

## **Internet Addiction in Freshmen Engineering Students in India**

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### **ABSTRACT**

The purpose of this paper is to describe the process undertaken to evaluate the psychometric properties of a questionnaire developed to measure internet addiction in freshmen engineering students in India. A questionnaire survey was conducted using convenience sampling method, among 97 freshmen engineering students from four colleges in Mumbai, identified as over users by counsellors of their institutions. Factor analysis of the 16-item instrument yielded a three-factor structure with scale composite reliability above 0.7 for each of the factors and average variance extracted scores above 0.5. An Independent samples t-test also showed a significant difference in internet addiction by substance users (M= 31.34, SD=12.38) as compared to non-users (M= 24.93, SD= 12.06;  $p < 0.05$ ). Programmes that engage students in meditation, yoga and intense physical activities should be encouraged so that students learn to encounter face to face interactions with real humans rather than the surreal ones behind their screens. It is also essential that parents, teachers and other authorities recognize changing behaviors among students and create an environment of congeniality where the individual can share his or her feelings openly.

**Keywords:** Adolescent, Engineering, Factor analysis, Freshmen, Internet Addiction, Validity

### **INTRODUCTION**

The evolution of information technology has revolutionized the way we perceive the world and process information. Around 50% of internet users in the world belong to Asia and, in Asia, India holds a 25.4% share in the internet usage statistics. There has been a 111% increase in the usage of internet in India in a decade from 2000 to 2019. Internet has become quintessential for effective and efficient working of personal and professional lives and is seen by users as a panacea for most problems be it medical, academic or fun. The problematic issue as far as internet usage is concerned is the difficulty in discerning whether the internet use is actually a real use or an overuse. It was in the 1990s that the term 'technological addiction' came to be used in psychological literature which described the situation of a "non-chemical addiction that involved human-machine interaction". (Griffiths, 1999; Shaw &, 2008). Adolescence is a very crucial period where an individual experiences dynamic biological, psychological and behavioral changes (Hammond, Mayes & Potenza, 2014) and it is in this period that individuals look for instant gratification and thus their entire biological development is focused around instant rewards and

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instant pleasure, thus making this adolescent group very vulnerable for addictive behaviors. It may be possible to draw a similarity in the way substance abuse and internet addiction works. Drug abuse and internet addiction both restructure cognitive processes and draw the individual away from reality into a world of fantasy that seems real to him or her. Thus, compulsive use of internet, for any purpose, begins to appear more rewarding than real healthy activities, alienating the individual from his real world of social networks and relationships. The current study focuses on understanding the differences in problematic internet usage by substance users and non-users.

**INTERNET ADDICTION**

There is a lack of consensus on the definition of this situation. Researchers understand the term as a difficult condition where the user interacts with the machine for such long hours, that is throws other aspects of life off-balance (Shaw & Black, 2008). A lack of typical connection between the internet use and corresponding disorders due to over use makes it difficult for recognizing clear symptoms as those for substance abuse (Weinstein & Lejoyeux, 2010). Unlike addictive drug or substance abuse, the internet offers benefits to the user too like ease of research, information about a variety of items, communication convenience between different parts of the world and also entertainment. Hence researchers opine that the term addictive cannot be used with the internet use since it also provides all the advantages of technological advancement (Young, 1999). Several studies have termed this behaviour differently, like Internet addiction, Pathological internet use, problematic internet use (Yellowless & Marks, 2007). Although internet cannot be compared with substances like alcohol or weed, there have been studies that have characterized internet addiction as similar to substance abuse (Griffiths, 1999; Shaw & Black,2008) and obsessive-compulsive disorders (Santos et al. 2015). Different studies have looked at different sets of behaviors associated with long hours at the internet. (Table 1).

