Proceedings of the 4th International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)

Redesigning Teaching and Learning towards Sustainable Education

22-23 JUNE 2021
KUALA LUMPUR, MALAYSIA

Organized by:
Kulliyyah of Engineering,
International Islamic University Malaysia,
P.O.Box 10, 50728 Kuala Lumpur,
MALAYSIA.
Fax: +603 6421 6594
Phone: +03-6196 6400
http://www.iium.edu.my/engineering
ISBN: 978-967-25875-0-7

Published by
Kulliyyah of Engineering
International Islamic University Malaysia
P.O. Box 10, 50728 Kuala Lumpur,
Malaysia

Additional Copies of the Proceedings can be obtained from
ICEPEE '21 Secretariat
Kulliyyah of Engineering
International Islamic University Malaysia
P.O. Box 10, 50728 Kuala Lumpur, Malaysia
Tel: +603-6196 6400, Fax: +603 6421 6594
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e ISBN 978-967-25875-0-7
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MESSAGE FROM THE CHAIRMAN OF ICEPEE'21

Ali Sophian
Chairman
4th International Conference on Engineering Professional Ethics and Education (ICEPEE 2021)

Assalamu'alaikum warahmatullahi wabarakatuh.

Sincere greetings to all.

Praise be due to Allah the Lord of the Universe. We are pleased and grateful to convey that ICEPEE has been revitalized following some hibernation, where the last one, the 3rd ICEPEE, was held back in 2013. International Islamic University Malaysia (IIUM) is a strong supporter of value-and-ethics-based education that will produce not just good professionals and scholars but also those who value and observe ethics in both their professional and personal lives. ICEPEE is one of the examples of the commitment shown by the university in this integrative, holistic education.

After the hibernation, this year ICEPEE is revived by the Faculty of Engineering of IIUM with a humble restart and we are aiming high *inshaAllah* for the future and will contribute more significantly towards integrative engineering education internationally. This year, we have received nearly 20 abstract submissions that involve authors from five different countries.

With the rise of digital transformation and other disruptive technologies and the concern over sustainability in social, economic and environmental aspects, new teaching and learning approaches and technologies are an inevitable future for all educators. This is even more true as the world has been hit by the current Covid-19 pandemic that has forced us to adapt our pedagogical systems quickly and effectively. With this in mind, ICEPEE'21 was launched with the theme "Redesigning Teaching and Learning for Sustainable Education".

I would like to thank the Conference Committee who have worked hard for the success of this conference. I would also like to extend my sincere gratitude to our distinguished keynote speakers, to all presenters and participants.

Finally, on behalf of the Organizing Committee, I welcome you all and wish you an enjoyable and fruitful virtual conference.

Best regards,

Ali Sophian
Chairman, ICEPEE'21

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22 – 23 June 2021, Kuala Lumpur, Malaysia.

Relationship Between Unethical Student and Supportive Education Systems During Online Learning Mode

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Abstract—This paper examines the root causes behind the surging trend of students cheating during online teaching learning mode due to COVID-19 pandemic, a global issue that threatens the integrity of universities. It presents analysis on the defensive mechanism employed by universities by deploying an array of technologies to counter attack the cheating students. A number of key messages emerged from the analysis. This paper looks in detail at the core factor that led to this unethical phenomenon and discussed how these vary according to institutional mission, priorities and management style. The findings showed the vital role played by education champions and the significance of supportive top management were key factors for change. It is also recognized that responsibility for change must be shared between universities, ministry and accreditation bodies.

Keywords: *COVID-19 pandemic, Online cheating, Unethical students and Supportive education system*

1. INTRODUCTION

For the vast majority of students around the world, remote learning is currently the only option available. Schools and universities are putting a lot of effort into maintaining the highest standards of teaching and helping their staff and students adapt to the new normal. Even though students are learning and taking exams in online mode, students are still accountable to the same high academic standards and ethical code of conduct as before COVID-19 pandemic hit upon our global community [1]-[2].

An alarming rise in cheating in universities since remote learning became the new norm was detected. Researchers at Imperial College London reported a tripling of requests to a major homework help website and an increase in the number of essay mills since classes and assessments have moved online [3]. Universities worldwide are battling academic misconduct by implementing plagiarism detection software for coursework assessment and remote proctoring to ensure students do not cheat while taking online exams. But even with the AI-enabled proctoring systems in place, students find ways to outwit the restrictions, for example, students can buy service from the infamous Chegg, a tech company that has a database of 46 million textbook and exam problems. Their stock price has increased threefold during the pandemic. Ironically enough, proctoring companies also have made millions capitalizing on the cheating phenomenon by selling anti-cheating software to academic institutions [1]-[2].

Newton [4] reported before the coronavirus forced millions of students online, a proctoring service company, ProctorU, administered 340,000 exams from January until March, and detected less than 1% of cheating cases. During the worldwide peak of remote examinations, the number of exams it supervised accelerated to 1.3 million from April until June, and the cheating rate rose above 8 percent. Newton [4] also recounted a survey conducted in May by the publishing and digital education company Wiley, it was found that 93 percent of lecturers think students cheat in online assessment, but despite the high percentage, only a third lecturers were using proctored exams. Many schools, colleges and universities have moved into online teaching without adequate training and support due to budget and time constraints. Others opted for less expensive tools, such as software that can lock

a web browser while a student takes a test. Having new digital tools at the lecturer's disposal is not an advantage when academic misconduct has become more diversified and difficult to identify [1], [4]. Online university education has worked reasonably well before the pandemic forced total closure of schools and universities worldwide. Indeed, online classes benefited students in terms of reliability of lecturer's recorded lectures that can be used at self-paced learning, online classes removed the feeling of intimidation to ask questions, and students can freely roam the entire internet networking for references and information. Instead, pools of students resort to cheating in assignments and exams in online learning mode [5]. It is the aim of this paper to identify root causes behind the surging trend of students cheating during online learning mode due to COVID-19 pandemic and suggest mechanism to curb it.

2. CHEATING CASES

Governments cannot simply abolish exams due to coronavirus pandemic, because parents and communities believe in them. For centuries, high stake exams have been considered as an ultimate outcome of the education system, these include intermediate, school leaving and university entrance exams and working recruitments. The United Nations Educational, Scientific and Cultural Organization (UNESCO) [6] surveyed 84 countries and identified that 58 countries had postponed or rescheduled exams, 23 introduced alternative methods such as online or home-based testing, 22 maintained exams while in 11 countries, they were cancelled altogether. UNESCO [6] found that since the outbreak of COVID-19 began, approximately 1.37 billion students in 138 countries worldwide have been affected by school and university closures. Nearly 60.2 million school teachers and university lecturers are no longer in the classroom. Prolonged schools and universities closures have major implications for learning, assessments, and credentials because exam results have been used as qualifying criteria for university admission, and companies' employment. The interruption of exams due to changes in learning mode from face to face to online have delayed students' progression and graduation, especially at Institutes of Higher Learning (IHL), affecting graduates' access to labour markets, carrying individual and broader socio-economic impact [1], [6]-[7]. Many IHLs proceeded with online exams to ensure students progression will not be halted, but they were encountered with unethical acts of cheating despite the precautionary measures that have been taken. Table 1 below presented cheating cases in IHLs.

Table 1: Academic misconduct cases during remote teaching learning

Ref	*Name of IHL*	*Unethical act by students*	*Actions taken by IHL*
[8]	*North Carolina State*	*200 students allegedly used Chegg during Statistics online final exam*	*1. Score of zero* *2. Pre-suspension status*
[8]	*MacEwan University*	*Contract cheating*	*1. Academic misconduct hearing* *2. Authorship verification algorithms*
[4]	*Purdue, George Tech & Boston Universities*	*Students shared answers via video conferences, used Chegg to allegedly cheat in online exams and tests*	*Grade F*

[5]	*Delhi Technological University*	*Students shared exam questions with accomplice*	*Internal investigation*

In the case that occurred at North Carolina State University as shown in Table 1, the lecturer used a time-limited online exam mechanism. Students have been accustomed to this method of assessment during physical classroom, and the lecturer also gave a 48 hour completion window and access to notes, yet a large number of students were allegedly cheated. In their defense, students cited there was no explicit communication on the prohibition and the rule was not applied in the course's previous assessment. If students are found guilty, they could possibly be sanctioned which has potential ramifications for those who are on financial aid or scholarships. For this type of assessment method, it is suggested to use questions that utilize higher order skills of Bloom's taxonomy that require students to be creative to provide solutions instead of just copying answers from Chegg [1], [9]. In the case of MacEwan, the lecturer conducted oral examinations to reduce potential academic misconduct. It is also a creative way of assessing Program Outcome in Ethics, Communications and Lifelong Learning that students possess. The disadvantages may be students are not comfortable with the new assessment method, which may lead them to underperform. Therefore, it is recommended to have a second marker for moderation [1], [9]. Purdue University gives proctored exams to curb students' unethical act of cheating [4]. Special automated proctoring services can catch cheaters who are taking their exam at home. These services block browsers from accessing forbidden websites, check to see if the student has contacted a friend or answer service, verify identity and geographical location, and see if the student is looking at flash cards or boards, etc. Some can even detect Bluetooth devices and suspicious movements of the test-takers' head, keystrokes, and eyes. The drawback is, it is not a practical solution for developing countries and rural areas where students do not have the luxury of a quiet room, wide-angle webcam, and stable internet connection. Furthermore, other IHLs such as Harvard, McGill and Stanford viewed proctoring software as compromising student's privacy and it may create high stress and rebellion among students [10]-[11]. It can be seen from Table 1 that all IHLs involved took serious action in handling cheating cases.

Truthfully, cheating is emotionally and psychologically unhealthy for the students. Even though their lecturer managed to catch them cheating, the administrative bureaucracy to file for a report made the students have to wait for many weeks to be notified that they were reported for cheating. The waiting duration will prolong the sense of dread and anxiety to the alleged students [12]. Researchers pointed out that there are complicated psychological dynamics at play when students cheat, they know it is wrong and unethical, yet they rationalize it for reasons they see as legitimate to maintain a self-concept as honest people. Furthermore, there's a danger of cheating becoming contagious among peers weakening their sense of responsibility and moral development [13]. Efforts on discouraging cheating made universities adapt alternative ways to assess students in fair, privacy protected and value outcome based. Consultations with various stakeholders including students, parents, teachers, medical experts and industries brough up concerns about equity, validity, and transparency with online exams, taking into consideration that many regions in the world are without electricity and internet. Various options were given, from extending the calendar year, using formative assessments and condensing the curriculum [2], [11]. Table 2 depicted examples of alternative assessment methods that have been delivered in several universities.

Table 2: Alternative assessments methods during remote teaching learning

Ref	*Name of IHL*	*Alternative assessment methods*
[11]	*University of Illinois*	*Developed in-house program (PrairieLearn for lecturers to design model problems, ranging from multiple choice questions to essay and generate randomized versions of the questions that are identical in degree of difficulty)*
[11]	*McGill & Stanford Universities*	*Take-home exams*
[11]	*U.C Berkeley*	*Replace difficult high stakes exam with frequent, low stakes exam*
[14]	*Harvard University*	*Group projects, creating podcast and open-book exam*
[15]	*Waterloo University*	*Students are made compulsory to take module on academic integrity and consequences of it*

Feathers [11] reported the success of 14,000 students from University of Illinois taking 25,000 exams in Sept 2020 using PrairieLearn as presented in Table 2. The success had prompted University of California Berkeley, University of Maryland and University of British Columbia to begin to use the in-house program [11]. As for McGill University and Stanford University, both IHLs refuse to use proctoring software because it violated their honor code. Instead, they allow for take-home examinations to accommodate students with disabilities such as different time zones, living constraint conditions and caretaker responsibilities. At U.C. Berkeley, the management performed surveys, pilot projects and conversations with students throughout the transitions from face to face to online learning, they identified that in cases where cheating cases were elevated, it involved courses that have intense pressure, such as entry exams into majors with enrolment caps. By replacing standardized high-stake exams with frequent low-stakes tests, they faced the challenge to ensure the alternative assessments can yield the same fairness and quality [2], [11]. Similarly, in Harvard University, the management is committed to its educational mission and values. Harvard implemented new forms of assessment like creating podcasts, group projects, and open-book tests that give opportunity for students to learn soft skills that are needed in the job market [11], [14]. It can be seen from Table 2 that these IHLs adopted a supportive management style to enable lecturers conduct alternative assessments in order to help students learn holistically instead of succumbing to cheating.

1.1 Why Students Cheat

Surveys conducted by universities management as well as student bodies reported similar findings; The pandemic has negatively impacted students' emotions and feelings; students having a hard time concentrating, became more stressed and weren't sleeping well. On top of that, many students are stressed about entering the job market during economic downturn and uncertainty, and students also experienced a pandemic-related drop in income [1], [12]. These insecure feelings are underlying factors that make disengaged and disinterested students prone to cheat in exams because it is the easiest way out. It definitely doesn't help when the system is easy to beat because lecturers were forced to adapt quickly, seizing on any tools available that would allow them to teach remotely.

The pandemic had created a recipe for stress for both students and lecturers. Lecturers are suddenly tasked to transform all of their instruction in this compressed time frame from physical medium to online mode, making them exhausted because their resources fall far short of need and they need to execute at the same time as they

need to learn how to do virtual teaching. Majority have little or no experience with virtual education. Consequently, it created excessive workload and working hours. Challenges such as unstable internet connection, complicated technology, questionable credibility of online assessments, distraction working from home and lack of social support makes conducting classes online even more stressful [16]. Combination of burned-out lecturers and stressful students created high likelihood of cheating or other academic misconduct when one or more situations listed below occurred during assessments and exams [5], [9], [10], [17];

- The questions are using lower order cognitive skills of Bloom taxonomy (remembering and understanding). Students could easily look up the answer in the internet or discuss with fellow friends in social media apps
- Easy and cheap access of commercial companies like Chegg, Quizlet, Course Hero and Brainly that provide answers for almost every exam question in very short time frame
- Cheating students get good grades while virtuous students get bad grades
- Lacked access to laptops or high quality internet services
- New assessments that students are unfamiliar with
- Unclear communication about assessment rubric and marking criteria
- Lacked of resources, e.g; text book has no e-book version, restrictions firewall
- Lacked of motivation

No matter what the circumstances might be, large populations of students with a pattern of cheating will devalue the grades and degrees they received. The degree no longer provides a measure of students' mastery of skill or knowledge, instead it portrays an education system that gives importance in getting high grades, not to actually learning a knowledge or skill. This is in fact against the true spirit of Outcome Based Education (OBE) that focuses on how much the students have attained from the intended learning and they should be assessed holistically within the context of their learning, online or offline [4], [10], [18].

1.2 Actions Taken by IHL

Research has shown that university management that demonstrates a supportive leadership style can improve lecturers' wellbeing by establishing trust, ensure safety, include lecturers' voice, and empower lecturers to make choices that improve both their teaching experiences and their students' learning environments. A lecturer's wellbeing is directly linked with high performance students. Supportive management style improves lecturer's interpersonal skills, encourages self-initiation and provides greater choice. These positive behaviors will create a good working model for lecturers to contribute towards sustainable education systems that reinforce relationship building and provide wellness and restoration support to all virtual classrooms while learning remotely [19, 20]. Good example of supportive management style was shown by Simon Fraser University, in order to help students cope with exam anxiety and pressure of online classes, students can choose a pass/fail option and drop a course without penalty. The university mission to protect students' well-being and protecting the integrity of academia are strongly interconnected [3], [7]. Cheating is a behavioral issue. Punitive policies, enhanced detection, and exam-room surveillance are all technical solutions to the issue, but none seek to directly change the underlying behavioral aspects. IHL focus should be on discouraging cheating before it happens rather than penalizing students after the act. Given how detrimental it is to students' learning process and how difficult it is for the teachers to identify cheating acts. Tracing and proving cheating are a waste of money, energy, and time and creates an unhealthy hostile environment [3], [9]. Comprehensive strategy from IHL must include raising awareness of academic integrity early on, employing AI technology to control contract cheating, use anti plagiarism software and change traditional ways of teaching and grading [1]. Table 3 below is a summary of alternative assessment strategies for online teaching learning recommended by Burnett and Fuentes [9], that have a high likelihood of preventing cheating because it facilitated student centered learning, not simply bringing the traditional class to the cloud. Fresher design of alternative assessment is possible when lecturer practice active learning that gave students cognitive and affective learning experience [21] However, in the beginning, some students may view this changes as disruption because they are unfamiliar with student centered methods, this may create confusion and anxiety

for students because getting a degree is an important moment in their lives and assessments will affect decisions on grades, progression, degree classification and employability opportunities [9], [14] , [21].

