INTERNET ADDICTION IN TEENAGERS OF INDIA: ANALYSIS USING FISHBONE METHODOLOGY

Deepa V. Ramane and Supriya Kottapalle
Sinhgad College of Science, Ambegaon, Pune, India - 411051

ABSTRACT

In recent days the problem of Internet Addiction has become more critical with teenagers. Literature survey shows that teenagers are spending hours and hours on internet. Their purpose may be either study, entertainment, social media or site surfing. Rigorous use of internet badly affects their overall performance. This paper focuses on finding out root causes of IA problem in teenagers using fishbone methodology. For this a group of 459 teenagers of variable age group, discipline, locality and community had been selected. Survey was completed by conducting two tests consisting of 20 questionnaires for teenagers. Each test hardly requires 10-15 minutes. Based on the analysis of test results, major factors responsible for addiction have been identified which help in construction of Fishbone diagram. Major root causes responsible for increasing IA problem are easy availability and affordability of electronic gadgets necessary for internet use, attractive sites and apps and environmental elements like friends, society, relatives etc. The impact of addiction on teenagers life has also been addressed.

KEYWORDS: *Internet Addiction, Fishbone methodology, teenagers, Teenagers Internet Addiction Test (TIAT), Teenagers IA Root Cause Test (TIARCT).*

I.   INTRODUCTION

The Internet has made human life easier by making available easy access to information and establishing connections globally. However, it has also led a lot of people to spend too much time on internet. Excessive use of two electronic gadgets: mobile and computer, lead to problem called Internet Addiction (IA)(1). The exponential growth rate of use of gadgets has made the problem severe. For measurement of different aspects of Internet use, and more particularly Internet addiction several screening tools were discussed in reference (2). The effect of IA on human health is a recently recognized disorder over the past two decades which has received increasing attention worldwide (3-6). IA leads to headache, backache, weight loss, disturbances in sleep, carpal tunnel syndrome, blurred or strained vision. The first validated measure of Internet Addiction is the Internet Addiction Test (IAT; Young, 1998) developed by Dr. Kimberly Young, a professor at St. Bonaventure University and director of the Center for Internet Addiction Recovery. It is a 20-item scale that measures the presence and severity of Internet dependency among adults and adolescents (7).

In a publication on the National Center for Biotechnology Information website, the study, which was conducted by the Department of Adult Psychiatry in the Poland Medical University, showed that Internet addiction was seen to be quite popular and common among young people, especially with children. According to them every fourth child is addicted to the Internet. This is an alarming statistic that needs to be addressed as soon as possible. Teenagers are spending hours and hours on internet for various purposes which badly affect their health and society relations. Kids' ages 8 to 19 now spend an *average* of 10 hours and 45 minutes a day on internet. That translates into 75 hours and 15 minutes per week, according to research published by the Kaiser Family Foundation in January 2010 (8).

The present research explores the severity of internet addiction in teenagers and its several key root causes. A structured approach using fishbone technique has been adopted to address the issue. The fishbone diagram for the said problem is constructed using survey in terms of brain storming sessions and pen-paper tests.

The paper starts with the explanation of concept of Fishbone technology. Next section describes data collection for the said problem. The results and construction of Fishbone diagram are discussed in the following section. The paper ends with the

II.   FISHBONE TECHNOLOGY

The fishbone diagram is a tool for identifying the root causes of a problem occurring in various fields. It is also called the Ishikawa diagram/ Cause-and-Effect Diagram, named after Kaoru Ishikawa, a Japanese quality control statistician, who pioneered it's use in the 1960's (Juran, 1999). The problem analysis tool basically provides a systematic way of looking at effects and the causes that create or contribute to those effects. Using this approach problems in different fields can be analyzed (9,10,11). The structure of Fishbone Diagram is shown in figure I.
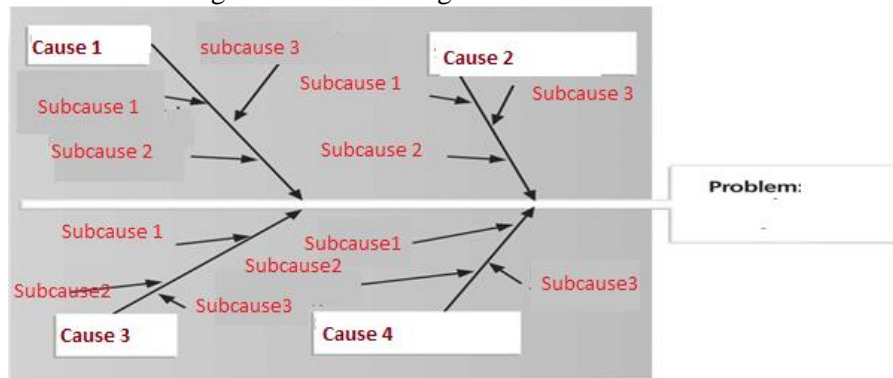