<b>Table 1: Common behaviors associated with internet overuse</b>	
Researchers	Internet Addiction types
Musetti et al.(2016)	Cybersexual addiction that includes cybersex and cyberporn
Hormes, Kearns, and Timko (2014),	Cyber relationship that includes an obsession to make online relationships
Gunuc and Keskin(2016)	Online gambling, online shopping
	Compulsive information search
Ng and Wiemer-Hastings (2005)	Online gaming

Internet addiction has been described as an uncontrolled compulsive use of the computer that leads to personal and professional distress, impaired social and occupational functioning and cognitive dysfunction (Black et al.1999; Shapira et al. 2003; Shek et al. 2015). Research studies have suggested that long hours spent at the internet has resulted in wide mood swings, adverse functioning at office or academics. Some other research studies have shown that indiscriminate use of the internet can lead to anxiety, depression, hostile tendencies attention deficit hyperactive disorder (Ko et al.2012). Inclusion of internet addiction in the American Society of Addiction Medicine has been justified by the fact that like any other substance abuse, over use of internet is accompanied by similar outcomes that affect cognitive control and decisions, a false temporary feeling of relief and peace and a momentary mood elevation (Cash, 2012).

**INTERNET ADDICTION AND ADOLESCENTS**

With the upsurge in technology and media, adolescents being exposed to the internet and using the same without restraint is on the rise. Reports of internet addiction among adolescents of

many countries have been reported in various studies. Adolescent health in all respects is of paramount importance because this category goes on to become the future of any nation. Along with physical health, mental health is also equally important. Tsai and Lin (2003) in their research study on internet addiction among adolescents in Taiwan found that internet addiction was attributed to the fact that all necessary and important information used to come to these individuals via the internet. In a study on problematic internet use in Lebanon it was found that addiction was the most severe in ages in the group of 12-16 years adolescents (Hawi, 2012). Several research studies have shown the association of internet addiction with symptoms like depression and compulsive disorders (Ha et al. 2007), cyberbullying, hostility and social anxiety (Ko et al. 2014), lack of self-esteem (Yen et al. 2014), problematic alcohol abuse (Ko et al. 2008) and suicidal intentions (Kim et al. 2006). Many research studies study on internet addiction among university students showed a strong association between internet addiction and adverse psycho-social conditions in Greece (Polyxeni, 2014), Indonesia (Pratama and Widyanti, 2019) and Turkey (Boylu & Gunay, 2019). The problems of adolescents especially engineering students become even more pronounced as these students are burdened by the rigour of their academics and confronted by their vulnerability of age.

Investigations in the topic of internet addictions have mainly been centred around understanding the level of addiction present in any population (Poli & Agrimi, 2012; Moreno et al. 2011) of regarding the predictors of internet addiction (Ceyhan, 2008; Tsitsika et al.2009) or the consequences of internet addiction (Akin, 2012). Very few research studies have explored differences in internet addiction among substance users in the Indian context.

#### **INTERNET ADDICTION SCALES**

There have been a large number of internet addiction scales that have been used which are multidimensional (Samaha et al., 2018; Siomos et al. 2008). The scales also show a factorial complexity mainly because of the differences in the definition of the internet addiction construct itself. The IAT (Young, 1998) which is possibly the most commonly used scale itself shows a different factor structure in different studies. A Thai version of the IAT showed a three-factor model (Neelapaijit et al. 2018). A study on Italian university students showed a two-factor model of the IAT which demonstrated good psychometric properties (Servidio, 2017), whereas a study on psychometric properties of the IAT on Malaysian students yielded a six-factor structure (Xi & Yeo, 2015). IAT is intended for adults and hence does not capture the situation faced by engineering students. Though many instruments are available, none of them has succeeded in reaching an agreement on the measurement and that is mainly due to the disagreement in the definition of internet addiction. There is no internet addiction scale that identifies with engineering students specifically and hence the motivation for the current study.

Internet is quintessential for academic and occupational functioning in society. Internet addiction is likely to become a public health issue in the near future as youngsters have access to the internet anytime, anywhere on smart phones. In this situation, a systematically developed and validated tool could assist in identifying current status, preventative intervention, and countermeasures in engineering colleges.

The current study is an attempt to develop and validate a questionnaire to measure internet addiction among engineering (IATE) students in India. The study will also explore differences in internet addition between substance users and non-users.

