Report

PAC Programme, 2017 - 2018

Development and Training Programme on Geographical Information System for KRP's of Senior Secondary Teachers of Geography Karnataka State.

Progamme Coordinator

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PREFACE

Geographical Information System is a tool that has emerged from traditional cartography and has adopted by various sectors, including research institutions and universities in the country. Although GIS has been introduced in school curriculum more than decade ago, the implementation of this technology in teaching and learning is in slow process, because of lack of facilities available and awareness among the school authorities.

GIS training program was conducted by Regional Institute of Education, Mysuru to enhance the skills of GIS to Senior Secondary Teachers of Geography. This five days' program from 13th to 17th November approved by committee (PAC) 2017-18 by National Council of Research and Training, New Delhi.

21 participants were attended training program from Karnataka state, teacher from Senior Secondary Schools / Pre-University Geography Lecturers. The pre training assessment of participant's knowledge in GIS revealed that, there is a need of training on GIS to teachers. After the training program a post training assessment was carried out in which it was found that, the participant's proficiency of handling of GIS was increased significantly.

Shivanand Chinnappanavar
Program Coordinator

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Introduction:

The recent emphasis on pedagogy is shifting from behaviorist to constructivist approach in learning. Problem-Based Learning (PBL) and Inquiry Based learning are instructional methods, which are based on constructivism. Students' roles are changing from passive recipients to active members of an interacting group, which processes and interprets on real-world issues and collectively builds up knowledge through inquiry and reflection. Similarly, teachers' roles are changing too. They will not be the sole source of information anymore as the students are encouraged to use the Internet and construct their knowledge on the basis of sources which provide information outside the narrow framework of textbooks and paper maps. Rather, the teachers will become instructors who will guide their students to the right sources and provide them support and motivation in the process of self-directed learning.

Geographical Information System (GIS) has the potential to facilitate PBL and Inquiry-Based learning. GIS may foster a resource rich environment, that can enhance spatial reasoning and support problem solving in the classroom. In addition, to this GIS instruction may promote geographic competence and interdisciplinary learning in the classroom. The advantages of GIS seems to be enormous to geography education if harnessed correctly. Unfortunately, there are some key issues which are considered as obstacles to use GIS in the schools such as unaccessful or unavaialability of hardware and software, time constraints, inadequate skills in geospatial techniques and lack of proper training.

Many developed countries have placed more emphasis on importance of geography and have established the subject as a cornerstone in education both at primary and secondary school level. As a result, at the beginning of the early 1990s, GIS were widely accepted and implemented in the secondary school geography curriculum. In similar line the NCERT has brought Geography textbooks with the components of GIS, as part of practical geography. Numbers scholars have reported positive impacts of using GIS as a teaching and learning tool for students.

The National Curriculum Framework 2005 is also highlights that "the secondary stage, in working with hands and tools to design more advanced technological modules, and in activities and analyses on issues concerning the environment and health. Working on locally significant projects involving science and technology, are to be important parts of the curriculum at this stage". In this context the Geographical Information System has major role to play, but schools which are using NCERT books have done nothing much so far with respect to GIS. Some teachers have undergone GIS training but usage of it is very meager.

The purpose of this training programme is to create awareness, know the potential of GIS, interpret and visualize geographical data with Geographical Information Systems in teaching and learning of geography in secondary level.

To address these needs of senior secondary teachers, a five day GIS training program was conducted at Regional Institute of Education (NCERT's) Mysuru under Programme Approved by the Committee (PAC) 2017/18. From 13th and 17th November 2017.

The trainning program was framed with seven exercises consits of basic to advance. A well Structured self-explanatory manual was prepared to help participant during the training as well as for future use.

This training programme was attended by 21 lecturers of pre-university schools of Karnataka state, who were obtained Master Degree and Educational Degree in Geography. Name list of the participants as fallows.

