Impact of Electronic Media on School Children- an Analytical Study using Fuzzy Soft Sets

R.Jayashree[1], Dr.A.Kalaichelvi[2],

[1]*Department of Mathematics*
Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore – 641 043

[2]*Associate Professor, Department of Mathematics*
Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore – 641 043

ABSTRACT

Soft Set Theory is one of the recent topics gaining significance in finding rational and logical solutions to various real life problems which involve uncertainty, impreciseness and vagueness. In this article, the authors develop a Decision Making Model using Fuzzy Soft Sets.

KEYWORDS

Soft set, Fuzzy Soft Set, Fuzzy Soft relation.

INTRODUCTION

Electronic media have become essential for comfort living of every Indian, rural or urban, male or female, children or elders, rich or poor and educated or illiterate. The technology developments gifted the society various electronic devices, particularly Television, Computer, Cell Phone and Video games. Though the devices are used by all for information and entertainment purpose, the usage by children and youth causes great concern, especially when the devices are misused by them.

Research studies in sociology reveal that children use television and computers for more than six hours a day. Also they found that they prefer to use such devices in the absence of their parents or elders. Television, Computer and Cell phone are easily accessible to the children and they gain better exposure to the academic information, scientific developments, current affairs, sports and games and international affairs. Many parents are particular to see that the electronic devices should cause cognitive development and academic excellence to their children. Supervised use of electronic media by children is the one of the ways to reap the fruits of this scientific innovation. Of all electronic media, television is widely used in almost all houses and it is rare to find a house without television. Due to conflicting taste and preference of channels between elders and children it is common to find more than one television in many houses. Long time viewing of television is common, especially in the case of children. However, research studies reveal that excessive and unsupervised use of electronic gadgets by children result in poor academic performance, aggression, lack of concentration and lack of social mobility.

Here the researcher has attempted to identify the various effects, both favorable and adverse, of using Television, Computer and Cell Phone by the school children in the age group of 12 to 16 years living in Villupuram district. Further the researcher intended to develop a mathematical model applying Fuzzy soft sets to identify the favorable and adverse effects. Such findings are useful not only to the parents but also to the policy makers. It ensures prosperity of the nation caused by the discipline and result oriented youth.

BASIC DEFINITIONS
Definition1 [1]:

Let U be a nonempty finite set of objects called universe and let E be a nonempty set of parameters. An ordered pair (F, E) is said to be a Soft set over U, where F is a mapping from E into the set of all subsets of U. That is, F: E⟶P(U).

It has been interpreted that a soft set indeed is a parameterized family of subsets of U.
Example 2:

Let $U = \{c_1, c_2, c_3\}$ be the set of three cars and E = {costly(e_1), metallic color(e_2), cheap(e_3)} be the set of parameters, where A = {e_1, e_2} ⊏ E. Then (F, A) = {F(e_1) = {c_1,c_2,c_3}, F(e_2) = {c_1, c_3}} is the crisp soft set over U which describes the " attractiveness of the cars" which Mr. S(say) is going to buy.

Definition 3 [3]:

Let U be a universe. A fuzzy set X over U is a set defined by a function μ_x representing a mapping $\mu_x : U \rightarrow [0, 1]$. Here, μ_x called membership function of X, and the value $\mu_x(u)$ is called the grade of membership of u ∈ U. The value represents the degree of u belonging to the fuzzy set X. Thus, a fuzzy set X over U can be represented as follows,

$$X = \{(u/(\mu_x(u)) : u \in U, \mu_x(u) \in [0,1]\}$$

The set of all the fuzzy sets over U will be denoted by F(U).

Definition 4 [2]:

Let U be a universal set, E a set of parameters and A⊂ E. Let F(U) denotes the set of all fuzzy subsets of U. Then a pair (F, A) is called fuzzy soft set over U, where F is a mapping from A to F(U).

Example 5:

Let U = {c_1, c_2, c_3} be the set of three cars and E = {costly(e_1), metallic colour(e_2), getup(e_3)} be the set of parameters, where A = {e_1, e_2} ⊂ E. Then (G, A) = {G(e_1) = {c_1/0.6, c_2/0.4, c_3/0.3}, G(e_2) = {c_1/0.5, c_2/0.7, c_3/0.8}} is the fuzzy soft set over U describes the "attractiveness of the cars" which Mr.S (say) is going to buy.

Definition 6 [4]:

Let (F, A) and (G, B) be two fuzzy soft sets over a common universal set. Then a relation R of (F, A) on (G, B) may be defined as a mapping R: A×B→P(U^2) such that for each e_i∈ A, e_j∈ B and for all u_l∈ F(e_i), u_k∈ G(e_j), the relation R is characterized by the following membership function,

$$\mu_R(u_l, u_k) = \mu_{F(e_i)}(u_l) \times \mu_{G(e_j)}(u_k), \text{ where } u_l \in F(e_i), u_k \in G(e_j).$$

APPLICATION OF FUZZY SOFT SETS

The researcher collected data from 100 school children dwelling in various parts of Villupuram District. Convenient sampling technique was adopted but sufficient care was taken to cover respondents belonging to different categories of parental income and education. The researcher collected data from children only in the presence of their parents, to ensure the correctness of the information given by the children. Based on the Pilot survey in the study area, the researcher identified the favorable and adverse effects of using Cell Phone, Computer and Television.

