revealed significant difference between the attitude levels among students belonging to different schools after performing 'Kruskal Wallis one-way analysis of variance'.

4.2.3 Relation between the students and teachers in school vegetable garden based on the attitude by using t-test.

Table 47. Relation between the students and teachers in school vegetable gardening based on the attitude using t-test.

Category	Students	Teachers
Number of Observations	100	30
Mean	38.58	42.40
Standard Deviation	3.294	2.044
T - Statistic	-6.004	
P(T<=t) two-tail	4.027*	
T - Table (0.01)	2.576	

It was evident from Table 47 that teacher's attitude was more than the student's attitude based on mean value. Therefore, Samples are significantly different at both 5% and 1% level of significance. This observation reflects the findings of the works of Avramidis *et al.* (2000)

4.3 CONSTRAINTS EXPERIENCED BY THE STUDENTS AND TEACHERS WITH SUGGESTION FOR REFINEMENT ON SCHOOL VEGETABLE GARDENING.

Students and teachers face a number of limitations in school vegetable gardening and garden activities. Constraints experienced by the students and teachers are identified, ranked and presented as a list. The constraint with the highest score was taken as the highest rank. The constraints faced by teachers and students in managing their vegetable garden are presented in Table 48.

Table 48. Constraints experienced by the students and teachers in managing and maintaining the school vegetable garden.

Sl. No.	Items	Students (N -100)		Teachers (N - 30)	
		Score	Rank order	Score	Rank order
1	High input cost	360	1	107	1
2	Non availability of labour	232	17	55	21
3	High labour cost	282	5	80	5
4	Inadequate capital	263	9	77	9
5	Lack of student's interest	263	10	79	6
6	Uneconomic holding	243	15	70	15
7	Lack of technology	246	14	72	13
8	Lack of knowledge about gardening	272	7	79	7
9	Scarce water resource	266	8	75	11
10	Non availability of credit	261	12	74	12
11	Poor storage facility	279	6	78	22
12	Lack of teacher's involvement	304	3	89	10
13	Lack of student's participation	314	2	98	2
14	Non availability of implements	288	4	87	4
15	Lack of protection implements	263	11	77	3
16	Lack of extension service	241	16	64	17
17	Lack of time	247	13	72	14
18	Lack of motivation	217	20	59	20
19	Poor economic status	231	18	63	18
20	Surplus but insufficient for marketing	201	21	63	19
21	Wild animals destroy produce	225	19	67	16
22	Less profit	196	22	48	24
23	Lack of proper training	195	23	55	8
24	Difficult to work	181	24	49	23
25	Pilferation	154	25	45	25

It was evident from Table 48 that the major constraints as perceived by students in school vegetable garden were, high input cost followed by lack of student's participation, lack of teacher's involvement, non-availability of implements, high labour cost, poor storage facilities and lack of knowledge about gardening etc.

Other major constraints as perceived by students in school vegetable garden included scarce water resource, inadequate capital, lack of student's interest and lack of plant protection implements in the order of decreasing importance.

It was clear from Table 48 that the major constraints as perceived by teachers in school vegetable garden were, high input cost, lack of voluntary participation of student's, lack of garden maintenance during holidays and vacation (obtained through open ended interview schedule since the item was not originally mentioned in the interview schedule), non-availability of implements, lack of student's interest and lack of proper training etc.

Other major constraints as perceived by teachers in school vegetable gardening included inadequate capital, lack of teacher's involvement, scarce water resource in the order of decreasing importance.

These observation reflects the finding of the works of Monroe and Kaplan (1988) and Klein and Merritt (1994).

4.4 SUGGESTIONS FOR REFINEMENT

The major strategies suggested as perceived by students and teachers obtained through the open ended interview schedule was screened after discussing with subject matter specialists and the results are presented in Table 49.

Table 49. Suggestive strategies

Sl. No.	Suggestions	F	%
1	Good quality inputs at required time and amount	126	96.92
2	Alternative arrangements for garden maintenances in summer vacations	117	90
3	Providing adequate number of training for knowledge enhancement of teachers and students on agricultural technology and its utilizations by competent subject matter experts	104	80
4	Follow up through government schemes/projects with increased outlay in school vegetable gardens	95	73.07
5	Making available of student friendly safe implements to be used for production and protection activities.	86	66.67
6	School vegetable garden as a compulsory subject in school curriculum	75	57.70

The results from Table 49 indicated that majority of the students and teachers (96.92%) opined that 'good quality inputs at required time and amount' should be made available at school for the uninterrupted and successful conduct of the programme. 'Alternative arrangements for garden maintenances in summer vacations' (90 %) was another felt requirement by both students and teachers.

Mechanism to provide profit based incentives for teachers and students who come and attend and manage school vegetable garden can be thought of. Also, the school council should consider devising strategy to engage labour, if required and institute supervisory team during vacations to ensure that the crops in field are not affected.



The other suggestions were 'Providing adequate number of training for knowledge enhancement of teachers and students on agricultural technology and its utilizations by competent subject matter experts' (80 %), 'Follow up of government schemes/projects with increased outlay in school vegetable gardens' (73.07 %), 'making available student friendly safe implements to be used for production and protection activities' (66.67 %) and School vegetable garden as a compulsory subject in school curriculum (57.70 %).

Apart from the above observations made by teachers and students, some general observations made by the researcher are:

1. Knowledge on preparation of organic inputs to be imparted to schools through training and demonstrations
2. The best school gardens have to be recognized at state level by conducting acclaimed award ceremony by instituting high prize money. Such an act can be a noble proposition.

All these measures would improve the overall scenario of school vegetable gardening. It will not only help in the overall development of the individual be it teachers or students, but also will help to bring more area under safe vegetable production. This will further help to improve the socio-economic position of Kerala through harnessing the young power available in large as students.

Summary

CHAPTER V

SUMMARY

A school garden is an innovative teaching tool and strategy that lets students incorporate hands-on activities in a diversity of interdisciplinary, standards-based lessons. The vegetable garden engages students by providing a energetic environment in which to observe, discover, experiment, nurture, and learn. It is a living laboratory where lessons are drawn from real-life experiences rather than textbook examples, allowing students to become active participants in the learning process. Through the garden, students gain an understanding of ecosystems, knowledge of plant and at the same time, they learn practical horticultural skills that last a lifetime.

Kerala Agricultural University also supports agricultural school outreach programmes through its extension system and student social bodies like National Service Scheme with an aim to improve the knowledge, skill, attitude and understanding of the school children on agriculture with special reference to vegetable gardens. Many Government, Aided and Unaided schools are maintaining vegetable gardens through the funding of State Government and the service support extended by Department of Agriculture Development and Farmers' Welfare. "Setting up of school gardens" is also a component of the vegetable development scheme where schools are provided with financial assistance as well. Around 100 schools in Thiruvananthapuram was undertaking vegetable gardening in the district. Hence, Thiruvananthapuram, district was purposively selected for the study. Hence the present study was undertaken with the following objectives:

- i. To study the influence of vegetable gardens in terms of attitudes.
- ii. To assess level of knowledge on vegetable gardening, delineating the benefits, training needs.

- iii. To identify the constraints and strategies as perceived by the school students and teachers.

The study was conducted in Thiruvananthapuram district involved 130 respondents with 10 students and 3 teachers each from 10 schools during the period, 2016-2017. The study was done to determine the influence of vegetable gardens in terms of attitudes, to assess the level of knowledge on vegetable gardening, delineating the benefits, training needs, constraints and strategies as perceived by the school students and teachers. Thirteen independent variables, namely, age, education, occupation, dwelling place, distance, school vegetable garden size, social orientation, extent of volunteering, political orientation, social participation, factors of influence, level of excitement and mass media exposure were selected through judges rating. Along with the selected variables, four additional variables like level of awareness, knowledge, training needs and benefits were also included purposively. The attitude of school students and teachers towards gardening and garden activities was selected as the dependent variable.