List of Participants Attended Training Program			
S.No.	Name of Participant	S.No.	Name of Participant
1	Mr. Ashoka B	12	Mr. Prakash
2	Mr. Chandrakumar Bankar	13	Ms. S Leela
3	Mr. Chandrashekar R B	14	Mr. Shivakumar G
4	Ms. Chinnamma	15	Mr. Shivakumara N
5	Mr. Gurusidda	16	Mr. Shivamadaiah
6	Mr. Jayashankarappa H S	17	Mr. Shivamade Gowda
7	Mr. M Mallikarjuna	18	Mr. Shivananda A R
8	Ms. M S Manjula	19	Mr. Somanna P
9	Mr. Mohan Raj URS G N	20	Mr. Srinivasan G M
10	Mr. Muddeeraiah C G	21	Mr. Venkatesha B S
11	Mr. Nanjunda Swamy		

Before the commence of training program, a well-structured questionnaire was prepared and surveyed among the participants to assess the knowledge of GIS. The questionnaire was prepared to get the information of a) training programs attended previously, b) list of GIS software used before, c) level of knowledge in GIS, d) perception of GIS in geography teaching, e) reason for attending this training program, f) knowledge about the GIS software, analysis and the fields in which GIS used predominantly.

After the completion of training program an another well-structured questionnaire was prepared and surveyed among the participants. This post training survey was conducted to understand level of knowledge that they have gained in the training program such as a) level of GIS knowledge they have achieved, b) ability to prepare maps using GIS software, d) will this training program increase their teaching skill, e) do they need advance training program in the future, f) list of problems faced during the training program, g) the important of manual for future practice, and h) overall rating for the training program.

Frequency of Computer Usage

As hardware and software play a major role in the components of GIS, a question regarding the frequency of computer usage by the participants was raised through 5 point Likert Scale as shown in the table below. The frequency of computer usage by the participants was calculated using frequency analysis and illustrated in chart below.

Frequency of Computer Usage by Participants		
Category	Frequency	%
Every Day	1	4.76
Once in Three Days	2	9.52
Once in a Week	1	4.76
Once in a Month	11	52.38
Don't Know to Operate	6	28.57
Total	21	100
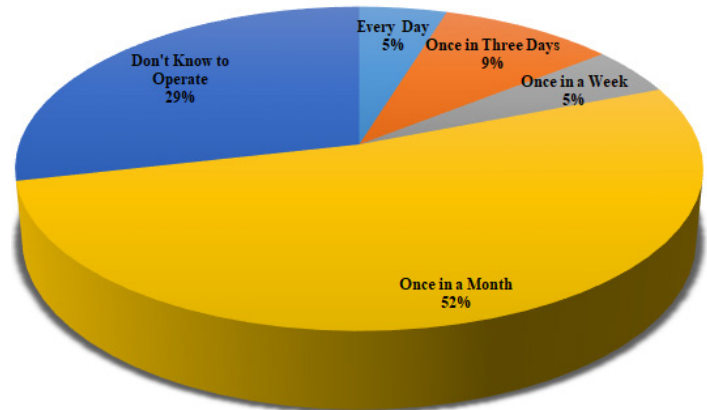
From the table and figure, it is clear that, among the 21 participants, 1 participant (4.76 %) uses computer every day, 2 participants (9.52 %) use once in three days and 1 participant (4.76 %) uses once in a week. The notable thing is that, 11 participants (52.38) use computer once in a month and 6 participants (28.57) do not know how to operate computer, this indicates that, higher proposition of participants are rarely use computer followed by higher computer illiterates.

Previous Training in GIS

A question was raised to know the details of GIS related workshop/seminar/training program attended by participants previously. The result represents that, none of the participants were never attended any workshop/seminar/training related to GIS, which states that, all the participants attended this training program are fresher in the field of GIS.

What made them to attend this training program?

A question was raised to know what made them to attend this training program, for which 20 participants (95.2 %) were answered "to learn GIS", whereas 1 participant (4.8 %) was answered "by the order of Karnataka State Pre-University Board". The answers of the participants clearly indicate that, except one participants all are willingly attended this training program to gain the knowledge of GIS.

Is GIS important to teach Geography in School?