## **METHOD**

### **Development and Validation of Internet Addiction Scale**

A preliminary questionnaire of 20 items were compiled from literature review (Babalola, 2019; Bisen & Deshpande, 2020). Next, an expert group consisting of psychiatrist, psychologist, students identified as problematic internet users by college counsellors and counsellors themselves determined 16 preliminary items after a series of discussions. Examples of items are:

- 'I am unable to concentrate on my studies'
- 'I get lot of complaints from my family regarding my long hours on the internet'
- 'I can easily make friends online than when I am face to face with people'

Responses were recorded on a 6 point Likert scale ranging from 0= 'Never ' to 5= 'Always'

### **Sampling**

Convenience sampling method was used where 97 participants(freshmen) were identified from four universities in Mumbai, India. The names of the participants were given by the institution counsellors who had identified these students as over-users(those who spent more than 7 hours a day on the internet). Questionnaire survey method was used and the researcher personally collected the answered questionnaires.

### **The Instrument**

The final instrument consisted of two parts. The first part was demographic data that included gender age, residency status of whether the student is a hosteler or a day scholar, weekly number of hours of internet usage and whether the respondent owned a device with internet access. The second part consisted of 16 items, on a 6-point Likert scale, that measured aspects of internet addiction.

## **RESULTS**

### **Data Analysis**

SPSS 16 was used for analysis of data.

The Internet addiction questionnaire (IATE) was validated using factor analysis and validity studies (convergent and discriminant).

### **Sample Description**

The sample consisted of 97 first year engineering students (64% males and 36% females) whose average age was 18.5 years (standard deviation= 1.57 years). 80% were hostelers while 20 % of the students stayed in their own homes. 39% of students were hostelers while 61% were day scholars. 99% of the respondents owned a device that had internet access while only 1% did not own a device with internet access. The weekly average time spent on the internet irrespective of the purpose was 52.3 hours (standard deviation = 7.21 hours) that roughly stands at an average of 7 hours daily.

### **Factor Analysis**

It is common to try and combine items into common factors so that it enables the researcher to interpret factors easily and clearly based on the item loading onto the factor. The 16 items were examined for their factorability. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.820 above the commonly recommended value of 0.6, and Bartlett's test of sphericity was significant ( $\chi^2 (120) = 614.491, p < .01$ ). The diagonals of the anti-image correlation matrix were all above 0.6. The communalities were all above 0.3,confirming that each item shared some common variance with other items (Table 2). Given these overall indicators, factor analysis was deemed to be suitable with all 16 items.

Initial Eigen values indicated that the first three factors explained 37.29%, 10.28%, and 8.12% of the variance respectively. The three-factor solution, explained 55.71% of the variance. This was also indicated by the leveling off of eigen values on the scree plot after three factors and the inability of subsequent factors to be amenable for interpretation. There were no cross loadings observed in the final structure. The first component was labeled Preoccupation, the second component was labeled Social withdrawal and the third component was named Mood swings. The descriptive statistics for each of the four factors has been given in Table 3.

**Table 2: Factor loadings and communalities based on a principal components analysis with varimax rotation for 16 items of the Internet addiction scale, IATE (n = 97)**

Items	Preoccupation	Social withdrawal	Mood swings	Communalities
I am unable to concentrate on my studies	0.706			0.588
I prefer to engage in online activities rather than outdoor physical activities	0.704			0.525
I seem to get hooked to the internet for more time than what I really want to	0.656			0.576
I only think about what next to surf in the internet	0.632			0.443
I like to meet people and make friends online rather than in real life	0.626			0.410
I spend long hours on the internet without getting bored	0.602			0.503
I feel that the virtual world is lot more exciting than the real world	0.525			0.537
I rather be surfing the internet than go out with family and friends		0.8		0.668
I can easily make friends online than when I am face to face with people		0.719		0.603
I often lose my rest and sleep due to the internet		0.7		0.589
I get lot of complaints from my family regarding my long hours on the internet		0.693		0.551
I try to keep away from a crowd in order to check my mobile phone for mails		0.675		0.640
I get tense when I cannot check the internet the first thing in my day			0.752	0.568
I get wild when people ask me about my internet activities			0.734	0.612