The data were collected from the students and teachers in school through personal interview using a well-structured and pre tested interview schedule. Focus Group Discussion was also conducted to get information regarding constraints experienced and suggestions for strategies. Relevant statistical analysis was used for the generated data and results were documented and interpreted.

The salient findings of the study were:

1. It was found that majority of students involved in school gardening activities belonged to 14 (33.0%) and 15 (28.0%) age group. Majority of the teacher's belonged to above mean age group (56.77%).

2. Majority of the students was studying in 7th (40.0%) and 8th (40.0%) standard. 100 per cent teachers had B.Ed or M.Ed degrees and majority of the teachers possessed BA/BSc or MA/M.Sc degrees.
3. 53.33 per cent of the teachers was not having any secondary occupation however less than half of the teachers (40%) had agriculture as their secondary occupation.
4. Most of the students dwelling place belonged to rural area (61.0%) and the distance from home to school was less than 3 km (45.0%). About 63.33 per cent of teachers came from urban back ground and their distance from home to school was more than 6 km (50.0%).
5. About 54 and 90 per cent of the students and teachers belonged to the category medium level of social orientation.
6. Majority of the students and teachers (60.0%) had high level of extent of volunteering work inside school however, when in the case of extent of volunteering work outside school, majority of the students (82.0%) belonged to the low category. More than 63.33 per cent of teachers had high level of extent of volunteering work outside school.
7. With respect to political orientation, 60 percent of students participated in 'environment protection campaign' followed by 31 per cent participated in various 'food security programmes'. In case of teachers, 43.34 per cent of the teachers participated in environmental protection campaign followed by 40 per cent of the teachers participated in food security programmes.
8. Majority of the students (47 %) belonged to the medium level of social participation followed by 34 and 19 per cent of the students who belonged to the high and low level of social participation respectively.

9. About 80 per cent of the students and 90 per cent of teachers had vegetable garden at home before involving in school vegetable gardening.
10. Majority of the teachers (50%) had vegetable garden followed by 20 per cent with mixed farm garden at home.
11. Majority of the students participated in school vegetable gardening activities once in 2 to 3 days and 92 per cent of students were very excited to come to school and participate in school vegetable garden activities.
12. Majority of the students (55%) and teachers (56.67%) belonged to high class limits with respect to factors of influence as derived from the 5 sub factors contributing to the total influencing factors on school vegetable garden followed by 40 per cent of the students and 26.67 per cent of teachers who belonged to medium class limits.
13. Majority of the students had high level of awareness (97.00 %) followed by 3 per cent of the students with medium level of awareness.
14. Majority of students (71%) had medium level of knowledge followed by 26.00 per cent of students with low level of knowledge. In case of teachers 53.33 per cent of teachers were with medium level of knowledge followed by 36.67 per cent of teachers with low level of knowledge.
15. In case of mass media exposure 90 per cent student respondents belonged to medium category and newspaper was their main source of information with rank one, followed by television and mobile advisory services that ranked 2nd and 3rd positions respectively. Majority of the teachers belonged to the category of medium level of mass media exposure (90.0%) and newspaper was their main source of information

with rank one, followed by mobile advisory services and television that ranked 2nd and 3rd positions respectively.

16. Majority of the students (40%) and teachers (40%) received training from experts and remaining 60 per cent of the students and teachers have not received training from experts. All the students and teachers in school required training about the vegetable garden activities.
17. In case of benefits, majority of the students (77%) and teachers (56.67%) perceived high level of benefits from their engagement in vegetable garden followed by 22.00 and 43.33 per cent of the students and teachers who perceived medium level of benefits.
18. The average school vegetable garden area was 18.5 cents and seven out of 10 schools were maintaining vegetable garden in an area of more than or equal to 20 cents.
19. Fourteen different vegetables were grown in school vegetable gardens and the most dominant was okra (100.0%) followed by amaranthus (60.0%), tomato (50.0%), cowpea (50.0%) and cucumber (40%).
20. Majority of the schools maintained mixed cropped vegetable garden (80.0%) and 7 out of 10 schools did possess protective fencing of which 5 were made of brick walls and two a combination of brick walls and live/mesh nettings.
21. Seventy per cent of the schools were irrigating their vegetable garden daily and 30 per cent of the schools were irrigating thrice a week. Eighty per cent of the schools used well water for irrigation.
22. Sixty per cent of the schools got financial support from government and 40.0 per cent of the schools from school management or PTA funds.
23. Student's attitude was high (60%) as a result of the influence of getting involved in school garden activities.

24. Sixty per cent of school teachers fell in the category of low attitude with respect to their involvement in school garden activities considering the mean attitude value (42.33) as a check. However, the overall mean attitude value of teachers was higher than that of students.
25. The results of the correlation between attitude and other profile characteristics of teachers towards school vegetable gardens affirms that education, dwelling place, political orientation, personal and socio factor, technological factors, mass media exposure and training needs were positively and significantly associated at 5% significance followed by benefits at 1% significance. However, in case of student's attitude was influenced by age at 1% significance and class of study, purpose of involvement and training needs at 5% significance.
26. Kruskal Wallis one-way analysis of variance revealed that there was significant difference between the attitude levels among students belonging to different schools.
27. The major constraints as perceived by students in school vegetable garden were, high input cost, lack of student's participation, lack of teacher's involvement, non-availability of implements, high labour cost, poor storage facilities and lack of knowledge about gardening in the order of decreasing importance.
28. Constraints as perceived by teachers were, high input cost, lack of voluntary participation of student's, lack of garden maintenance during holidays and vacation, non-availability of implements, lack of student's interest and lack of proper training in the order of decreasing importance.
29. Top three strategies to be adopted for sustenance of school vegetable gardening as perceived by students and teachers after ranking followed by focus group discussion were, availing good quality inputs at

required time and amount, alternative arrangements for garden maintenances in summer vacations and providing adequate number of training for knowledge enhancement of teachers and students on agricultural technology and its utilizations by competent subject matter experts. Also, it was opined that agriculture should be made a compulsory subject in their curriculum right from the early class or standard of study.

Suggestions for future research

1. Scaling up of the same study in other districts of Kerala should be thought of and implemented.
2. School level demonstrations of effectiveness of vegetable gardening and garden activities for involving the students should be undertaken and the same should be documented and analysed for socio-psychological and economic benefits.
3. Further studies on school gardening should be taken up with variables like leadership pattern at various levels – students, teachers and management levels and extent of linkage – with Krishi Bhavans, ATMA, Watershed development programmes, Grama Panchayat, Block Panchayat.
4. Reason for non-participation of majority of the students in school garden activities should be thoroughly subjected to social science research. Studies on the physical / economic output from school vegetable gardens should be undertaken.
5. Action research should be taken up in schools and the techno socio-economic benefits should be comprehensively worked out.



Plate. 1. G. G. H. S. S. Cotton hill school students working in school vegetable garden



Plate. 2. S S P B school students working in school vegetable garden



Plate. 3. St. Mary's school students working in school vegetable garden



Plate. 4. St. Mary's school students sowing on polyethene bags and pots in school vegetable garden



Plate. 5. School vegetable garden in St. Joseph's Higher Secondary School, Palayam



Plate. 6. School vegetable garden in Government High School, Pappanamcode.



Plate. 7. School vegetable garden in St. Joseph's Higher Secondary School, Palayam.



Plate. 8. School vegetable garden in G. G. Higher Secondary School, Attingal,



Plate. 9. School vegetable garden in Government High School, Vazhamuttom,



Plate. 10. School vegetable garden in M G M Vidya Mount Public School, Edavilakom,

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Abstract

**INFLUENCE OF SCHOOL VEGETABLE GARDENS ON THE
STUDENTS AND TEACHERS OF THIRUVANANTHAPURAM
DISTRICT: AN EXPOSITORY ANALYSIS**

by

DILIP S

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ABSTRACT

The study entitled 'influence of school vegetable gardens on the students and teachers of Thiruvananthapuram district: An expository analysis' was conducted in Thiruvananthapuram district that involved 130 respondents with 10 students and three teachers each from 10 schools involved in school vegetable garden programme during the period, 2015-2017. The study was done to determine the influence of vegetable gardens in terms of attitudes, to assess the level of knowledge on vegetable gardening, delineating the benefits, training needs, constraints and strategies as perceived by the school students and teachers. Four variables were purposively selected along with thirteen independent variables through judges rating and included in the study. The attitude of school students and teachers towards gardening and garden activities was selected as the dependent variable.