To know the perception of participants on important of GIS in Geography teaching, a question was raised, for which all the participants (100%) were answered 'GIS is important for Geography Teaching', which clearly illustrates that, all the participants attended the training program were aware of necessity of GIS in school level geography teaching.

Do they like to teach geography through GIS in school?

To know, do they like to teach geography using GIS in their classes, a question was raised for which 20 participants were answered 'YES' while 1 participant answered 'NO'. from this it is visible that, except 1 participant all are interested to use GIS in their class rooms.

Knowledge of Geographical Information System

To understand the level of GIS knowledge of participants 5 point Likert Scale (Excellent to Nil) question was asked and the answers were arranged as shown below table.

Knowledge of GIS Before Training Program		
Category	Frequency	%
Moderate	1	4.8
Poor	6	28.6
Nil	14	66.7
Total	21	100
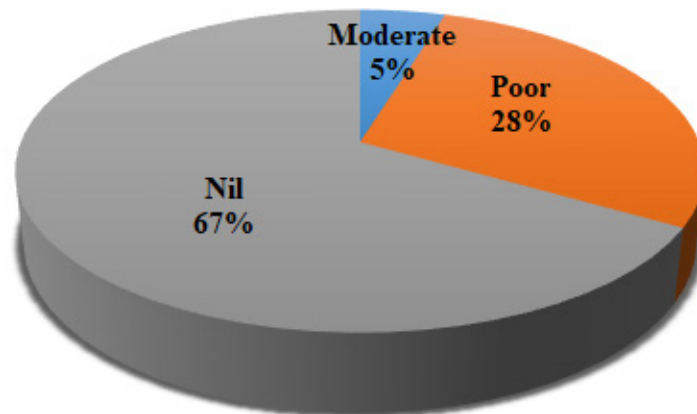
From the table and figure, it is clear that, among the 21 participants around 14 participants (66.7 %) were not at all having any knowledge about GIS, while 6 patients (28.6) were mentioned as poor and 1 participant (4.8) was mentioned as moderate. The outcome of question illustrates that, higher proportion of participants were having no knowledge while poor and moderate are less.

Name of GIS Software/Analysis/Fields Known

Three questions related to name of GIS software, name of GIS analysis and name of fields in which GIS used predominantly was raised. i) for software 20 participants were answered 'not aware', while 1 participant answered aware of google earth (which is one of the web based GIS). ii) for analysis, all the participants were answered as 'not aware'. iii) for name of fields in which GIS used, 1 participant was answered moderately, and 4 participants were answered poorly while 16 participants were answered 'not aware'.

Have they ever used Geographical Information System?

To know whether they have ever used GIS software or not, a question was raised, for which 20 participants were answered 'they have never used', while 1 participant answered as 'used' indicating Google Earth software for demonstration of class room teaching.

The overall result of pre training program survey illustrates that,

- Majority of participants rarely use computer followed by higher computer illiterates,

- The participant's knowledge in GIS is very poor, especially they are not aware of name of GIS software, name of analysis in GIS and fields in which GIS used,

- All the participants were agreed that, GIS is important to teach Geography in School Education as well as except one participant all others stated that, they will use GIS in their teaching after the training program.

- Except 1 participant all other have attended the training program willingly to learn the GIS.

- None of the participants were attended GIS related workshop/seminar/training program before as well as except a participant no one was used GIS software before.

Therefore, it can be concluded that, the training program was started with enthusiastic participants who do not have any previous knowledge or experience in GIS and want to learn GIS for improving their knowledge as well as to implementing this technology in their school.

DAY WISE REPORT OF TRAINING PROGRAM

The five days training program was arranged into different sessions to educate the participants in proper way, which is discussed in detail below.

13 – 11 – 2017

On the first day, introduction of participants, their knowledge in GIS, their need in GIS and GIS in their curriculum was discussed in the beginning. Then, Introductory lecture was given to the participants which includes i) basics of computers, ii) basics of GIS, iii) components of GIS iv) application of GIS in different fields, v) different GIS software available, vi) commercial and open source software, followed by a lecture on introduction of QGIS software.

