

Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 19(1), January-April, 2021]

Pantnagar Journal of Research

(Formerly International Journal of Basic and
Applied Agricultural Research ISSN : 2349-8765)



G.B. Pant University of Agriculture & Technology, Pantnagar



ADVISORYBOARD

Patron

Dr. Tej Partap, Vice-Chancellor, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Members

Dr. A.S. Nain, Ph.D., Director Research, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. A.K. Sharma, Ph.D., Director, Extension Education, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. S.K. Kashyap, Ph.D., Dean, College of Agriculture, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. N.S. Jadon, Ph.D., Dean, College of Veterinary & Animal Sciences, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. K.P. Raverkar, Ph.D., Dean, College of Post Graduate Studies, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Sandeep Arora, Ph.D., Dean, College of Basic Sciences & Humanities, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Alaknanda Ashok, Ph.D., Dean, College of Technology, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Alka Goel, Ph.D., Dean, College of Home Science, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. R.S. Chauhan, Ph.D., Dean, College of Fisheries, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. R.S. Jadaun, Ph.D., Dean, College of Agribusiness Management, G.B. Pant University of Agri. & Tech., Pantnagar, India

EDITORIALBOARD

Members

Prof. A.K. Misra, Ph.D., Chairman, Agricultural Scientists Recruitment Board, Krishi Anusandhan Bhavan I, New Delhi, India
Dr. Anand Shukla, Director, Reefberry Foodex Pvt. Ltd., Veraval, Gujarat, India
Dr. Anil Kumar, Ph.D., Director, Education, Rani Lakshmi Bai Central Agricultural University, Jhansi, India
Dr. Ashok K. Mishra, Ph.D., Kemper and Ethel Marley Foundation Chair, W P Carey Business School, Arizona State University, U.S.A
Dr. B.B. Singh, Ph.D., Visiting Professor and Senior Fellow, Dept. of Soil and Crop Sciences and Borlaug Institute for International Agriculture, Texas A&M University, U.S.A.
Prof. Binod Kumar Kanaujia, Ph.D., Professor, School of Computational and Integrative Sciences, Jawahar Lal Nehru University, New Delhi, India
Dr. D. Ratna Kumari, Ph.D., Associate Dean, College of Community / Home Science, PJTSAU, Hyderabad, India
Dr. Deepak Pant, Ph.D., Separation and Conversion Technology, Flemish Institute for Technological Research (VITO), Belgium
Dr. Desirazu N. Rao, Ph.D., Professor, Department of Biochemistry, Indian Institute of Science, Bangalore, India
Dr. G.K. Garg, Ph.D., Dean (Retired), College of Basic Sciences & Humanities, G.B. Pant University of Agric. & Tech., Pantnagar, India
Dr. Humnath Bhandari, Ph.D., IIRRI Representative for Bangladesh, Agricultural Economist, Agrifood Policy Platform, Philippines
Dr. Indu S Sawant, Ph.D., Director, ICAR - National Research Centre for Grapes, Pune, India
Dr. Kuldeep Singh, Ph.D., Director, ICAR - National Bureau of Plant Genetic Resources, New Delhi, India
Dr. M.P. Pandey, Ph.D., Ex. Vice Chancellor, BAU, Ranchi & IGKV, Raipur and Director General, IAT, Allahabad, India
Dr. Martin Mortimer, Ph.D., Professor, The Centre of Excellence for Sustainable Food Systems, University of Liverpool, United Kingdom
Dr. Muneshwar Singh, Ph.D., Project Coordinator AICRP- LTFE, ICAR - Indian Institute of Soil Science, Bhopal, India
Prof. Omkar, Ph.D., Professor, Department of Zoology, University of Lucknow, India
Dr. P.C. Srivastav, Ph.D., Professor, Department of Soil Science, G.B. Pant University of Agriculture and Technology, Pantnagar, India
Dr. Prashant Srivastava, Ph.D., Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, University of South Australia, Australia
Dr. Puneet Srivastava, Ph.D., Director, Water Resources Center, Butler-Cunningham Eminent Scholar, Professor, Biosystems Engineering, Auburn University, U.S.A.
Dr. R.C. Chaudhary, Ph.D., Chairman, Participatory Rural Development Foundation, Gorakhpur, India
Dr. R.K. Singh, Ph.D., Director & Vice Chancellor, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P., India
Prof. Ramesh Kanwar, Ph.D., Charles F. Curtiss Distinguished Professor of Water Resources Engineering, Iowa State University, U.S.A.
Dr. S.N. Maurya, Ph.D., Professor (Retired), Department of Gynecology & Obstetrics, G.B. Pant University of Agric. & Tech., Pantnagar, India
Dr. Sham S. Goyal, Ph.D., Professor (Retired), Faculty of Agriculture and Environmental Sciences, University of California, Davis, U.S.A.
Prof. Umesh Varshney, Ph.D., Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, India
Prof. V.D. Sharma, Ph.D., Dean Academics, SAI Group of Institutions, Dehradun, India
Dr. V.K. Singh, Ph.D., Head, Division of Agronomy, ICAR-Indian Agricultural Research Institute, New Delhi, India
Dr. Vijay P. Singh, Ph.D., Distinguished Professor, Caroline and William N. Lehrer Distinguished Chair in Water Engineering, Department of Biological Agricultural Engineering, Texas A&M University, U.S.A.
Dr. Vinay Mehrotra, Ph.D., President, Vinlax Canada Inc., Canada

