

Building Social Resilience During Disasters: An Investigation into the Role of Online Social Media Networks

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Abstract— Within the last ten years, the world witnessed four serious epidemics. COVID-19 has been the most serious of these ones in terms of the number of people affected and the lives lost. In order to contain the spread of the disease many countries including Sri Lanka enforced 24 hour curfews. The social isolation created by lockdowns creates many problems in people including anxiety and depression. Many studies have been carried out on effect of lockdowns on mental well being of people. But, so far nobody has studied whether online social media can help people overcome the negative effects of lockdowns. This research was carried out to fill this gap. An online survey was carried out to understand how people used social media during the continuous curfew enforced by the Sri Lankan government. The research found that the average time spent using social media has increased compared to normal days. Also, majority of the users agreed that the social media helped them overcome the boredom created by the lockdown. This fact was confirmed using statistical tests in this study.

Keywords—COVID-19, pandemics, social resilience, social media networking.

I. INTRODUCTION

The world has witnessed several disasters including epidemics, pandemics and other man-made and natural disasters in the recent past. In addition to natural and man-made disasters, epidemics and pandemics are categorized as biological disasters, which can be natural, accidental or intentional [1]. Biological disasters are defined as “a calamity caused by the spread of a certain kind of living organism causing diseases in humans, animals or plants in large numbers disrupting the normal life of people in a large geographical area” [2]. Biological disasters can be further subdivided into epidemics (including pandemics), insect infestations and animal stampedes [3]. Epidemics (including pandemics) include all the infectious diseases caused by virus, bacteria, fungus or other parasitic organisms that spreads rapidly from one human being or animal to another. An insect infestation is an invasion of pests or other parasites in large numbers in a particular area affecting humans, animals, crops, and perishable goods. Examples of insect infestations include swarming of locusts of agricultural lands, mosquito breeding in water logged areas and parasites infecting cattle, sheep and goats. Animal stampede is the uncontrolled concerted running of wild animals in farmlands and other human inhabited areas. Animal stampede generally results in destroying of croplands, houses and sometimes killings of people. The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 has also specifically recognized biological hazards and risks including epidemics and pandemics along with other threats in its agenda and

recommends that it be included in any multi-hazard management approach developed by governments [4-5].

Within last ten years the world witnessed four serious outbreaks of epidemics including H1N1 influenza (swine flu), Ebola, Zika outbreaks and the present COVID-19 (Corona Virus Disease 2019) pandemic that has spread to more than 200 countries and regions world over [6]. These epidemics have affected people to different extents depending on how fast it spreads and the regions affected. The most recent epidemic the COVID-19 has reached the pandemic levels affecting almost every country in the world and claiming closer to one million lives as of this writing. In order to contain the spread of the disease, many countries have taken drastic measures including travel restrictions, quarantines and curfews. As a result of these restrictions, the faces of many cities including the life styles of people have changed [7]. Almost in all the affected cities, the movements of people are restricted due to the lockdowns and curfews imposed on those cities by the authorities. People in locked down cities are allowed to leave their homes under very limited circumstances completely banning public gatherings and closing of all non-essential services affecting the social life of many people.

Social resilience is defined as the ability of the social entities including individual, families, communities and other social groups to tolerate, absorb, cope with and adjust to environmental and social threats of different kinds [8-9]. Physical distancing practiced during the times of epidemics or pandemics like COVID-19 may result many emotional, psychological and mental problems in people irrespective of whether they are affected by the disease or not [10-11]. Due to the curfew and other lockdown measures imposed by governments, people have lost the opportunity of socializing due to the closing of clubs, pubs, cafes, parks, theatres, gyms and other recreational centers, where people used to meet and engage in informal conversations and other activities that underpins the civic life and community engagements. In many of the affected areas, people are forced to work from home depriving the opportunity of meeting and conversing with co-workers as well. Human beings are considered as social animals or creatures by sociologists and psychologists [12]. Hence, human beings cannot stay in isolation without interacting with each other for long.