Figure 1: Basic Structure of Fishbone Diagram

Construction of a Fishbone Diagram involves following steps:
1. Definition of the problem that needs to be solved.
2. Generation of the probable causes by using brainstorming method.
3. Writing of causes of summary on fishbone diagram.
4. Diagram exploration by asking series of 'Why' question to find the root cause.
5. Refining of the diagram by emphasising most probable cause.

Based on the above mentioned steps current problem is framed and analyzed.

III.   DATA COLLECTION FOR GENERATION OF PROBABLE CAUSES

For the present study the problem definition is "Internet Addiction in Teenagers". To construct the fishbone diagram for the said problem the data was collected to predict the probable causes.

The problem of Internet addiction amongst adults was addressed by many researchers in which various aspects and an effect of IA on human life were discussed. Literature survey shows that mostly researchers have focused on articulating criteria by which Internet addiction could be described and diagnosed based on survey results. They have used a variety of methods such as paper-and pencil survey, online survey, telephone interviews, case studies, etc. (12,13,14).

We have selected the personal interaction and paper-and pencil survey method for our task.

The data collection was accomplished using brainstorming sessions and conduction of tests on 459 teenagers of different locality, of different disciplines and of different community with different genders. Two tests were conducted, one, **Teenagers Internet Addiction Test (TIAT)**, for finding how severely teenagers are addicted to internet and second **Teenagers Internet Addiction Root Cause Test (TIARCT)** for finding out causes for addiction. Outcome of brainstorming sessions and test results have led to locate root causes and sub-causes. Using these findings fishbone diagram was constructed.

a) **Teenagers Internet Addiction Test (TIAT):** First task of the project is to find out the severity of internet dependency amongst teenagers. It is accomplished using a written test, which we called as Teenagers Internet Addiction Test (TIAT), consisting of 20 questionnaires. It was based on five point scale where for each question five options were provided viz.

i) Not Applicable   ii) Rarely   iii) Occasionally   iv) Frequently   v) Always

After reading each question carefully, teenager had to select the most appropriate option. The rating given to each option is as follows:
Not Applicable = 0,   Rarely = 1 , Occasionally = 2, Frequently = 3 , Often = 4 ,   Always = 5.
Individual score is calculated by adding rating of each question.

b) Teenagers IA Root Cause Test (TIARCT): Second task is to find the key factors which are responsible for IA problem. This is accomplished using second test having 20 questions with five options same as TIAT. The questions were framed to address the issues: how teenagers get introduce to internet and what they access? Whether access to internet is easy and economical? Do environment boost up internet use?

IV.   RESULT AND DISCUSSION

4.1 Teenagers Internet Addiction Test(TIAT): The Test was conducted to study whether teenagers were really addicted to Internet or not. Measure of the extent of child's involvement in internet use is predicted from individual score card test results and are represented graphically in Figure II.
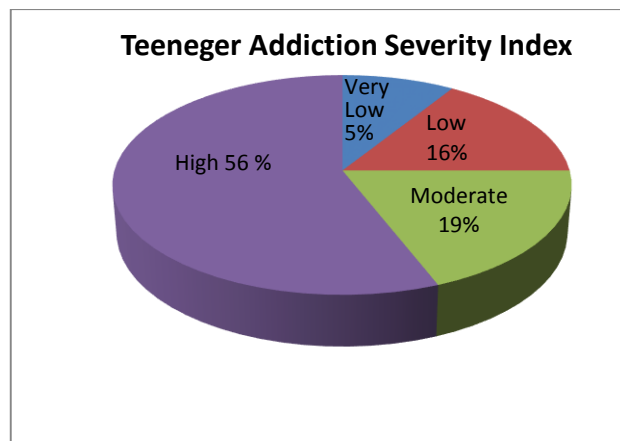

Figure 2: Teenager Addiction Severity

The severity of teenagers internet addiction is expressed in terms of Severity Impairment Index (SII).SSI is based on individual score card. It is subdivided into four zones to define Safe zone, Less Critical zone, More Critical zone, Most Critical zone as follows:

Table 1: Severity Impairment Index (SII)

Score	SII Zone	Severity of IA	No. of teenagers (%)
00-24	I	Safe / Not addicted	05
25-49	II	Less Critical	18
50-74	III	More Critical	21
75-100	IV	Most Critical	56

If score is between 0 – 24 points, teenager is not addicted. For 25-49 points: he/she is an average online user. Here surfing of the Web is done a bit too long at times, but teenager has control over internet usage. For points between 50 -74, teenager is occasional or frequent user of the Internet. Score between 75 – 100 points: Internet usage is causing significant impact on teenager life. Thus in TIAT, higher the score, it indicates greater addiction towards the internet.
Test results show that percentage of teenager's who are in SIV zone is 56. Teenagers in this zone use Internet extensively and are badly affected. While 21% teenagers who are in SIII zone are on the verge of becoming severe internet addict. The percentage of teenagers in SII zone who have control over internet use is only 18%. Surprisingly percentage of teenagers who rarely use internet is very low. They are in SI zone having percentage 05.

4.2 Teenagers IA Root Cause Test (TIARCT):

Result and analysis of brainstorming sessions and TIARCT helped in finding key Root causes and sub-causes to construct fishbone diagram. Outcome leads to enlisting the key root causes as:

A] People

B] Method

C] Machine

D] Environment

Each factor is described below:

A] People

First major question addressed was how teenagers get introduced to internet? It was found that we human beings in different capacities are responsible for introducing teenagers towards internet. Major stake holders are parents, friends, relatives and society. Parents give freedom to their child since they want their child to be equally smart like other techno savvy people. Today's generation is smart. Very hot discussions' regarding web sites is taking place in friend circles. Teenagers are tempted to visit these websites and spend hours on surfing. Further relatives and society plays vital role in keeping the teenagers online on social networks such as what's app, Facebook and Instagram (12).

The contribution of each stake holder is given in table 2 and represented in figure III.

Table 2: Percentage of PeopleResponsible for IA problem

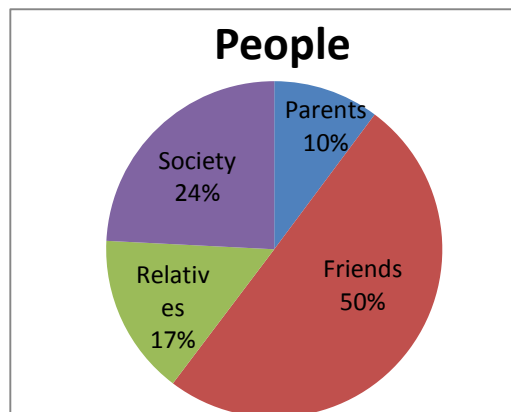| Parents	Friends	Relatives	Society
10.2	50.1	15.5	24.2

Figure 3: Percentage of People Responsible for IA problem

It has been observed that teenagers get first hand usage of internet from parents in house. Afterword major resources are friends and to some extend society and relatives.

B] Machine

For internet use one needs a machine with software and compatible hardware. Exponential growth in technology has made reliable electronic gadgets available readily with affordable prizes. 90 % teenagers have smart phones or laptops or desktop computers with internet facility. Parents provide them these gadgets for n number of reasons, viz. study, communication, status symbol etc.

Table III and figure IV shows that smartphones are widely used by teenagers. In brain storming sessions it is revealed that computer or laptops are used for long duration video clips.

Table III: Percentage of Gadgets used

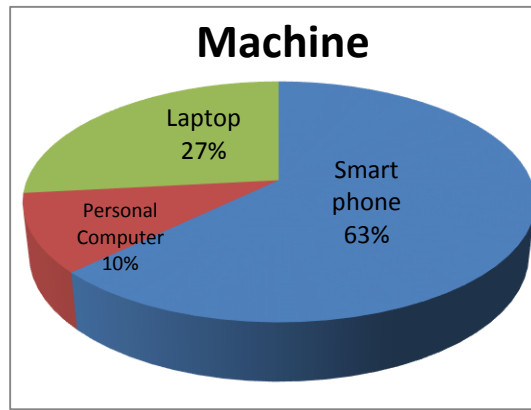| Smartphone	Computer	Laptop
62.8	10.5	26.7

Figure 4: Percentage of Gadgets used by teenagers for Internet usage

C] Method

One more important aspect for wide spread use of internet is easy access for internet. Teenagers having own machine for internet, can access internet using either Wi-Fi or internet pack or USB dongle. Even cyber cafes are a better option if he does not have machine to work with. Attractive schemes provided by internet service providers compel teenagers to use internet for 24/7.