Editor-in-Chief

Dr. Manoranjan Dutta, Head Crop Improvement Division (Retd.), National Bureau of Plant Genetic Resources, New Delhi, India

Managing Editor

Dr. S.N. Tiwari, Ph.D., Professor, Department of Entomology, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Assistant Managing Editor

Dr. Jyotsna Yadav, Ph.D., Research Editor, Directorate of Research, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Technical Manager

Dr. S.D. Samantray, Ph.D., Professor, Department of Computer Science and Engineering, G.B. Pant University of Agriculture and Technology, Pantnagar, India

CONTENTS

Study of genetic diversity in bread wheat (<i>Triticum aestivum</i> L.em.Thell) under late sown irrigated conditions VIJAY KAMAL MEENA, R K SHARMA, NARESH KUMAR, MONU KUMAR and ATTAR SINGH	1
Selection of teosinte (<i>Zea mays</i> subsp. <i>parviglumis</i>) predomestication alleles to inflate maize genetic resources SMRUTISHREE SAHOO, NARENDRA KUMAR SINGH and ANJALI JOSHI	8
Effect of crop establishment methods and nutrient management options on productivity and economics of baby corn (<i>Zea mays</i> L.) ABHISHEK BAHUGUNA and MAHENDRA SINGH PAL	16
Effect of organic and inorganic mulches on soil properties and productivity of chilli (<i>Capsicum annuum</i> L.) crop grown on alfisols K. ASHOK KUMAR, C. INDU, J. NANDA KUMAR REDDY, M. BABY, P. DINESH KUMAR and C. RAMANA	21
Performance of plant growth promotory rhizobacteria on maize and soil characteristics under the influence of TiO₂ nanoparticles HEMA KUMARI, PRIYANKA KHATI, SAURABH GANGOLA, PARUL CHAUDHARY and ANITA SHARMA	28
Bio-efficacy of <i>Ageratum houstonianum</i> Mill. (Asteraceae) essential oil against five major insect pests of stored cereals and pulses JAI HIND SHARMA and S. N. TIWARI	40
Resistance in rice genotypes against brown planthopper, <i>Nilaparvata lugens</i> 14 SWOYAM SINGH and S.N. TIWARI	46
Fumigant toxicity of alpha-pinene, beta-pinene, eucalyptol, linalool and sabinene against Rice Weevil, <i>Sitophilus oryzae</i> (L.) JAI HIND SHARMA and S.N. TIWARI	50
Potato Dry Rot: Pathogen, disease cycle, ecology and management SANJAY KUMAR, PARVINDER SINGH SEKHON and AMANPREET SINGH	56
Health status of farmers' saved seed of wheat crop in Haryana S. S. JAKHAR, SUNIL KUMAR, AXAY BHUKER, ANIL KUMAR MALIK and DINESH KUMAR	70
Socio economic impact of rice variety CO 51 on farmers in Kancheepuram and Tiruvarur districts of Tamil Nadu DHARMALINGAM, P., P. BALASUBRAMANIAM and P. JEYAPRAKASH	73
Assessment of students' knowledge level on e-learning, e-resources and IoT S.SENTHIL VINAYAGAM and K.AKHILA	77
An analysis of the factors influencing the opinion of social media users on online education and online purchasing in Namakkal district of Tamil Nadu N. DHIVYA and R. RAJASEKARAN	81
Nutritional status of children in Uttarakhand: A case study ANURADHA DUTTA, AMRESH SIROHI, PRATIBHA SINGH, SUDHA JUKARIA, SHASHI TEWARI, NIVEDITA PRASAD, DEEPA JOSHI, SHWETA SURI and SHAYANI BOSE	86
Performance evaluation of hydraulic normal loading device on varying soil conditions for indoor tyre test rig SATYA PRAKASH KUMAR, K.P. PANDEY, MANISH KUMAR and RANJEET KUMAR	90
Performance evaluation of bullock drawn plastic mulch cum drip lateral laying machine A. V. KOTHIYA, A. M. MONPARA and B. K. YADUVANSHI	96
Performance evaluation of bullock drawn battery powered sowing machine A. M. MONPARA, A. V. KOTHIYA and R. SWARNKAR	103