The recent technological developments especially in the field of Information and Communication Technology (ICT) have created many opportunities that were not available in the past [13-15]. The development and the popularity of online social media in the recent past have opened new avenues for people to communicate and be in touch with

each other. Social media have enabled the creation of online communities, where people can interact with each other irrespective of the physical distance between them [16]. These online communities help people not only share information with each other but also share photos and videos, play games, have chats and even one-to-one and many-to-many discussions and conferences over the Internet. All these can be carried out by people without leaving the convenience of their living rooms. The only facilities needed to be a part of these online communities are the access to the Internet through a suitable communication device or computer and a membership in the social media platform where the community is hosted. It is generally expected that these online social media can be effectively used for overcoming the issues of social distancing from family and friends during the times of biological emergencies like epidemics and pandemics. This paper takes an in-depth look at how the online social media is used by people of Sri Lanka to lead a normal life despite the social isolation during the ongoing COVID-19.

This paper is divided into six sections as Introduction, Background, Related Work, Research Methodology, Data Analysis and Findings and Conclusions. Section I introduces the paper by discussing the recent epidemic attacks suffered by the world including the COVID-19 and the possible human-related issues arising from the measures taken by the governments to counter the spread of the disease along with a brief outline on how the online social media could be leveraged to overcome the social isolation problem. Section II discusses the background information with special reference to the COVID-19 pandemic and an in-depth analysis of features, advantages and disadvantages of online social media. Section III takes a brief look at the related work by other researchers in the field with special emphasis on how they are related and different to the work presented in this article. Section IV presents a detailed description of the research methodology adopted in this work along with the questionnaire preparation and data collection methods. Section V presents the details on how the data collected through the survey was analyzed and the findings. Finally Section VI concludes the article by summarizing the findings and some suggestion for future work.

II. BACKGROUND

The COVID-19 pandemic caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS - CoV - 2) commonly known as the Coronavirus that started in December 2019 in the Wuhan city of the Hubei province in China and spread to almost every corner of the world within a short time [17]. Compared to other pandemics (or epidemics) that affected the world in recent times, COVID-19 is the most infectious disease characterized with a long incubation period and the mode of transmission from one person to another. Cough, fever, sore throat, nasal congestion, headache, shortening of breath, loss of smell and/or taste and fatigue are found to be the common symptoms of the disease. Depending on the severity of the infection, the symptoms can be mild or severe leading to viral pneumonia, multi-organ failure, or cytokine storm [18]. The primary mode of spread of the virus is the close contact of people through small droplets created by coughing, sneezing, or talking. The droplets falling on to the surfaces can remain active for a long time and cause diseases in a person. When a person comes into close contact with the

droplets lying on a contaminated surface even long after the original person had left place may cause the diseases in the second person when he or she touches the face without properly washing the hands.

Almost immediately after the diseases were identified in Wuhan, it spread to other parts of China and the world within a period of weeks. The number of COVID-19 patients increased dramatically mainly due to a large number of people traveling as it was the Spring Festival (Chinese New Year) period and the underestimation of the severity of the disease [19]. On January 20, 2020, the National Health Commission classified the disease as a B type infectious disease officially and took actions to fight against it alerting the entire world of the nature and the seriousness of the disease. Since then, many countries have effected very comprehensive epidemic prevention actions. Since the governments have implemented very serious epidemic prevention methods, it has become the beginning of many real universal concerns indicating widespread impacts [19]. The experts state that the uncertainty and low predictability of COVID-19 not only threat to people's physical health, but also to people's mental health, especially in terms of emotions and cognition [11, 20]. Coupled with the uncertainty of the disease, the actions taken by the authorities to contain the disease may have serious consequences of the mental health of people in the affected regions.