Further, participants were guided step by step to download the QGIS software from authorized website and install the obtained software in their computer/laptop. Then, participants were initiated to use the different tools and panels in the software to get familiar Graphical User Interface of QGIS.

14 – 11 – 2017

The second day of the program was started with exercise of obtaining spatial data and non-spatial data from different sources such as Bhuvan Portal, USGS, GLCF, DivaGIS, Census of India, Indian Meteorological Department and other concern website. The participants were advised to download a taluk wise map of Madya district from the Google Image search to use as a basemap for the training purpose.

After the completion of methods of acquiring data for GIS work, a detailed lecture was given on what is raster and vector data, different between them in structure, storage, visualization, suitable analysis, merits and demerits.

Further, the participants were guided step by step to perform image registration/geo-referencing in QGIS software using downloaded Mandya basemap. The concept of different units of latitude and longitude representation was explained (Degree Minutes Seconds, Decimal Degrees, Meters) followed by the explanation of Geographical Coordinate System (GCS), Projection Coordinate System (PCS), Root Mean Square Error (RMSE), Transformation type and suitable resampling method.

The participants also educated why one should use WGS1984 coordinate system and UTM Zone 43 N projection coordinate system for mapping Karnataka.

15 – 11 – 2017

The third day of workshop was started with step by step guidance of preparing vector layer on the registered basemap. Point vector layer was created on the location of taluk headquarters, line vector layer was prepared on the roads and polygon vector layer was prepared for the taluks boundaries of Mandya district.

The concept of attribute table, different types of data format (text, whole number, decimal number, date) were explained in detail followed by selection of suitable GCS and PCS for vector data.

Further, participants were guided to download taluk wise population data of Mandya district from Census of India website to perform the joining spatial data with non-spatial data. Then, the downloaded population data was joined with created taluk boundary vector layer using 'Join' option in QGIS. The participants were educated about need of unique ID while joining, problems which may arise which linking table and how to save the joined data in the system.

16 – 11 -2017

On fifth day, the participants were guided step by step to prepare a thematic map using linked Census of India population data. The different methods of data classification (categorized, graduated), different modes of classification (equal interval, natural break, standard deviation, quantile and pretty breaks) and choosing suitable method of classification and mode for specific purpose were explained in detail.

Then participants were trained to prepare a layout for created thematic map. The important of map elements, placing scale, legend, title north arrow, grids, insert image and title on correct position was explained. Further, a lecture was given how to export the final thematic map in different file format followed by hands-on exercise.

17 – 11 – 2017

The final day of the training program was started with the introductory lecture on advance analysis GIS. The participants were educated about different analysis/modelling/queries can be performed in GIS such as overlay analysis, buffer analysis, network analysis, 3D modelling, location-allocation analysis followed by spatial and attribute queries.

Then hands-on advance analysis training was given to participants in QGIS software. The participants were trained step by step to prepare a buffer having 300 mts. around a lake (polygon buffer), a buffer along roads having 200 mts (line buffer), and a buffer from a bus stand having 1000 mts (point buffer) distance.

Further, the participants were guided step by step to perform overlay analysis. The task was assigned to identify suitable area for agricultural activities using quality of soil and availability of water. Different options available in overlay analysis and which analysis is suitable in which situation was explained in detail.

Finally, the program was ended with valedictory function, when feedback of participants was conveyed in front of Principal and Dean department of extension education RIE, Mysuru. After the completion of valedictory function, a post training survey was conducted among the participants to know the knowledge they have gained through the training program.

<h1 align="center">POST TRAINING PROGRAM ASSESSMENT</h1>

Is your knowledge of cartography improved?

A question was raised to know the improvement of cartography knowledge among the participants. For this all the participants (100 %) were answered their knowledge in cartography was increased after the training program.