Assessment of students' knowledge level on e-learning, e-resources and IoT

S.SENTHIL VINAYAGAM¹ and K.AKHILA²

Education Systems Management, ICAR-National Academy of Agricultural Research Management, Hyderabad (500 030)

ABSTRACT: The present educational system enhanced the usage of technology. Learning is a continuous process and the focus is now shifted towards e-learning, e-resources and Internet of Things (IoT). A prospective study was conducted to assess the change in knowledge level before and after training and to identify the students' perception towards training programme. The quasi-experimental design was used in this study. Thirty students, who attended the training, were selected as respondents and distributed a Google form with a questionnaire before and after training. To test knowledge level, paired *t*-test was used. The post knowledge test was significant than pre knowledge test at 1% level of significance and they had high level of perception regarding technology usage in learning process. It can be deduced that the overall performance of students was improved because tests strengthen the memory by retrieving the information and also enhance the learning of contents through long-term retention of specific information.

Key words: Assessment, knowledge level, Pre Knowledge Test, Post Knowledge Test

The teaching process needs to be revolutionized along with changing technologies. The traditional and old paradigm of education requires the touch of new technologies to make the learning process fun instead of a task. The development and use of Information Technology (IT) have an impact on the teaching and learning systems at various levels, which leads to change in education system. Web-based learning tools are continuously being redesigned by developers to increase their effectiveness. Indeed the ease of technology will be beneficial if used wisely. Learning by utilizing the internet in the education system has many benefits. The internet deliver information throughout the world by reducing distance, space, and time (Wasim *et al.*, 2014; Fauziah 2015 and Prabowo *et al.*, 2020).

E-learning is primarily training/teaching via the use of computers, it has been described through many different terms such as computer-based training, online teaching, virtual teaching, web-based teaching, etc. It has changed the dynamics of educational content and has opened new avenues to education. It is the effective use of various modern multimedia technologies and tools via internet to provide an interactive environment to learners by allowing them to access resources and services. Smart classroom is user centric to carry forward notes to next level through e-learning on source collecting from IoT devices. It provides access to big gigantic data and information resources through Google documents, digital repositories, journals, e-books, databases and the web. It helps the teachers in multiple ways to emphasis the students to learn effectively rather than wasting time to maintain large procedure when handling them in classroom. The benefits of using IoT in classrooms are assessment of students, storing of data, frequency of usage and evading delay of transmission etc., (Hasan and Akter,

2020 and Khiccha *et al.*, 2020).

Adoption of instructional methodologies in the education viz., Small Group Discussion (SGD), web-based, simulation-based, and problem-based learning helps to promote active learning among the undergraduate students. To impart knowledge to large number of students especially at undergraduate level, the lecture method was considered as most effective, feasible and economical. But the lecture is a teacher-centered process with less involvement of students with least evaluative and analytical power. Testing assess what the students have learned, and it helps to improve long-term memory. Hence, now-a-days multiple choice questions (MCQs) are used as a tool of assessment. It helps in better understanding of the topic as well as retention of knowledge and information acquired from the lessons (Papanna *et al.*, 2013; Ilic and Maloney, 2014; Jayachandran and Balaji, 2016; Ayyub and Mahboob, 2017). Therefore, the present study was conducted with the objective to assess the pre and post knowledge level of students and their perception towards e-Learning, e-Resources and IoT.

REVIEW OF LITERATURE

Baz (2018) highlights the new trends of e-learning. The concept of e-learning in the field of education leads to speedy progress. In this study, the concepts included cloud computing, Artificial Intelligence, IoT, m-learning, blended learning modes, Virtual and Augmented reality, blogs, learning through games, videos etc. The author provided insight on innovation in the field of e-learning by e-learners.