Though, Sri Lanka is not on the list of worst affected countries by the COVID-19 pandemic, the spread is not fully contained as of this writing. The government of Sri Lanka has started taking measures to contain the pandemic even before the first case of infection within the country was detected. One of the very first measures implemented by the government was instructing the quarantine unit at the Bandaranaike International Airport to screen all the incoming passengers for COVID-19 infection. The first confirmed case of COVID-19 infection and death were reported in Sri Lanka on January 27, 2020 and March 28, 2020 respectively [21]. As of September 15, 2020, Sri Lanka's COVID-19 victims stand at 3271 confirmed infections and 13 deaths respectively. Fig. 1 presents the incidences of confirmed corona infections and deaths on a daily graph.

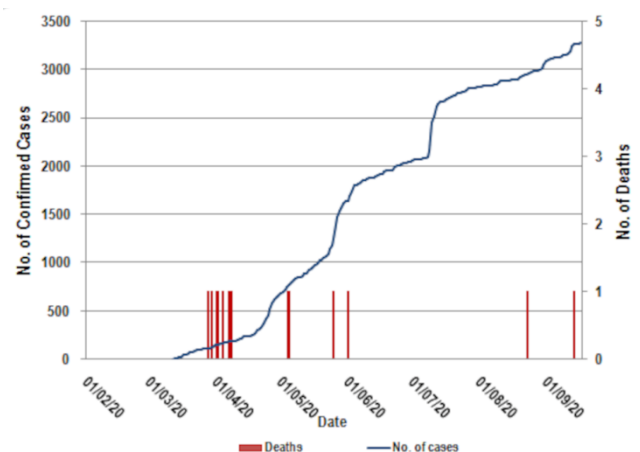


Fig. 1. COVID-19 incidents in Sri Lanka [21]

The actions taken by the Government of Sri Lanka (GoSL) to contain the spread of COVID-19 include: forming a presidential task force for fighting the COVID-19 virus, closing down of the international airport and suspending visa for tourists, opening quarantine centers at multiple places for

isolating suspected patients and people brought in from foreign countries, closing down all schools and universities, converting several government hospitals by providing the necessary facilities to treat suspected and confirmed corona patients, cremating the dead bodies of all suspected patients, and imposing of island wide curfew for several weeks. The GoSL also announced several financial incentives and relief measures to help people affected by the measures taken by the government. Along with the above measures, the essential services including electricity, water and telecom services were made to function without interruption. All the above measures have helped Sri Lanka to control the spread of the disease successfully despite the other countries in the region still struggling to bring the situation under control.

By the end of June, the GoSL relaxed many of the restrictions imposed including lifting the curfew gradually and letting the government and private institution to operate normally. Schools and universities have also started their normal functions by the time of this writing. But several sectors including tourism, entertainment, and export are yet to overcome the impact of COVID-19 and the economy may take some time to recover fully.

III. RELATED WORK

This section presents an analysis of related work carried out by other researchers on different aspects of COVID-19. The analysis mainly looks at what the main objective of those studies along with the positives and negatives of each work.

Pan has carried out a survey among university students almost immediately after the detection of the deadly virus in China to understand their thoughts and behavior during the lockdown period imposed by the government [7]. His analysis mainly centered around their online learning experience, the evaluation of the measures taken by the government to contain the spread of the disease and the changes in their own behavior and thoughts after the start of the epidemic. Though, this study was a good starting point, it only concentrates on university students and the sample size is very small. Also, the study does not look at how the participants cope with lack of or total absence of social interactions that they enjoyed prior to the emergence of the pandemic.

In [11], Huang and Zhao have taken a critical look at the high risk group whose mental health conditions are vulnerable to COVID-19 outbreak. This study had been carried out on a sample of 7236 participants to find out whether symptoms like anxiety, depression, and loss of sleep were present. The study has found that anxiety is more common among people aged less than 35 compared to the older group and healthcare workers and younger people were more susceptible to mental healthcare issues during the COVID-19 outbreak by thinking about it. Though this study provides a good insight into a very important aspect of social resilience but fail to provide any advice on how to cope with or overcome this kind of mental issues during pandemics or other similar conditions on their own with minimum outside help or interventions.