I find solace in browsing the internet when I feel sad regarding my poor performance in exams and grades			0.595	0.537
I feel very uneasy when the internet fails but feel reassured the minute it gets restored			0.557	0.564

**Table 3: Descriptive statistics for the Internet addiction Scale, IATE (n=97)**

	Number of Items	Mean (SD)	Skewness	Kurtosis	Cronbach's Alpha Coefficient
Preoccupation	7	12.16 (6.27)	0.662	1.006	0.814
Social withdrawal	5	8.14 (4.75)	0.697	0.461	0.824
Mood swings	4	6.93 (3.98)	0.437	-0.532	0.728

**VALIDITY OF THE SCALE**

Convergent and Discriminant validity analyses were done for the Internet overuse scale. It can be seen that the standardized factor loading of each item is above 0.5 (Table 4), the scale composite reliability (SCR) is well above 0.7 and the average variance extracted (AVE) is also above 0.5 (Table 3). AVE should ideally be greater than or equal to 0.5 but lower values can be accepted as composite reliability is well above 0.6 (Huang et al. 2013; Fornell & Larcker, 1981). Thus, convergent validity is established for the scale.

**Table 4: Convergent validity for Internet addiction scale, IATE (n= 97)**

Construct	Items	Factor loading	Variance	Error	SCR	AVE
Preoccupa tion	I am unable to concentrate on my daily routine work	0.706	0.498436	0.294	0.885	0.407
	I prefer to engage in online activities rather than outdoor physical activities	0.704	0.495616	0.296		
	I seem to get hooked to the internet for more time than what I really want to	0.656	0.430336	0.344		
	I only think about what next to surf in the internet	0.632	0.399424	0.368		
	I like to meet people and make friends online rather than in real life	0.626	0.391876	0.374		
	I spend long hours on the internet without getting bored	0.602	0.362404	0.398		
	I feel that the virtual world is lot more exciting than the real world	0.525	0.275625	0.475		

Social withdrawa l	I rather be surfing the internet than go out with family and friends	0.8	0.64	0.2	0.901	0.516
	I look for excuses to stay away from parties and get together	0.719	0.516961	0.281		
	I often lose my rest and sleep due to the internet	0.7	0.49	0.3		
	I get lot of complaints from friends regarding my internet habits	0.693	0.480249	0.307		
	I try to keep away from a crowd in order to check my mobile phone for mails	0.675	0.455625	0.325		
Mood swings	I get tense when i cannot check the internet the first thing in my day	0.752	0.565504	0.248	0.836	0.728
	I get irritated when people ask me about my internet activities	0.734	0.538756	0.266		
	I find solace in browsing the internet when I feel sad	0.595	0.354025	0.405		
	I feel very uneasy when the internet fails but feel reassured the minute it gets restored	0.557	0.310249	0.443		

Discriminant validity for the Scale (Table 5) is established as correlations between any two dimensions are lesser than their individual Cronbach alpha values (Iyer, 2017; Andaleeb & Conway, 2006; Richey et al. 2005; Gaski & Nevin, 1985).

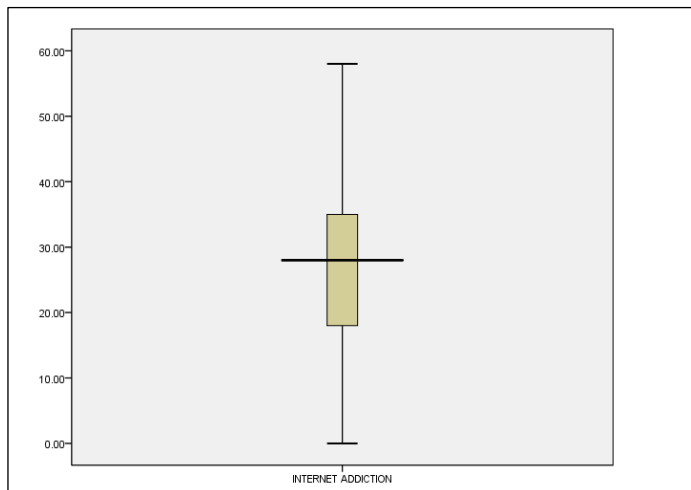
Component	Preoccupation	Social withdrawal	Mood swings
Preoccupation	<b>0.814</b>		
Social withdrawal	0.523**	<b>0.824</b>	
Mood swings	0.520**	0.559**	<b>0.728</b>