Table 3: Potential alternative assessments to discourage cheating [9]

Type of assessment	*Benefit to students*
Personal reflection on specific examples provided in class	*Promote higher learning order*
Take-home assessment	*Reduce students' anxiety*
Real world problems replacing textbook problems	*Enhance problem solving skill*
Questions require students to produce original ideas and solving a problem	*Promote higher learning order*
Written assessments that require students to apply their knowledge to a case study, not reproducing theory or content	*Promote higher learning order*
Use dynamic timing	*Convenient for student from different time zone*

In Table 3, many new assessment methods were introduced such as derive personal reflection, solve real world problems, produce original ideas and apply knowledge to a case study promotes active learning. As a counterbalance, lecturers should be ready to offer adequate support for students who are worried about their new assessment method. Students should be clearly informed that alternative assessments are extended opportunities to enable them to achieve high standards in their learning. Students were trusted to complete the assessments with integrity. These assessments were linked with learning outcomes using four OBE principles, clarity of focus, designing back, high expectations and expanded opportunity. It concentrated on the targeted outcomes which students should achieve at the end of the ongoing educational experience, regardless if it is online or offline [18]. The teaching methods should have attributes of active learning that improve student academic performance, and motivated them to learning and promote intellectual development [22]. The accreditation bodies acknowledgement and acceptance are crucial in validating the effort done by IHLs in changing their teaching and assessment methods as long as it achieves the outcomes, goals and objectives of their curriculum design because conventional methods are not helping students to learn effectively in online classes. The challenges of executing alternative assessments as presented in Table 3 is for IHL to demonstrate a process to measure the results and show outcomes are being achieved.

What happen in online classrooms is lecturer teaching live synchronous session using materials prepared for traditional face to face instruction. Instead of using whiteboard to project their PowerPoint, they use video, and Google Classrooms. They gave assessments prepared for traditional classroom instruction via online quizzes. Replicating conventional practices for online classes is a big hindrance for students to be independent in learning remotely. Online classes should be fully utilized to apply student centered strategies that enable mastery-based learning and individualized learning pathwhays. Student will feel more excited and engaged to learn in contrast to feeling fatigue watching recorded lecture for two hours and reading power point slide in Google Classroom. University should provide resources to encourage lecturers to practice student centered learning so that students can actively engaged with learning materials by thinking, practicing and discussing. They will not be tempted to cheat in remote exams when they are enjoying the learning process itself.

2. CONCLUSION

Supportive management style by IHL plays a vital role in helping lecturers to take control in enhancing the system and accommodating the students during remote teaching learning in this new post-pandemic world. Cheating is as ancient as education itself, therefore good communication and managing students' expectations are very important under the current scenario. This is high time to practice student centered learning replacing conventional lectures. At the same time, unethical actions by students must be kept in check. Combating cheating is a shared responsibility of all parties, universities, ministries, accreditation bodies and most importantly, students. They must embrace the learning process and involve actively, not merely waiting for information and instruction.

ACKNOWLEDGEMENT

The authors would like to thank International Islamic University for the facilities provided to conduct this research.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Driving Ethically towards an Autonomous Future

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Abstract— Self-driving vehicles are expected to rise road safety, increase convenience, improve the mobility of those who are currently unable to use traditional vehicles, and reduce emissions. There are challenges, however, which may serve as obstacles on the path to an autonomous future. Some of them include technological and infrastructural challenges, vested interests, fear, perceived expense etc. In this paper, the self-driving revolution and its cascading effects have been explained. Various advantages as well the challenges faced in this matter and the ethical dilemmas faced in the smart automotive industry have been addressed.

Keywords: *Smart cars, Automaticity, Moral dilemma, Ethics, Artificial intelligence, EMC Engineer.*

1. Introduction

Contrary to common opinion, there are not just two types of driver contact in vehicles. According to the National Highway Traffic Safety Administration, or NHTSA, there are five different levels, with level 0 representing the car with no autonomous features and level 5 representing the vehicle that is fully autonomous and no driver involvement is required at all. There are various types of semi-automated vehicles in between these stages. They will take over in some circumstances, but they are not completely self-contained. Smart car is a self-driving vehicle with a high (level 4) or complete (level 5) automation level [1].

Self-driving cars have a lot of potential for increasing efficiency, both time and economic efficiency, reduce traffic accidents as today's automobiles have driver aid systems that are already saving lives and preventing accidents, increase productivity, and minimize our environmental impact as autonomous vehicles are a fascinating development in the field of green transportation, and this cutting-edge technology would enable consumers to minimize carbon emissions while doing so. However, they have faced opposition from various groups who say that they are dangerous, could be compromised and they would endanger employment. Besides this, there is always an ethical dilemma associated with the self-driving cars. In this paper, the need for autonomous vehicles and the transition from a driving to an autonomous society is discussed. The cascading effects of the autonomous revolution along with the role of Artificial Intelligence in this field is discussed. Lastly the Moral dilemma associated with the self-driving cars is also explained.

2. The need for Autonomous Vehicles

Humans are excellent problem solvers with a highly developed sense of perception and are generally pretty good drivers. Accidents are uncommon. But this should be accepted that one is too many, and the bulk of those that do occur are due to human error. A human can get bored, tired, confused, and distracted, and has a short reaction time. There are things that people have done overall to lower the impact of human error. In 1958, the magazine Science Digest published a bold post with the following statement "Driving will one day be foolproof, and accidents unknown, when science finally installs the electronic highway of the future" [2]. Throughout the nineteenth century, automobiles were incrementally improved, with stronger braking, steering, and other features.

But, at the end of the day, the driver is still the one behind the wheel. For the first time, the technology behind self-driving cars alters this relationship. Since self-driving cars are not distracted and have faster response times, the risk of death or injury in a motor vehicle may be drastically reduced with an automated device. Self-driving cars' safety consequences, of course, would far outweigh any other advantage we can think of, but, with a self-driving car people will not have to drive themselves all the way to office and back home which means that time could be used more productively. Another significant advantage is that many existing non-drivers would have different transportation options. Elderly people will be able to jump into their cars without anyone fearing for their life. Blind people are going to be able to travel effortlessly. Drunk drivers will be able to get their keys without fear of being caught, and children will be able to get home from their after-school events on their own.

3. The transition from driving society to self-driving cars

Nations across the globe are now concentrating on smart car technology. Within a year or so, major automakers such as Tesla, General Motors, Ford, Fiat-Chrysler, and Waymo are expected to introduce their level 5 vehicles. There are already self-driving cars on the road today. The technology is advancing at a breakneck pace, and it will have a much greater effect on lives than people may know. The technology is the reason people have been waiting for so long. However, things are gradually taking over to the point that something can be seen happening and it is important that people understand how it will be introduced to them. There are several options like adaptive cruise control that adapts the speed of the vehicle to that of the other car driving in front automatically [3], automatic breaking that sends out both an audible and visual signal to warn the motorist and then operates on the brakes of the vehicle if the possible danger has been detected inside the passenger compartment [4], the park assist [5], Lane change systems or Lane assist that intervenes quickly, signaling to the sensors that an exit is not signaled from the lane when a vehicle begins to deviate from the ideal trajectory [6], traffic sign recognition that can detect, for example, speed limits, but also access and overtaking prohibitions [7], and many more available today for making a car intelligent. So, we can see how our cars are becoming more intelligent which means that it is not going to be a binary shift from manual to self-driving cars but a rather considerable weaning period.

4. Cascading effects of this revolution

Several socioeconomic and technological developments have resulted in a profound shift in the way urban public and semi-public types and spaces are planned, operated, and used over the last two decades [8]. It is undeniable that the automobile has had a significant impact on our way of life. However, the car movement also brought with it a slew of issues. Most of the time, our vehicles are idle. Because of the large number of vehicles, a large amount of space is used for parking. However, it appears that only15 to 20% of the current parking will be needed in case of self-driving cars. A self-driving car can be called, it can take the passenger to the destination and then go to pick someone else. Housing will become much more affordable when people will not have to buy that extra land for parking. If the laws of supply and demand is considered, dramatically increasing the supply while demand remains relatively constant, will result in the decline of prices. As a result, property prices will fall if all that land becomes accessible in a short period of time. Decrease in income taxes in addition to a decrease in property prices will be seen. So, how cities are going to maintain all their infrastructure and have all the services when cutting their budgets will be a big question. Daily commute is another example of some of these cascading effects. Instead of an additional half-hour commute, people may be able to work on their phones, eat, sleep, exercise or do something else. The comfort aspect of self-driving cars will assist in the removal of stress that is generally referred to as "non-paying stress".

City planners and engineers will have to come up with new ways to bring infrastructure into cities, as well as think about what should be done with the infrastructure that remains. Smart cars will mean cities will have to be smart as well. Smart cities lead to surveillance. There are video surveillance cameras everywhere. People are concerned and rightly so, that it could ambush their privacy by collecting personally identifiable data. Motorcycles can face extinction because of self-driving vehicles. Since autonomy makes transportation safer, people may consider motorcycles to be an unnecessary risk. Legal experts will have to grapple with the crucial questions of liability and ethics. Security professionals would have to consider how to outsmart cyber criminals.

Because of the large amount of digital infrastructure needed for SDVs to function, there has been concern that they would be easily hacked [9]. Since both consumers and politicians are putting pressure on the automotive industry to reduce CO2 emissions, which currently account for 20% of overall greenhouse gas emissions, the car of the future will be green. Since traffic increases significantly as the urban population rises, and while cars are used 95% of the time, ownership costs rise as well [10]. Because of the population's aging, the vehicle of 2025 will see a safety advancement that is also significant, and it will eventually have to be affordable [11]. Another big concern is SDVs replacing cab drivers, bus drivers, delivery drivers, and anyone else who works as a driver. All this can make us realize that a smart care is not a transportation issue. It will have an impact on all of us. We need to have everyone at the table. People involved in the community development; people involved in economic development etc. all need to get involved.

5. The role of Artificial Intelligence

When autonomous vehicles are programmed, we cannot simply install our own moral theory because we do not know it well enough. What we do know is they should align with human values, they should be able to perform even better than humans because even the best human drivers are not good enough and lastly, they should use machine learning to get there which is one of the key enabling features of modern artificial intelligence. There are few different forms of machine learning that are important as far as self-driving cars are concerned. Supervised learning is one of them. Labeled data, which is a data set that has been categorized is used to infer a learning algorithm with supervised learning. Using machine learning algorithms, the data set is used to predict the classification of other unlabeled data. Another option to consider is reinforcement learning. The reinforcement learning paradigm, which lies halfway between supervised and unsupervised learning, deals with learning in sequential decision-making problems with minimal feedback. The training of machine learning models to make a series of decisions is known as reinforcement learning [12]. A more complex example of these seemingly simple approaches would be an ancient Chinese board game called "Go" and it has become the gold standard for a lot of Artificial intelligence research. The most recent one and arguably the most interesting for smart car industry is "AlphaGo zero" which as the name suggests, starts from a really low level of intelligence [13].

However, Self-driving cars matter the way that board games do not, because if a self-driving car makes a mistake someone could die. The rules of AlphaGo zero are really defined quite well but the rules so to speak of the problem of self-driving cars are not. The moral rules are so elusive and to state them explicitly and pin them down is hard because the consequences would be catastrophic in case of a mistake. The other issue is that the following states, i.e., what could happen next is not as clearly defined. Even though in Go there are many different options, we could technically enumerate them if we wanted to and in the real world, that is not the way it is. To solve the first problem, a moral truth that most people would not disagree with can be thought of. This might be something like all human life has intrinsic moral worth and then from there, let the machine do more of the work instead of providing explicit rules and risking getting it wrong. As a result, it will abstract and generate higher-level moral truths without our intervention. To solve the problem of not knowing the following state, having a separate system that has some knowledge of physical laws may help. To be able to reap the benefits of efficiency and safety, the only way is allowing the machine more freedom than we might have thought, as well as making ourselves the tool of verification to ensure that nothing bad ever gets into the hands of customers of smart cars.

6. The Moral Dilemma

Imagine a passenger is in a driverless car sitting back. The car suffers mechanical failure and cannot stop. It will collide with a group of people crossing the street if the car continues. However, the car can swerve and hit a bystander, killing him to save the pedestrians. What does the car do, and who should make the decision? Tradeoffs will be involved, and tradeoffs require ethics. Surveys designed to classify driving behavior have been shown to be unreliable. Critics have argued that assuming people are generally selfless in split-second decisions is naive, even though this has been shown in repeated driving simulations. As a result, incorporating crash algorithms based on social values or individual values into Self Driving Vehicle (SDV) driving algorithms has proven difficult.

Iyad rahwan, an associate professor at the at the MIT Media Lab, along with his team made a project called the MIT moral machine. It is a website where we can log on to and choose between scenarios like these. It is a medium for collecting a human viewpoint on machine intelligence's moral choices, such as AVs. The developers have varied the ages and even the species of the various victims and have collected more than 30 million decisions

from the website from more than 3 million people worldwide so far. This can help to build an early image of what tradeoffs people are comfortable with, and even across cultures, what matters to them [14]. But sometimes knowing what people will do is not enough and it certainly is not enough to know what they should do because what people think and what's right are often different things.

These kinds of scenarios were posed to people and two choices inspired by two philosophers, Jeremy Bentham, and Immanuel Kant, were given. The car should follow utilitarian ethics, Bentham says [15]. Even if that action kills a bystander, it should take action that minimizes overall damage. Immanuel Kant says that the car should stick to duty-bound values. So, it should not take an action that directly hurts a human being, and even if that is going to injure more individuals, the car should take its course. They found that Bentham sided with most people. So, it seems like people want to reduce absolute harm by being utilitarian. But people were hesitant when asked whether they would purchase such cars. They want to purchase cars that protect them at all costs, but they want everyone else to buy cars that mitigate harm. This problem is called a social dilemma. William Foster Lloyd, an English economist, published a pamphlet in the 1800s outlining a similar scenario [16]. It is historically referred to as the Tragedy of Commons. In case of smart cars, this is what can be called the tragedy of the algorithmic commons and it presents new kinds of challenges.

7. Morality and Business ethic issues in Automotive Industry

Proper functioning of the IC in an impeding Electromagnetic environment has always been a major concern. Automotive industry in particular, the smart vehicle, is facing design challenges such as susceptibility towards Electromagnetic Radiation Interference (EMI) [17]. EMI causes electronics control units to calculate wrong output and sensors to give false readings. These effects can vary from an increase in the error rate to a complete loss of data in the case of a data path [18]. Nowadays, smart automotive industry has employed extensive electronic components in its system. The growing numbers of ICs on the electronic modules in smart automotive industry creates demand on Electromagnetic Compatibility (EMC) Compliance. This EMC is driven by preventing EMI malfunctions within a vehicle. Failure to prevent this could cause loss both financially and in worst cases human life could be lost. There have been efforts to evaluate the EMI conditions in ICs and ways to establish EMC [19]. The corporate bottom line and ethics are at odds with each other several times. Unethical actions and activities often arise inside the EMC Department because of management pressure to give them the responses they want to hear. Much of the time, the EMC engineer is overwhelmed. For many enterprises, this is a big concern since the lifecycle of goods is very limited. Technology is progressing at a much faster pace today than it was 10 years ago. Product development cycles are from six months and one year. These shorter growth cycles are driven by market opportunity windows. Parallel market rivalry has pushed down the cost of product sales and decreased profit margins. The EMC engineer is stuck in the middle of this squeeze with a typically limited budget, minimum manpower and more EMI design and test products than allowed by time. If electrical and mechanical engineers follow the EMC design guidelines from the start, their chances of passing the emission tests the first time are quickly increased from 35 to 80 percent [20]. In the center of the decision triangle, the EMC engineer gets stuck. The management decision is on one corner of the triangle, the second corner is the legal decision, and the engineering decision point is the final corner of the triangle. To ensure professional respect and liability, an EMC engineer must learn to recognize the boundaries between these fields.

The case of Ford's Pinto where Ford's new president, Lee Iacocca, rushed the Ford Pinto into production in 1970, [21] is a prime case of white-collar crime in which benefit takes precedence over ethical considerations. Security was not included in the product objectives because Iacocca, contrary to his statement that "safety does not sell," was unconcerned about it. This profit-driven mindset led to the creation of a car that could be used as a mobile bomb, waiting for a minor accident to claim the lives that Ford had projected as an expected cost. Clearly, it lacks ethical consideration to monetize human life for the sake of a cost-benefit analysis, because life is priceless and cannot be converted into monetary terms without dehumanizing people as nothing more than consumers intended to produce profits to fuel an economy that is intended to serve society as a means of facilitating specialization and exchange to enhance the quality of life for all.

8. Conclusion

Self-driving cars are the technology of the future, painting a picture of a world where convenience and comfort come first, eliminating the burden of everyday commutes, allowing productivity to rule the road, and even saving countless lives that would have been lost in fatal collisions. Autonomous vehicles also raise several concerns about our collective future. While the overwhelming array of benefits that self-driving cars can have on society can appear to be a win-win scenario, the possible challenges that self-driving cars may face must also be recognized. When technology is so fresh, it is necessary to remain both open and cautious. Also, with this cutting-edge technology, accidents happen, and computers fail, so self-driving cars cannot always get it right. By understanding that regulating self-driving cars is a social collaboration challenge as well as a technical one, we can at least begin to ask the right questions.

ACKNOWLEDGEMENT

This paper is funded by Ministry of Higher Education Malaysia through the Research Centre, International Islamic University Malaysia under the Fundamental Research Grant Scheme For Research Acculturation Of Early Career Researchers – FRGS-RACER 1/2019 (Ref: RACER/1/2019/TK08/UIAM//1 and RACER19-060-0060).