Another study was carried out by Wang et al on the public psychological states and its related factors during the COVID-19 outbreak [20]. This was a cross sectional study carried out on people who are 18 years or older with the help of online questionnaires. This study found out that only a

small percentage of general public was affected by anxiety or depression during COVID-19 pandemic. This study also stops with explaining the findings and falls short of giving any advice on how to cope on their own during lockdowns following the outbreaks of epidemics or pandemics.

From the above discussion it can be seen that the above studies were mainly concentrating on problems caused by isolation. But, not study looked at what people were doing to overcome the issues associated with isolation. This study aims to fill this gap by looking at how the social media was used and whether it helped them to maintain the social contacts with friends and relatives during the period of lock down.

IV. RESEARCH METHODOLOGY

In order to make the work presented in this article scientifically reliable and valid, a rigorous quantitative (descriptive) research methodology using online questionnaire for collecting primary data was devised and adopted. The research methodology used for conducting the research was a six step process as explained below:

Step 1: Define Research Questions and Objectives

The research was started with a preliminary literature study on the work carried out on the physical and mental status of humans affected by the lockdown following the outbreak of COVID-19 at the latter part of 2019. Following an extensive study, a suitable research gap was identified and the following research questions and research objective were established.

RQ1: Is there a change in people using online social media during the lockdown period?

RQ2: Do online social media help people overcome the boredom created by social isolation and maintain effective relationship with each other?

RO: To evaluate how online social media help people overcome boredom created by lockdown.

Step 2: Define the population and sampling frame

It was decided to collect data from the Sri Lankans who are above 18 years of age and use online social media regularly. Hence, the population includes all the online social media users above the age of 18 and living in Sri Lanka. It was decided to reach as many social media users as possible instead of limiting it to a predetermined number. But, it was also decided to have reasonable number of valid responses. If sufficient number of valid responses were not received less, it was decided not to continue with the research.

Step 3: Develop and validate the questionnaire

An online questionnaire with 25 questions that included demographic factors of responders, types of online social media they commonly use, and various aspects of social media usage related to socialization including their opinion on how effective the online social media has been during the time of lockdown. Before creating the online questionnaire, it was first distributed among a few colleagues at the University for Comments using email. The questionnaire was refined based on the comments received and then the online questionnaire was created at the online survey site SurveyMonkey. The invitation to participate in the online survey was distributed using email lists, Facebook, Twitter

and LinkedIn. The survey period was set for one month starting from May 15th to June 14th 2020. On June 15th the survey link was disabled and the questionnaire was removed.

Step 4: Collect and cleanse data

The 253 completed responses were received and 231 were selected for final analysis. The responses from people living outside Sri Lanka and of age below 18 were removed first and then inconsistent and incomplete responses were removed as non responsive.

Step 5: Analyze data and interpret results

The selected responses were encoded and entered into Microsoft Excel for further analysis. The results of the analysis and interpretation are given in Section V in detail.

Step 6: Disseminate the results

Finally a research paper was prepared using the results along with the background information for presentation and publication at an international scientific conference.

V. DATA ANALYSIS AND FINDINGS

As stated before, 231 responses were accepted as complete and responsive for detailed analysis. A simple computer application with Microsoft Excel as the background along with a front end interface for data entry was created for analyzing data. This section presents the results of the analysis in details.

A. Demographic Information

Out of all the accepted responses, 72.83% belonged to males and 27.27% belonged to female responders. The age distribution of responders is shown in Table I, while Table II lists their employment status and Table III listing the highest qualification achieved respectively.

TABLE I. AGE DISTRIBUTION OF RESPONDERS

Age	18-30	31-40	41-50	Above 50
Distribution	42.66%	37.38%	11.75%	8.21%

TABLE II. EMPLOYMENT STATUS OF RESPONDERS

Type of Employment(sector)	Distribution
Government sector	26.04%
Private sector	52.32%
Self employed	17.93%
Unemployed	3.71%

TABLE III. HIGHEST QUALIFICATION ACHIEVED

Highest Qualification	Distribution
Secondary School	9.63%
Bachelors Degree	37.81%
Postgraduate Degree	15.12%
Professional Qualification	37.44%
No Formal Education	0.00%

B. Online Social Media Usage

Every participant stated that they are members of at least one social media network. Many users were active in more than one social media network. Fig. 2 shows the distribution of users among different social networks.