On analysis of data, it was found that majority of students involved in school gardening activities belonged to 14 and 15 age group and were studying in 7th and 8th standard. In case of teachers, majority (56.77%) of them belonged to above mean age (44 years) group and all the teachers' possessed B.Ed. or M.Ed. degrees. It was heartening to notice that 40 per cent of teachers had agriculture as their secondary occupation however 53.33 per cent teachers did not have any secondary occupation indicating the need for extension service to reach schools for educating teachers to engage themselves in agriculture at home focusing on food and nutritional security and also for generating additional income through sale of surplus. Most of the students dwelling place belonged to rural area where as teachers come from urban area and the distance from home to school was less than 3 km for students and more than 6 km for teachers.

In case of variables, viz., social orientation, social participation, attitude, factors of influence, mass media exposure and knowledge, the majority of the respondents belonged to medium category. Newspaper was their main source of information with rank one, followed by television for both teachers and students. The mean score for variables like

level of volunteering, level of excitement and attitude of teachers was higher than that of students indicating the mentoring role played by the teachers for managing and maintaining the school vegetable gardening. With respect to political orientation, the students were politically sensitive to issues and 60 per cent teachers making it clear that they were not actively involved in politics but do participate in programmes like 'environment protection campaign' and 'food security programmes'. The variables namely, dwelling place, political orientation, personal and social factor, technological factors, mass media exposure and training needs were positive and significantly correlating with attitude at 5% significance and benefits at 1% significance. However, students attitude was influenced by age at 1% significance and class of study, purpose of involvement and training needs (-ve) at 5% significance. Both teachers and students reported the need for more training and 80-90 per cent fell in the category of high training needs.

The average school vegetable garden area was 18.5 cents and seven out of 10 schools were maintaining vegetable garden in an area of more than or equal to 20 cents. Majority of the school maintained mixed cropped vegetable garden (80.0%) and 7 out of 10 schools did possess protective fencing. Seventy per cent of the schools were irrigating their vegetable gardens daily and 80.0 per cent of the schools used well water for irrigation. 60.0 per cent of the schools had financial support from government and 40.0 per cent of the schools from school management or PTA funds. 14 different vegetables were grown in school vegetable gardens and the most dominant was okra (100.0%), amaranthus (60.0%), tomato (50.0%), cowpea (50.0%) and cucumber (40%).

The top three constraints as perceived by students and teachers were 'the high input cost, lack of voluntary participation of student's, lack of garden maintenance during holidays and vacation. Important strategies to be adopted for sustenance of school vegetable gardening as perceived by students and teachers were, availing good quality inputs at required time and amount, alternative arrangements for garden maintenances in summer vacations, and making agriculture as a compulsory subject from upper primary level to high school.

സംഗ്രഹം

“ തിരുവനന്തപുരം ജില്ലയിലെ വിദ്യാർത്ഥികളിലും അധ്യാപകരിലും വിദ്യാലയ പച്ചക്കറി ഉദ്യാനങ്ങൾ ചെലുത്തുന്ന സ്വാധീനം” - എന്ന ഈ പഠനം നടന്നിരിക്കുന്നത് തിരുവനന്തപുരം ജില്ലയിലാണ്. ഈ പഠനത്തിനായി 2015 - 2017 കാലയളവിൽ വിദ്യാലയ പച്ചക്കറി ഉദ്യാന പ്രവൃത്തിയിൽ ഏർപ്പെട്ടിട്ടുള്ള 10 വിദ്യാലയങ്ങളിൽ നിന്നും 10 വിദ്യാർത്ഥികളെയും 3 അധ്യാപകരെയും തിരഞ്ഞെടുത്തു. മൊത്തം 10 വിദ്യാലയങ്ങളിൽ നിന്നും 130 പേരാണ് ഈ പഠനത്തിനായി തിരഞ്ഞെടുത്തത്. ഈ പഠനം നടന്നിരിക്കുന്നത്, വിദ്യാർത്ഥികളിലും അധ്യാപകരിലും വിദ്യാലയ പച്ചക്കറി ഉദ്യാനങ്ങളുടെ സ്വാധീനം, അവരുടെ മനോഭാവം, വിജ്ഞാന വില, പ്രയോജനങ്ങൾ ഉപയോഗിക്കാനുള്ള കഴിവ്, പരിശീലനങ്ങളുടെ ആവശ്യകത, ബുദ്ധിമുട്ടുകൾ, അത് മറികടക്കാനായി രൂപീകരിച്ച നയതന്ത്രങ്ങൾ എന്നീ ഘടകങ്ങൾ ഉപയോഗിച്ചാണ് പഠിച്ചിരിക്കുന്നത്. ഉദ്യാനവർത്തിയോടും, ഉദ്യാന പരിപാടികളോടുമുള്ള വിദ്യാർത്ഥികളുടെയും, അധ്യാപകരുടെയും മനോഭാവമാണ് ആശ്രിതപരിവർത്തിത വസ്തുവായ് തിരഞ്ഞെടുത്തത്.

വസ്തുതകളുടെ പഠനത്തിൽ നിന്നും, ഭൂരിപക്ഷം വിദ്യാർത്ഥികളും, 14-15 വയസുള്ളവരായിരുന്നുവെന്നും, അവർ 7 - 8, ക്ലാസുകളിലാണ് പഠിക്കുന്നുവെന്നും കണ്ടെത്തി. അധ്യാപകരിൽ ഭൂരിപക്ഷംപേരും (56 - 77%) 44 വയസ്സിന് മുകളിലുള്ളവരാണെന്നും അവർ B.ed അല്ലെങ്കിൽ M.ed ബിരുദധാരികളാണെന്നും കണ്ടെത്തി. 40% അധ്യാപകരും കൃഷി ഒരു രണ്ടാം തൊഴിലായിരുന്നു, എന്നാൽ 53 - 33 % അധ്യാപകർക്കു ഒരു രണ്ടാം തൊഴിൽ ഇല്ലായിരുന്നുവെന്നും അധ്യാപകരെ കൃഷിയിൽ ഉൾപ്പെടുത്താനും, ഭക്ഷ്യസുരക്ഷയെക്കുറിച്ച് ബോധവാന്മാരാക്കാനും, ഒരു അധിക വരുമാനം ഉണ്ടാക്കാനുള്ള വഴിയെയും കുറിച്ച് അറിവ് നൽകാനും വിജ്ഞാന വ്യാപന പ്രവർത്തനങ്ങൾ അനിവാര്യമാണെന്ന് അവർ ചൂണ്ടിക്കാട്ടി. ഭൂരിപക്ഷം വിദ്യാർത്ഥികളും ഗ്രാമീണ പ്രദേശങ്ങളിൽ വസിക്കുന്നവരുമായിരുന്നു. വീടുകളിൽ നിന്നു വിദ്യാലയങ്ങളിലേക്കുള്ള ദൂരം വിദ്യാർത്ഥികൾക്ക് 3 കിലോമീറ്റർ കുറവായിരുന്നു. എന്നാൽ അധ്യാപകർക്ക് 6 കിലോമീറ്ററിൽ കൂടുതലും. സാമൂഹിക അറിവിന്യാസം, സാമൂഹിക സംബന്ധം, മനോഭാവം, സ്വാധീനഘടകങ്ങൾ ഭൂരിപക്ഷം ഇത്തരംമികളും, മാദ്ധ്യമ വിഭാഗത്തിൽ ഉൾപ്പെട്ട ശ്രോതസ്സ്. വിദ്യാലയ പച്ചക്കറി, ഉദ്യാനങ്ങളും നടത്തിപ്പിലും, പരിപാലനത്തിലും, അധ്യാപകർക്കാണ് വിദ്യാർത്ഥികളേക്കാൾ കൂടു

തൽ ആവേശം എന്നും കണ്ടെത്തി. രാഷ്ട്രീയ അറിവിന്യാസത്തിൽ, വിദ്യാർത്ഥികൾ രാഷ്ട്രീയ വിഷയങ്ങളോട് ദാവുകതപരമായ കാഴ്ചപ്പാട് ഉള്ളവരായിരുന്നുവെന്നു കണ്ടെത്തി.