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Scale Development and Validation using Rasch Analysis to Measure Students' Lifelong Learning Readiness to Learn Embedded System Design Course

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Abstract—this paper discussed the development and validation of a scale to measure students' lifelong learning readiness to learn the Embedded System Design course using Rasch model. A survey was carried out among engineering undergraduate students (415). Content validity was conducted and a pilot test was performed to measure the scale reliability. Rasch analysis using WINSTEPS 3.92.1 was used to measure the scale construct validity, with results showed that all the scale items fit the Rasch model with acceptable fit index (0.60 - 1.40) and demonstrate excellent consistency, with reliability of 0.98 and 0.78 for item and person respectively indicating a valid and reliable scale. The results indicate that the students lack lifelong learning skills, which can inspire their natural curiosity, creativity and enable them to develop their personal learning needs. Therefore, there is a need for universities to take remedial action to equip the students with the required lifelong learning skills.

Keywords: *Embedded-System Design, Lifelong learning, Rasch analysis, Readiness, and instrument development.*

1. INTRODUCTION

Higher education institutions are currently faced with the task of producing engineering graduates who are relevant in the twenty-first century, which is distinguished by rapid technological advancement and information generation in the embedded systems sector [1, 2-4]. As a result, learners must be able to adapt and learn new abilities in order to stay up with these developments. As a result, lifelong learning has become a more crucial phenomenon in the future knowledge society. To address these issues, higher education institutions place a strong emphasis on lifetime learning skills in their curricula. They strive to equip students with the necessary abilities to develop their individual learning needs, strengthen their ability to learn for themselves and appraise the learning of others, and educate them to manage and prosper in such a dynamic world.

The field of embedded systems design has undergone remarkable growth in recent years. It emerged as a leading sector in the manufacturing sector due to their wide range of applications and contributing significantly to many countries export growth [5, 6]. This growth motivates the higher education institutions to offer the embedded system design course in their undergraduate Electrical & Electronics and Computer Engineering curriculums to produce a steady supply of skilled talent, both in numbers and in the appropriate skills sets, to meet the present and future needs of the sector. Embedded system remains a challenging and specialized course, despite current efforts in embedded system education, because it requires students to have a thorough understanding of earlier

body of knowledge courses in both theory and practice [7, 8]. Higher education institutions, as a result, expect their students to be on the cutting edge of research and technology. They must continually review their curriculums and introduce emerging techniques, technology, practices, and applications to the students as well as to encourage them to further their knowledge through lifelong learning [9]. Lifelong learning refers to the learners continuing search of knowledge to build their skills, explore new ideas and enhance their understanding [10]. It keeps the learners desire to acquire new knowledge outside of the formal education system. The lifelong learner must acquires the ability to research, evaluate, and synthesize the information. In addition, they need to develop curiosity, imagination, resilience and self-regulation as well as to respect and appreciate the ideas, perspectives and values of others [11]. Therefore, this paper discussed the development and validation of a scale to measure the student's lifelong learning skills for embedded systems design course using the Rasch analysis. It produced a measure to be used as a foundation to identify the body of knowledge gap in the higher education institutions curriculums and incorporate these requirements into the course curricula, teaching and assessment.

The following is a breakdown of the paper's structure. The research approach was fully addressed in the second section. The findings were carefully described in the results section. A conclusion was reached at the end of the research.

2. METHODOLOGY

The study used exploratory empirical design to evaluate students' lifelong learning skills readiness to learn embedded systems design course [12]. Empirical research is one that used empirical proof as a method of obtaining knowledge by means of direct and indirect observation or experience, which can be analysed quantitatively or qualitatively [12]. The researcher has integrated qualitative and quantitative methods in a single study of analysis to better answer the research questions in order to achieve the objectives. The research, which have been defined as the comprehensive method of gathering and analysing data to provide in-depth understanding of the subject in which there is interest, is a significant element of the empirical study and the total success of the study. The research design plays an important role and may influences the total success of the study, is classified as causal, exploratory, and descriptive. Given that this issue is new, the methodology is flexible, collected data analysed quantitatively [13].

Data was collected from engineering undergraduate students in nine universities, whereby 426 eligible respondents were invited to complete the survey questionnaire. A total of 415 questionnaires were returned to the researcher (the response rate was 97.1%). The survey scale asked respondents to indicate their level of agreement or disagreement with a series of four item (LL1-LL4) shown in Table I related to lifelong learning readiness for embedded system design course. This instrument utilized a five-point rating scale: 1=Strongly Disagree, 2=Disagree, 3=Somewhat Agree, 4=Agree, 5=Strongly Agree.

Content validity index (CVI) and content validity ratio (CVR) were used to assess the content validity quantitatively [14, 15] via panel of experts as an initial evidence on validity of the instrument. CVI and CVR were used to measure both the items level (I-CVI) and (I-CVR) and the scale-level (S-CVI) and (S-CVR). Then, a pilot test was performed using SPSS 23.0 to measure the scale reliability using Alpha reliability to examine the internal consistency of scale items by examining the average inter-item correlation. Next, Rasch analysis using WINSTEPS 3.92.1 was performed to evaluate the structure of the measurement scale. The construct validity was examined by measuring the scale statistical analysis, unidimensionality and local independence and Wright map. Finally, the students' lifelong learning readiness to learn the embedded system design course was analysed using SPSS 23.0 and WINSTEPS 3.92.1 [16].

TABLE 1: Lifelong learning scale items

Item	*Label*
LL1	*I am able to identify problems in any situation and make justifiable evaluation.*
LL1	*I am able to work in different environments.*
LL3	*I am able to adapt to the varied working environment.*
LL4	*I am able to relate daily life activities to my course materials.*

3. RESULTS AND DISCUSSIONS

3.1 Content Validity

A panel of thirteen experts reviewed the initial version of the scale. The experts' response on the scale is shown in Figure 1. The result shows that the I-CVR and I-CVI ranging from 0.69 to 1.00 and 0.85 to 1.00 respectively. The S-CVR is 0.85 and S-CVI is 0.92, which proves excellent content validity. All of the members of the panel agreed that the scale could adequately measure the students' lifelong learning readiness to learn the embedded system design course.

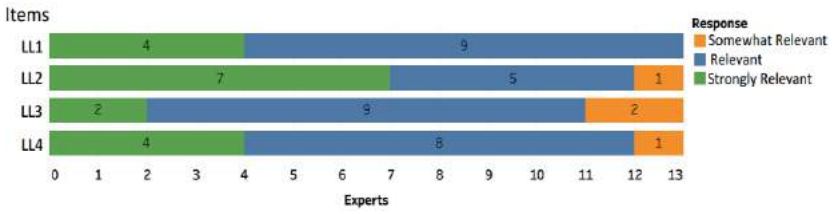

Fig.1. Experts' response of lifelong learning skills scale

3.2 Pilot Test

A pilot test was conducted by collecting data from 40, fourth year, Universiti Teknologi Malaysia (UTM) students using a paper format survey. Data collected from pilot test was analyzed using Statistical Package for Social Sciences (SPSS) 23.0. A reliability coefficient (alpha) of 0.70 or higher is considered acceptable [3]. The result shows the scale Cronbach alpha is 0.79 indicating excellent scale reliability. All the scale items have good item correlations, indicating that all items are consistent with each other as shown in Table 2.

Table 2. Cronbach alpha of lifelong learning skills scale

Item	*Corrected Item-Total Correlation*	*Cronbach's Alpha if Item Deleted*
LL1	*0.537*	*0.78*
LL2	*0.532*	*0.78*
LL3	*0.742*	*0.67*
LL4	*0.652*	*0.73*

3.3 Construct Validity

3.3.1 Statistical Analysis

Table 3 shows the results of the person reliability is 0.78, item reliability is 0.98, and 0.79 for Cronbach's alpha indicating that the scale has an excellent item and person reliability. The person MNSQ INFIT and OUTFIT values are 0.96 and 0.97 respectively. The person ZSTD INFIT and OUTFIT values are both -0.3. While, item MNSQ INFIT value is 0.98 and MNSQ OUTFIT is 0.97. MNSQ INFT and OUTFIT values for person and item are within the acceptable range of 0.6 to 1.4 and around one (1), suggesting that data has a good alignment to the Rasch model [17]. The item ZSTD INFIT value is -1.1 and the ZSTD OUTFIT value is -1.3, which are within the acceptable range of -2.0 and +2.0 [16]. The scale item separation is 7.73, indicating there is enough data samples to distinguish the item difficulties. The person separation is 1.86 resulting in strata value of 2.8, indicating that the scale is able to distinguish three (3) level of person lifelong learning abilities as suggested by Linacre [16].

Table 3. Summary of lifelong learning skills scale analysis

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	11.5	4.0	-.25	.97	.96	-.3	.97	-.3
P.SD	2.7	.0	2.44	.17	1.18	1.4	1.21	1.4
S.SD	2.7	.0	2.44	.17	1.18	1.4	1.22	1.4
MAX.	20.0	4.0	8.29	1.95	7.81	4.0	8.11	3.9
MIN.	4.0	4.0	-8.75	.86	.10	-2.0	.09	-1.9
REAL RMSE	1.16	TRUE SD	2.15	SEPARATION	1.86	PERSON RELIABILITY		.78
MODEL RMSE	.98	TRUE SD	2.23	SEPARATION	2.27	PERSON RELIABILITY		.84
S.E. OF PERSON MEAN = .12								
CRONBACH ALPHA = .79								

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	1190.8	415.0	.00	.09	.98	-1.1	.97	-1.3
P.SD	91.2	.0	.80	.00	.42	6.3	.42	5.8
S.SD	105.3	.0	.92	.00	.49	7.2	.48	6.7
MAX.	1263.0	415.0	1.34	.10	1.52	6.4	1.46	5.3
MIN.	1038.0	415.0	-.62	.09	.52	-8.4	.50	-8.2
REAL RMSE	.10	TRUE SD	.79	SEPARATION	7.73	ITEM RELIABILITY		.98
MODEL RMSE	.09	TRUE SD	.79	SEPARATION	8.50	ITEM RELIABILITY		.99
S.E. OF ITEM MEAN = .46								

3.3.2 Unidimensionality and Local Independence:

Table 4 shows the unidimensionality results of the scale. The amount of variance explained by different components in the data is 62.6% with 44.6% explained by persons and 18.0% explained by items, unexplained variance in the first contrast of 17.7% resulting in a ratio of 3.54:1, which meets the 3:1 criterion for unidimensionality [16]. The scale eigenvalue is 1.89. Additionally, the results show that the residual correlations of all the scale items are less than 0.7, posing no violation of the principle of local independence [16]. As a result, the lifelong learning skills scale items are locally independent (residual correlation < 0.70) and there is no redundancy of items in this scale. These Rasch analysis findings indicate that the scale is a unidimensional construct.

Table 4. Standardized residuals of lifelong learning skills scale

Lifelong Learning Skills	*Empirical (Observed)*		*Modeled (Expected)*	
Total variance in observations	*10.71*	*100.0%*		*100.0%*
Variance explained by measures	*6.71*	*62.6%*		*61.5%*
Variance explained by measures(Persons)	*4.78*	*44.6%*		*43.9%*
Variance explained by measures (Items)	*1.92*	*18.0%*		*17.6%*
Unexplained variance (Total)	*4.00*	*37.4%*	*100.0%*	*38.5%*
Unexplained variance in first contrast	*1.89*	*17.7%*	*47.3%*	

3.3.3 Wright Map:

Figure 2 illustrates that all the scale items fit the model well (-2 to +2) t value as suggested by Bond and Fox [17] and there is no redundancy or overlap in the items. The person mean of the scale is -0.25, indicating low competencies in lifelong learning skills among the respondents. Item LL2 that is located at -0.62 logit is the easiest item of the scale endorsed by the respondents. Meanwhile, item LL4, which is located at +1.34 logit, is the hardest item.

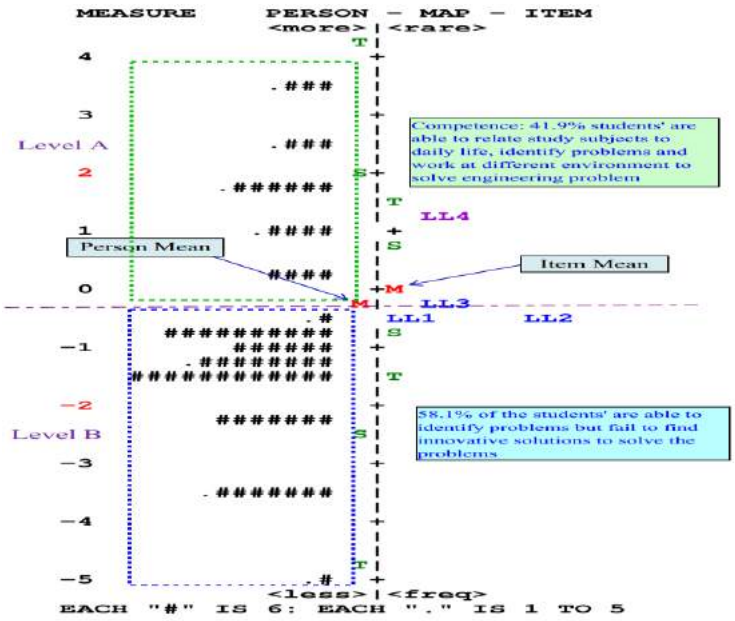

Fig.2. Wright map of lifelong learning skills scale

3.4 Students' Readiness

Wright map readiness result of the scale is shown in Figure 2. The map indicates that there are 41.9% of the respondents in level A, who endorse all the scale items, suggesting that they have developed the basic lifelong learning skills. However, over 58.1% of the respondents are in level B, who could endorse only two items of the scale (LL1 and LL2). This result indicates that a majority of the students could identify the problems but fail to find innovative solutions to solve the problems. In addition, they lack the lifelong learning skills to enable them to relate the course to their daily life problems and the real business.

4. CONCLUSIONS

By measuring students' lifelong learning skills, this study produced a reliable and valid scale to measure their preparation for the embedded systems design course. The results showed that the scale was both valid and reliable in assessing student readiness. Furthermore, the data reveal that the students lacked lifelong learning capabilities and were thus unprepared to master the embedded system design course. They lack the ability to recognize and evaluate difficulties in any setting, as well as the ability to adapt to a variety of work environments. They are also unable to connect everyday life activities to their course topics. As a result, higher education institutions must become more aware of the entire scope of the embedded system problem as it affects undergraduate students.

ACKNOWLEDGEMENT

I want to grate everyone, who has supported the creation of this work. Special thanks to my late supervisor Dr. Rosmah binti Ali for her dedication and continuous support. This research work would not have been possible without her help and guidance.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Artificial Intelligent Applications for Mental Health Support: A Review paper

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Abstract— Mental health is every human's right. Physical health cannot be achieved without a healthy mind. Good mental health helps dealing with the stress of life, affects physical health, and allows building and maintaining strong human relationships. Individuals with a healthy mind can be a valuable part of society and contribute to their community while feeling fulfilled and satisfied. While its importance is obvious, almost everyone at some points in their lives faces some life-altering experiences that could challenge their mental health, such as trauma, abuse and family problems, genetics, and lifestyles. At the moment, the treatment options are majorly limited to attending psychotherapy, medical therapy, and self-help.

Unfortunately at the moment, the option of attending a psychotherapy session is not available or affordable for everyone around the world. Also, accessibility to professional therapists is limited. Besides that even though therapists are trained to be unbiased and fair, it is always harder for humans to overcome their personal preferences and biases. Sometimes that is way easier to control and manipulate with machines. This paper will review the latest advancements in technology, from mobile applications to robots, that are designed to help with mental health matters.

Keywords: *Artificial Intelligence, Machine Learning, Mental Health, Therapeutic Chatbot, Deep Learning Approaches.*

5. INTRODUCTION

The World Health Organization (WHO) reported in January 2020 that more than 264 million are suffering from depression. It also mentioned depression as the leading cause of disability, and it may lead to suicide [1]. After the COVID-19 pandemic, WHO reported in October 2020, that based on their recent survey, less than 1% of international budgets for health is dedicated to mental health. While during the pandemic mental health services were disrupted in 93% of countries around the world [2].

The National Institute of Mental Health reported that more than a quarter of American adults face some sort of depression or anxiety every year [3]. Based on the study done in 2017 on 273,203 individuals in Malaysia, more than 6.7% of them were suffering from some level of depression [4]. The National Health and Morbidity Survey (NHMS 2019) reported, almost half a million Malaysians are experiencing some signs of depression. Also, 424,000 children are facing mental health issues [5]. Based on a Kaiser Family Foundation poll, about half of American adults are concerned about the effects of the COVID-19 pandemic on their mental health [6]. It can only conclude, the increase of depression and mental health in Malaysia as well.

More than 165,000 healthcare apps are available in smartphones app stores at the moment, of which only 6% are related to mental health matters [7]. As mentioned in the UNHCR's Sustainable Development Goals (SDG), Fig 1, SDG1: no poverty, SDG2: no hunger, SDG3: good health and well-being and SDG16: peace and justice are every human being's right. UNHCR published an article in May 2018, "Mental health is a human right". The complication of participating in daily activities such as attending school or work, personal and communal responsibilities with an ill mind is mentioned. Mr. Dainius Pūras states while it is evident "there cannot be health without mental health", there still is not merely as much attention and budget allocated to it compared to physical health anywhere in the world [8].