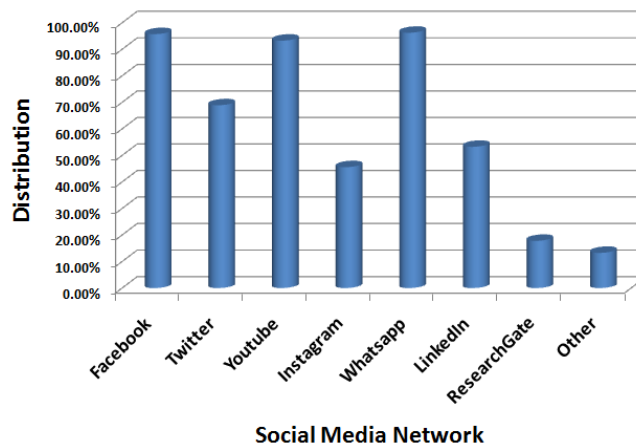


Fig. 2. Distribution of users among different social media networks

Users were asked mainly about their online social media usage including the average time spent per day before and during the lockdown period. Table IV shows the descriptive statistics computed using the social media usage information collected from the responders.

TABLE IV. DESCRIPTIVE STATISTICS FOR SOCIAL MEDIA USAGE

		Mean	Std. Dev.	N
Social Media Usage	Normal	114.6min	59.2min	231
	Lockdown	147.4min	83.7min	231

C. Use of Social Media During Lock Down

Based on the RQ1 given in Section IV, the following hypothesis H0 against H1 was formulated to see if there was a significant change in the social media usage patterns in terms of average time spent during the lockdown period.

H0: The use of social media has not changed during COVID-19 lockdown

H1: The use of social media networks has increased during COVID-19 lockdown

Using paired samples, the t -value calculated and the p -value at the significant level of 0.05 and the degrees of freedom of 230 are 7.217 and 1.972 respectively. Since the calculated t -value is larger than the p -value, H0 is rejected. Hence, it can be safely concluded that the social media usage has increased significantly during the COVID-19 lockdown period.

D. Impact of Social Media

In order to understand whether social media was helpful in overcoming the boredom and social isolation created by the lockdown, the following question (statement) was formulated.

Q1: Social media helped me to overcome the boredom during the period of lockdown.

A 5-point Likert scale as Strongly Agree, Agree, Neither Agree Nor Disagree, Disagree and Strongly Disagree was provided to indicate their preferences. Fig. 3 shows the preferences cast by the users for the above question.

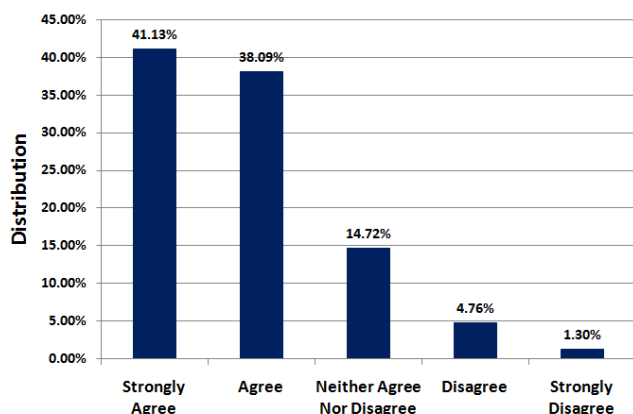


Fig. 3. Distribution of opinion on social media impact on boredom

Using the above information, the statistics including Mean, Standard Deviation, Shannon Entropy [22] and Consensus [23] were computed for the given preferences by assigning ordinal values 5, 4, 3, 2 and 1 for categories strongly Agree, Agree, Neither Agree Nor Disagree, Disagree and Strongly Disagree in that order. Table V shows the statistics computed using this information.

