Effectiveness of Evidence-Based Learning Strategy for Enhancing Cyber Security Awareness of Higher Secondary Students

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ABSTRACT

Learning based on evidence and empirical data always make students more involved in the content area and help to conceptualise how to take decisions, based on tangible evidence offered by both scientific literature and experiments, or by data and information obtained through various procedures. This is the era where digital natives inhabit and immerse in Google world for every single need and deed which may results in intentional or unintentional engagements in several social media platforms that may lead to serious cyber threats and issues, even crimes. The present experimental study analysed the effectiveness of Evidence based learning strategy for enhancing cyber security awareness among higher secondary students. From a total sample of 100 higher secondary students, 50 each were randomly selected as control and experimental groups and are given learning experience through ongoing activity-based method and Evidence based learning strategy respectively. Pre-test and post-test on cyber security awareness were conducted and results obtained were statistically analysed through mean, standard deviation, and t-test. Result of the study revealed that the group instructed through evidence-based learning strategy showed significantly higher level of awareness than the group instructed through ongoing method.

Keywords- Effectiveness, Evidence-based learning strategy, Enhancing, Cyber security, awareness, Higher secondary students.

I. INTRODUCTION

Globalisation and revolution in information technology also changed the face of education and educational practices got equipped with diverse experimentation to equip the children to meet the challenges of modern society and its demands. Higher secondary education is the time which teenagers went through an undefined status, increased decision-making capacities, self- search, clumsiness, thriving for modern activities, and high pressure of societal norms. Thus, increased use of cyber space pulled adolescents to "crime behind the screens". Cybercrimes is the type of crime which can be committed with ease and with no geographical boundaries. Cyber threats can damage systems which are digital, connected to the internet. Afterward the multi fold growth in the field of internet

usage with significant increases in the number of cybercrime cases along with the global nature resulted. Various types of cyber-crimes by juvenile are cyber frauds, cyber bullying, cyber stalking, identity theft, drug trafficking, digital piracy, cyber suicides, cyber theft, hacking etc. Apart from these known cyber-crimes new crimes are committed by means of technology each day. To bring desirable modification in students, teachers, parents, and all other patrons must show their responsibility in this direction to be more aware and attentive than our students. According to the UNICEF report (2020), 13% of children and people aged 25 years or less in South Asia and in lower income countries only 14 % school-age children (3-17 years) access the internet at home; it's estimated that during pandemic around 37.06 million children across 16 states in India continued education through various online classrooms and radio

programmes and lost socialisation. National crimes records bureau (NCRB) data stated that more than 400 % increase in cyber-crime are committed in 2020 in comparison to 2019. Top 5 states reported cyber-crimes registered against children; UP (170), Karnataka (144), Maharashtra (137), **Kerala (107) and** Odisha (71); Information Technology Act, 2000. (Press Trust of India, New Delhi, November 14, 2021).

As realised by much educationalists evidence – based approach to teaching is crucial to maximise students learning out comes. (Michele Bruniges,2005). When a learning experience is given through more interesting and evidence-based manner the demotivating factors can be overruled and can instil versatile, think aloud empirical knowledge in learners. EBL can provide collaborative learning experience and can draw the attention of learners and retention of learned material as they experience critical thinking process through an energised mind process when compared to normal traditional way of learning.

Research studies conducted by Khudair (2021), Kim (2021), Jangand and Hyunseok (2014), Kumar and Mahanas (2021), Lubis and Oktarina (2022), McCuddy and Esbensen (2017) McGuire and Dowling (2013), Martolia and Diya (2020) Paat and Markham (2020), Shawkat, Naseer et al (2022) conducted several studies in cybercrimes its types, possibilities, types of health issues and traumas results. Also, Davies (1999), Blake Havard (2018), Michele Bruniges (2005), Bathgate, Aragon et al (2019), McDonald (2012) Greenhow and Galvin (2020), Laura (2019) Kiser (2021) Simpson (2019) etc conducted studies on evidence-based learning strategy and highlighted its use in medical science. Thus, the investigator thought about the application of evidence-based learning strategy to enhance cyber security awareness among higher secondary students rather than usual talks, classes, and activity-based instruction.

II.   RESEARCH DESIGN

Experimental design was adopted, and randomly selected students were assigned to control and experimental groups. Experimental group was treated with Evidence based learning strategy which is the independent variable while control group was approached with ongoing teaching method to enhance cyber security awareness, the dependent variable. The major objective of the study was to examine the effectiveness of Evidence based learning strategy.