Fig 1. UNHCR's Sustainable Development Goals [9]

Cognitive Behavioral Therapy (CBT) is a known empirically-supported treatment that implements several cognitive and behavioral interactions [10]. The ideology of CBT relies on the importance of inaccurate beliefs and mindsets, dysfunctional information processing, and behavior in the etiology of depression [11]. So during a therapy session, cognitive-behavioral techniques are introduced and practiced, with homework assignments to internalize the new mindsets [12]. Hence these sessions are mainly conversational, making the CBT technique perfect for this project. The chatbot will have conversations with the user to readjust their beliefs and mindset while keeping their assignments and progress.

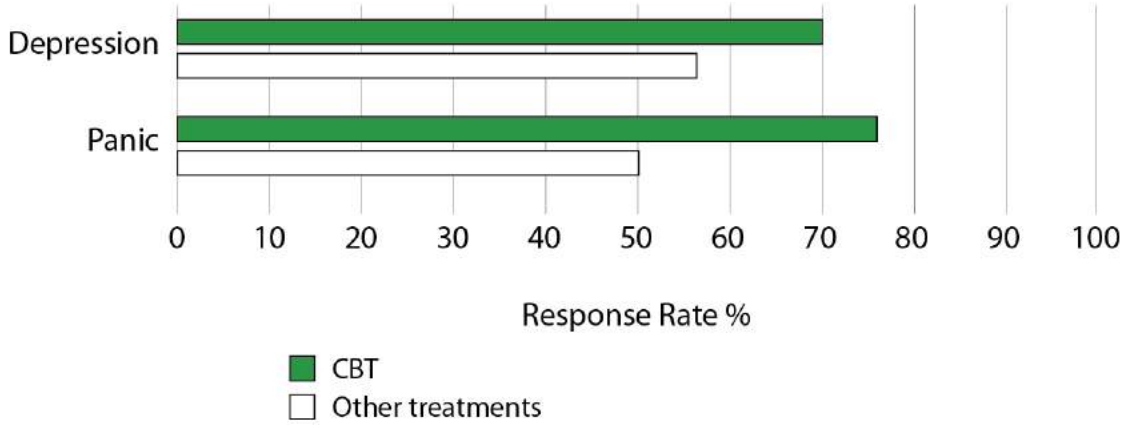

Fig 2. The effectiveness of CBT compared to other treatments [13]

In the following section, this paper is going to analyze the conventional available methods of mental health diagnoses and treatment in Malaysia. After that, an array of popular applications are compared and discussed. In section 3 different methods analyzed earlier are going to be discussed and compare. Finally, the paper is concluded and some future works are suggested.

6. RELATED WORK

There are different methods available to help improve one's mental health. In this section, first, the costs of available therapy and consultation sessions, online and in-person are compared. Then some of the available chatbots apps and robots in the market are discussed.

6.1 Conventional Methods

Based on an article published in a personal website in October 2018 [14], while the cost of seeking treatment in a Malaysian government hospital can be as low as RM15 per session, patients are required to have a referral letter from a general practitioner and they will not receive consultation from a psychotherapist but a medical doctor. This is not a long term solution for a serious problem. Attending a private therapist can cost between RM200 and RM500 per session. While this is an effective solution, unfortunately not affordable for everyone.

6.2 Online Consultations

More affordable and accessible psychotherapy sessions are available through online applications. During the sessions, patients would have a conversation with a certified therapist via text or voice call. Betterhelp, figure 3, and Talkspace are examples of these applications. Betterhelp charges between $60 to $80 per week [15] and Talkspce between $35-$80 [16]. While fairly more affordable, still expensive for some and reliable on the therapists' accessibility.

Fig 3. Betterhelp application [33]

6.3 AI Robots and Applications

In the following, some of the applications that are mainly free and don't require an active therapist to function will be discussed. Table 1 compares their methods, findings, and gaps.

- Catch It [17]: This is an android app collaboration project between the Universities of Liverpool

and Manchester, using the Deployment of Kohonen's SOM (Self Organizing Maps) algorithm for CBT to treat personality disorders. Even though this application is one of its kind in the field of using Cognitive Neuropsychology and Artificial Neural Networks, users find it limiting since it mostly just records your moods and suggests you find the triggers yourself. Also, the features of the application mostly look like a form that the user should fill up as mentioned by the developers as close-ended questions, Fig 4. As of December 2020, the application's rated 3.8/5 by 141 users in Google Play Store.

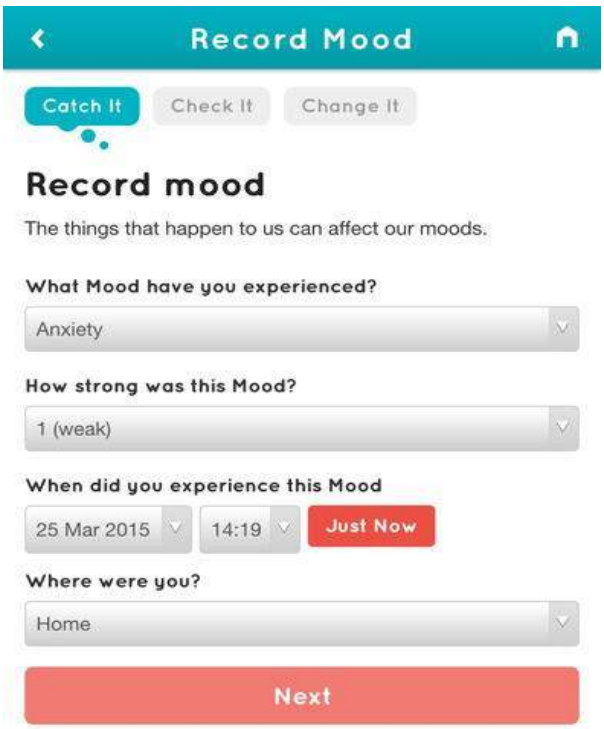

Fig. 4. Catch It app [17]

- Ryan the Companion Bot [18]: Ryan is a Socially Assistive Robot, developed using Program-R, a dialogue management system, using CBT to treat depression designed by a team of engineers in the University of Denver. It also analyzes the user's spoken responses and facial expressions. Based on the results of treatments attained by Ryan, it is not yet a viable alternative to therapists. Also since it is a physical robot, it still would not be accessible to a wide range of users.
- Youper [19]: This application uses CBT, Commitment Therapy, and mediation to help with anxiety and stress. Though the application receives good reviews in app stores, 4.9/5 in Apple App Store as of December 202, there are no studies or research published by the team to prove its efficacy. This application is a chatbot that mostly allows you to respond using limited options. So technically the user is taking a multiple question quiz rather than converting with the chatbot using their own words. Technically Youper is an example of an expert system designed with the help of therapists, figure 5.
- Appsiety [20]: This is not a published app, so it is not available for testing. Based on the paper published, it is mainly a platform that would be used by patients while already visiting a therapist. This way they can provide more regular updates and be easier in touch with therapists. Though it is a useful app in the sense of more regular documentation and communication between the patients and therapists, it is not a useful tool for situations that no therapist is available.

Fig 5.Youper

- T-Bot [21]: It is a therapy chatbot that helps to detect depression severity and suggest remedies for self-improvement. Though it provides a lot of techniques and helps users to find their depression level, it is not able to proceed with a conversation as much as providing techniques instead. It is basically up to the user to learn and implement the techniques they like.
- Replika [22]: This is a popular generative bot that can have a meaningful conversation with users while remembering and recalling the conversions afterward. It clones the user's conversion and messaging behaviors and slowly learns to talk similarly. While technically it is showing great results as a spoken system, hence it doesn't hold any expertise in mental health matters, it is not recommended to be used instead of seeking professionals. In some senses relying on its responses might be dangerous because it would learn what the user likes to hear which means it can even possibly encourage the user to pursue a wrong decision just because the user would enjoy this encouragement. In short, it would tell you what you like to hear but not what you need to hear.

Table 1. Table of comparison

No	***Research work***	***Methods***	***Findings***	***Gaps***
1	*Catch It, 2014 [17]*	• *Deployment of Kohonen's SOM algorithm for CBT to treat personality disorders*	*- Records modes and keep diary* *- Help users to find triggers* *- 3.8/5 rating in Google Play app store by 141 users*	*- UI is just filling a form without flexibility* *- The bot's responses are vague and useless based on users comments*

		• *Cognitive Neuropsychology and Artificial Neural Networks*		
2	*Ryan the Companion Bot, 2017 [18]*	• *Uses Program-R, dialogue management system, using CBT to treat depression* • *Analyzes spoken responses and facial expressions*	- *Improved depression and dementia in elderly users* - *Can engage with users*	- *Since it is physical, not widely accessible* - *Considers as a companion, not a therapist* - *Mainly for entertainment at this stage*
3	*Youper, 2016 [19]*	• *Uses CBT, Commitment Therapy, and mediation* • *Example of an expert system designed with the help of therapists*	- *Users self-reported improvement in their anxiety and stress* - *4.9/5 rating by 14.2K users in Apple app store*	- *No studies were released to prove its efficacy* - *Quiz-like* - *Mainly uses documentation and self helps on different issues*
4	*Appsiety, 2019 [20]*	• *Uses build om sensors to collect users activities that can help therapists* • *The System Usability Scale (SUS) used to assess users*	- *Helps keeping track of patient already attending therapist*	- *Not published, so can't be tested* - *Don't benefit those who don't have access to therapists*
5	*T-Bot, 2018 [21]*	• *PHP module using the A.L.I.C.E. technology* • *Based on Program E*	- *Provides treatments methods* - *A more interactive way of self-help/ tutoring*	- *Does not include a spoken system* - *Users can't have a meaningful conversation with the bot* - *Not available to the public*
6	*Replika - 2017 [22]*	• *Neural Networks* • *Generative chatbot using natural language interfaces*	- *Great in making meaningful conversations* - *Remembers the conversations and clone the behavior of the user* - *4.7/5 by 1.9k users in Apple app store*	- *No expertise in mental health or any specific ethical values* - *No published evidence of improvement in mental health*
7	*Woebot: your self-care expert, 2017 [23]*	• *By Stanford psychologists and AI experts* • *Web-based CBT* • *Conversation Management System* • *NLP*	- *Based on a study on university students, a significant reduction in depression, PHQ-9 (F=6.47; P=.01) and anxiety GAD-7 (F1,54= 9.24; P=.004)* - *4.9/5 rating by 28 users in Apple app store*	- *Based on users feedback, responses are mainly generic, script-like* - *Not generative*
8	*COVID Coach, 2020 [24], [25]*	• *By US Department of Veterans Affairs (VA)* • *Secure privacy protections*	- *Educating on the pandemic* - *Great tool for self-help* - *Mood and goal tracking* - *4.8/5 rating by 524 users in Apple app store*	- *Does not include chatbot* - *Just a self-management tool* - *No studies on its effectiveness*

9	*Wysa: Mental Health Support, 2015 [26]*	• *Conversational AI Agent* • *CBT* • *NLP an emotional balance*	*- Have an online session with a professional coach* *- As reported by developers, 93% find it helpful* *- Best stress app of 2019 by Apple* *- 4.9/5 rating by 131 users in Apple app store*	*- Possible availability and bias issues from the coaches for the professional sessions* *- Only about 20% cheaper than face to face therapy* *- Vocal conversations with chatbot not included*
10	*Naluri , 2017 [27]*	• *Malaysia base* • *A platform for healthcare providers to communicate with patients/ messenger*	*- Easy accessibility* *- Variety of coaches, including psychotherapists and dietitians* *- 4/5 by 16 users in Apple app store*	*- The application still immature with bugs based on comments* *- Possible availability and bias issues from the coaches*

7. DISCUSSION

The concept of employing software technologies to help mental health is not new and the AI chatbot technology goes back to the 1960s. While through this time their complexity and involvement in mental health have improved, still the majority of the available solutions concerns psychoeducation [28]. Psychoeducation concentrates on educating the patients and their families with the relevant knowledge [29]. While based on studies it helps destigmatizing mental health disorders and usually has a positive impact on patients, the effectiveness and quality of this method is not well documented and the knowledge might not be appropriate for all individuals.

While using mobile applications might increase the chance of regular checking from the patients due to notifications, it might as well lead to information overload and less interest in using the application[30]. Information Seeking Anxiety (ISA) happens when there is a gap between what a person understands and what a person thinks they should understand [31]. Overwhelmed by the amount of information receiving from the application, the user may experience ISA and stop learning about mental health.

When it comes to chatbots and other AI applications the biggest concern is the lack of clinical standards and regulations [32]. There is an immediate need for transparency and accountability regarding AI applications. Analyzing the available applications can help create an informed path on how to protect patients and their personal information.

In terms of efficacy, a mental health application, like other treatment techniques, must undergo extensive testing before being recognized as a clinically effective tool. Unfortunately, only a limited number of chatbots have been clinically tested under specific circumstances. Based on those studies AI applications proved to have positive impacts on patients with depression and anxiety. The efficiency of therapeutic treatments included in chatbots is also a factor to investigate. CBT is one well-known example of an anxiety and depression treatment that has been demonstrated to be helpful both in-person and online. Although app designers have espoused the potential usefulness of mental health apps, specialists are hesitant to suggest them without more information about their efficacy. Because there is currently no empirical research on mental health apps, evidence-based suggestions and suggestions for many tools, including chatbots, cannot be provided.

CONCLUSION

The primary intent of mental health apps and AI chatbots is to aid individuals, and there is a demonstrable demand for support in the mental health field. As previously stated, mental health physicians are in limited supply, with certain locations lacking any certified mental health doctors. People may be unable to see a mental health clinician in the degree or frequency that they require. People with lower earnings, such as teenagers, the seniors, ethnic and racial minorities, and other vulnerable groups, are particularly affected by these inequities. Stigmatization adds to the situation by discouraging people from obtaining medical assistance.

Mental health AI chatbots have the capacity to assist relieve the shortage of mental healthcare, but their lack of

user-centered architecture, efficacy, protection, and privacy make them a risky option.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Higher Education in the Wake of Covid-19: Prospective Lessons

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Abstract— The current system of higher education has been hardly hit by the Covid-19 pandemic as revealed by the closure of most schools, institutes, and universities all over the globe. In unprecedented manner, millions of students had to resort to virtual learning with the very active physical classroom reduced to a few inches computer screen. Faculty and instructors found themselves forced to deliver their online lecturing using technology with the highest efficiency in a very short period. Both sides of the financial ledger, revenue and expenditure, suffer the impact. Administrators found themselves in an unenviable and gloomy situation with the highest degree of uncertainty and a need for swift decision making.

It is a fact that the pandemic revealed not only a very fragile global health system, but also an educational systems and administrative mechanisms that were not generally resilient or robust. Most educational systems were operating without any exigency or crisis-mode plans. Even worse is the fact that some top-leaders in academic institution were generally not cognizant with the required technical leadership skills in crisis environment.

This contribution attempts to highlight some important lessons related to higher education inspired by the already accumulated Covid-19 pandemic experience. Towards this end, the article will first endeavor to underline a set of inaccurate assumptions made by academic leaders in their handling of the crisis, which in some cases, reflected in an unpleasant way on the students and their families. The Covid-19 pandemic disclosed to a certain extent lack of robustness in the current higher education systems in facing exigencies, a thing that necessitates the availability of contingency plans for maintaining robustness and to ensuring resilience. The article will then present some important lessons inspired by the crisis.

Keywords: *Higher education, Covid-19, future challenges, pandemic effects*

1. Introduction

In view of the intricate interconnected networks spreading through our modern life on a global scale, COVID-19 becomes one of the unique crisis hitting humanity during the last 100 years. The Pandemic has made it clear that life activities, including education, can no longer run as usual. The Pandemic was very peculiar in its far-reaching ramifications related to higher education because it struck all aspects of the education ecosystem including the corporeal (revenue, expenditure, enrolment, mobility) and the incorporeal (equity, social values…) aspects. Therefore, it becomes incumbent on all leadership circles in higher education to extract fully the lessons from the crisis in order to have in place an optimum exigency plan capable of creating a resilient system that is firmly rooted and immune towards similar shocks. There is no doubt that this crisis has stimulated creativity on a widespread scale, but especially within the education systems [1-2].

The Pandemic will have many short-, medium-, and long-term effects on the higher educational ecosystem [1]. Some of these effects are on the boon side and others are on the bane side. At the end, however, there has been a radical shift in the mindsets for enhanced robustness and resilience. Although many educational institutions have risen to the occasion in a record time scale, many others will have to identify new sustainable strategies to help young people get their education under environments of uncertainty and rapid changes. The pandemic has made the central role of education in the social, economic, and political dimensions of nations so obvious and well understood. There is no doubt that the Pandemic brought with it some other positive consequences including cleaner environment, healthier lifestyles, rise of delivery services and adoption of modern technologies. This empowered and accelerated the progress and implementation of IoT (Internet of Things) and AI (Artificial Intelligence) towards more smart delivery services. The move to total online instruction happened remarkably swiftly, contrary to the previously prevailing perception that education-related changes are very slow in pace [3,4].