TABLE V. DESCRIPTIVE STATISTICS FOR SOCIAL MEDIA IMPACT

Mean	Std. Dev	Shannon Entropy	Consensus
4.13	0.92	1.76	0.68

From the Table V, it can be seen that majority of the users responses are leaning towards Agree as the mean is in between 4 and 5. By taking Mean and Consensus together, it can be safely concluded that the users have arrived at a consensus of opinion that the social media has in fact helped them to overcome the boredom created by lockdown.

VI. CONCLUSIONS

The COVID-19 pandemic has affected more than 200 countries claiming more than 1 million lives. In order to contain the spread of the disease, many countries implemented very drastic measures including 24 hour curfews and closing down all the places where people used to gather. This kind of social isolation has been found to create many problems including boredom, anxiety and other psychological issues in people. In recent times, online social media has gained a lot of popularity among people. People tend to keep in touch and communicated with even the long lost friends through social media. In this study, the author carried out an investigation to see if social media was any help in overcoming the boredom created by the lockdown enforced by the GoSL for controlling the spread of COVID-19 virus. The study was carried out using an online user survey and the preliminary results are presented in this article. The results show that the time spent on social media has in fact increased during the lockdown period compared to normal days. This can be attributed to the fact that people now have more time but has less work or no work at all to employ their available time. During normal days, major

portion of their time is spent on work or work related activities. Also, the other fact is that people are now unable to meet and spent their time with friends and relatives as they are unable to leave their homes due to the lockdown imposed. Hence, they are forced to get engaged on some activity to spend their time. Hence, for many Sri Lankans online social media was the only means available for them to spend their time on. On further analysis, it was also found that majority of the users are of the opinion that through engaging in social media, they were able to overcome the boredom created by the lockdown, which was confirmed through statistical tests. This article resents only the results of a preliminary analysis of the data collected. It is planned to carry out an in depth analysis that would help unravel more facts on the use and impact of social media during social emergencies.

REFERENCES

- [1] N. Narayanan, C. R. Lacy, J. E. Cruz, M. Nahass, J. Karp, J. A. Barone, & E. R. Hermes-DeSantis, "Disaster preparedness: biological threats and treatment options," *Pharmacotherapy*, vol. 38, no. 2, pp. 217-234, 2018. DOI: 10.1002/phar.2068
- [2] M. Burdak, "Disaster management response cycle in context of structural system and elements," *International Journal of Science and Research (IJSR)*, vol. 7, no. 9, pp. 998-1002, 2018. DOI: 10.21275/ART20191438
- [3] D. P. Coppola, "Hazards," *Introduction to International Disaster Management*, pp. 40-149. 2015. DOI: 10.1016/B978-0-12-801477-6.00002-2
- [4] R. Djalante, R. Shaw, & A. DeWit, "Building resilience against biological hazards and pandemics: COVID-19 and its implications for the Sendai Framework," *Progress in Disaster Science*, vol. 6, pp. 1-7, 2020. DOI: 10.1016/j.pdisas.2020.100080
- [5] R. Maini, L. Clarke, K. Blanchard, & V. Murray, "The Sendai Framework for Disaster Risk Reduction and Its Indicators—Where Does Health Fit in?," *International Journal of Disaster Risk Science*, vol. 8, no. 6, pp. 1-6, 2017. DOI: 10.1007/s13753-017-0120-2
- [6] M. Acuto, "COVID-19: Lessons for an urban(izing) world," *One Earth*, vol. 2, no. 4, pp. 317-319, 2020. DOI: 10.1016/j.oneear.2020.04.004
- [7] H. Pan, "A glimpse of university students' family life amidst the COVID-19 virus," *Journal of Loss and Trauma*, pp. 1-3, 2020. DOI: 10.1080/15325024.2020.1750194
- [8] M. Keck, & P. Sakdapolrak, "What is social resilience? Lessons learned and ways forward," *Erdkunde*, vol. 67, no. 1, pp. 5-18, 2013. DOI: 10.3112/erdkunde.2013.01.02
- [9] S. M. Hashemi, A. Bagheri, & N. Marshall, "Toward sustainable adaptation to future climate change: insights from vulnerability and resilience approaches analyzing agrarian system of Iran," *Environment, Development and Sustainability*, vol. 19, pp. 1-25, 2017. DOI: 10.1007/s10668-015-9721-3
- [10] K. Koutoangelos, M. Economou, & C. Papageorgiou, "Mental health effects of COVID-19 pandemic: A review of clinical and psychological traits," *Psychiatry Investigation*, vol. 17, no. 6, pp. 491-505, 2020. DOI: 10.30773/pi.2020.0161
- [11] Y. Huang & N. Zhao, "Mental health burden for the public affected by the COVID-19 outbreak in China: Who will be the high-risk group?," *Psychology, Health & Medicine*, pp. 1-11, 2020. DOI: 10.1080/13548506.2020.1754438
- [12] M. Tomasello, "The ultra-social animal," *European Journal of Social Psychology*, vol. 44, no. 3, pp. 187-194, 2014. DOI: 10.1002/ejsp.2015
- [13] M. F. M. Firdhous, & P. M Karunarathne, "A model for enhancing the role of Information and Communication Technologies for improving the resilience of rural communities to disasters," *Procedia Engineering*, vol. 212, pp. 707-714, 2018. DOI: 10.1016/j.proeng.2018.01.091
- [14] M. P. Bosamia, "Positive and negative impacts of Information and Communication Technology in our everyday life," in *International Conference on Disciplinary and Interdisciplinary Approaches to*