60 % അധ്യാപകരും രാഷ്ട്രീയ പ്രവർത്തനങ്ങളിൽ ഏർപ്പെടുന്നവരെല്ലാവരും വെളിപ്പെടുത്തി എന്നാൽ, അവർ പ്രകൃതി സംരക്ഷണ പരിപാടികളിലും, ഭക്ഷ്യസുരക്ഷ പരിപാടികളിലും പങ്കെടുക്കാറുണ്ടെന്ന് അംഗീകരിച്ചു. വാസസ്ഥലം, രാഷ്ട്രീയ അറിവിന്യാസം, വ്യക്തിപരവും, സാമൂഹികവുമായ ഘടകങ്ങൾ, സാങ്കേതിക ഘടകങ്ങൾ, ബഹുജനമധ്യമ പ്രവേശനം, പരിശീലന അവശ്യകത എന്നീ ഘടകങ്ങൾ മനോഭാവവുമായി സ്പഷ്ടവും, അർത്ഥപൂർണ്ണവുമായ ബന്ധം പുലർത്തുന്നവയായിരുന്നു. അധ്യാപകരും, വിദ്യാർത്ഥികളും, കുടുതൽ പരിശീലനം ആവശ്യമുണ്ടെന്ന് അഭിപ്രായപ്പെടുകയും അവരിൽ 80-90% പേരും ഉയർന്ന പരിശീലന ആവശ്യകതയുടെ വിഭാഗത്തിൽപ്പെടുന്നവരുമായിരുന്നു. ഒരു ശരാശരി വിദ്യാലയ പച്ചക്കറി ഉല്പാദനത്തിന്റെ വ്യാപ്തി 18.5 സെന്റ് ആണ്. പത്തിൽ ഏഴ് സ്കൂളുകളും പച്ചക്കറി ഉല്പാദനം 20 സെന്റിൽ ഉൾപ്പെടുത്തിയിരിക്കുന്നു. ഭൂരിപക്ഷം സ്കൂളുകളും (80.0%), ഇടച്ചേർന്ന പച്ചക്കറി ഉല്പാദനമായിരുന്നു സംരക്ഷിച്ചിരുന്നത്, കൂടാതെ പത്തിൽ ഏഴു സ്കൂളുകളും ഉല്പാദനങ്ങൾക്കും ചുറ്റും ഒരു സംരക്ഷണവേലിയും തീർത്തിരിക്കുന്നു. ഏഴു പതു ശതമാനം സ്കൂളുകളും പച്ചക്കറി ഉല്പാദനങ്ങൾക്ക് ദിവസവും ജലസേചനം നൽകുന്നവരായിരുന്നു, കൂടാതെ 80% സ്കൂളുകളും ജലസേചനത്തിനായി കിണർവെള്ളത്തെ ആശ്രയിച്ചിരുന്നു. 60% സ്കൂളുകൾക്കും ഗവൺമെന്റിൽ നിന്നും സാമ്പത്തിക സഹായം ലഭിച്ചിരുന്നത് അതിൽ ഏറ്റവും പ്രധാനപ്പെട്ടത് വെണ്ടയ്ക്ക (100.0%) ചീര (60%) തക്കാളി (50%), പയർ (50.0) വെള്ളരി (40.0%) എന്നിവയായിരുന്നു.

അധ്യാപകരുടെയും വിദ്യാർത്ഥികളുടെയും കാഴ്ചപ്പാടിലുള്ള ഏറ്റവും പ്രധാനപ്പെട്ട മൂന്ന് ബുദ്ധിമുട്ടുകൾ/പ്രശ്നങ്ങൾ ഉയർന്ന നിക്ഷേപ നിരക്ക്, വിദ്യാർത്ഥികളിൽ നിന്നുള്ള സ്വേച്ഛാനുസാര സന്നദ്ധതയുടെ അഭാവം അവധിക്കാല സമയങ്ങളിൽ ഉല്പാദനങ്ങളുടെ പരിപാലനത്തിന്റെ അഭാവം എന്നിവയായിരുന്നു. ഈ പ്രശ്നങ്ങൾ മറികടക്കാനായി, രൂപീകരിക്കേണ്ട നയതന്ത്രങ്ങൾ വിദ്യാർത്ഥികളുടെയും, അധ്യാപകരുടെയും കാഴ്ചപ്പാടിൽ, കൃത്യമായ യത്നം നല്ല നിക്ഷേപവസ്തുക്കളുടെ ലഭ്യത, അവധിക്കാലങ്ങളിൽ ഉല്പാദനപരിപാലനത്തിനായി ഇതര മാർഗ്ഗങ്ങൾ കണ്ടെത്തുക, കൂടാതെ ഹൈസ്കൂൾ വരെ, കൃഷി ഒരു നിർബന്ധിത വിഷയമാക്കുക എന്നതുമായിരുന്നു.

Appendices

APPENDIX I



KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
Department of Agricultural Extension
VELLAYANI - 695 522
THIRUVANANTHAPURAM

Dr. Allan Thomas
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Department of Agricultural Extension

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Date: 20 -09-2016

Sir/Madam,

Mr. Dilip S. (Ad. No. 2015-11-111), the Post graduate scholar in the Department of Agricultural Extension, College of Agriculture, Vellayani is undertaking a research study entitled "Influence of school vegetable gardens on the students and teachers of Thiruvananthapuram district: An expository analysis" as part of his research work. Variables supposed to have close association with the study have been identified after extensive review of literature.

Considering your vast experience and knowledge on the subject, I request you to kindly spare some of your valuable time for examining the variables critically as a judge to rate the relevancy of them. Kindly return the list duly filled at the earliest in the self-addressed stamped envelope enclosed with this letter.

Thanking you

Yours faithfully

Allan Thomas

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OBJECTIVES OF THE STUDY

This study will assess the influence of vegetable gardens in terms of attitudes, to assess level of knowledge on vegetable gardening, delineating the benefits, training needs, constraints and strategies as perceived by the school students and teachers.

You may please rate the statement with a tick mark in the appropriate column against the statement with special reference to its importance to meet the objectives of the study. A score of 5 indicates maximum relevancy and a score of 1 indicates the least relevancy.

Sl. No	Independent variables for students	1	2	3	4	5
1	Age It is defined as the number of calendar years completed by the students at the time of investigation.					
2	Education It refers to highest academic qualification possessed by the school students at the time of data enumeration.					
3	Family size It is defined as the total no of family members who are dependent on the head of family for their living.					
4	Height of student The measurement of someone or something from head to foot or from base to top.					
5	Weight of student					

	The weight of an student is usually taken to be the force on the object due to gravity.					
6	Information source Utilization It is defined as the different sources through which information on vegetable garden is obtained by a school student.					
7	Knowledge The facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a growing of vegetable garden.					
8	Education stand in school Student's marks will be replaced by grades which will be evaluated through a series of curricular and extra-curricular evaluations along with academics.					
9	Training attended It is defined as the number of trainings related to school vegetable gardening by school students.					
10	Innovativeness It is defined as the degree to which an individual is relatively earlier in adopting new ideas.					
11	Risk orientation It refers to the degree to which an school students is oriented towards risk and uncertainty in adopting vegetable garden in school.					
12	Social participation Participating in school gardening activities enhances my ability to deal with a problem situation by influencing					

	cognitive and emotional processes related to the situation (Martin, 2006)					
13	Technology availability It is the degree to which school students has accessibility to right technology in time.					
14	Level of encouragement It is operationalised as to what encourage or discourage the school students/teachers attending to school vegetable garden.					
15	Self confidence It is the extent of feeling about one's own power, abilities and resourcefulness to perform any activity which the school students/teachers desires to undertake.					
16	Attitude Positive or negative feeling of the school students towards school vegetable gardening.					
17	Information Acquisition Behaviour It is defined as the sources or channels from which the school student gets technological information regarding school vegetable garden. Students are categorized based on their information acquisition through personal – cosmopolite channels.					
18	Environment concern It refers to the school students concerns for the environment that have prompted them for embracing vegetable gardening practices in their school.					
19	Adaptability					