This contribution attempts to highlight some important lessons related to higher education that are inspired by the Pandemic. The article will first endeavor to underline a set of incorrect assumptions invoked by academic leaders in formulating their urgent plans to combat the effects of the Pandemic. The Pandemic revealed to some extent a lack of robustness, a thing that necessitates the availability of contingency plans to maintain robustness and to ensure resilience. In the second place, therefore, the article will attempt to present some important lessons that need to be remembered for building a robust contingency plans in case of other similar crises.

2. Covid-19-The Cruel Mentor

In this section some lessons, as perceived by the author's personal view, are presented. In no way this represents an exhaustive enumeration of lessons relevant to higher education as inspired by the Pandemic. On the contrary, the list of lessons in this regard seems to be continually populated.

1. Never cross Universe Red-Lines

Let us imagine how tough would the debate be if humanity had to agree on reducing air traffic to get the planet blanket atmosphere cleaned by 10% of its poison-laden contents! The ongoing argument on climate change can shed some light on the impossibility of such a task. With the new invading and unwelcome visitor, Mr. Covid-19, humanity raced to shut down their air traffic to block the (massless) visitor from entering territories! Consequently, the already trudged planet found some respite to clean some of human dirt expelled into its ecosystem, "*Cities are seeing a notable drop in their air pollution. Northern Italy saw a clear decrease of its nitrogen dioxide concentrations, as highlighted by the ESA, and the same can be said of other European cities under lockdown*" [5]. This is a good example of the effort that humanity would have to take to cut other outlets of toxic materials in other industrial sectors like oil and gas, power generation, transport systems, etc.

The chances are very slim that humanity will come voluntarily to a consensus on policies to preserve the planet. Thus, the whole ecosystem may become under threat at some points. It is here, i.e., when red-lines set by the Great Creator, are intentionally and recklessly crossed, that the built-in physical laws will start acting using its provided self-regulating mechanisms and rules provided by the Great Creator. This is one of the consistent rules that never failed whenever humankind abuses his relation with the planet and the norms of instincts. Verse 59-Surat Al-Kahf in the holy Quran translates to "S*uch were the populations we destroyed when they committed iniquities"*. Around that meaning also verse 41-Surat Al-Room tells that "*Mischief has appeared on land and sea because of (the deeds) that the hands of men have earned that God may give them a taste of some of their deeds in order that they may turn back*. The severity of corrective actions taken by the universe according to its mandate is proportional to the size of intentional transgression of such red lines. This test of Covid-19 could be much tougher a test in case humankind insists on unjustly challenging the universe.

Therefore, at a time when everyone engaged in academia is emphasizing the importance of liberal arts in modern education curricula, it is worthwhile to include at least one educational outcome that implants consciousness in our future generations that this universe is having hands that can punish irresponsible behavior when its norms and red lines are crossed.

2. Predictive models with bad assumptions are worthless

In view of the lack of preparedness for crises like that of Covid-19, most academic leaders in higher education institutions found themselves in need to take rush decisions based on their predictions of consequences of the prevailing crisis. Thus, based on some assumptions, they adopted action plans that incurred certain costs. Unfortunately, most of these assumptions turned out not to be accurate at best. Following is a sample of such assumptions, which in some cases, misled leaders in higher educations:

2.2.1 Financial crisis is imminent due to certitude enrolment drop.

Experts and observers in higher education anticipated serious drop in enrolment following travel restrictions and lockdowns. Several specialized research institutions issued reports, which almost all endorsed the gloomy point of view of a sharp revenue loss because of enrolment crisis [6]. Many scholars in educations portrayed a very pessimistic picture for higher education institutes. Some anticipated that most small-size institutes would lose ground for the giant ones [7]. However, for more than a year so far when students are away from their schools, the picture turned out not to be that dark. Many universities and colleges, which expected at least 20% loss of revenues, interestingly encountered much less losses and in some (rare) cases, the opposite was the case [1]. Good

news of course, but it would have been much more in order if realistic predictions were made. More reliable and systematic anticipatory process for such crises would have saved a lot!

2.2.2 Online education can subsume normal classroom delivery

Online education was assumed the most reliable substitute for the direct face-to-face education, and it really is. Some researchers went further in anticipating that the future will be totally for virtual learning. Soon it became clear that on-line learning is not without a price because education is not mere data processing. Scores of studies poured into the open literature contrasting online education to the classical classroom teaching/learning [8]. Furthermore, some arguments against the effectiveness of online education in critical thinking and social practices have surfaced [9]. This put back things into perspective regarding the relevance of physical education in a normal classroom.

2.2.3 Face-to-face classroom is coming back soon

All institutes that worked on that premise soon realized how erratic an assumption that was. Some schools that shrugged the seriousness of the pandemic scrambled to the extent that they suffered loss of their students because of the way they handled the pandemic. It is interesting to note that students, who did not go back to their schools, cited as their top reason for that to be the way their institutes handled the pandemic [10]. Had these institutes had a robust predictive model under such crises, they would have done a better job.

2.2.4 Students would prefer online teaching/learning

For many different reasons, quite the opposite of this assumption was the case: students at home are very passive knowledge receiver with no human interactions with faculty, administrator, or peer students and friends. All social activities suddenly disappeared from dining with a friend, attending a public lecture, seminar, or debate or any of what used to be very vigorous career fair activities. Many institutes found themselves in need to do something in this context by keeping their students engaged so as not to reach a tipping point where they may go for another alternative, such as going to shorter programs like community colleges or so. Parents also added to the complexity of this in becoming more of anxiety about their children study programs. All of these factors invalidate the assumption that students would love the virtual education business. This represents an important lesson that normal classroom teaching/learning is staying.

2.2.5 The Pandemic hits all equally

Not true at all! The assumption that all students have favorable conditions at home masked a very sad aspect of that crisis for many underrepresented students and physically/mentally retarded students. Several students, especially in developing countries, suffer from not having a suitable place in the house, not having the needed internet connection, or at least not having the required internet bandwidth, not having the needed hardware such as laptop, tablet, iPhone or tablet, or even not having the suitable time slot because of home country time zone difference. The lack of invoking all possible scenarios for audience students contributed to the uncertain environment of academic leaders who had to put in place swiftly an action plan for that commencing threat [9,11].

2.2.6 By their very nature, changes in higher education are slow

Changes in higher education systems are perceived to happen at a very slow pace. Plans to introduce online teaching in institutions with no pre-experience would have spanned a very long time in their planned Gantt chart. Many institutes showed a very fast response where virtual platforms were adequately functioning for students, faculty, and staff. Higher education systems in general showed a good degree of resilience and the crisis almost was absorbed with the least damaging consequences. On the other side, there were some institutes with inadequate resources or readiness to catch-up with the overall wave, and thus found themselves behind.

2.2.7 Higher education institutes are sluggish in their response to help their communities in crises

The pandemic showed unequivocally that the degree of loyalty higher education institutes have towards their communities is very high. The world of higher education responded innovatively, rapidly, and responsibly to the crisis as it emerged. They rushed into help at all possible aspects ranging from helping families in their stumbled financial situation for due education tuitions to heavily indulging in research efforts in the medical and health-care sectors. Huge emphasis was put on research related to vaccines and development of suitable sanitizers and

hygienic materials. Universities and research institutes championed most of awareness campaigns towards spreading scientific facts in the face of huge waves of rumors and distorted information. The importance of higher education institutes and research centers in the economic, social, and political prosperity and stability of nations gained much greater appreciation and understanding by the general population.

3. Virtues of physical classroom education are appreciated and highly valued

One of the positive outcomes of Covid-19 onslaught on the education landscape is that it has put into perspective the contrast between physical classroom education and the online education in a way that brought forward many overlooked or unappreciated virtues of the former. No one argues against the several merits that online education may have in contrast to the normal physical classroom education such as: 24/7 access to learning materials (e.g., module contents, assignments, lecture materials, recorded sessions), availability of assistants, flexibility in designing teaching schedules, flexibility in assessments methods, and agility. In spite of these undeniable merits for online education, there has been a counter argument against it as presented in section 2.2.2 above [8,9]

The physical interaction with teachers and peers, which is involved in the physical classroom learnings, however, has never been considered to have that pivotal importance as compared to the passive virtual environment. It is true that there is human interaction in the virtual education, but it happens online via virtual lectures, virtual discussions, face-to-face video workshops etc.

4. Anticipatory, horizon thinkers are the leaders of tomorrow

The pandemic has made it essential to engender a vision for the future of higher education, that is, a vision that will render the educational system resilient and robust in dealing with shocks such as the current Pandemic. A target-driven path for capitalizing on the accumulated experience is in order. The crisis has tested the leadership skills of academic leaders in an unprecedented way, where swift and effective decisions have to be made to protect the health of the academic community and maintain activity continuity under uncertain constraints. Some leaders rose to the occasion and practice the highest levels of agility and transparency, thus having their constituencies on board in embracing their difficult decisions. On the other side, many other leaders took a bewildered approach that has left many students and their families in limbo, creating additional stress and anxiety, and in some cases even putting the lives of students in danger. Accurate data and early feedback from reliable sources, together with sheer anticipatory outlook, have never been in demand for academic leaders. This anticipatory character, together with horizon thinking capabilities, and tolerance for risk taking will be making the difference [11]. Many leaders may be inclined under crisis conditions like the prevailing Pandemic to consider decentralizing decision-making, thus allowing for practical and innovative solutions. Future leaders will have to endeavor to identify and seize the new opportunities offered by the current experience to build more resilient education systems [12].

5. Change will happen when the mindset happens

What was perceived to require a long time for its occurrence, happened in a record time; within one year most of the academic institutions were applying some kind or another of virtual teaching/learning. According to one global survey report issued by IAU (the International Association of Universities) on the impact of COVID-19 on higher education around the world [1], about 2/3rd of the responding institutions replaced classroom teaching by distance online learning; however, 60% of the universities worldwide reported online learning provisions in their strategic planning prior to COVID-19. Nevertheless, most higher education institutes coped swiftly with the new crisis and showed a reasonable degree of flexibility. Institutions that planned for hybrid teaching/learning provision never thought that the change would occur with that fast pace, thanks to the new mindset and determination that produced the required changes in a record time scale

6. IoT and AI will become an integral part of the educational process

IoT and AI technologies are touching almost all aspects of our lives-education is no exception of course. The prevailing Covid-19 pandemic, however, has crystalized further the role of this twin in higher education systems. The unprecedented use and reliance on online learning will invoke more of IoT and AI involvements in education. The pandemic reopened our eyes on several applications of IoT and AI in education in different areas. Examples of such areas are safety, resource and information tracking, smart learning, and enhancing financial efficacy. IoT and AI will play a pivotal role in education by creating an environment that supports the learning process in an efficient manner consistent with the learners' needs and expectations. Many advantages can be achieved through these tools including: creating interactive smart classrooms and smart labs, realizing personalized interactive models of education, stimulating learners' creativity, and real-time tracking of the students' cognitive activities [13]. IoT, because of its important characteristics such as connectivity, adaptability for control, sensing, analysis and forecast of states and events, can be utilized and employed as a framework for management of the educational process (training and evaluation) in higher education through automated tracking of students' activities and behaviors, i.e., it can serve as a digitalization tool for virtual learning.

3. Conclusion

- Some important lessons related to higher education that ought-to-be apprehended from the Covid-19 Pandemic experience are presented.
- A set of inaccurate assumptions made by academic leaders in their handling of the crisis are underlined.
- The Covid-19 pandemic disclosed some lack of robustness in the current higher education organizations in facing exigencies, a thing that necessitates the availability of contingency plans to maintain robustness and to ensure resilience.
- Some important lessons inspired by the crisis are presented.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

The Counselling Challenges Facing Muslim's Clients Across The World

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Abstract— This systematic review is conducted with the major aim of highlighting the need for a comprehensive and modern Islamic counselling Model, due to the several psychological challenges facing Muslim client across the world. The main source of data collection in the research is past empirical studies related to the field of counselling as it affects Muslim majority and minority countries. The study found from the extant literature reviewed that, there is a risk of psychological problems among Muslim populated countries, most especially, the crises and turbulence regions such as Syria, Yemen, Palestine and others as well as among the Muslim minority groups in some countries such as US, UK and other European countries. It was discovered from the literature that the major causes of mental health problems are lack of fear of God, wars, poverty, natural disaster, political unrest, discriminations and Islamophobic tendencies. In this regard, the study highlights the need for research and applied programs that majorly focused on the well-being of Muslim in the entire global community. It emphasized that Muslims require the professional assistance of a professional counsellor equipped with culturally and Islamically relevant techniques for the mitigation of distress and depression. It finally proposed the need for a comprehensive Islamic counselling model that matches and competes with the western-oriented counselling models. Therefore, Al-Ghazali counselling Model has been recently developed which has comprehensively and scientifically highlighted modern suited therapeutic techniques with promising effective intervention to client psychological challenges.

Keywords: *Islamic Counseling, Muslim client, Psychological problems*

1. Introduction

Counselling as a profession is a noble discipline, which primarily aims at helping people with psychological and other related problem. The act of helping people is as old as human being, however, the structural counselling, in reality, commenced after the 2nd world war in the 1950s [1]. The term counselling has been defined by several authors in several ages of which no unanimous agreement is reached on a particular definition. This is because; the word counselling has proven to be a difficult concept to explain. The public's lack of clarity is due, in part, to the proliferation of modern-day services that have adopted the label counsellor. They range from credit counsellors to investment counsellors and from camp counsellors to retirement counsellors. Although their services share the common ingredient of verbal communication, those services have little in common with psychological counselling [2].

2. Meaning and Features of Effective Counseling Practices

Counselling was defined as a situation whereby two people work together so that the problem may be more clearly defined and the counselee may be helped to a self-determined solution [3]. It was equally seen as a process that takes place in a one to one relationship between an individual beset by problems with which he cannot cope alone and a professional worker whose training and experience have qualified him to help others reach solutions to various types of personal difficulties" [4] More comprehensively Counseling is a professional relationship that empowers diverse individuals, families, and groups to accomplish mental health, wellness, *education, and career*

goals. Given all these, counselling is seen as a helping relationship in which the therapist strives to empower the client for greater functioning.

Meanwhile, effective counselling was reported to possess some characteristics such as emotionally charged interaction, the confiding relationship between client and therapist; warmth, support, and attention from the therapist in a healing setting; a positive therapeutic alliance between client and therapist; installation of hope and expectancy; and techniques consistent with client expectation and efficacy [5]; [6]; [7].

2.2 Integration of Religion into the Counselling Profession

More so, counsellors interact and deal with clients from different ideological background, of which the individuals with a psychological problem are highly knitted to their set of beliefs and ideologies. This has made it imperative for counsellors to be equipped with knowledge about the beliefs and ideologies as well as the religious background of the clients [8]. This is because; the client is the centre point of the counselling activities [9]. It is therefore affirmed that religion is a set of beliefs that determines most of the engagement and activities of people in life. If these set of beliefs are altered, it may affect the entire life of the individuals because it determines how they perceive things, how they think, and even the choices they make throughout their lives. Given this, the religious issue is very important in counselling [10].

Due to the above assertion on religion, it was incorporated into the field of counselling. Even studies have confirmed that most people who seek counselling assistance are adherents' of religious beliefs. For instance, a study was conducted to assess whether participants would prefer to discuss religious or spiritual issues in a counselling session and found that more than half of the participant prefers to discuss religious and spiritual issues [11]. It was added that religion and spirituality are very critical sources of strength for many clients ([12]. Due to this, religion and spirituality are indispensable in the field of counselling, which made it to be integrated into the counselling profession [13].

Meanwhile, there are several religions across the globe, of which the most prominent ones are Islam and Christianity. This is because they are organized religions with many followers across the globe. Therefore it has become a necessity for present-day counsellors to be fully aware of the importance of integrating the principles of religions, which are predominantly practised among their clients, into counselling practices.
On the aspect of Christianity, it has been deeply integrated into formal counselling discipline [14]. Islam on the other hand, despite that it has been integrated into formal counselling, is not as popular and fully integrated into the formal counselling profession as Christianity [15].

2.3 Evolution of Islamic Counselling Practices

The followers of Islam are 1/5 of the world population and they see Islam as a comprehensive way of life of which most of its ideologies are in contrast with western worldview [65]. They believe in it and are pleased with Islamic principles and laws to govern their lives. Therefore, using the western system of counselling may not be helpful and might threaten the stability of their faith because counselling relationship mostly anchors the human mind, which is the house of human ideology. Due to this, Islamic counselling was introduced.

Meanwhile, the notion of Islamic counselling or Muslim psychotherapy has been in existence since the 9th and 12th centuries through the work of Al-Balkh and Al-Ghazali and others [16]; [17]; [19]. This shows that organized Islamic counselling has been in existence for a long. However, from the onset of Islamic counselling, it is characterized by giving advice (Nasiha), guidance (Irshad) and helping relationship. This kind of Islamic traditional counselling manifests itself in the form of the ritual healing practices, such as reading the Quran for healing, prayers, following prophetic tradition. All these have been attested from several studies as being effective [15].