Table IV :Percentage of methods used by teenagers to access internet

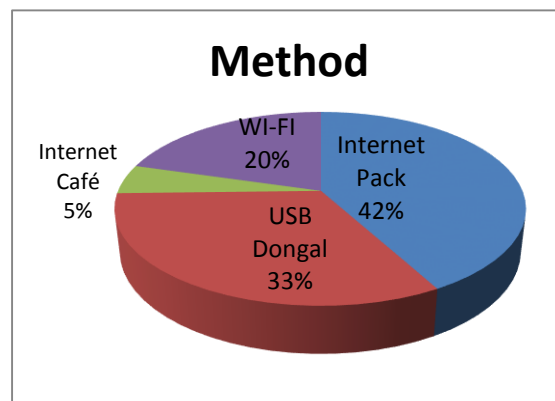| Internet Pack	USB Dongal	Internet Café	Wi-Fi
42	32.6	4.9	20.5

Figure 5: Percentage of methods used by teenagers to access internet

D] Environment

Supportive environment further boosts up the internet use. The environmental factors responsible for pushing up internet access use are summarized in table V and graphically represented in figure VI.

Table V: Percentage of Environmental factors

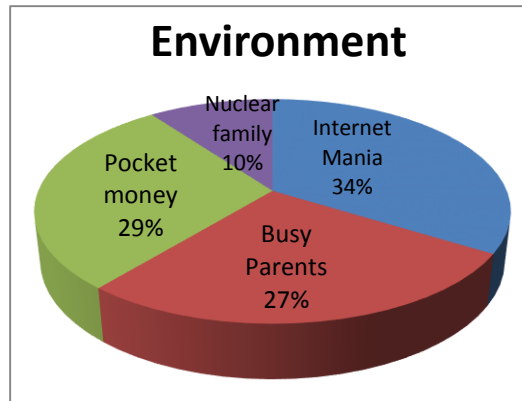| Busy Parents	Internet Mania	Pocket money	Nuclear family
27.2	33.8	28.9	10.1

Figure 6: Percentage of Environmental factors

Unhealthy environment at homes and in society support teenagers for using internet. Parents don't have time for child because of rat race in service. They fill proud and think that they have completed their duty/responsibility as parent if they provide new gadgets and pocket money to their child. Due to nuclear family concept, child fill lonely and try to fill up the gap by making internet friends using online social networks.

Fast developing websites are coming up now a day's which include sites related with technology, games, e-commerce, adult sites etc. Once teenager gets introduce to these new sites, he gets attach to internet like a bug. For example applications such as e-games, Google, face book, LinkedIn, What's app, Amazon, Flipkart etc. are very common. Few teenagers tend to attract adult or antisocial sites and thereby may drag into crime world either knowingly or unknowingly. Afterword internet becomes integral part of their life.

Table VI: Internet usage effect on Teenagers

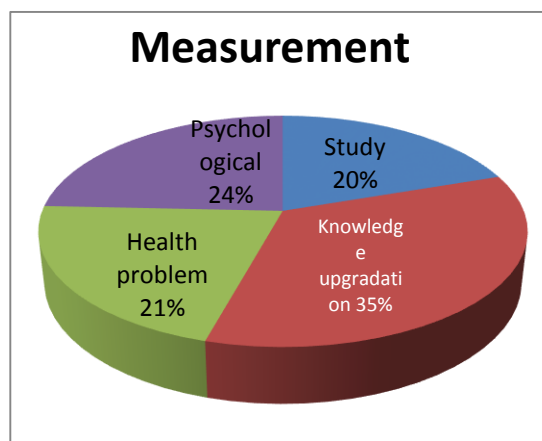| Knowledge up gradation	Health problem / physical	Study	Psychological
35	21	20	24