Knowledge Creation in Higher Education: Canada & India (GENESIS 2013), Bhavnagar, India, 2013, pp. 1-8.

- [15] W. Qidwai, "Advances in Information and Communication Technology (ICT): Issues, challenges and opportunities for health care professionals," *Journal of College of Physicians And Surgeons Pakistan*, vol. 21, no. 11, pp. 651-653, 2011.
- [16] A. Gruzd & C. Haythornthwaite, "Enabling community through social media," *Journal of Medical Internet Research*, vol. 5, no. 10, pp. 1-17, 2013. DOI: 10.2196/jmir.2796
- [17] J. S. Mackenzie, & D. W. Smith, "COVID-19: A novel zoonotic disease caused by a coronavirus from China: what we know and what we don't," *Microbiology Australia*, MA20013 pp. A-F, 2020. DOI: 10.1071/MA200132020
- [18] Y. C. Wu, C. S. Chen, & Y. J. Chan, "The outbreak of COVID-19: An overview," *Journal of the Chinese Medical Association*, vol. 83, no. 3, pp. 217-220, 2020. DOI: 10.1097/JCMA.0000000000000270
- [19] S. Li, Y. Wang, J. Xue, N. Zhao, & T. Zhu, "The impact of COVID-19 epidemic declaration on psychological consequences: A study on active Weibo users," *International Journal of Environmental Research and Public Health*, vol. 17, no. 6, pp. 1-9, 2020. DOI: 10.3390/ijerph17062032
- [20] Y. Wang, Y. Di, J. Ye & W. Wei, "Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China," *Psychology, Health & Medicine*, pp. 1-10. 2020. DOI: 10.1080/13548506.2020.1746817
- [21] worldometers.info, "COVID-19 coronavirus pandemic," Available at https://www.worldometers.info/coronavirus/?utm_campaign=homeAdvegas1?, Accessed on September 15, 2020
- [22] C. E. Shannon, "The mathematical theory of communication," *The Bell System Technical Journal*, vol. 27, no. 3, pp. 379-423, 1948. DOI: <https://doi.org/10.1002/j.1538-7305.1948.tb01338.x>
- [23] W. J. Tastle, & M. J. Wierman, "Consensus and dissention: A measure of ordinal dispersion," *International Journal of Approximate Reasoning*, vol. 45, pp. 531-545, 2007. DOI: <https://doi.org/10.1016/j.ijar.2006.06.024>