Diagonal entries are Cronbach alpha coefficients: others are Pearson's correlation coefficient  
\*\* correlations are significant at 0.01 levels

The results of the factor analysis and the validity studies show that the Internet overuse scale is a reasonably accurate measure of aspects of Internet overuse among engineering students. The Cronbach alpha values as also the scale composite reliability values establish the reliability of the scale. The instrument as good reliability as well as validity and can be used for further research studies. Internet addiction has been predicted as one of the symptoms that will engulf the youth of today and engineering students being the technological background of any country, this instrument can be used to detect internet overuse and design timely interventions.

**DIFFERENCES IN INTERNET ADDICTION AMONG SUBSTANCE USERS AND NON-USERS**

In addition to developing and validating a questionnaire to measure internet addiction among engineering students, an endeavor was made to explore differences among substance users and non-users with regards internet addiction score. An independent samples-t-test was conducted for this purpose. We could conduct the t-test since the data satisfied the criteria required for being amenable for t-test(Howell,2011).The dependent variable internet addiction, measured on a 6-point Likert scale ,is an interval variable. The independent variable Substance user consists of 2 categories, ‘users’ and ‘non-users’. There were no significant outliers (Fig 1).



**Fig 1. Box plot of Internet Addiction**

Homogeneity of variances was tested using Levene’s test for homogeneity of variances. Variances were assumed to be equal for the substance users vs. non users. ( $F = .137, p = .712$ ). . The Shapiro Wilk test was used (Guo, 2012; Zimmerman, 2003). Both the independent groups were found to be normally distributed: Substance user ( $W = .982, p= 0.816$ ), non -users ( $W = .986, p = 0.702$ ). In addition, it was found that the skewness and kurtosis values of internet addiction for both the categories of independent variable were found to be less than the thresholds of 2 and 7 respectively (Iyer, 2017; Curran et al. 1996; Iyer, 2017; Kim, 2013). An independent samples t test was conducted to assess the difference in internet overuse scores between substance users and non-users (Table 6).

<b>Table 6: Independent samples t-tests (n= 97)</b>				
<b>Component</b>	<b>Levene's test for equality of variances</b>		<b>t-test for equality of means</b>	
	<b>F</b>	<b>Sig</b>	<b>t</b>	<b>Sig. (2 tailed)</b>
Internet overuse	0.137	0.712	-2.489	0.015

The independent samples-t-test was used to compare internet addiction scores between substance users and non-users. There was a significant difference in the scores for Substance Non users ( $M= 24.93, SD= 12.06$ ) and Users ( $M= 31.34, SD=12.38; t(95)= -2.489, p < 0.05$ ). The magnitude of differences in means was moderate ( $\eta^2 = 0.06$ ) (Cohen, 1988)



## DISCUSSION

There is a significant difference in internet addiction scores between substance users and substance non-users. In the current sample, 64% have admitted to be substance users while 36% are not substance users. Substances included either illicit drugs, alcohol or cigarettes or all of them. Alcohol, smoking and illicit drug use are a problematic trio for most adolescents that is a common make up of their lifestyles and impacts their social dynamics, cognitive processes and decision making abilities, behaviour and vulnerability (Ko et al., 2008). Young (2011) has opined that people who have other substance dependencies like alcohol, illicit drugs and cigarettes are more prone to getting addicted to the internet because their compulsive behaviour apparently helps them overcome difficulties and hurdles. Yen, Yen and Ko (2010) have found that when an MRI was conducted the areas that were activated when an individual had an urge to use the internet are the same as those activated by addictive substances. So the result depicted by the t-test (Table 6) is not surprising at all.