Since September 11, the numbers of Muslim therapists have increased in the U.S. and across the world, because most Muslims have become worried about how they are viewed by others, due to the bad portraying in the media

as terrorists. Therefore, average Muslims today not only deal with the stressors of life but also have to defend their value as acceptable and normal [8]. The constant state of fear, contempt and, feeling of embarrassment has led most Muslims to be susceptible to stress, depression and others, which increase their likelihood to visit Muslim psychotherapist.

Meanwhile, several psychotherapists have made efforts, to incorporate, Islamic worldviews and ideology into the counselling services [19]. The Muslim counsellors have been reported to find religious psychotherapy effective for treating Muslim client with anxiety, depression as well as bereavement. Even some Muslim counsellors specialize in counselling Muslim on bereavement, by using Islamic prescription of contemplation as a technique, which proves to be effective [20]. Muslim counsellors from the Middle East provide training on multicultural competence, affective empathy, self-efficacy training and cognitive for students [10]. In all indication, Islamic counselling is in operation across the world and most of which have been proved to be effective.

More so, it can be discerned from the previous paragraphs that, the counselling profession has been evolving until the present time. The evolution is because the world is evolving and developing with technological advancement and several innovations in all spheres of life. The corresponding psychological problems and challenges keep on spreading across the world. Several studies show that psychological problems are markedly higher in recent decades compared to the previous times ([21]; [22]; [23].

2.4 Counselling Challenges Facing Muslim Clients across the World

World Health Organization [24] affirmed that the increase in social inequalities in the present and modern age is associated with the high risk of several common psychological problems. According to WHO, the general trends in the field of mental health in the past two decades have experienced substantial changes at the global, national, and local levels. A high-quality epidemiological study by the World Federation for Mental Health [25] has assisted to identify the extent and impact of psychological problems as the top of public health challenges and priorities. This shows that the spread of psychological problems from the global perspective is on the rise in the present age. Even the generational trends in the psychological problems across the universe are on increase [23]. In essence, the above-cited empirical studies have indicated upsurge psychological problems worldwide.

Apart from the global proliferation of psychological challenges, the sectional escalation in psychological complications is also looming. The most pertinent section to the present study is the Muslim community around the globe. In this sense, psychological problems among Muslims are at increase. For example, [26] reported from his study that the trends of murder, suicide and mental health conditions among Muslim majority countries such as Morocco, Pakistan, Yemen and others are skyrocketing as a result of violence and conflict. This empirical study, covering 25 years of data, shows a soaring trend of death from suicide. In 2015 alone, the study equally reported that almost 30,000 people committed suicide in countries such as Syria and Iraq [26].

In addition, studies from the Muslim majority countries found a sharp increase in mental health issues such as bipolar disorder, anxiety, depression, and schizophrenia [27]. The study identified anxiety disorder and depression as the most common psychological problems among all. A clinical survey of Arab-American reported that 50% of the participants have symptoms of clinical depressions [28]. A report from the UK house of parliament revealed that 24% of Muslims in England cannot work due to one mental illness or the other [28]. Also, [29], through Hamdard Center for Health and Human Services Chicago, presented statistical data of American Muslims that have various psychological problems.

Table 1: Intake Diagnoses of Muslim Americans at Hamdard Center for Health and Human Services, Chicago (N= 875)

Diagnosis	Per cent
Adjustment Disorder	43%
Anxiety Disorder	15%
Mood Disorder	9%

Obsessive-Compulsive Disorder	14%
Post Traumatic Stress Disorder (PTSD)	10%
Schizophrenia and other Psychotic Disorders	5%
Substance Abuse	4%

Table 1.2 Emotional and Behavioral Problems of Young Muslim Americans (N=712)

Diagnosis	**Per cent**
ADHD	16%
Mood Disorder	15%
Anxiety Disorder	13%
Schizophrenia	5%
Adjustment Disorder	19%
Alcohol and Substance Abuse	3%
Impulse Control Disorder	5%
Eating Disorder	2%
Somatoform Disorder	1%
Other Issues**	20%

Source: [29]

The figures from the above tables coupled with the reports from the cited empirical studies indicated that mental health challenges are spreading among Muslims. As mentioned earlier, these problems among Muslims in the past were very low compared to the present time, which has risen in terms of numbers. This implies that there could be some situational causes that are responsible for such an extent of psychological problems.

Based on the above explanation, it can be deduced that the mental health challenges sprang up from some sources because for every problem, there must be a reason. In this regard, several studies have highlighted the major causes of mental health challenges among Muslims. The main causes of these challenges are categorized into biological/personal factors and environmental factors. The biological factors are well taken care of among the Muslims because they have control over these causes as a result of their faith and knowledge that serve as means of adjustment for them.

However, environmental factors are reported to be the major cause of psychological problems among Muslims. Based on WHO reports, war, poverty, abuse, stressful life, natural disasters, and poor nutrition are some examples of environmental causes [24]. It is even discovered that environmental factors influenced biological/personal factors. This has made it difficult to distinguish between environmental factors and biological/personal factors. Other studies further illustrated that a complex nature by which the environment and the genetic factors interact could lead to schizophrenia and depression which are the major aspect of mental health problems [30]. Equally, some environmental factors like life stressors such as sudden death, abuse, natural disaster and war have been identified as the trigger to psychological problems [31]. Studies have consistently reported that poverty among others is more likely to lead to psychological challenges. For example, [32] reported that people in the lower strata of income are three to two times more likely than those in higher strata of income to have mental health problems.

Within the recent few decades, the turbulence regions such as Gaza Strip, Iran, Israel, Egypt, Syria, Yemen, and West Bank that have suffered wars, natural disasters, political violence, force and occupation displacement have concurrently suffered from mental health problems such as post-traumatic stress disorders (PTSD). Even civilians in these aforementioned turbulent regions have been subjected to incessant episodes of violence, inter and intra-group conflicts, and natural disasters which have greatly affected their psychological well-being. War is not only traumatizing the civilian but also imposing a psychological burden on them, of which the aftermath effect could lead to psychological/mental problems [33]. Exposure to war has been found to trigger a high level of stress

which could ultimately lead to a wide range of psychological problems [34]. An empirical study also found that 87% of children who are exposed to chemical attack weapons showed a wide range of psychological symptoms and traumatic reactions [34]. It means that the children demonstrated some psychological reactions in response to their being in the area of bombing.

Moreover, natural disasters were discovered to have a high relationship with PTSD [35]. PTSD was found to be prevalent among a population examined during the Barn and Marmara earthquakes [36]. It was reported that 43% of the 1000 sample that experienced Marmara earthquakes suffered PTSD until after six months of the occurrence. Another empirical study by [37] investigating adults and children survivors of the 2003 Barm earthquake found a very high rate of PTSD. In essence, a natural disaster is also regarded as one of the major causes of psychological problems.

The recent experiences of Muslim refugees also greatly affect their psychological well-being. For instance, the investigation of the Iraqi refugees in California revealed that trauma is the biggest challenge to their psychological and mental well-being [38]. Another study investigated Afghan refugees and asylum seekers who are under international protection with continuous exposure to war. It was found that the participants experienced high post-traumatic disorders and depressive symptoms [39]. One point that can be noted is that most of the above-cited cases of wars, poverty and refugees mostly affect Muslim majority countries like Iraq, Syria, Palestine American and UK Muslims. It means that psychological problems among Muslim populated countries are spread and prevalent. Hence, the services that have been offered by a few Muslim counsellors and psychotherapists must be corroborated to reduce the prevalent conditions of the psychological problems among the Muslim community.

2.5 Psychological Challenges among Muslim Clients across the World

The reported cases of several psychological problems among Muslims across the globe are at an alarming state. It is evident from several empirical studies that Muslim mental health problems call for additional attention. For example, research by the [63] found that there are prevalent mental health issues among Muslim females in Glasgow. Though the problem is common among the low income and black minority, [40] found that psychological disorder is prevalent in the Middle East which is a 95% Muslim populated zone.

Equally, existing data show high rates of adjustment disorder experienced by Muslim Americans seeking mental health treatment, which may be suggestive of the challenges of acculturation and adjustment, as well as discrimination and marginalization in society [64]. It was equally reported that younger Muslims, women and Arabs are most likely to experience prejudice based on their religion [41]. Even, Religious discrimination against Muslims is associated with depression, anxiety, subclinical paranoia, and alcohol use [42]; [43]. The recent travel and immigration restrictions directed primarily at Muslim countries by the U.S. government have led to traumatizing experiences for many Muslim Americans. In particular, the harsh handling and long detainments by U.S. Customs and Border Protection can be re-traumatizing to those already vulnerable [44].

More so, within the current socio-political climate, where UK Muslims are increasingly portrayed negatively [45], the mental well-being of this minority group is, particularly under threat. Empirical evidence suggests that this context may be having a significant effect on the general mental health of the Muslim population [46]; [47]. [48] reported that 50% of Arab Americans were diagnosed to be having clinical signs of depression. [26] also reported that Muslim populated countries have the highest rate of psychological problems such as depression, suicide, and other related problems.

The surge of the psychological problems among the Muslims is neither just appearing without a cause nor being a Muslim is primarily or naturally vulnerable to several mental health problems. Therefore, some causes, which are majorly environmental factors, were reported to trigger psychological problems among Muslims. However, it was identified from the study that one of the major causes of psychological problems is the unwillingness to follow the guidance and teaching of Islam, while the remaining causes can be categorized as minor causes [49]. This is because faith in Allah, which is followed with action, fortifies and prevents the soul against all forms of psychological problems:

And whoever turns away from My remembrance - indeed, he will have a depressed life, and We will gather him on the Day of Resurrection blind (Quran 20: 124).

Meanwhile, other identified causes are wars, loss of beloved ones, displacement, natural disasters, and poverty [40]. All these causes are common in Muslim populated areas such as the Middle East. For example, the persistent turbulence and unrest in Palestine, Syria, Libya, Iraq, and Yemen have led many Muslims to be displaced, faced the loss of their beloved ones, become refugees and poor, and affected by diseases [39].

More so, stigmatization, prejudice and Islamophobic tendencies against Muslim is another reported major cause of psychological problem among Muslim. For instance [50] found about 70% reported shame and 62% felt embarrassment seeking formal mental health services. [51] a study involving 459 Muslims in the United States revealed similar gender patterns in stigma and help-seeking. Because of this, stigma experts emphasize the need for interventions to be local, culturally specific, and carefully targeted [52]; [53].

Against the backdrop of recent national and international political events, more attention has been drawn to the mental health needs of Muslims worldwide as a result of the increasing incidents of discrimination and violence against Muslims, immigration problems, refugee resettlement, and asylum crisis ([54]; [55]; [51]; [56]. Therefore, there is a strong need for research and applied programs that specifically focus on the well-being of not only the Muslim American communities but also the entire global community especially amidst the largest spike in anti-Muslim hate crimes that corresponded with the 2016 Presidential elections [44]. These factors have resulted in an increasing demand to understand the mental health needs of Muslims with a growing focus on research and publications [56]. This will furnish the Islamic counselling practices with up-to-date methods and intervention which are empirically supported to cater for the unhealthy psychological conditions of the Muslim.

2.6 The Necessity for Contemporary and Comprehensive Islamic Based Counseling Model

The unhealthy psychological conditions of the Muslims reported above require continuous professional assistance equipped with culturally and Islamically relevant techniques for the mitigation of distress and depression among the Muslim population [39]. However, most Muslim therapists usually follow the model developed by western-oriented psychotherapists. That is why it was reported that 10% out of 5.7 million Iraqi children in school is in dire need of psychological assistance [34].

However, it was reported that some western-oriented counsellors and psychotherapists experienced ordeals and challenges in dealing with Islamic faith-based clients as a result of different cultural orientations [38]. It was equally reported that, despite the growing size of the Islamic community in the western countries, most western practitioners appear not to have been very well exposed to Islamic values and teachings during their educational careers which hampered their ability to handle Muslim client effectively [42]; [57]. Equally, researchers found that many Muslims are hesitant to seek help from the mental health professionals in Western countries due to the differences in their beliefs and lack of understating of the helping professionals about Islamic values in their treatment modalities. Consequently, Muslims might feel uncomfortable seeking psychiatric help to avoid conflicting with their religious beliefs [58]. It means that western-oriented counsellors and psychotherapists cannot handle Muslim clients effectively as well as most Muslims are unwilling to seek therapeutic assistance from them, whereas the available Muslim counsellors and psychotherapists on the ground for the task are very minimal compared to the enormity of the numbers of Muslims with psychological challenges. In this regard, there is a need for more Muslim counsellors with Islamic focused model.

However, the integrated Islamic counselling in existence does not have a complete Islamic framework or a systematic outline as well as a procedural framework that matches and competes with several western counselling theories. For example, Sigmund Freud is the father of the psychoanalytical counselling model. While client-centred theory, counselling theory, and other counselling theory came from Carl Rogers. People all over the world have been using these counselling models for their clients. On the other hand, it was reported that the integrated Islamic counselling Practices model and theoretical basis are deficient [59]. The deficiency here means that it does not complete. It is equally reported that the current situation concerning Islamic Counseling in the world especially in Malaysia is not clear [59].

For that reason, there is no clear-cut and comprehensive model for Islamic counselling practices. One of the major reasons that could be responsible for this according to [60] is the issue of attaining a balance between unity and diversity in the conceptual definition of some concepts of Islamic counselling such as Islamic spiritual care. This is because Muslims are very diverse in terms of their ethnicity, culture, nationality, and tradition. For example, some Muslims believe that reciting the Quran for healing is a proper tradition, while some others believe that such an act is an innovation that must be rejected [61].

The problem of diversity in Islam is born because of two major sources of knowledge in Islam, which are the Quran and Hadith. Scholars have their school of thoughts with different interpretations [62]. Different interpretations lead to diversity in thoughts and actions, which greatly affect how Muslim think, interact and react to issues [66]. This is because most Muslims directly interpreted the two sources by themselves. This sometimes led to a distortion of the religious text as well as a deviation from the right course of the religion. As a result, there is no uniformity in some religious sources, which are related to counselling practices and psychotherapy. This could lead to diverse Islamic counselling approaches and practices, which can confuse the Muslim clients especially the newly converted Muslims and the weaker Muslims.

3. Conclusion

The need for a comprehensive and modern Islamic counselling Model is the main motive behind this study's substantial argument. As a result, this highlights several challenges facing Muslim clients and several causes of their psychological challenges. The evolution of the Islamic counselling practices till the present time was equally chronicled. Hence, it was found from this narrative that, there is a rise of psychological problems among Muslim populated countries, most especially, the crises and turbulence regions such as Syria, Yemen, Palestine and others as well as among the Muslim minority groups in some countries such as US, UK and other European countries. It was discovered from the literature that the major causes of mental health problems are lack of fear of God, wars, poverty, natural disaster, political unrest, discriminations and Islamophobic tendencies. Therefore, the study highlights the need for research and applied programs that majorly focused on the well-being of Muslim in the entire global community. It emphasized that Muslims require the professional assistance of a professional counsellor equipped with culturally and Islamically relevant techniques for the mitigation of distress and depression. It finally proposed the need for a comprehensive Islamic counselling model that matches and competes with the western-oriented counselling models. In favour of this, Al-Ghazali counselling Model has been recently developed which has comprehensively and scientifically highlighted modern suited therapeutic techniques with promising effective intervention to client psychological challenges.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Investigating the Indirect effect of Religious Coping on Academic Stress through Religious Orientation of IIUM Undergraduate Students

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Abstract— One of the major goals of any educational institution is to ensure that, the academic environment is stress tolerance for students of which several coping strategies have been designed to alleviate the students' academic stress. It is believed that, religious coping skill is effective in reducing student's academic stress, most especially in a predominantly religious institution such as IIUM. In view of this, the study intends to investigate the indirect effect of the religious coping on academic stress through religious orientation of International Islamic University Malaysia (IIUM) undergraduate students. The present study uses quantitative method with the sample of 321 undergraduate students from five Kulliyyahs: Engineering Education, Human Science, Law and Economics. The data were collected through survey comprises Educational Stress Scale, Religious Coping Scale as well as Intrinsic and Extrinsic Religious Orientation Scale. Pearson moment correlation was used to analyze the relationship between religious coping, religious orientation and academic stress using SPSS version 25. Equally, mediation analysis was conducted using AMOS (Version 26.0). The findings from the study indicate that religious coping has direct effect on student's religious orientation and indirect effect on academic stress. The result of the present study could have implication for educational and counseling practices.
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Keywords: *Religious coping, Academic Stress, Religious orientation, Mediation*

1. Introduction

It is an undeniable fact that living and surviving in today's world is not an easy task and succeeding can be a great challenge. Today's generation faces numerous problems in their daily lives and are affected by an ever-changing environment and challenging situations. Among the challenges is the issue of academic achievement which causes unpredictable problems and tension to many young students. Similarly, academic stress among students has long been studied and authors have identified stressors as multiple assignments, competition among students, failure, lack of pocket money [1] poor relationships with other students or lecturers and family or problems at home. There are also stressors at institutional level such as crowded lecture halls, [2]. In light of this, numerous studies have found that religion plays an important role in coping with stress ([3]; [4];[5]; [6]; [7]; [8] . People may use a religious orientation as a defence mechanism to lower their academic load. [9] and [10] reported that religious coping was a better predictor of adjustment to challenging circumstances such as exam periods compared to a general religious orientation. In addition, religious coping strategies showed discrepancies in outcomes across different stressful scenarios. Religious coping was particularly harmful or helpful depending on the specific religious coping strategy used [11].