III.   SAMPLE

The study was conducted among 100 randomly selected students pursuing higher secondary education from St. Mary's HSS Pattom Thiruvananthapuram.

IV.   TOOLS

Lesson transcript based on Evidence based learning strategy which was prepared by the researcher and validated by the expert. (b) Cyber security awareness questionnaire with a total of 36 items in draft and 30 items in final tool, selected having the difficulty index between 0.4 and 0.6 and having discriminating power more than 0.4. (Ebel & Frisbie, 1991).

V.   STATISTICAL TECHNIQUES

Mean, standard deviation and t- test were employed for statistical analysis and interpretation of collected data.

VI.   PROCEDURE ADOPTED

For the experimental study the investigator followed four steps:
(a) sample selection
(b) conducting pre-test
(c) administration of intervening technique
(d) conducting post-test.

The investigator selected 100 higher secondary students of St Mary's HSS Pattom Thiruvananthapuram. The students were pretested to know about the previous knowledge. Students were randomly selected and grouped into two, one is considered as control group and the other is considered as experimental group. Planned lesson transcript was implemented and instructed for one week in experimental group. Lesson transcript to enhance cyber awareness of higher secondary student was framed based on evidence-based learning strategy. Both the groups were post tested with the same awareness test questions and scores of both the pre-test and post-test were recorded for analysis.

VII.   ANALYSIS AND FINDINGS

Data were analysed using descriptive statistics to examine the profile of the samples. Arithmetic mean, standard deviation finally the test of significance was calculated which are as follows.

Table .1. Data and results of test of significance of the Pre-test scores of pupils in the Experimental and Control Groups.

Groups	No. of pupils (N)	Arithmetic Mean	Standard deviation SD	CR	Level of significance
Experimental					

Group	50	4.34	0.9606		
Control				1.3268	**p>0.05**
Group	50	4.04	1.2771		

The obtained t-value is not significant even at 0.05 level (t= 1.3268, p>0.05). so, the experimental and control groups do not differ significantly in their pre-test scores.

Table .2. Data and results of test of significance of the Post-test scores of pupils in the Experimental and Control Groups.

Groups	No. of Pupil (N)	Arithmetic mean	Standard deviation (SD)	Critical Ratio	Level of significance
Experimental Group	50	27.23	10.09		
Control				4.6	**P<0.01**
Group	50	18.43	6.86		

The critical ratio obtained is significant (CR = 4.6; P < 0.01) which shows that there is significant difference between the means of the Post-test scores of the pupils in the Experimental and Control groups which means the two groups differ significantly in their performance.

Table .3. Data and results of test of significance of the Pre-test and Post-test scores of pupils in the Control Group.

Tests	No. of Pupils (N)	Mean	Standard Deviation (SD)	Critical Ratio (CR)	Level of Significance
Pre-test	**50**	15.325	6.2		
				2.1	**P<0.05**
Post-test	**50**	18.43	6.86		

The value of critical ratio obtained is 2.1, which is significant at 0.05 level (CR = 2.1; P < 0.05) which indicates there is significant difference between the means of the Pre-test and Post-test scores of the Control group

Table.4. Data and results of test of significance of the Pre-test and Post-test scores of pupils in the Experimental Group.

Tests	No. of Pupils (N)	Arithmetic Mean	Standard Deviation (SD)	Critical Ratio (CR)	Level of Significance
Pre-test	50	16.625	6.9		
				5.5	**P<0.01**
Post-test	50	27.23	10.09		

The obtained value of critical ratio is significant (CR = 5.5; P < 0.01) which indicates there is significant difference between the means of the Pre-test and Post-test scores of the Experimental group.
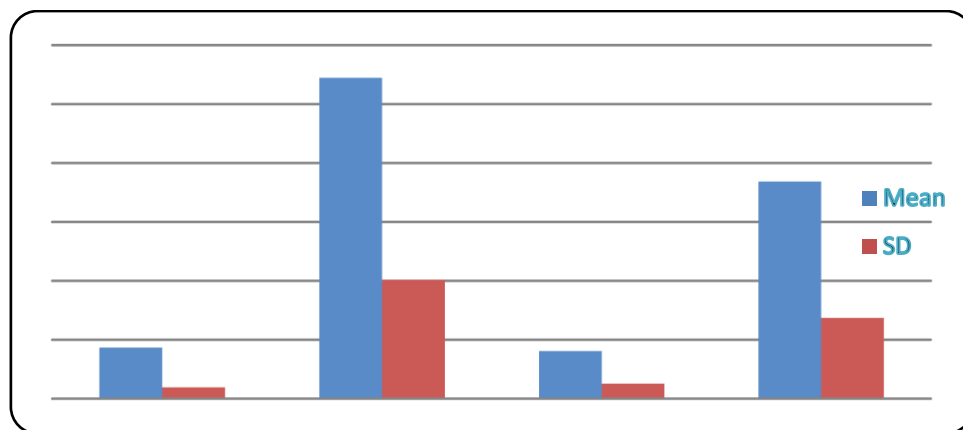

Fig.1.Graphical representation of statistical values of pre-test and post-test of experimental and control group on enhancing awareness on cyber awareness of higher secondary students.