	Adaptability shows the ability of school students to learn from experience, and improves the fitness of the learner as a competitor with special reference to vegetable gardening practices.					
20	Simplicity It is the degree to which the technology (school vegetable gardening measures) is simple to be adopted by the students.					
21	Social acceptability Defined as the degree to which a technology is considered useful, practical and feasible by majority of social system.					
22	Extent of volunteering Volunteering is also renowned for students in skill development, and is often intended to promote goodness or to improve student quality of life.					
23	Purpose of involvement Involving in school gardening activities of student had a positive influence with special reference to school attendance.					
24	Any others (specify)					

Sl No	Independent variables for teachers	1	2	3	4	5
1	Age It is defined as the number of calendar years completed by the respondent at the time of investigation.					
2	Education It refers to highest academic qualification possessed by the school teachers at the time of data enumeration.					
3	Family size It is defined as the total no of family members who are dependent on the head of family for their living.					
4	Information source Utilization It is defined as the different sources through which information on vegetable garden is obtained by a school teacher.					
5	Knowledge The facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a growing of vegetable garden.					
6	Economic motivation It is defined as the occupational motives of school teachers practicing vegetable garden intended for profit maximization and relative value the teacher places on monetary gain.					
7	Awareness It is defined as the extent to which the school teachers were familiar with vegetable gardening practices.					
8	Infrastructure facility					

	It is the basic facility and installations required or available for a school basically intended for practicing vegetable gardening.					
9	Training attended It is defined as the number of trainings related to school vegetable gardening by school teachers.					
10	Innovativeness It is defined as the degree to which an individual is relatively earlier in adopting new ideas.					
11	Risk orientation It refers to the degree to which an school teachers is oriented towards risk and uncertainty in adopting vegetable garden in school.					
12	Social participation Participating in school gardening activities enhances my ability to deal with a problem situation by influencing cognitive and emotional processes related to the situation.					
13	Self confidence It is the extent of feeling about one's own power, abilities and resourcefulness to perform any activity which the school teachers desires to undertake.					
14	Attitude Positive or negative feeling of the school teachers towards school vegetable gardening.					
15	Motivation It refers to the need satisfying and goal oriented behavior of school teachers with special reference to the support					

	they get from Government/Non Government for adopting vegetable garden in school.					
16	<p>Farm size</p> <p>It is defined as the total farming land owned by the school for vegetable gardening activities and is expressed in hectares.</p>					
17	<p>Annual income</p> <p>It is operationalised as the total amount of income in a year earned by the school through primary and secondary occupations.</p>					
18	<p>Environment concern</p> <p>It refers to the school teachers concerns for the environment that have prompted them for embracing vegetable gardening practices in their school.</p>					
19	<p>Cosmopolitaness</p> <p>Defined as the extent of contact of school students/teachers with outside village such as visiting the nearest town, the purpose of visit and membership in organizations outside the village may influence their behavioural pattern.</p>					
20	Any others (specify)					

APPENDIX II

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI, TRIVANDRUM
DEPARTMENT OF AGRICULTURAL EXTENSION

STUDENTS DATA ENUMERATION SCHEDULE-(2017) “Influence of school vegetable gardens on the students and teachers of Thiruvananthapuram district: An expository analysis”

1. Name of school with full address and contact details: -----

2. Family details:

Name of family members living together	Age	Education	Occupation		Total annual income
			Primary	Secondary	

3. Religion: ----- Caste: -----

4. Dwelling place: [Rural/Urban]; [Own or Rented]; If rented Do you have an own house? [Yes/No]

5. Distance to your school from home: ----- km.

6. Vehicle facilities: own 4 wheeler /own 2 wheeler / auto rickshaw / bicycle / school bus / public transport / by walk / any other mode (specify-----)

7. **Social orientation:**

- How often you have participated in community service or civic affairs related to school: [Regular/ Sometimes/Never]
- How often you have participated in community service or civic affairs related to non school: [Regular/ Sometimes/Never]

8. **Extent of Volunteering:**

- How often did you do some volunteer for community service work in school?

- On average, 'I volunteered _____ hours each day'(Monday, Tuesday, Wednesday. Thursday, Friday, Saturday). I volunteered _____ hours each week'
- How often did you do some volunteer for community service work out of school?
- On average, 'I volunteered _____ hours each day (Monday, Tuesday, Wednesday. Thursday, Friday, Saturday). I volunteered _____ hours each week'

9. Civic engagement /Political orientation:

Whether they have participated in any political oriented programmes? (Yes?No): If yes; tick items given in brackets [political campaign, boycott a product or service, and demonstrate publicly for a cause; environment protection campaign; food security programmes, others (specify-----)].

10. Social participation: extent of participation in social activities:

Sl. No.	Area of participation	Extent of participation		
		Regularly	Occasionally	Never
1	School music, drama, arts, etc.			
2	Literary activities			
3	School sports			
4	School parliament			
5	School clubs: Whether [member/Office bearer]? Name of the club:			
6	NSS volunteer (whether exist- Y/N); If Yes..			
	NCC (whether exist- Y/N); If yes..			
7	Out of school activities like in religious/cultural/ social bodies etc. (Specify):			

11. Did your family have a garden at home before you started involving in the school garden activity? (Yes/No)

If yes what type of garden do you have:

[Ornamental/Kitchen/Herbal/Vegetable/ Mixed farm/other (specify -----)]

12. Level of excitement:

Are you really excited to come school for participating the vegetable garden activities? (Yes/No)

Student’s participation in garden activities [Daily; once in 2/3 days; Once in a week]

How excited are you to participate in school garden activities? Very Excited/Moderate/Not excited

How excited are you to come to school every day? Very Excited/Moderate/Not excited

13. Factors of influence

Sl No.	Statement	SA	A	D	SD
	Level of encouragement: is operationalised as to what encourage or discourage the respondents attending to school vegetable garden.				
1	I think it’s important to know where my food comes from.				
2	Gardening allows myself to work autonomously, enjoy learning relationships with peers, and feel they are competent to reach their goals				
3	I think gardening create learning opportunities that are active, collaborative, and promote learning relationships				
	Purpose of involvement: in this study is indicated as to why the respondents would attend school garden activities.				
1	Involving in gardening ensure the classroom environment is welcoming myself from all cultures.				
2	Involvement in gardening helps in recognizing and enhances one’s mental and physical stability.				
3	Involving in school gardening activities had a positive influence with special reference to school attendance				
	Personal and Socio-psychological factors				
1	Participating in school vegetable gardening activities helps to improve my mental alertness				

2	School garden activities promote family relationships and increase student-teacher-parent involvement				
3	Teacher's play a vital role towards my (and vice versa) motivation and engagement when they participate in the school garden activities				
	Economic factor				
1	I am very much interested to grow the school vegetable garden because it teaches me the hardship to earn				
2	I would like to earn for my pocket money by myself rather than depending and bothering my parents and hence involve in school garden activities				
3	Deriving profit through the products and produces helps one to get more engaged in school garden activities				
	Technological factor				
1	I am very much interested to know the science of nutrient management for better yield.				
2	I am keen to know the disease and pest management techniques while involving myself in school vegetable garden activities.				
3	I will improve my technical skills through the use of different implements used in farming when getting involved in school garden activities.				

The purpose of this survey is to discover factors of influence of the students attending to school vegetable garden. (Please give your responses against each statement that will help the researcher to delineate different factors of influence).