Schalich (2015) examined the effectiveness of small group instruction methods. Pre-test and post-test

qualitative data collected from 28 students. The results revealed that teachers' need to understand individual's background and set efforts to teach grammar, awareness of reading comprehensive strategies and encourage the students in group discussion to influence knowledge.

Shivaraju *et al.* (2017) conducted a study to assess the knowledge of didactic lecture among students by giving pre- and post-test questionnaire based evaluation technique. The students provided the pre-test 10 questions before lecture and same 10 questions were provided at the end of the lecture as a post-test questionnaire. The results revealed that significant enhancement in the recipient knowledge after post-test assessment when compared to pre-test.

Muthukumar *et al.* (2015) also stated that instant feedback regarding their level of understanding can be received by using post-test and also helps the students to learn subject.

MATERIALS AND METHODS

The online training program was conducted on eLearning, eResources and IoT due to COVID-19 by faculty of ICAR-NAARM (ICAR-National Academy of Agricultural Research Management, Hyderabad, India) to final year students of University of Agricultural Sciences, Raichur during the month of February 2021. The quasi-experimental design was used. The study focused on 30 students. The programme was structured with introduction of pre-knowledge test before training and post-knowledge test at the end of training. The pre-knowledge test contained 30 items of MCQs covering the topics related to training. After completion of training, a post-knowledge test was done comprising of similar set of questions. For pre-and post- knowledge test 20 minutes were provided each for filling answers.

Two Google forms were prepared to test the knowledge level of students i.e., pre-test and post-test. The study group completed a pre-knowledge test two days before starting of the training. After completion of training same group attempted the post knowledge test. Individuals scoring <10 are considered as low performer; scores between 10 and 20 as moderate performer and more than twenty as high performers. The level of perception regarding training was also analysed by categorizing into low (<15.2), medium (15.2 to 25.6) and high (>25.6) based on mean and standard deviation. For comparing pre- and post-knowledge test scores, the paired t-test was used and computed by *P* values by using SPSS 25.

RESULTS AND DISCUSSION

The study indicated that 57 per cent of respondents were male and 43 per cent of female attended the training. Out of thirty students, the 70 per cent of them belong to rural background and 30 per cent were urban. Among attended students, most of the respondents belonged to low income

group followed medium and high (Table 1). From the study it could be deduced that most of students belonged to rural background and low income group to use technology during learning process.

Table 1: Demographic characteristics of the respondents (N=30)

S.No.	Categories	Frequency	Percentage (%)
Gender			
1	Male	17	56.6
2	Female	13	43.3
Family Background			
1	Rural	21	70.0
2	Urban	9	30.0
Family Income(Rs.)			
1	Low (<3,82,500)	25	83.3
2	Medium (3,82,501-7,65,002)	4	13.3
3	High (>7,65,003)	1	3.3

Total 30 students participated in pre- and post-knowledge test. Total post knowledge test correct responses were highly significant ($P < 0.01$) than pre knowledge test responses (Table 2). Overall scores increased in post knowledge test because most of the students scored above twenty (60%) called as high performers and around 40 per cent of them were low (<10) and moderate (10-20) performers (Table 3). This method helped in enhancement of learning ability and knowledge received. The students endeavored pre-tests before training that would increase the concentration, interest, enthusiasm to attend the programme and also improved the shortterm knowledge gain. This indicated that the tests were beneficial for students (Mohanram *et al.*, 2015; Mandla *et al.*, 2016; Shivaraju *et al.*, 2017 and Sonkar, 2019).

Q1: The art of communication involves; Q2: Communication skills 'a teacher must possess'?; Q3: The most important communication skill which plays a dominant role in understanding customer needs and others opinions; Q4: which helps an individual to work with other persons; to win their confidence with decent behaviors?; Q5: The receiver must perceive the sender of information as trustworthy and competent is called as; Q6: What is a pan-India electronic trading portal, which networks the existing APMC mandis?; Q7: India's first mobile application to bring APMC, farmers and agents on one platform?; Q8: Which is a profit educational organization founded by Sebastian Thrun, David Stavens, and Mike Sokolsky offering MOOCs?; Q9: Which method or thought process used to generate creative ideas by exploring many possible solutions?; Q10: Which is a powerful processor that allows you to create Fax coversheets, Web pages, Reports?; Q11: Excel work sheet is made up of how many columns and rows?; Q12: Which is made of a grid of columns (designated by letters) and rows (designated by numbers)?; Q13: What is a single database