Figure 7: Internet usage effect on Teenagers

4.3 Construction of Fishbone Diagram
Considering about test results the fishbone diagram is constructed as shown in **figure VIII**.
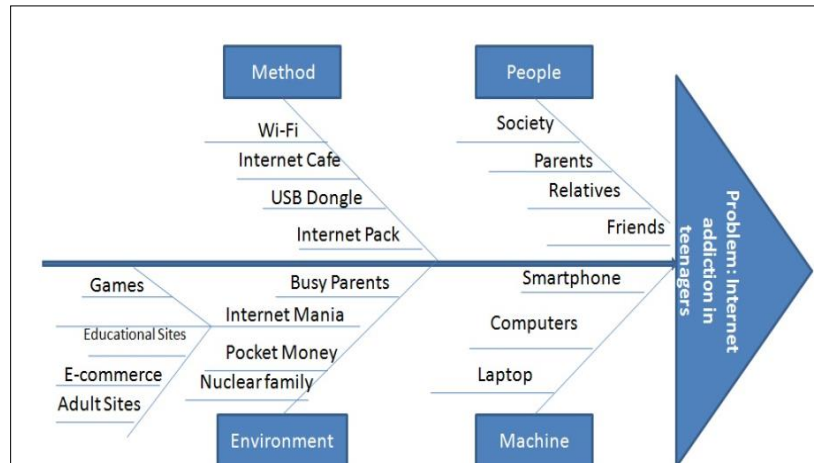
Figure 8: Fishbone diagram of Internet Addiction problem in Teenagers

V.   CONSEQUENCES OF INTERNET ADDICTION

The test analysis further reveals the implications of extensive use of internet on teenager's life, whether physical or social or psychological. IA directly affects individual teenager's health and social life. Problems faced by adults due to excessive use of internet are already discussed in 6, 8 and 11. Same kind of health issues are observed in teenagers. Teenagers falling in SII-IV class are facing health problems in early ages, such as vision problem, backache, weight gain or loss, disturbances in sleep, lack of concentration, mood swings. Their mind gets diverted towards site surfing, games, social media, adult site etc. Their own world gets created and they become introvert day by day. They lose bonding with family, relatives and society.

We have focused our attention on finding out the reason for highest percentage of internet mania. To investigate the cause, we focused on purpose of accessing of internet. Most frequently visited sites are found out. Percentage of site visits is shown in pie chart (figure IX).It is revealed that more than 50 % of teenagers visit games or social sites. Percentage of teenagers using internet for education purpose is 21.1%. While adult sites visiting percentage is 10.8 %.

Table VII: Purpose of Internet usage

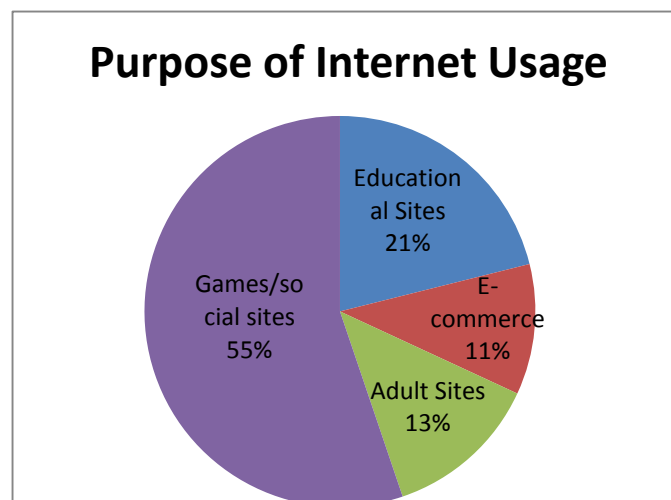| Educational Sites	E-commerce	Adult Sites	Games/ social sites
21.1	10.8	12.9	55.2

Figure 9: Purpose of Internet Usage

VI. CONCLUSION

Using Fishbone diagram, root cause analysis was carried out. The following table shows the factors and its implications on mentioned study and also the factor which is highly responsible for Internet addiction in teenagers.

Table VIII: Analysis of sub- causes

Sr. No.	Category	Possible Causes	Result	Conclusion
1	People	Parent	10.2	Low
		Relative	15.5	Low
		Friends	50.1	High
		Society	24.2	Moderate
2	Method	Wi-Fi	20.5	Low
		Internet Café	4.9	Very Low
		USB Dongal	32.6	Moderate
		Internet Pack	42	High
3	Environment	Internet Mania	33.8	High
		Busy Parents	27.2	Moderate
		Pocket Money	28.9	Moderate
		Nuclear Family	10.1	Low
4	Machine	Smart Phone	62.8	High
		Computers	10.5	Low
		Laptop	26.7	Moderate

Above table indicates major root causes responsible for increasing IA problem. These are
- Easy availability of electronic gadgets necessary for internet use.
- Affordability of internet because of attractive schemes of Net pack and that to within their capacity of pocket money.
- Easy accessibility of attractive sites and apps.
- Friends circle and to some extend society dragging new ones into Internet Mania.