14. Attitude of school students towards the vegetable garden

I am going to read out some statements of opinion which other students hold about **ATTITUDE OF SCHOOL STUDENTS AS A RESULT OF MANAGING AND MAINTAINING THE VEGETABLE GARDENS** and would like you to tell me how much you agree or disagree with each one...Please tick only one answer for each questions and do not leave any question unanswered.

Sl. No.	Attitude statements	SA	A	D	SD
1	Involving myself in school vegetable gardening activities				

	helps to improve my self-esteem and attitudes toward school vegetable garden.				
2	Engaging myself in school vegetable gardening activities helps to improve my social skills and behaviour				
3	Participating in school vegetable gardening activities helps to improve my environmental stance				
4	Through school gardening activities group cohesion increases and there by helps to improve my interpersonal relationships				
5	My science achievement scores have increased significantly after getting to be a part of school garden activities				
6	School garden activities helped to increase my sense of ownership and responsibility and interpersonal relations with school children				
7	School garden activities foster family relationships and increase student-teacher-parent involvement				
8	I believe that school gardening activities should be included as a part of curriculum and all students should be made to compulsorily participate				
9	I lose my interest in growing vegetable garden if not successful.				
10	Increased spending on agricultural activities in schools, I believe is a waste of money and time				
11	It is difficult for me to learn and internalize growing of vegetables and plants in garden activities				
12	I am afraid that I will score less marks in getting myself involved in school garden activities				
13	I don't like to garden because it is hard work				
14	I don't like to garden because I get dirty				

SA- Strongly Agree; A- Agree; D- Disagree; SD- Strongly Disagree

15. Given are the factors that are most important for the successful use of school gardening as a teaching strategy. Tick '5' for the most important and '1' for the least important.

Sl No.	Statement	5	4	3	2	1
1	Availability of garden-based curriculum					
2	Teachers' gardening knowledge					
3	Availability of support materials					
4	Availability of funding for supplies					
5	Support of the principal					
6	Availability of gardening equipment					
7	Person with responsibility for school gardening activities					
8	Others (specify)					

16. Given are the items under Knowledge Material that describes the knowledge materials accessed by respondents to support the use of school vegetable gardening in the elementary school curriculum. (please tick mark based on your opinion or preference)

Sl No.	Knowledge Materials	A	NA	VE	E	LE
1	Library books					
2	Gardening catalogs/magazines					
3	Personal books					
4	Experiments					
5	Videos					
6	Trade books					
7	Text books					
8	Computer software					
9	Internet					
10	Filmstrips					

A- Available; NA- Not Available; VE- Very Effective; E- Effective; NE- Not Effective

17. Mass media contribution

Sl No.	Items	Frequency			Usefulness		
		Very much	Much	Much less	Very useful	Useful	Less useful
1	Newspaper						
2	Television						
3	Magazines						
4	Radio						
5	Mobile advisory services						
6	Kiosks						

18. Training:

(a) Any training received on expert

Yes/No

If yes, please provide the following information

Sl. No.	Name of the training program	Organization	Duration

(b). Weather the students need training from expert

Yes/No

If Yes, please provide the following information

Sl No.	Name of training program	Very effective	Effective	Less effective
1	Production			
2	Protection			
3	Technology			
4	Marketing activities			
5	Other (specify)			

19. Benefits as perceived by students involved in school vegetable gardening

Benefits to students participating in school vegetable gardening. In three point

continuum, '3' indicates high, '2' indicates medium and '1' indicates low for the corresponding statements.

Sl No.	Statement	High	Medium	Low
1	Increase access to safe vegetables direct from school garden			
2	Helps to enhance the physical activities through garden activities and a positive influence on my health			
3	It helps me to develop of personal relationship and involvement with my friends and teachers through garden activities			
4	A feeling of accomplishment and self empowerment when the myself participate garden activities			
5	Improves my life skills including working with group			
6	It Help me to develop a sense of ownership and responsibility			
7	It has a positive impact on my achievement and behaviour			
8	Gardening offers hands-on, experiential learning opportunities in a wide array of disciplines from sowing to marketing			

20. Constraints experienced by the students towards school vegetable garden.

Please indicate your response to the listed constraints and solutions as perceived by the students in vegetable gardens.

Sl. No.	Items	Score				Perceived solution
		4	3	2	1	
1	High input cost					
2	Non availability of labour					
3	High labour cost					
4	Inadequate capital					
5	Lack of student's interest					

6	Uneconomic holding					
7	Lack of technology					
8	Lack of knowledge about gardening					
9	Scarce water resource					
10	Non availability of credit					
11	Poor storage facility					
12	Lack of teacher's involvement					
13	Lack of student's participation					
14	Non availability of implements					
15	Lack of protection implements					
16	Lack of extension service					
17	Lack of time					
18	Lack of motivation					
19	Poor economic status					
20	Surplus but insufficient for marketing					
21	Wild animals destroy produce					
22	Less profit					
23	Lack of proper training					
24	Difficult to work					
25	Pilferation					

MI-Most Important I- Important LI-Less Important Li-Least Important

Signature with date

ANY OTHER REMARKS AND SUGGESTIONS...

TEACHERS DATA ENUMERATION SCHEDULE-(2017)
“Influence of school vegetable gardens on the students and teachers of
Thiruvananthapuram district: An expository analysis”

21. Name of school with full address and contact details: -----

22. Family details:

Name of family members living together	Age	Education	Occupation		Total annual income
			Primary	Secondary	

23. Religion: ----- Caste: -----

24. Dwelling place: [Rural/Urban]; [Own or Rented]; If rented Do you have an own house? [Yes/No]

25. Distance to your school from home: ----- km.

26. Vehicle facilities: own 4 wheeler /own 2 wheeler / auto rickshaw / bicycle / school bus / public transport / by walk / any other mode (specify-----)

27. Uses of land

Components	Building	Garden land	Play ground	Waste land	Others (specify)
Area in cents					

28. Social orientation:

- How often you have participated in community service or civic affairs related to school: [Regular/ Sometimes]
- How often you have participated in community service or civic affairs related to non school: [Regular/ Sometimes/Never]

29. Extent of Volunteering:

- How often did you do some volunteer for community service work in school?

- On average, ‘I volunteered _____ hours each day’/ I volunteered _____ hours each week’
- How often did you do some volunteer for community service work out of school?
- On average, ‘I volunteered _____ hours each day’/ I volunteered _____ hours each week’

30. Civic engagement

a. Political orientation:

Whether they have participated in any political oriented programmes? (Yes?No): If yes; tick items given in brackets [political campaign, boycott a product or service, and demonstrate publicly for a cause; environment protection campaign; food security programmes, others (specify-----)].

31. Did your family have a garden at home before you started working in the school garden? (Yes/No)

If yes what type of garden do you have: [Ornamental/Kitchen/Herbal/Vegetable/Mixed farm/other (specify.....)]

32. Factors of influence

The purpose of this survey is to discover factors of influence of the teachers attending to school vegetable garden. (Please give your responses against each statement that will help the researcher to delineate different factors of influence).

Sl No.	Statement	SA	A	D	SD
	Level of encouragement: is operationalised as to what encourage or discourage the respondents attending to school vegetable garden.				
1	Gardening allows myself to work autonomously, enjoy learning relationships with peers, and feel they are competent to reach their goals.				
2	Gardening creates my experiences that are challenging and enriching and that extend their academic abilities.				
3	I think gardening create learning opportunities that are active, collaborative, and promote learning relationships				
	Purpose of involvement: in this study is Indicated as to why the respondents would attend school garden activities.				

1	Involving in gardening ensure the classroom environment is welcoming myself for all cultures.				
2	Involvement in gardening helps in recognizing and enhances one's mental and physical stability.				
3	It is very important to know and understand the principles of vegetable production				
Personal and Socio-psychological factors					
1	School garden activities promote family relationships and increase student-teacher-parent involvement				
2	Myself play a vital role on their students' (and vice versa) motivation and engagement when I am participate with students in the school garden activities				
3	Participating in school gardening activities enhances my ability to deal with a problem situation by influencing cognitive and emotional processes related to the situation				
Economic factor					
1	I am very much interested to grow the school vegetable garden because it teaches me the hardship to earn				
2	Deriving profit through the products and produces helps one to get more engaged in school garden activities				
3	I give importance to stability of returns rather than rapidity of returns while engaging in school garden activities.				
Technological factor					
1	I am very much interested to know the science of nutrient management for better yield.				
2	I am keen to know the disease and pest management techniques while involving myself in school vegetable garden activities.				
3	I learn about new varieties (both open pollinated and hybrid) and its traits while involving myself in school vegetable garden activities.				