Name of GIS Software/Analysis/Fields Known

Three questions regarding name of GIS software, name of analysis can be performed using GIS and name of major field in which GIS used predominantly was raised. As these three topics were discussed deeply in the training program almost all the participants were answered appropriately. It is clear that, the participants were trained well in the training program when we compare the answer of same question in pre training program survey in which most of them answered 'not aware'.

Can they prepare thematic map using GIS?

A question was asked to know can they prepare thematic map using GIS software without others help. The answers states that, among the 21 participants 20 (95.2 %) indicated they can prepare while 1 participant specified need help to prepare map.

Is training manual help to participants?

A self-explanatory GIS book was prepared to help the participants during the training program as well as in the future. Hence a question was asked to know the important of training manual for their GIS practice. All the participants (100 %) stated that, the training manual was very much helpful during the training program as well as they stated the book will be used in class room teaching in their school.

Knowledge of GIS

A Likert scale (Excellent to Nil) question was raised to participants to assess their knowledge in GIS. The answers were categorized and frequency and percent was calculated as shown in the table below.

| Knowledge of GIS After Training Program		
Category	Frequency	%
Excellent	3	14.3
Good	9	42.9
Moderate	9	42.9
Total	21	100
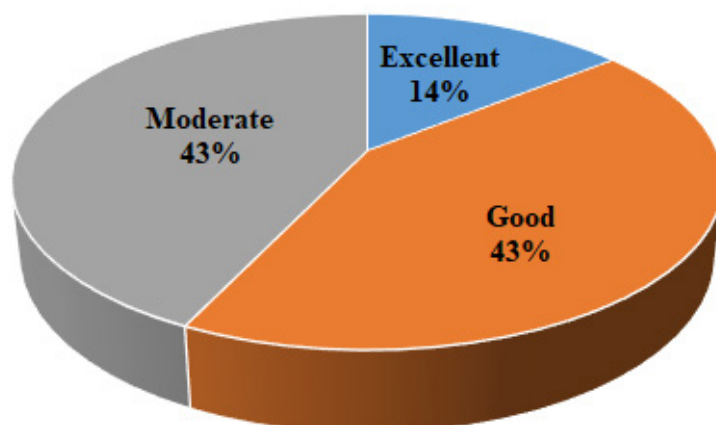
From the answers of participants, it is clear that, 14 per cent of participant's knowledge is in excellent level, while good and moderate level are 43 per cent in each category as shown in the figure.

Comparison of Pre and Post training program survey on participants GIS knowledge

Pre and post survey result were compared and discussed in detail below.

Category	Before		After	
	Frequency	Percent	Frequency	Percent
Excellent	0.0	0.0	3.0	14.3
Good	0.0	0.0	9.0	42.9
Moderate	1.0	4.8	9.0	42.9
Poor	6.0	28.6	0.0	0.0
Nil	14.0	66.7	0.0	0.0
Total	21.0	100.0	21.0	100.0