Table 2: Student's Pre - and Post-knowledge Test Responses

Questions	Correct Responses		Two-tailed P-value
	Pre Knowledge test	Post Knowledge test	
1	30	30	<0.001*
2	21	23	
3	25	28	
4	0	2	
5	25	28	
6	24	27	
7	15	21	
8	19	26	
9	13	28	
10	14	23	
11	20	26	
12	6	9	
13	9	17	
14	25	27	
15	11	14	
16	14	20	
17	19	26	
18	1	2	
19	24	25	
20	26	27	
21	14	10	
22	2	3	
23	14	20	
24	4	7	
25	16	23	
26	5	10	
27	3	5	
28	14	29	
29	16	24	
30	27	28	

*Significant at 1% level

spread across multiple tables?;Q14: Students and teachers interaction in real predetermined time is known as;Q15: Which is a regularly updated website/web page, typically run by an individual or small group that is written in a freestyle without any restrictions?;Q16: What are web-based software application platforms used to plan, implement, track, report and assess learning processes?;Q17: Open source LMS are;Q18: What can facilitate reusability of the developed content?;Q19:

Table 4: Distribution of respondents according to their perception

S.No.	Statements	Agree	Undecided	Disagree
1	Enhancement of communication between students and teachers	27 (90.0)	1 (3.3)	2 (6.6)
2	Development of solid foundation for learning	23 (76.6)	5 (16.6)	2 (6.6)
3	eLearning creates active participation and involvement of students	22 (73.3)	3 (10.0)	5 (16.6)
4	Quality of using e-learning is easy	26 (86.6)	2 (6.6)	2 (6.6)
5	Development in thinking and learning skills	24 (80.0)	5 (16.6)	1 (3.3)
6	To receive professional support from teachers	27 (90.0)	2 (6.6)	1 (3.3)
7	Prepare self for innovation	25 (83.3)	3 (10.0)	2 (6.6)
8	Adoption of IoT technology shows adverse effect on agriculture	21 (70.0)	1 (3.3)	8 (26.6)
9	mLearning reduces the attentiveness from appropriate work	14 (46.6)	11 (36.6)	5 (16.6)
10	eLearning reduces the self-learning among learners	3 (10.0)	8 (26.6)	19 (63.3)

Figures in the parentheses indicate percentage

Which is the most popular open source free Content Management System (CMS) framework for website development?;Q20: _____ is a promising infrastructure which provides computation, storage, software resources as services;Q21: Which is the key factor for the survival of small-scale farming in an ever-changing and increasingly complex global economy?;Q22: _____ is a more detailed process approach to entrepreneurship, which is complex and also emphasize the individual, environment, organization and the venture process;Q23: Who enjoy taking calculated risks, constant approach to the new challenges, which are motivated by a vision on 'what future could be'?;Q24: How many phases are there in entrepreneurial venture?;Q25: What enable the storage, management, and analysis of large quantities of spatially distributed data?;Q26: It is a digital repository of accumulated knowledge in agriculture and allied sciences, having collection of old and valuable books, old journals, thesis, research articles, popular article etc.;Q27: Who express dominant innovator traits with little or no interest to take these innovations to the marketplace?;Q28: It is the process of discovering educational, training and professional opportunities that suit your interests, passions and goals; Q29: The series of positions that a person occupies throughout the life regarding job is classified as?;Q30: The concept of Artificial Intelligence (AI) belongs to which generation computers?

Table 3: Students Pre and PostKnowledge Test Scores (N=30)

S. No.	Category	Pre Knowledge test scores	Post Knowledge test scores
1	<10 (low performer)	8 (26.6)	6 (20.0)
2	10-20 (Moderate performer)	13 (43.3)	6 (20.0)
3	>20 (High performer)	9 (30.0)	18 (60.0)

Figures in the parentheses indicate percentage

Student's perception towards e-Learning, e-Resources and IoT

The results showed that most of the students (90 %) felt that training assisted them to enhance communication between students and teachers and receive professional

Table 5: Level of Students perception**N=30**

S.No.	Category	Frequency	Percentage (%)
1	Low level (<15.2)	2	6.6
2	Medium (15.2 to 25.6)	6	20.0
3	High (>25.6)	22	73.3
		Mean=20.4	SD=5.2

support from teachers effectively (Table 4). This provides a wider view point to the students to learn new things with a better understanding and communication with teachers and their friends. The educational experts should develop the students to solve real world problems (problem solving ability) (Hasan and Akter, 2020). The overall perception of students was high regarding digitization in learning process (Table 5).