The table represents the comparison of mean values and standard deviation of post-test scores, experiment group and control group. It is evident that the mean of the experimental group in post-test is greater than that of the mean of the control group. Therefore, it is inferred that after the sample is subjected to experimentation post test score of experimental group is raised than the post test score of control group, i.e., there exists a significant difference between the post-test scores of two groups.

Consolidated results of awareness test (post-test of experimental group and control group) on enhancing awareness on cyber security of higher secondary students.

Sl No	Groups	N	Arithmetic mean	SD	t-test	Level of Significance
1	Experimental Group	50	27.23	10.09	5.09	0.01
2	Control Group	50	18.43	6.86		

VIII.   CONCLUSION AND DISCUSSION

The results establish the effectiveness of evidence-based learning strategy for enhancing cyber security awareness and can be concluded that the evidence-based learning strategy for enhancing cyber security awareness of higher secondary students was effective and could enhance their awareness with respect to the content and objectives formulated as it was established through the performance of experimental group. Teaching learning process through evidence-based learning strategy can enhance students' achievement one step ahead. Therefore, it was inferred that evidence-based learning strategy is a better teaching strategy for enhancing students' performance.

IX.   EDUCATIONAL IMPLICATION

Teaching learning process based on evidence can be easy to categorize different types of delinquent activities and its nature. The result of the present study emphasises that evidence-based learning ignites the interest towards the content, attention enhancement, maximum learning, and achievement of expected outcomes. Evidence based learning can create curiosity and awareness about social circumstance to which they are a part. Curriculum planners, teachers etc can rely on evidence-based learning for a distinct teaching learning experience. Teachers should make use of the strategy for an effective learning outcome also should initiate students to engage in learning based on empirical data.

REFERENCES

[1]   Al-Shammari, Z. (2019). Leading special education teachers to envision evidence-based Meta cognitivist instructional strategies in inclusive education schools. *Education quarterly reviews,* Vol.2 No.2.

[2]   Anderson, J.D. (2015). David Sackett 1934-2015: The father of evidence-based medicine. https://pubmed.ncbi.nlm.nih.gov/26323106/

[3]   Audi, R. (1999). Definitions and descriptions of analysis. *Cambridge dictionary of philosophy,* 1999, ed.https://plato.stanford.edu/entries/analysis/s1.html#CDP

[4]   Back, S., Soor, S., LaPrade, J. (2018). Juvenile hackers: An empirical test of self-control theory and social bonding theory. *International journal of cyber security Intelligence & cybercrime.*1(1),40-55, 2018.

[5]   B. Banga and T. Tiwari, "Cybercrime in India: Types and Target of Cyber Attack," *International journal of Science Technology & Management.*

[6]   Bhatt, Chandra, S., Pant, Durgesh. (2011 October). Cybercrimes in India. *International Journal of advanced research in computer science,* Vol.2 Issue 5, p153-156.

[7]   Blake, H. (2018 January,23).*2 Evidence based learning strategies.* Edutopia. Retrieved   January 23, 2018, from https://www.edutopia.org/article/2-evidence-based-learning-strategies

[8]   Bruniges, M. (2005). *An evidence-based approaches to teaching and teaching learning.* Australian council   for   education   research.   Retrieved fromhttp://research.acer.edu.au/research_conference_2005/15

[9]   Buchheit, J.P., Doyle, D.B., et al. (2021). Developing a learning environment to enable public understanding   and   support   for   evidence-based information for senior secondary school students in higher education. Vol.13, No. 1, pp 1-13

[10]   Choudhary, M. (2020). Cybercrime awareness among higher education students from Haryana with respect to various demographic variables. *PalArch's Journal of Archaeology of Egypt/Egyptology,* 17(7) 14454-14461

[11]   Cranney, J., & McDonald, F. (2012). Evidence based learning. *Enclclopedia of the science of learning, from* https://doi.org/10.1007/978-1-4419-1428-6_767

[12]   *Current affairs-over 400 rise in cybercrime cases against children in 2020*(2021).Business standards https://www.business-standard.com/article/current-affairs/over-400-rise-in-cyber-crime-cases-aganist-children-in-2020-ncrb-data-121111400320_1.html

[13]   Cyber juvenile delinquencies: side effects of internet and social networking sites (2018 August,04).