Engineering students enter a new world when they leave home for the first time for a professional course and face a new environment. This sample has 80% of students staying in hostels away from their homes. This is a transition face that few people get adjusted to quickly while some take their own time while some never adjust. Students encounter many situations in this phase like rigour of academics, assignment submissions, project work, new friends and colleagues and a completely new environment. Many also undergo turmoil in their personal lives like romantic involvements, breakups and, failures or low scores in academics and they are mentally not attuned to accept these. They face all these turmoil on their own and possibly find it difficult and too early to develop any confidant. Also, since majority of the students are hostelers, there is no external control from somebody who is close to them. Individuals spend a lot of time on the internet as a defence mechanism in order to conceal certain emotionally or physically threatening situations or to combat loneliness. The internet is a very viable and attractive ghetto for individuals to escape from real life and set up a world that is non-real.

Communication suddenly seems easier with people the student never knows, confiding one's fears and apprehensions in an unreal world. Many students also drown themselves in the internet in the quest for knowing more and more while some will drown themselves in gaming, online shopping and sometimes cyberporn. Freshmen are very vulnerable due to the complete change in their environment and hence are prone to substance use too in addition to internet overuse. It was also found that adolescents in Taiwan (with an average age of 16 years) with this combination of three abusive behaviors also exhibited problematic internet usage behaviors (Ko et al., 2008). Several studies have also shown internet addiction associated with problematic alcohol usage (Yen et al. 2009).

The current study is similar to a study conducted by Lee, Hans, Kim, and Renshaw (2013) where it was seen that substance users were at a high risk to internet addiction. Drug abuse reduces an individual's cognitive abilities alienating him or her from the real world. The internet is perceived as a safe place for such individuals to seek refuge or even heighten the pleasurable effects of abusive substance. Alcohol users experience a general high after its consumption. Alcohol is associated with the release of Dopamine that affects reasoning power and sense making which in turn results in fool hardy fun-seeking behaviors. The internet provides such users a perfect haven to satisfy their urges while remaining away from the actual reality. In a study on an association between smoking and internet addiction among Japanese adolescents, it was found that adolescents who smoked routinely or were regular smokers are more addicted to the internet than the non-smokers (Morioka et al., 2016). The results of this study support the findings of previous studies that adolescents who are substance abusers have a greater propensity to exhibit internet addictive behaviors.

The current study suffers from various limitations. The study could not include variables like family background, parental support and faculty support, low self-esteem, attention deficit disorder and other personality traits and their impact on addiction. A convenience sampling method could make the results of the study less generalizable across populations.

## CONCLUSION

We believe that this study is possibly one of the very few studies that have been conducted on substance abusers and internet addiction among engineering freshmen in the Indian context. Access limitation and blocking of certain sites that would prevent these adolescents from spending an indiscriminate amount of their time on campus on the internet might be helpful since free access to the internet on most college campuses is an incentive for students to get hooked on. Similarly service providers recognizing the harmful impact of internet over-usage can do their social part by limiting access to certain sites as per the age of the user. In addition to these physical and technological interventions, socio-psychological interventions are also a clear must. CBT has been effectively used for addictive behaviors (Lee et al. 2019). The counsellor may have a few sessions with close family members to understand the relationship dynamics and then plan family therapies.

Internet addiction is becoming a serious problem plaguing our society. Effective interventions and awareness programmes should be delivered on campus to promote the ill effects of overuse of the internet. It is also essential to counsel family members and promote the value of connection with parents, relatives, friends and a social life beyond the engineering classroom. Programmes that engage students in meditation, yoga and intense physical activities should be encouraged so that students learn to encounter face to face interactions with real humans rather than the surreal ones behind their screens. It is also essential that parents, teachers and other authorities recognize changing behaviors among students and create an environment of congeniality where the individual can share his or her feelings openly with his near and dear ones.

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