Assessment of GIS Knowledge Before and After Training Program
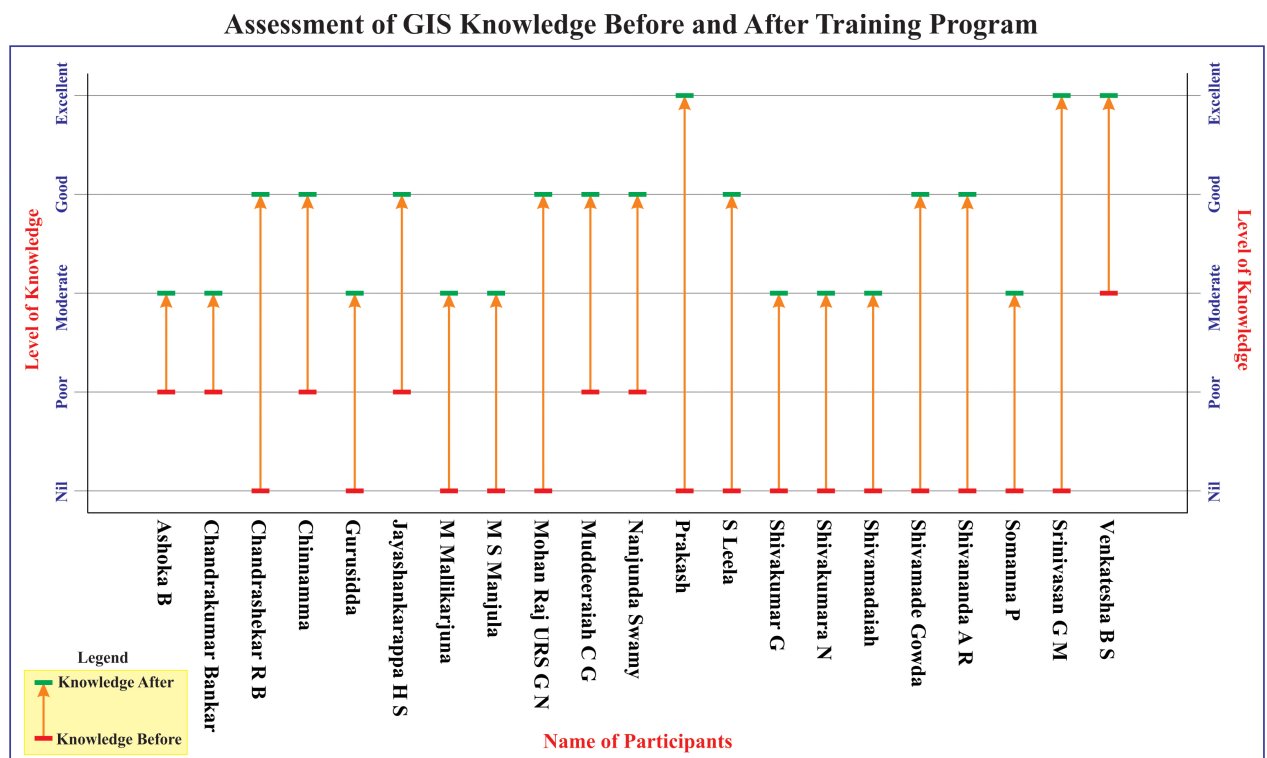
Major problems faced by participants

To know the major problems faced by participants during the training program a question was raised, for which i) 19.05 per cent were stated the duration of training program was too short to learn entire technology, hence need longer period training program, ii) 28.57 per cent specified un availability computer, iii) 23.81 per cent stated lack of computer knowledge and iv) 28.57 per cent stated they have not faced any problems.

Problems faced by participants		
Category	Freq.	%
Shortage of Time	4	19.05
Non Availability of Computer	6	28.57
Lack of Computer Knowledge	5	23.81
Nil	6	28.57
Total	21	100
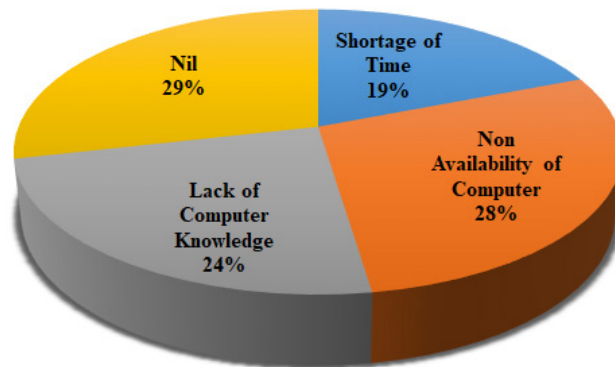
Do they want advanced training program?

A question was raised among the participants, to know their interest in advance training program in future. Among the 21 participants 19 (90.48 %) were want to attend advance training program, whereas 2 (9.52 %) were stated they do not want, as shown in the table and figure below.