33. Area (cents)

Total Area (cents)	Total infrastructure area	Area maintained as play ground	Area kept apart of school garden	Area kept apart for school vegetable garden

34. Type of gardens in the schools.(Please indicate by marking a tick mark)

Sl No.	Types	Yes	No
1	Outdoor garden		
2	Raised beds garden		
3	Indoor gardens		
4	Container gardens		
5	Greenhouse gardens		
6	Mixed cropped vegetable gardens		
7	Sole vegetable cropped garden		
	Other types (specify)		

35. Details of crops grown in vegetable garden

Sl No.	Crop	Total area grown crop	Variety/ hybrid	Duration of crop	Yield
1					
2					
3					
4					
5					
6					

36. System of farming: [Organic/ Inorganic]

Type of school vegetable garden land : [Wetland/ Garden land/Dry land/ Others (specify)]

Type of soil: [Laterite/ Alluvial/Loamy/ sandy/ Others (specify)]

Fencing (Yes/no); Fencing type: (Live/wall/wire/mesh netting/mud wall)

Frequency of irrigation: daily/ twice a week/ thrice a week/weekly; others (specify.....)]

Type of irrigation: (Hose/ Sprinkler/ Drip/ Basin/ others (specify).....)]

37. Water resources available in the school

Type	Yes/ No	No./ Area	Perennial Y/N	If N, period of scarcity
Well				
Pond				
Pipe				

Whether any financial support for purchasing implements and inputs. (Yes/No)

If Yes, who supports (Government/School management/ NGO's/Commodity Boards/ Scientific institutions like KSCSTE, DOECC, KBB/PTA)

If No, How will you meet the expenses? -----

20. Attitude of school teachers towards the vegetable garden

I am going to read out some statements of opinion which other teachers hold about **ATTITUDE OF SCHOOL TEACHERS TOWARDS MANAGING AND MAINTAINING THE VEGETABLE GARDENS** and would like you to tell me how much you agree or disagree with each one...Please tick only one answer for each questions and do not leave any question unanswered.

Sl. No.	Attitude statements	SA	A	D	SD
1	Engaging myself in school vegetable gardening improves healthy environment				
2	Participating myself consider that school gardening enhances my teaching skills				
3	I consider that school vegetable gardening creates cleanliness among students.				
4	Involving myself believe more comfortable in school vegetable gardening work				
5	I consider Student attitudes toward the environment become more positive when gardening is used in the curriculum				
6	I sense that school vegetable garden provides self grown produce for own consumption				
7	I believe school vegetable gardens are beneficial for students growing on waste land in school				
8	For me, Using gardening as a teaching strategy to				

	assists students in learning and understanding new ideas and concepts				
9	I feel school gardening provides good exposure in vegetable cultivation				
10	I judge that school gardening is not easy to maintain				
11	I deem that school gardening causes wastage of time				
12	I hope that school vegetable gardening is not good for academic environment				
13	I not consider in successful of growing vegetable gardening in schools				
14	I think timely management of school gardening is a challenging task				

SA- Strongly Agree; A- Agree; D- Disagree; SD- Strongly Disagree.

21. Given are the items under Knowledge Material to the survey question that describes the knowledge materials accessed by respondents to support the use of school vegetable gardening in the elementary school curriculum. (please tick mark based on your opinion or preference)

Sl No.	Knowledge Materials	A	NA	VE	E	LE
1	Library books					
2	Gardening catalogs/magazines					
3	Personal books					
4	Experiments					
5	Videos					
6	Trade books					
7	Text books					
8	Computer software					
9	Internet					
10	Filmstrips					

B- Available; NA- Not Available; VE- Very Effective; E- Effective; NE- Not Effective

22. Mass media contribution

Sl No.	Items	Frequency			Usefulness		
		Very much	Much	Much less	Very useful	Useful	Less useful
1	Newspaper						
2	Television						
3	Magazines						
4	Radio						
5	Mobile advisory services						
6	Kiosks						

23. Training:

(b) Any training received on expert Yes/No

If yes, please provide the following information

Sl. No.	Name of the training program	Organization	Duration

(b). Weather the teacher's need training from expert Yes/No

If Yes, please provide the following information

Sl No.	Name of training program	Very effective	Effective	Less effective
1	Production			
2	Protection			
3	Technology			
4	Marketing activities			
5	Other (specify)			

24. Benefits as perceived by teachers involved in school vegetable gardening

Benefits to teachers participating in school vegetable gardening. In three point continuum, '3' indicates high, '2' indicates medium and '1' indicates low for the corresponding statements

Sl No.	Statement	High	Medim	Low
1	Gardening activities can help me to engage students in their learning in a way that is more difficult in the classroom			
2	Myself have a interest to learn unknown useful gardening skills			
3	Myself have a positive impact on student achievement and behaviour			
4	I am developing the teaching practices on garden activities			
5	I improved the student's readiness to learn			
6	I Encouraged to take greater control of their own learning vegetable garden activities			
7	Easy to analyse the students who are more active in seeking knowledge and solving problems			
8	Enable myself to develop students with responsible behaviour in unsafe situations through activities like vegetable gardening			

25. Constraints experienced by the school teachers

Please indicate your response to the listed constraints and solutions as perceived by the teachers in vegetable gardens.

Sl. No.	Items	Score				Perceived solution
		4	3	2	1	
1	High input cost					
2	Non availability of labour					
3	High labour cost					
4	Inadequate capital					
5	Lack of student's interest					
6	Uneconomic holding					
7	Lack of technology					
8	Lack of knowledge about gardening					
9	Scarce water resource					

10	Non availability of credit					
11	Poor storage facility					
12	Lack of teacher's involvement					
13	Lack of student's participation					
14	Non availability of implements					
15	Lack of protection implements					
16	Lack of extension service					
17	Lack of time					
18	Lack of motivation					
19	Poor economic status					
20	Surplus but insufficient for marketing					
21	Wild animals destroy produce					
22	Less profit					
23	Lack of proper training					
24	Difficult to work					
25	Pilferation					

MI-Most Important I- Important LI-Less Important Li-Least Important

Signature with date

ANY OTHER REMARKS AND SUGGESTIONS...

APPENDIX III

1. Students factors of influence

Sl. no.	Category	Score	Rank	Total score
1	Level of encouragement			
	a) I think it's important to know where my food comes from.	385	1	1118
	b) Gardening allows myself to work autonomously, enjoy learning relationships with peers, and feel they are competent to reach their goals	358	3	
	c) I think gardening create learning opportunities that are active, collaborative, and promote learning relationships	375	2	
Mean = 11.18				
Standard deviation = 0.796				
Standard error = 0.0796				
2	Purpose of involvement			
	a) Involving in gardening ensure the classroom environment is welcoming myself from all cultures.	354	3	1082
	b) Involvement in gardening helps in recognizing and enhances one's mental and physical stability.	362	2	
	c) Involving in school gardening activities had a positive influence with special reference to school attendance	366	1	
Mean = 10.82				
Standard deviation = 0.9031				
Standard error = 0.0796				
3	Personal and Socio-psychological factors			
	a) Participating in school vegetable gardening activities helps to improve my mental alertness	386	1	1135
b) School garden activities promote family relationships and increase student-teacher-parent involvement	366	2		

	c) Teacher's play a vital role towards my (and vice versa) motivation and engagement when they participate in the school garden activities	383	2	
	Mean = 11.35			
	Standard deviation = 0.8211			
	Standard error = 0.08211			
4	Economic factor			
	a) I am very much interested to grow the school vegetable garden because it teaches me the hardship to earn	367	1	
	b) I would like to earn for my pocket money by myself rather than depending and bothering my parents and hence involve in school garden activities	348	2	1060
	c) Deriving profit through the products and produces helps one to get more engaged in school garden activities	345	3	
	Mean = 10.6			
	Standard deviation = 0.9847			
	Standard error = 0.09847			
5	Technological factor			
	a) I am very much interested to know the science of nutrient management for better yield.	370	1	
	b) I am keen to know the disease and pest management techniques while involving myself in school vegetable garden activities.	355	3	1089
	c) I will improve my technical skills through the use of different implements used in farming when getting involved in school garden activities.	364	2	
	Mean = 10.89			
	Standard deviation = 1.1091			
	Standard error = 0.11091			
	Total			5484
	Mean = 54.83			
	Standard deviation = 2.3785			
	Standard error = 0.23785			