Onmanorama
https://www.onmanorama.com/news/straight-talk/2018/08/04/cyber-juvenile-delinquencies.html

[14] Davies, P. (1999 June,). What is evidence-based education? *British Journal of educational studies*, ISSN 0007-1005 Vol. 47, No. 2, June 1999, pp 108-121

[15] Deiry,A.,Vogel,F.,Knogler,M.,Seidel,T.(2020 June,2).Evidence based practice in higher education: Teacher educators attitude, challenge, and uses.https://doi.org/10.3389/feduc.2020.00062

[16] Djanggih, H. (2018). The phenomenon of cybercrimes which impact children as victim in Indonesia. Vol 33, No.2.

[17] Drew, J.M. (2020 February,5). A study of cybercrime victimisation and prevention: exploring the use of online crime prevention behaviours and strategies. *Journal of criminological research,* Vol.6, Issue.1, ISSN:2056-3841.

[18] Greenhow, C., Galvin, S. (2020). Teaching with social media: evidence-based strategies for making remote higher education less remote. *Information and learning sciences*, ISSN 2398-5348

[19] Jang, Hyunseok, S. Juyoung, K. Ramhee. (2014). Does *the offline Bully-Victimization Influence Cyber Bullying Behaviour among youth*? Application of general strain theory. *Computers in human behaviour*,31:85-93.

[20] J. Iqbal and B. Maqbool Beigh, (2017). "Cybercrime in India: Trends and Challenges," *International Journal of Innovations & Advancement in Computer Science*, vol. 6, no. 12.

[21] *Kerala launches cyber safety protocol for teachers and students for protection against cybercrime.*(2019,February 25).India todayhttp://www.indiatoday.in/education-today/news/story/kerala-launches-cyber-safety-protocol-for-teachers-and-students-for-protection-against-cyber-crime-1464473-2019-02-25

[22] Khudhair, N.S., (2021). Cyberbullying- a critical analysis of laws, criminal responsibility, and jurisdiction. *Journal of contemporary issues in business and government,* Vol. 27 (3) 2644-2650. https://doi.org/10.47750/cibg.2021.27.03.317

[23] Kim, S. (2021). How daily strain leads to cyber delinquency: a focus on the role of self-esteem and anger. *Current psychology,*40(12), 5996-6005

[24] Kiser, S. (2021.July 29). *What is evidence-based instruction?* Retrieved from https://www.teachhub.com/teaching-strategies/2021/07/what-is-evidence-based-instruction/

[25] Kumar, S., Manhas, A. (2021 February). Cyber delinquencies. *International journal of law management and humanities,* Vol.4, Issue.3, 2536-2544.

[26] Larsen, C.M., Terkelsen, A.S., Carlsen, A.M.F., Kristensen, H.K. (2019). Methods of teaching evidence-based practice: a scoping review *medical education,* No.2

[27] Laura, L. (2019 August,8) *Simple ways to integrate four evidence-based teaching strategies.* Retrieved August 8,2019, from https://www.edutopia.org/article/simple-ways-integrate-four-evidence-based-teaching-strategies/

[28] M. Martolia and Divya, (2020). "Types of Cybercrime in India and Its Detection, *Journal of Critical Reviews* " vol. 7, no. 9.

[29] Paat, Y., Markham, C. (2020 November,13). Digital crime trauma, and abuse: Internet safety and cyber risks for adolescents and emerging adults in the 21st century. *Social work in mental health,* Vol.19, Issue 1, p18-40

[30] Philpott, C., & Poultney, V. (2018). Evidence-based teaching*: A critical overview for Enquiring teachers*, Critical publishing Ltd, p7-23

[31] Showkat, A., Naseer. A., et al. (2022 January). Cybercrimes in India. *UGC Care journal,* Vol.43, No.04, (VIII)

[32] Simpson, A. (2019). The evidential basis of "evidence-based education": An introduction to the special issue. *Educational research and evaluation-An international journal for theory and practice,* Retrieved 2019 August 28 p 1-6.

[33] Srivastava, A., & Sinha, S. (2019). *Cyber delinquency: Issues and challenges under Indian legal system*, international journal of Engineering and Advanced Technology ISSN:2249-8954volume-8 Issue5