Academic learning and academic achievement are among the "problematic" issues facing young adolescents and are a global concern. Nowadays, there is an increase in the number of suicides among adolescents due to their stressful life situations [12]. For example, [12] studied academic and adolescent stress in Indian higher education institutions, where the researcher found that majority of the students surveyed were stressed due to the upcoming school year and the rates of depression and anxiety were quite high in the sample. Likewise, the study discovered that there were differences in academic track, gender, and school type in relation to academic stress.

One way to address this issue is to link religion to the real world as mentioned by [4]; thus, revealing that religion plays a significant role in coping with stress [13]. In this regard, [9] investigated the role that religious coping plays in managing academic stress among students in Saudi Arabia and confirmed that it indeed plays a significant role in students' academic life. Meanwhile, the transition from one state to another in life is always accompanied by life stressors [14]. Therefore, [15] found that there is a significant increase in life stressors among first year students in terms of their physical and mental health. In view of this, the present paper intends to investigate the indirect effect of religious coping on academic stress through religious orientation of first year IIUM students.

1. LITERATURE REVIEW

Definition of Concepts

RELIGIOUS ORIENTATION

Religious orientation involves presuppositions about the nature and existence of God or gods, religious instructions regarding morality, and collective and personal spirituality [16]. Such assumptions include the study of ethics, anthropology, psychology, and sociology. Meanwhile, [17] helped explain two religious orientations: intrinsic and extrinsic. The important difference between the two orientations lies in the way people approach religion and in what light they view their religiosity [18]. The extrinsic or means orientation describes a pattern of religious involvement characterized by an individual's interest in gaining something from religious involvement [19]. Religion thus becomes a tool for achieving goals, such as social contact or developing one's financial situation. In addition, the values of a faith can be used for specific purposes, such as promoting one's beliefs or worldview through increased religious justification [20].

Intrinsic religious orientation is associated with seeing religion as an end in itself. Individuals who score higher on this type of religious orientation are likely to frame their other life events around their religiosity [21]. These individuals are comfortable with their faith and are not motivated to bend their religion to accommodate or justify their actions. Instead, they base their actions on religious doctrines and teachings. Colloquially, extrinsics tend to see God (or their higher spiritual power) as being on their side, while intrinsics tend to see themselves as being on the side of God (or their higher spiritual power) [22].

RELIGIOUS COPING

The word "coping" implies two meanings in stress literature. It has been used to refer to ways of dealing with stress or efforts to cope with conditions of threat, challenge, or harm when an automatic response or routine is not readily available [23]. According to Lazarus, coping often involves self-regulation of emotional responses in a variety of ways, either by changing threatening conditions, postponing unpleasant situations, or simply disengaging from stressful situations. Therefore, he emphasized that the individual actively considers the circumstances and unanticipated environmental situations that affect the individual's behavior. Meanwhile, religious coping is defined as the effort to comprehend and cope with life stressors in a sacred and spiritual manner [4]. It has been emphasized that religious coping serves multiple functions that include the search for meaning, intimacy with others, identity, control, anxiety reduction, transformation, and the search for the sacred or spirituality itself.

ACADEMIC STRESS

Stress is viewed differently by several authors. Some authors see it as an unpleasant emotional and physical stimulus, while others see it as a psychological or physiological response to external and internal stressors [24]. Similarly, it is defined as a non-specific response of the body to a change request [25] . Academic stress, on the other hand, is considered as a situation in which students (especially in higher education) worry about their performance, the level of pressure and anxiety about their academic performance.

In recent years, there has been remarkable research on the effects of academic stress, regardless of culture [26]; [27]. The workload in a college or other higher educational institution is much higher than in a school. Students have to face many problems and challenges during their time as college students such as difficult exams, classroom assignments, internal and external pressures from parents and teachers, etc. To make matters worse, they have to survive in a sometimes unfamiliar environment while studying. Therefore, students in universities and colleges are exposed to high risk resulting from this stressful situation. The demand for academic success with limited personal and social time can affect their mental and physical health. Moreover, universities rarely take steps to provide comfort to these students.

Hypothesis Development

Religious coping and religious orientation

Significant studies within the psychology of religion and psychological well-being have suggested that religious orientation is highly related to religious coping [20]. For example, [28] found that religious orientation and commitment influence the religious coping process of cancer patients university Iowa Hospitals. In this regard, [29] reported that compared to healthy controls, adolescents with a chronic illness spend more time thinking about their religion, internalize their religious beliefs more than healthy peers, and use more religious/spiritual coping than healthy peers. This suggests that adolescents' religious orientation supports and influences their religious coping with their chronic illnesses. It has also been reported that there is a significant correlation between internal religious orientation and religious coping in type 2 diabetic women [30]. In summary, several studies have found a significant relationship and influence of religious orientation on religious coping [31] ; [32]; [33]. Thus, in light of these findings, the present study hypothesizes;

H1: *There is direct effect of religious coping on religious orientation of first year students of IIUM.*

Effect of religious coping on academic Stress

Several studies have reported that people with religious backgrounds cope with life stressors. Religious coping strategies are used by Muslim "Tahfiz" students in dealing with their academic and personal problems [34]. Another study found that positive religious coping skills were associated with positive psychological adjustment to stress [35]. Similarly, active religious coping, practised religious coping, and benevolent reappraisal coping were found to predict depression reduction [36]. Positive religious coping skills have also been found to be positively correlated with psychological well-being [37]; [38]. Another empirical study found that both positive and negative religious coping simultaneously predicted academic burnout, compared to when each religious coping alone predicted academic burnout [39]. Results showed that positive religious coping was significantly associated with more positive worldviews, whereas negative religious coping was significantly associated with more negative worldviews in patients with posttraumatic stress disorder [40]. Positive religious coping only slightly buffered the effects of stress on depressive symptoms [41]. Religious variables were significant predictors of three measures of event outcome [42].

H2*: There is direct effect of religious coping on academic stress of first year one students in IIUM*

Mediating effect of religious orientation of religious coping and academic stress of the year one students in IIUM

From the previous hypothesis, it was found that religious coping has a direct influence on religious orientation, while on the other hand, religious coping has a direct influence on academic stress. If religious coping has a direct effect on religious orientation as well as academic stress, of which there is no case in which an indirect effect of religious coping on academic stress was found, the present student proposed to investigate the indirect effect of religious coping on academic stress through religious orientation

H3: *Religious coping indirectly influence academic stress through religious orientation of the years one students in IIUM*

Hypothesized Model

Considering the literature cited above and the hypothesis developed in the light of the current literature analysis a research model is proposed shown in the figure 1.

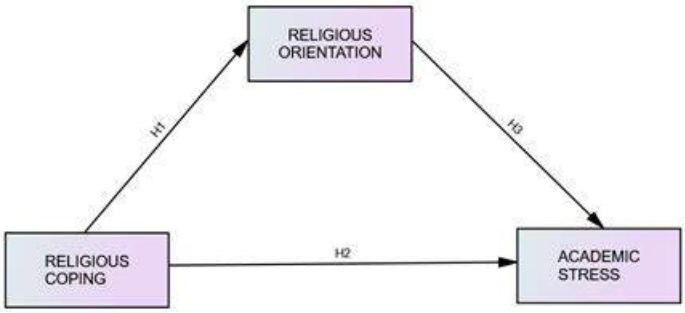

Figure 1: Hypothesized Model

2.0. METHODOLOGY

This study is a quantitative exploratory research that uses a cross-sectional survey to collect the necessary data. Survey research is a procedure in quantitative research in which the researcher conducts a survey to a sample to describe the opinions, characteristics, attitudes, or behaviors of the population. In this procedure, survey researchers collect quantitative, numbered data using questionnaires and statistically analyze the data to describe trends in responses to questions and test research questions. It also interprets meaning appropriately in a study examining academic stress among first-year students at IIUM.

Population and Sample

The population of the present study is the first year students of International Islamic University Malaysia. The present study used the quota sampling technique, which is a non-probabilistic version of stratified random sampling. This sampling design allows the inclusion of all groups in the studied

system [43] (Sekaran &Bougie 2010).This method was used to select 321 respondent first year students from education, engineering, law, Human Science and business Kulliyyahs.

Table 1: Distribution of Sample

Kulliyyah	Samples
Law	75
Engineering	62
Human science	56
Economics	49
Education	79
Total	321

Instrumentation

Multi-item scales were used to measure the relevant constructs in the study. All items were taken from existing scales with satisfactory reliability. Some of the items in the questionnaire were slightly modified to reflect the profiles of the first-year students. The survey contains three scales and several demographic questions that profile the respondents on factors such as age, gender, nationality, and kulliyyah. The instruments used are the Religious Orientation Scale (ROS), Educational Stress Scale for adolescents (ESSA) and Religious Coping Scale (short RCOPE).

The Religious Orientation Scale (ROS) represents Allport's attempt to operationalize extrinsic and intrinsic religious orientations. Extrinsic religious orientation refers to a blatantly utilitarian motivation underlying religious behaviors. The individual endorses religious beliefs and attitudes or engages in religious acts only to the extent that they can help achieve worldly goals, such as feeling comforted and protected or gaining social status or recognition. In contrast, intrinsic religious orientation refers to motivation arising from the goals set by the religious tradition itself, and is therefore thought to have an 'other', non-worldly, even self-denying quality. Religion is seen as the "primary motive, while other needs, however strong, are considered less significant" [17] (Allport &Ross, 1967).

The Educational Stress Scale for Adolescents (ESSA) is a 16-item scale developed by [44]. Seven items were adapted from AESI [45] with a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).ESSA consists of five factors to measure academic stress in adolescents: Pressure from studying (4 items); Worry about grades (3 items); Dejection (3 items); Self-expectation (3 items); and Workload (3 items). Despite the above definition of five factors, ESSA may not capture all elements of academic stress. Moreover, ESSA was only collected in China among Chinese adolescents in Shandong, and its cross-cultural appropriateness has yet to be established. However, this newly developed scale showed psychometric properties and is useful for research on academic stress among adolescents. Despite the above definition of five factors, ESSA may not capture all elements of academic stress. Moreover, ESSA was only collected in China among Chinese adolescents in Shandong, and its cross-cultural appropriateness has yet to be established. However, this newly developed scale showed psychometric properties and is useful for research on academic stress among adolescents.

The Brief RCOPE is a 14-item religious coping scale for major stressors in life. Two overarching forms of religious coping, i.e., positive and negative, were articulated through factor analysis of the full RCOPE. The positive religious coping subscale (PRC) of the brief RCOPE captures a sense of connection to a transcendent power, a secure relationship with a caring God, and a belief that life has a

greater benevolent purpose. An example of PRC items is: "Seeking a stronger connection to God" and "Sought God's love and caring". The Negative Religious Coping (NRC) subscale of the Brief RCOPE is characterized by evidence of spiritual tension, conflict, and struggle with God and others, manifested by negative evaluations of God's powers (e.g., feeling abandoned or punished by God), spiritual questioning and doubting, and interpersonal religious dissatisfaction. The scale was developed from [4] theory and research program on religious coping. The items themselves were generated through interviews with people experiencing major life stressors.

Validity and Reliability

For the Religious Orientation Scale developed by [17], the reliability of ROS using Cranach's alphas varied from .78 to .87. Meanwhile for the Educational Stress Scale for Adolescents (ESSA), Cranach's alpha for the total 16-item ESSA scale was .81 indicating good internal consistency. The coefficients were .74, .71, .66, .66, and .75 for the five factors respectively, all suggesting acceptable to good levels of reliability. The Brief RCOPE demonstrated good internal consistency in a number of studies across widely differing samples. The highest alpha for PRC was 0.94.The Brief RCOPE demonstrated good concurrent validity. As would be expected, PRC is most strongly and consistently related to measures of positive psychological constructs and spiritual well-being. Studies have also demonstrated the validity of PRC relative to psychological, physical, and social well-being constructs. PRC is only occasionally related to negative constructs such as depression and mental health. Nearly all of the studies that used the Brief RCOPE have been conducted in the United States and Western Europe with largely Christian samples.

Table 2: Reliability of the Instruments

Scale	Item No	Reliability(Cronbach Alpha)
Religious Orientation Scale [17]	17 Items	.78
Brief Religious Coping Scale [11]	14 items	.94
Educational Stress Scale for Adolescents(ESSA) [44]	16 item	.81

Data collection and analysis

The researcher distributed the questionnaire along with some volunteers in all the five kulliyyahs of law, engineering, humanities, economics and education. After the data was collected, it was analyzed through path analysis using IBM AMOS version 26. In view of this, mediation analysis was conducted to investigate the indirect effect of religious coping scale on students' academic stress due to religious orientation.

3.0 RESULT AND FINDINGS

This section summarizes the sample response rate, characteristics, demographic information, and results based on the frequency and percentage of the sample studied. Similarly, the results are presented in path format after ensuring the reliability and validity of the hypothesized measurement model.

Demographic information of the respondents

The respondents consisted of 321 first year students selected from the five Kulliyyahs of Education, Law, Economics, Human Sciences and Engineering at International Islamic University Malaysia. The summary can be found in Table 3 below:

Table 3: Demographic Information of the Respondents

Category	Frequency	Percentage
Gender		
Male	103	31.1
Female	218	67.9
Total	321	100.0
Nationality		
Malay	288	89.7
Inter	33	10.3
Total	321	100.0
Kulliyyahs		
Law	75	23.4
Engineering	62	19.3
Human Science	56	17.4
Economics	49	15.3
Education	79	24.6
Total	321	100.0

Measurement Model

To ensure the validity and reliability of the measurement model, the reliability of all constructs used in the survey was calculated by Cronbach's alpha, where the value of all constructs is higher than 0.70, which is considered a good standard for measurement reliability. Therefore, all Cronbach's alpha values of this study are considered reliable. Convergent validity and discriminant validity for the measurement model were determined using confirmatory factor analysis (CFA). The standard range for factor loading scores was described as 0.54 with a p-value of less than 0.001, all factor loading scores in this study remained above the standard range, and the threshold for the sum of composite reliability (CR) was described as 0.70, all sum of CR in this study remained well above the standard range. Similarly, the threshold value for the sum of average variance extracted (AVE) was described as 0.50, all the values of the sum of AVE for this study remained well above the threshold value except for religious orientation which was 0.375 below the threshold value. The presented result also showed that the average extracted variance for each pair of factors was greater than the squared correlation for the same pair, indicating that each construct is a separate construct, which shows that there is obviously discriminant validity in the presented measurement model for the present study. The result is presented in the following table.

Table 4: Reliability and Validity Information

Variables	Cα	CR	AVE	MSV	MaxR(H)	R-Coping	R-orientation	A-Stress
Religious Coping	.94	0.782	0.553	0.338	0.827	**0.743**		
Religious Orientation	.78	0.705	0.375	0.338	0.708	0.581	**0.612**	
Academic Stress	.81	0.840	0.517	0.008	0.860	-0.001	0.087	**0.719**

The goodness of fit of the measurement model was estimated in the present study by tools like Root-mean-square error of approximation (RMSEA), goodness-of-fit index (GFI), and Chi-square minimum/df (CMIN/df) to measure the fitness of the model. The comparative fit index (CFI), the adjusted goodness of fit index (AGFI), and the normed fit index (NFI) were also employed as appropriate supplementary measures. Additionally, the study used Parsimonious-fit measures like parsimony goodness of fit index (PGFI) and parsimony normed fit index (PNFI). The values given in Table 5 for all the fitness indicators used to measure the reliability and validity of the model used in the current study demonstrates that these values lie in an acceptable range, and the fitness indicators meet the required standards.

Table 5: Fit index of the confirmatory factor analysis (CFA) model

Fit Index	Output Score	Recommended Threshold Values
Absolute fit measure		
Cmin/df	1.629	≤ 2[a]; ≤ 5[b]
GFI	.961	≥0.90[a]; ≥ 0.80[b]
RMSEA	.044	≤ 0.80[a]; ≤ 0.10[b]
Incremental fit measure		
NFI	.933	≥ 0.90[a]
AGFI	.940	≥ 0.90[a]; ≥ 0.80[b]
CFI	.973	≥ 0.90a
Parsimonious		
PGFI	.628	Greater is good
PNFI	.721	Greater is good

[a] Acceptability: yes, acceptable; [b] Acceptability: marginal.

Structural Model

In this section, we assessed the procedure by determining how to measure the results of an inner structural model. The proposed hypotheses of the current study were tested through path analysis technique. The findings of the study were presented in Table 6 and Figure 2.