2. Teachers factors of influence

Sl. no.	Category	Score	Rank	Total score
1	Level of encouragement			
	a) Gardening allows myself to work autonomously, enjoy learning relationships with peers, and feel they are competent to reach their goals.	108	2	327
	b) Gardening creates my experiences that are challenging and enriching and that extend their academic abilities.	112	1	
	c) I think gardening create learning opportunities that are active, collaborative, and promote learning relationships	107	3	
Mean = 10.9				
Standard deviation = 1.0678				
Standard error = 0.1938				
2	Purpose of involvement			
	a) Involving in gardening ensure the classroom environment is welcoming myself for all cultures.	105	3	328
	b) Involvement in gardening helps in recognizing and enhances one's mental and physical stability.	114	1	
	c) It is very important to know and understand the principles of vegetable production.	109	2	
Mean = 10.93				
Standard deviation = 1.2015				
Standard error = 0.2193				
3	Personal and Socio-psychological factors			
	a) School garden activities promote family relationships and increase student-teacher-parent involvement.	110	1	317
	b) Myself play a vital role on their students' (and vice versa) motivation and engagement when I am participate with students in the school garden activities.	104	2	
		103	3	

	c) Participating in school gardening activities enhances my ability to deal with a problem situation by influencing cognitive and emotional processes related to the situation.			
	Mean = 10.566			
	Standard deviation = 1.5241			
	Standard error = 0.2782			
4	Economic factor			
	a) I am very much interested to grow the school vegetable garden because it teaches me the hardship to earn	108	1	
	b) Deriving profit through the products and produces helps one to get more engaged in school garden activities	92	3	291
	c) I give importance to stability of returns rather than rapidity of returns while engaging in school garden activities.	98	2	
	Mean = 9.7			
	Standard deviation = 1.7840			
	Standard error = 0.3257			
5	Technological factor			
	a) I am very much interested to know the science of nutrient management for better yield.	105	3	
	b) I am keen to know the disease and pest management techniques while involving myself in school vegetable garden activities.	106	2	
	c) I learn about new varieties (both open pollinated and hybrid) and its traits while involving myself in school vegetable garden activities.	107	1	318
	Mean = 10.6			
	Standard deviation = 1.1919			
	Standard error = 0.2178			
	Total			1581
	Mean = 52.7			
	Standard deviation = 5.4781			
	Standard error = 1.0001			

APPENDIX IV

1. STUDENTS BENEFITS STATEMENT

Sl. No.	Statement	Total score	Rank
1	Increase access to safe vegetables direct from school garden	275	1
2	Helps to enhance the physical activities through garden activities and a positive influence on my health	263	2
3	It helps me to develop of personal relationship and involvement with my friends and teachers through garden activities	259	5
4	A feeling of accomplishment and self empowerment when the myself participate garden activities	246	8
5	Improves my life skills including working with group	261	3.5
6	It Help me to develop a sense of ownership and responsibility	261	3.5
7	It has a positive impact on my achievement and behaviour	256	6
8	Gardening offers hands-on, experiential learning opportunities in a wide array of disciplines from sowing to marketing	249	7

2. TEACHERS BENEFITS STATEMENT

Sl No.	Statement	Total score	Rank
1	Gardening activities can help me to engage students in their learning in a way that is more difficult in the classroom	73	7

2	Myself have a interest to learn unknown useful gardening skills	78	3
3	Myself have a positive impact on student achievement and behaviour	79	1.5
4	I am developing the teaching practices on garden activities	75	5.5
5	I improved the student's readiness to learn	70	8
6	I Encouraged to take greater control of their own learning vegetable garden activities	79	1.5
7	Easy to analyse the students who are more active in seeking knowledge and solving problems	77	4
8	Enable myself to develop students with responsible behaviour in unsafe situations through activities like vegetable gardening	75	5.5

APPENDIX V

Name of the school with full address.

Sl. No.	List of School Name	Respondent (N=130)	
		Students	Teachers
1	Government High School, Vazhamuttom, Thiruvanthapuram.	10	3
2	M G M Vidya Mount Public School, Edavilakom, Thiruvanthapuram.	10	3
3	Government Girls High Secondary School, Cotton Hill, Vazhuthacaud, Thiruvanthapuram	10	3
4	Government High School, Pappanamcode, Thiruvanthapuram	10	3
5	B N V V Higher Secondary School for Boys, Thiruvallam, Thiruvanthapuram	10	3
6	SreeSethu Parvathi Bhai High School, Kadakkavoor, Thiruvanthapuram	10	3
7	St. Mary's Higher Secondary School, Pattom, Thiruvanthapuram	10	3
8	Government Girls Higher Secondary School, Attingal, Thiruvanthapuram	10	3
9	S N V Government Higher Secondary School, Kadakkavoor, Thiruvanthapuram	10	3
10	St. Joseph's Higher Secondary School, Palayam, Thiruvanthapuram.	10	3
	Total	100	30

APPENDIX VI

1. Attitude statement for students

Sl. No.	Attitude statements	Total score
1	Involving myself in school vegetable gardening activities helps to improve my self-esteem and attitudes toward school vegetable garden.	383
2	Engaging myself in school vegetable gardening activities helps to improve my social skills and behaviour	364
3	Participating in school vegetable gardening activities helps to improve my environmental stance	366
4	Through school gardening activities group cohesion increases and there by helps to improve my interpersonal relationships	351
5	My science achievement scores have increased significantly after getting to be a part of school garden activities	359
6	School garden activities helped to increase my sense of ownership and responsibility and interpersonal relations with school children	353
7	School garden activities foster family relationships and increase student-teacher-parent involvement	355
8	I believe that school gardening activities should be included as a part of curriculum and all students should be made to compulsorily participate	367
9	I lose my interest in growing vegetable garden if not successful.	181
10	Increased spending on agricultural activities in schools, I believe is a waste of money and time	167
11	It is difficult for me to learn and internalize growing of vegetables and plants in garden activities	169
12	I am afraid that I will score less marks in getting myself involved in school garden activities	162
13	I don't like to garden because it is hard work	146
14	I don't like to garden because I get dirty	135

2. Attitude statement for teachers

Sl. No.	Attitude statements	Total score
1	Engaging myself in school vegetable gardening improves healthy environment	113
2	Participating myself consider that school gardening enhances my teaching skills	102
3	I consider that school vegetable gardening creates cleanliness among students.	103
4	Involving myself believe more comfortable in school vegetable gardening work	105
5	I consider Student attitudes toward the environment become more positive when gardening is used in the curriculum	109
6	I sense that school vegetable garden provides self grown produce for own consumption	100
7	I believe school vegetable gardens are beneficial for students growing on waste land in school	112
8	For me, Using gardening as a teaching strategy to assists students in learning and understanding new ideas and concepts	108
9	I feel school gardening provides good exposure in vegetable cultivation	109
10	I judge that school gardening is not easy to maintain	79
11	I deem that school gardening causes wastage of time	48
12	I hope that school vegetable gardening is not good for academic environment	43
13	I not consider in successful of growing vegetable gardening in schools	47
14	I think timely management of school gardening is a challenging task	92

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