Do they want advanced training program?		
Category	Frequency	Percent
Yes	19	90.48
No	2	9.52
Total	21	100
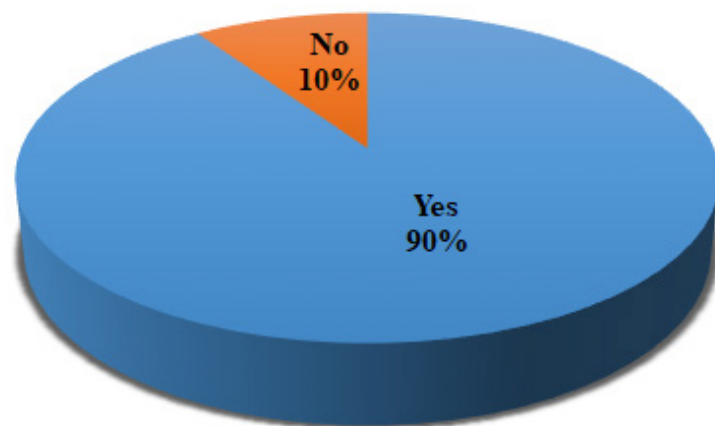
Rating of training program

To know the opinion of participants on training program, a question was asked to rate the training using 5 point Likert scale (worst to excellent), the answers were arranged and shown in table and fig.

Rating of Training Program		
Category	Frequency	Percent
Excellent	11	52.38
Good	9	42.86
Moderate	1	4.76
Total	21	100
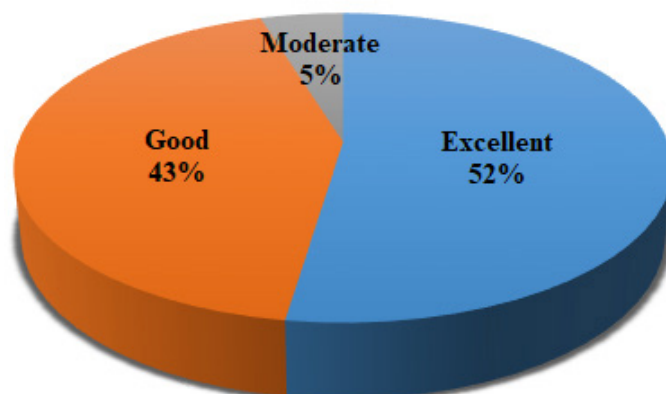
The result participant's opinion represents that, among the 21 participants 11 (52.38 %) specified it was excellent, 9 (42.86 %) specified it was good and 1 (4.76 %) indicated it was moderate.

SUMMARY OF POST - TRAINING PROGRAM SURVEY

- The participant's knowledge in cartography was enhanced after the training program

- The knowledge on GIS software, GIS Analysis and GIS fields were improved

- Around 95.2 per cent of participants stated that, they can prepare thematic map using QGIS software without others help.

- All the participants were agreed that, the self-explanatory training manual given to them was very helpful during the training period as well as which can be helpful during future practice.

- The comparison of pre and post survey result illustrates that, participants who were not having basic knowledge in the field of GIS before training program have obtained knowledge significantly after the training program.

- There were three problems faced by participants during the training period such as, i) shortage of time, ii) non availability computer and iii) lack of computer knowledge.

- As they have trained through basic exercises in this training program around 90 per cent of participants requested to conduct advance training program in the future.

- Totally 52.38 per cent of participants stated the training program was 'excellent', 42.86 percent stated as 'good, and 4.76 per cent stated as 'moderate'.

CONCLUSION

The GIS training program conducted for 21 pre-university Geography teachers was started on 13th November, for the participants who had less or no knowledge in the field of GIS. The five days' program was framed with basic exercises and few advances exercises. The self-explanatory manual provided to them was used to instruct step by step training through which the understand capacity of participants were enhanced significantly. As all the participants from Geography background and was eager to learn GIS, they have understood the concepts and techniques of GIS quickly. After the training program it was observed that, almost all the participants were able to prepare the thematic maps using QGIS software. The participant's knowledge in the field of GIS increased suggestively. Therefore, it can be concluded that, the training program was successful, which has fullfilled its aim.

GIS has potential to implement in teaching of geography, by using available ICT facilities and human resources in the country. Therefore, the lack of facilities available and the low computer literacy rate in the country should not be an excuse to implement GIS in the teaching and learning of geography in the future.