To apply Fuzzy soft sets to this problem consider the three important electronic media Cell Phone, Computer and Television as Universal set $U = \{P_1 P_2, P_3\}$ and the positive effects of using these electronic gadgets as the set of parameters $E = \{C_1, C_2, C_3, C_4, C_5\}$ and the negative effects as the set of parameters $N = \{D_1, D_2, D_3, D_4, D_5\}$

Gadgets which impose effects on children

1. Cell Phone - (P_1)
2. Computer - (P_2)
3. Television - (P_3)

Favorable Effects

1. Academic Excellence (C_1)
2. Awareness on Current Affairs (C_2)
3. Familiarity with Personalities (C_3)
4. Knowledge on Global Information (C_4)
5. Awareness on Scientific Innovations (C_5)

Adverse Effects

1. Irregularity in Routine Activities (D_1)

2. Physical Problems (Obesity, Eye problem etc.) (D_2)

3. Poor Outdoor Activities (D_3)

4. Poor Performance in Studies (D_4)

5. Lack of Social Mobility (D_5)

Based on the opinion of the respondents, the Fuzzy Soft Sets (F_i, P_i), i = 1 to 3 were framed by considering the membership value $\mu_{F_i(P_i)}(C_j)$ as the ratio between the number of respondents who gave favorable response to the effect C_j for the gadget P_i and the total number of respondents.

(F_1, P_1) = F_1(Cell Phone) = {C_1/0.2,C_2/0.4,C_3/0.4,C_4/0.7,C_5/0.5}

(F_2,P_2) = F_2 (Computer) ={C_1/0.6,C_2/0.7,C_3/0.8,C_4/0.8,C_5/0.6}

(F_3,P_3) = F_3(Television) = {C_1/0.3,C_2/0.8,C_3/0.6,C_4/0.9,C_5/0.7} and

Fuzzy Soft Sets (F_i, P_i), i = 1 to 3 were framed by considering the membership value $\mu_{F_i(P_i)}(D_j)$ as the ratio between the number of respondents who gave favorable response to the effect D_j for the gadget P_i and the total number of respondents.

(F_1, P_1) = F_1(Cell Phone) = {D_1/0.8,D_2/0.7,D_3/0.9,D_4/0.8,D_5/0.9}

(F_2,P_2) = F_2 (Computer) {D_1/0.6,D_2/0.5,D_3/0.5,D_4/0.7,D_5/0.6}

(F_3,P_3) = F_3(Television) {D_1/0.5,D_2/0.8,D_3/0.7,D_4/0.6,D_5/0.7s}

The authors used fuzzy soft relations to identify both favorable and adverse effects of using Electronic Gadgets.

Identification of the favorable Effect on Electronic Gadgets

(R, C) = R(Cell phone, Computer, television)

= {C_1/0.36,C_2/0.224,C_3/0.192,C_4/0.504,C_5/0.21}

Here C_4 has the largest membership value (0.504 hence these gadgets are more helpful for the students on attaining the knowledge of Global Information

Identification of the Adverse Effect on Electronic Gadget

(R, C) = R(Cell phone, Computer, television)

= {D_1/0.24,D_2/0.28,D_3/0.315,D_4/0.336,D_5/0.37}

Here D_5 has the largest membership value (0.37). Hence these gadgets make the students in lack of poor outdoor activity.

CONCLUSION

In the real life situations there are vast numbers of problems that warrant rational, logical and scientific decisions that fit best for the accomplishment of desired objective. The concept of fuzzy soft sets has rich potentials for developing such decision making models suitable for personal, social, technical, commercial and managerial issues.

REFERENCES

[1] English Kuppusamy Ramamoorthy Nagarajan and Ganesamoorthi Meenambigai, "An Application of Soft Sets to Lattices" Kragujevac Journal of Mathematics, Vol.35, No.1, pp.75-87,2011.

[2] B.Chetia and P.K.Das, "An Application of Interval-Valued Fuzzy Soft Sets in Medical Diagnosis" Int.J.Math.Sciences, Vol.5, No.38,2010.

[3] NaimCagman, FilizCitak and SeararEnginoglu, "Fuzzy Parameterized Fuzzy Soft Set theory and its application" Turkish Journal of Fuzzy Systems Vol.1, No.1, pp. 21-35,2010

[4] ArindamChaudhri, Dr.Kajal De and Dr.DipakChatterjee, " Solution of the Decision Making Problems using Fuzzy Soft Relations" International Journal of Information Technology, Vol.15, No.1,2009.