CONCLUSION

The use of interactive technology makes the learning interesting and entertaining. To test the students' level of knowledge on technology usage in learning process, the pre and post method was used. This method is an effective and feasible way of assessing students. It also helps students in acquiring new way of learning. Tests amalgamated into training is useful to improve the attentiveness, active involvement and emphasis better performance of students'. It is also useful for the faculty to assess themselves and to use various skills for better improvement in teaching process. The method of assessment using pre and post-test questionnaire should be made mandatory in all training programs.

ACKNOWLEDGEMENTS

The authors are thankful to the Principal Scientist Dr. G. R. K. Murthy (ICAR-NAARM) and Director of Extension Dr. B.M. Chandargi (UASR, Raichur) for conducting training program and also the students, who have cooperated during pre and post-knowledge tests.

REFERENCES

- Ayyub, A. and Mahboob, U. (2017). Effectiveness of test-enhanced learning (TEL) in lectures for undergraduate medical students. *Pak J. Med Sci.*, 33 (5):1339-43.
- Baz, F. Ç. (2018). New Trends in e-Learning. *Trends in E-Learning*, 1–16.
- Fauziah, D. A. (2015). The Effectiveness of Using Web-Based Learning Media for Student Results in Lesson Programmable Logic Controller Programs TIPTL Class XIISMKN-I Adiwerna Tegal, M.Sc. Thesis. Semarang State University, UNNES.
- Hasan, M. T., and Akter, T. A. (2020). Quantitative Survey on Smart Classroom with IoT. *Journal of Multidisciplinary Engineering Science and Technology (JMEST)*, 7(6):12121- 12126.
- Ilic, D. and Maloney, S. (2014). Methods of teaching medical trainees evidence-based medicine: A systematic review. *Med. Educ.*, 48 (6): 124-35.
- Jayachandran, A. L. and Balaji, J. (2016). Introduction of pre and post lecture multiple choice question for second year undergraduate medical students in microbiology: A technique to assess knowledge acquired from the lecture. *Int. J. Res. Med. Sci.*, 4(8): 575-8.
- Khiccha, P. K., Soni, S. and Solanky, M. (2020). The Impact of E-Learning Apps on Child's Mental Agility. *International Journal of Research in Engineering, Science and Management*, 3(9): 174-181.
- Mandla, J., Shaik, H., Pidigundla, D., and Katepogu, V. (2016). Evaluation of lectures by pre & post-test MCQS. *Journal of Education Technology in Health Sciences*, 3(2): 65-67.
- Mohanram, A.M., Zhong, Q., Singh, T. and Jagadeesh, A. (2015). Evaluating the Effectiveness of Pretest and Posttest Model of Active Learning in a Medical School. *The FASEB Journal*, 29 (1):928-4.
- Muthukumar, S., D'cruz, S.M. and Anandarajan, B. (2015). Introduction of pre-test and post-test enhances attentiveness to physiology lectures - Students' perceptions in an Indian medical college. *Int.J. Biomed. Adv. Res.*, 4(5):341-4
- Papanna, K. M., Kulkarni, V., Tanvi, D., Lakshmi, V., Kriti, L. and Unnikrishnan, B., (2013). Perceptions and preferences of medical students regarding teaching methods in a medical college, Mangalore India. *Afr. Health Sci.*, 13(7): 808-13.
- Prabowo, S., Surjono, H. D. and Prabowo, M. (2020). Improving Virus Lesson Mastery by Using Web-Based Learning Media.
- Schalich, M. E. (2015). Analysis of Pre Test and Post Test Performance of Students in a Learning Center Model at the Elementary School Level. M.sc. thesis, Dominican University of California San Rafael, CA.
- Shivaraju, P. T., Manu, G., Vinaya, M. and Savkar, M. K. (2017). Evaluating the effectiveness of pre-and post-test model of learning in a medical school. *National Journal of Physiology, Pharmacy and Pharmacology*, 7(9): 947.
- Sonkar, V. K. (2019). Knowledge of primary health care in India: Pre and post-test analysis of sixth semester students of Dr. Shankarrao Chavan Government Medical College, Nanded. *MRIMS Journal of Health Sciences*, 7(3): 70.
- Wasim, J., Sharma, S. K., Khan, I. A., and Siddiqui, J. (2014). "Web-Based Learning". (IJCSIT) *International Journal of Computer Science and Information Technologies*, 5 (1): 446-449.

Received: February 26, 2021

Accepted: March 29, 2021