The study reveals the causes of increase in Internet Addiction in teenagers and effect of IA on their day to day life. Accordingly easy availability of electronic gadgets at cheaper rate and with advanced technical features, easy affordable internet access, various e-applications and friend circle are the major factors.

VII. FUTURE WORK

Internet addiction problem can be further studied gender wise and age wise. More data survey can be carried out to find out some concrete solution for the problem which can reduce Internet addiction problem.

REFERENCES

[1]. VadimEmelin, Alexander Tkhostov, Elena Rasskazova, Procedia - Social and Behavioural Sciences,(October 2013), Excessive Use of Internet, Mobile Phones and Computers: The Role of Technology-related Changes in Needs and Psychological Boundaries, Volume 86 (10), pp 530–535.
[2]. StéphanieLaconi, Rachel Florence Rodgers, Henri Chabrol, (December 2014), Computers in Human Behavior, The measurement of Internet addiction: A critical review of existing scales and their psychometric properties, Volume 41, pp 190–202.
[3]. Davis RA,(2001),Computers in Human Behaviour, A Cognitive-behavioural model of pathological internet use. 17 (2): pp187-195.
[4]. Matthias Brand, Christian Laier and Kimberly S. Young, Internet addiction: coping styles, expectancies, and treatment implications, Frontier Psychology.
[5]. Ko CH, Liu GC, Yen JY, Chen CY, Yen CF, Chen CS, (2013), Addict Biol, Brain correlates of craving for online gaming under cue exposure in subjects with Internet gaming addiction and in remitted subjects, 18 (3),pp559-569.

[6]. AnetaMałgorzata Przepiorka, AgataBlachnio, Barbara Miziak, Stanisław Jerzy Czuczwar, (April 2014), Pharmacological ReportsElsevier publication, Clinical approaches to treatment of Internet addiction, Volume 66 (2), pp 187–191.

[7]. Winkler A, Dörsing B, Rief W, Shen Y, Glombiewski JA: Treatment of Internet addiction: a meta-analysis.(2013)Clinical Psychology Review, vol. 33 (2): pp317-329.

[8]. Kaiser Family Foundation Report of January 2010, Generation M2: Media in the Lives of 8- to 18-Year-Olds.

[9]. Shan-Shan Li and Ling-Chu Lee, 2011,Medicine&Health&Social Sciences, Using fishbone analysis to improve the quality of proposals for science and technology programs, Volume 20 (4), pp 275-282.

[10]. Gheorghe Ilie, Carmen Nadia Ciocoiu,(2010) Application Of Fishbone Diagram To Determine The Risk Of An Event With Multiple Causes, Management Research And Practice, Vol. 2 (1) pp 1-20.

[11]. AbhishekJayswal,Xiang Li, Anand Zanwar, Helen H. Lou, Yinlun Huang, (December 2011), Computers & Chemical Engineering, A sustainability root cause analysis methodology and its application, Volume 35 (12), pp 2786–2798.

[12]. Young, K. S., Cyber Psychology and Behavior,1998, Internet Addiction: The Emergence of a New Disorder, volume 1(3), pp 237- 244.

[13]. PrasannaChebbi, Kai S. Koong, Lai Liu, Rottman, Some Observations On Internet Addiction Disorder Research, Journal of Information Systems Education Volume 11(3-4).

[14]. ChienChou, LindaCondron and John C. Belland, A Review of the Research on Internet Addiction, (2005), Educational Psychology Review, Vol. 17, No. 4.

[15]. Noreen Akhter, (October 2013), Relationship between Internet Addiction and Academic Performance among University Undergraduates, Educational Research and Reviews, Vol. 8(19), pp 1793-1796.

AUTHORS

Deepa Ramane, Associate Professor and Head, Department of Electronics, Sinhgad College of Science, Pune, India. Born in 1970 at Pune, India, she has completed her Bachelor in 1990 , master in 1992 and Doctorate in 2012 from University of Pune, India. Her research interests include agricultural electronics, embedded systems, wireless communication.

Supriya Kottapalle: Assistant Professor, Department of Computer Science, Sinhgad College of Science.DOB:11/11/1984, Completed Bachelor in 2005 from SRTM University Nanded, India, Master in 2008 from Savitribai Phule Pune University, Pune, India. Interest areas are Software Development, Artificial Intelligence.