Table 6: Structural equation modeling (SEM) results

Hypothesis	Relationship	Anticipated impact	Estimate	P-Value	Result
H1	Religious Coping →Religious orientation	+	0.465	.000	Confirmed
H2	Religious coping → Academic stress	+	0.244	.056	Not confirm
H3	Religious orientation→ Academic stress	+	0.296	.001	Confirmed

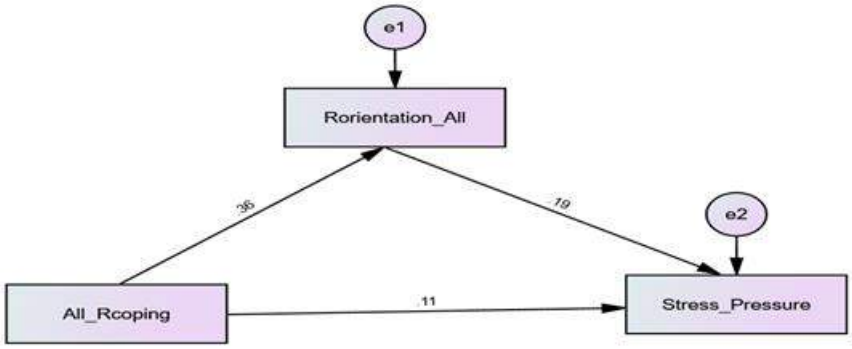

Figure 2: Structural model path coefficients

Analysis of Direct and Indirect Effects

The direct effects between the two independent variables were described in Figure 2 and Table 8. Hypothesis 1 claimed, "There is a significant positive relationship between religious coping and religious orientation of IIUM year one students. According to the findings of the study, a statistically significant and positive relationship exists among the two independent variables. Besides, a considerable impact of the proposed hypotheses was also found, and the results of the study supported all proposed hypotheses. Hypothesis 1 demonstrated a positive and significant impact of religious coping on religious orientation results (RC = 0.465, p = 0.000) confirmed H1. The study equally stated that, "religious coping positively influences the student's academic" Thus, the outcome of the H2 reveals that religious coping does not positively influence academic stress which is not supporting and confirming the H2 of the study (RC = 0.224, p = 0.056). Then this model proposed that, "religious coping indirectly influence academic stress through religious orientation of the first year students" with H3. The outcome, as indicated in Table 8, support H3, and finding confirmed (RO = 0.296, p = 0.001). Summary of the present analysis is that religious orientation fully mediates the relationship between religious coping and academic stress.

Findings from the Study

The main findings from the study are as follows:

1. Religious coping strongly related to religious orientation
2. Religious coping have strong effect directly on religious orientation
3. Religious coping do not have direct effect on academic stress
4. However, religious orientation mediate the relationship between religious coping and academic stress

4. DISCUSSION AND IMPLICATIONS

It is almost a scientific fact that religious coping strongly related to religious orientation as well as a having bi-directional in one another. This is due to the fact that, plethora scientific studies from different background and culture have confirmed this assertion [29]; [30]; [33]. It should be borne in mind that, the outcome of the confirmatory factor analysis indicated that, both factors and constructs are spate entities which was evident from the discriminant validity result. It means that construct measure different attributes for instance RC religious coping is seen as a religious or spiritual way of responding to stress and adversities in a positive way, while the RO is process of acquiring and imbibing religious attributes to realize both non-religious and religious goal [17]. It means RC is an attributes while RO is means of process to achieve the attribute of coping. That is why contended that both constructs are separates but are inter-dependent.

It is equally discovered from the study that RC does not have direct effect on academic stress. It can be seen that, the result is in contrary to the mainstream academic findings that RC significantly influence and directly affect academic stress [46]; [47]; [48]; [37]; [49]. However, [50] found that RC does not significantly relate to daily stress. From this finding what may likely responsible for the variation in the result could be the fact that, RC might not possess the robustness to singularly influence student's academic stress due to the fact that both constructs are separate but are inter-dependent as have being reported from several scientific findings. This assertion is illustrated and justified from the outcome of H3.

However, the final result indicated RC indirectly influences academic stress through RO. It means religious orientation mediates relationship between RC and student's academic stress. In theory, the model present by this study is known as full mediation. Meaning that, RO fully mediate the relationship with academic stress without the direct effect of RC on academic stress. In practical illustration, RC most be adequately strengthened by RO before it can be able to influence academic stress. This result shows that, RC will motivate the need for RO of which the latter will later influence student's academic stress. The major implication of the present study is the fact that college and university students should not only be nourished with proper religious coping skills such as prayers, remembrance of God but also imbibed and furnished with proper religious doctrines and instructions that will enrich their religious orientation level.

5. CONCLUSION

The study is just a simple mediation research which is based on how RO mediates the relationship between RC and student's academic stress. It is found majorly from that RC indirectly influences student's academic stress through RO. It is equally discovered that, both RC and RO are separate

construct but inter-dependent. Meaning that each depends on the other to function and impact positively on the dependent variable. In view of this RO is seen as means to achieve RC. Therefore the outcome from the present study is implicated for psychotherapist, college or school counselors, academic stakeholders and lecturers as well as parents to, not only equip their students and children most especially those in their final year in college as well as first year in higher institution with proper RC skills but also inculcate in them the proper religious orientation in order to cope with their stressors in the early year in college or university.

ACKNOWLEDGEMENT

The acknowledgements come at the end of an article after the conclusions and before the references

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Environmental Ethics and Sustainability During Pandemic Era

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Abstract— The relationship between human beings and environment is not new, it started with the creation of mankind and his availability on earth, the communication between them was at a high level of trust, but with wrong doings of human on earth and for his selfishness, the earth started to change her face, as such many disasters happened as earthquake, flooding, and the worse was the pandemic diseases. Water, solid and air are the main components for environment, and misbalance in them may result to sort of crises, but the serious one among the three environmental components is the air, without it all livings will be affected, and this is what happened at this serious COVID-19 pandemic and lock down to the people's life on earth. This paper focused on why such pandemic crises happened on earth, who is responsible for it, and why it may continue to happen and how can we sustain our living on earth with ethics, values, and norms.

Keywords: *Environment, Ethics, sustainability, and pandemic.*

1. Introduction

Sustainability is the capacity to endure in a relatively ongoing way across various domains of life. In the 21st century, it refers generally to the capacity for Earth's biosphere and human civilization to co-exist. Environmental sustainability is defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality.A pandemic is the global occurrence of a disease. A pandemic is an epidemic of an infectious disease that has spread across a large region, for instance multiple continents or worldwide, affecting a substantial number of people. A widespread endemic disease with a stable number of infected people is not a pandemic. The most recent being the COVID-19 pandemic, declared as such by the World Health Organization on March 12, 2020. Pandemics are generally classified as epidemics first, which is the rapid spread of a disease across a particular region or regions. The Zika virus outbreak that began in Brazil in 2014 and made its way across the Caribbean and Latin America was an epidemic, as was the Ebola outbreak in West Africa in 2014-2016. The U.S. has been experiencing an opioid epidemic since 2017 because of the widespread misuse and high numbers of deaths caused by the drug, according to the U.S. Department of Health and Human Services.

COVID-19 began as an epidemic in China, before making its way around the world in a matter of months and becoming a pandemic and absolutely lock down to people on earth. But epidemics do not always become pandemics, and it is not always a fast or clear transition. For example, HIV was considered an epidemic in West Africa for decades before becoming a pandemic in the late 20th century. Religious are a driving force to boost sustainable development across the world.

2. Worst Pandemics in History

Outbreak of diseases and pandemics has taken its toll on humanity, often changing the course of history. Throughout history, disease outbursts have damaged humanity, earth and sometimes changing the course of

history and, at times, indicating the end of entire civilizations. Here are some of the worst pandemics humanity has experienced.

1. The Black Death: 1346-1353

The Black Death moved from Asia to Europe, causing damage in its journey. Some assessments announce that it destroyed out over half of Europe's population [1]. It was initiated by a strain of the bacterium *Yersinia pestis* that is apt dead today and was scattered by fleas on infected gnawers. The bodies of victims were buried in mass graves.

The disease changed the face of Europe's history. With so many dead, no labour for any type of jobs, even with about better pay for workers and the end of Europe's system of serfdom. The lack of low-cost labour may also have impacted to technological innovation.

2.2 Cocoliztli pandemic: 1545-1548

"Cocoliztli" is the Aztec word for "pest". The illness that affected the cocoliztli pandemic was a form of viral hemorrhagic fever that killed 15 million inhabitants of Mexico and Central America. Among a population already damaged by severe famine, the disease proved to be entirely disastrous. A recent study that investigated DNA from the skeletons of victims found that they were infested with a species of *Salmonella* known as *S. paratyphi C*, which produces intestinal fever, a category of fever that includes typhoid. Enteric fever can cause high fever, dehydration and gastrointestinal problems and is still a major health threat today [2,3].

2.3 American Plagues: 16th century

The American Plagues are a cluster of Eurasian diseases brought to the Americas by European explorers. These diseases, including smallpox, caused to the breakdown of the Inca and Aztec civilizations. Some reckons suggest that 90% of the indigenous population in the Western Hemisphere was killed off.

The diseases were a reason that Spanish force led by Hernán Cortés beat the Aztec capital of Tenochtitlán in 1519 and another Spanish power led by Francisco Pizarro conquer the Incas in 1532. When citizens of Britain, France, Portugal, and the Netherlands began exploring, capturing and settling the Western Hemisphere, they were also helped by the fact that disease had hugely reduced the size of any ethnic groups that disagree with them [4].

2.4 Great Plague of London: 1665-1666

The Black Death's last major outbreak in Great Britain caused a mass exodus from London, led by King Charles II. The plague started in April 1665 and circulated quickly through the hot summer months. Fleas from plague-infected rodents were one of the main causes of transmission. By the time the plague ended, about 100,000 people, including 15% of the population of London, had died. But this was not the end of that city's suffering [5].

2.5 Russian plague: 1770-1772

In plague-devastated Moscow, the terror of quarantined citizens exploded into bloodshed. Demonstrations circulated through the city and ended in the murder of Archbishop Ambrosius, who was urging crowds not to gather for worship.

The empress of Russia, Catherine II (also called Catherine the Great), was so desperate to contain the plague and restore public order that she issued a hasty decree ordering that all factories be moved from Moscow. By the time the plague ended, as many as 100,000 people may have died. Even after the plague ended, Catherine struggled to restore order. In 1773, Yemelyan Pugachev, a man who claimed to be Peter III (Catherine's executed husband), led an insurrection that resulted in the deaths of thousands more [6].

2.6 Flu pandemic: 1889-1890

In the modern industrial age, new transport links made it easier for influenza viruses to create destruction. In just a few months, the disease spreads over the globe, killing 1 million people. It took just five weeks for the epidemic to reach peak death.

The earliest cases were reported in Russia. The virus spread promptly throughout St. Petersburg before it rapidly made its way throughout Europe and the rest of the world, even though air travel didn't exist yet [7].

2.7 AIDS/HIV

HIV/AIDS, or human immunodeficiency virus, is considered by some authors a global pandemic. However, the WHO currently uses the term 'global epidemic' to describe HIV. As of 2018, approximately 37.9 million people are infected with HIV globally. There were about 770,000 deaths from AIDS in 2018 [8].

2.8 American polio epidemic: 1916

A polio outbreak that began in New York City affected 27,000 cases and 6,000 deaths in the United States of America. The disease mostly involves children and at times gives toughies with lasting disabilities.
Polio outbreaks occurred sporadically in the United States of America till the Salk vaccine was developed in 1954. As the vaccine became commonly accessible, cases in the United States dropped. The last polio case in the United States of America was reported in 1979. Worldwide immunization attempts have significantly decreased the disease, although it is not yet eliminated [9].

2.9 Spanish Flu: 1918-1920

An anticipated five hundred million people from the South Seas to the North Pole dropped fatality to Spanish Flu. One-fifth of them died, with some local populations pushed to the point of destruction. The flu's scattered and deadliness was improved by the confined conditions of soldiers and poor wartime nutrition that many people were experiencing during World War I.
Despite the name Spanish Flu, the infection likely did not start in Spain. Spain was a neutral nation during the war and did not enforce strict control of its press, which could therefore freely publish early accounts of the illness. As a result, people mistakenly believed the illness was specific to Spain, and the name Spanish Flu stuck [10].

3. The current COVID-19 pandemic

Coronavirus disease 2019 (COVID-19), that has hit the environment, began by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), thought to have spread to humans from bats via a live animal market in Wuhan, China. It is inevitable that infamous pandemics of the past are recalled and recounted [5].

Coronavirus disease 2019 at present, has imposed limits on freedom of movement and audience. Social distancing and quarantine measures were applied for the sake of preserving life in different countries based on advice by WHO. Loss of livelihood ameliorated by government loans and inconvenient opinions suppressed, and these suggest a commonality of organized responses to mass infections across national borders. Increased danger associated with certain necessary occupations and flight to second homes by the rich have been observed. Health inequities uncovered and restrictions on being with the dying and burying the dead enforced. Wholly extraordinary in comparison with the past, when the wealthiest in a parish were taxed to pay for measures against plague, is the quarantining of the whole society and the financial package for workers on unpaid leave to avoid mass unemployment. In the new normal after lock-down, people should be given more credit for sophisticated understanding than was allowed in past centuries, when fear and punishment pressured the majority to adapt, and be allowed access to relevant information which will in-fluence decisions about national and community life going forward after lockdown. The worse even in taking which type of vaccine, which up to this moment the scholars not agreed on certain and specific one, rather than start marketing the vaccine than caring of human health.

4. Materials and Methods

The data used in this paper covered the period of May 2020 to May 2021, a full year during which the environment was affected by this Coronavirus disease 2019 (COVID-19). The databases Web of Science Core Collection and Scopus are the main source of this study. The data that this paper depends on comes from secondary sources, newspapers, journals and updated decisions taken by several countries, particularly by Malaysia.

1. Scenario of COVID 19 in Malaysia

In Malaysia, the first proven case of COVID-19 was documented on January 25, 2020, involving three Chinese nationals. Reacting to it, the COVID-19 patients were handled and separated at a hospital in Johor Bharu. These detected cases were considered under control. The first COVID- 19 case concerning a Malaysian was documented on February 4, 2020 (BERNAMA, 2020), which took Malaysia's accumulative COVID-19 cases to 10 cases. On

March 16, 2020, the movement control order (MCO), was announced by the prime minister of Malaysia following the increase in number of positive COVID-19 cases. The number of positive COVID-19 cases during the date of the announcement, stood at 553 (Ministry of Health, 2020). Under the MCO, six main orders were enforced; i) prohibition of any mass gatherings, ii) prohibition of movement of Malaysians from going abroad, iii) prohibition of movement of foreigners into Malaysia, iv) closure of all schools and kindergartens, v) closure of higher educational institutions and skills development centres, vi) closure of all government and private premises except for those involved in essential services (Prime Minister of Malaysia speech, March 16, 2020). Table 1 shows movement control order by phase which include MCO1, MCO2 and MCO3 [11].

Table 1: Movement control order by phase

Phase	*Date*
Movement Control Order 1 (MCO/PKP18 March-3 May 2020)	
Phase 1	*18 March 2020-31March 2020*
Phase 2	*1 April 2020- 14 April 2020*
Phase 3	*15 April 2020-28 April 2020*
Phase 4	*29 April 2020- 3 May 2020*
Conditional movement control order (CMCO/PKPB, 4 May 2020-9Jun2 2020)	
Phase 1	*4 May 2020-12 May 2020*
Phase 2	*13 May 2020- 9 June 2020*
Recovery Movement Control Order (RCMCO/PKPP 10 June 2020-31 March 2021)	
Phase 1	*10 June 2020-31 August 2020*
Phase 2	*1 September 2020- 31 December 2020*
Phase 3	*1 January 2021-31 March 2021*
Movement Control Order 2 by States (11 January 2021-31 May 2021)	
Each States switch between MCO, CMCO, RMCO, EMCO, and semi-EMCO depending on COVID-19 conditions	
MCO3: Total lock down (FMCO 1June 2021-14 June 2021)	
Full movement control order set by Malaysian Government	

2. Environmental consequences of COVID-19

The main relationships of authors, journals, and collaborative links of COVID-19 papers between May 2020 and April 2021, show that many efforts have been undertaken to build up a strong database for COVID-19 in order to analyze the environment, business sectors etc. The online newspaper Eldiario.es likewise delved into the environmental consequences of new methods of consumption, migration, and mobility after the crisis. No study has discovered the development of publications related to COVID-19 or discovered its main ideas and environmental consequences in the specific area of the environment as described in Table 2.

Table 2: Listing of the journals with the greatest number of COVID-19-related environmental studies

Journal	*Number of Publications*
Science of the Total Environment	*125*
Environmental Research	*25*
Air Quality, Atmosphere and Health	*22*
Environment, Development and Sustainability	*12*
Global Journal of Environmental Science and Management GJSEM	*9*
Sustainability	*28*
Journal of Air Transport Management	*8*

Nowadays COVID-19 is still hitting different places with very strong impact such as in India, Brazil, South Africa, Malaysia etc. The reason behind that is due to irresponsible behavior towards the environment. Daily there are millions of infected masks that are disposed incorrectly and dumped into the environment. This reckless dumping comes back to the environment in different ways such as the rain, oxygen or humidity. It can also come back as medical waste in the inhalation system, domestic waste or through the rise and fall of the temperature as shown in Figure 1.

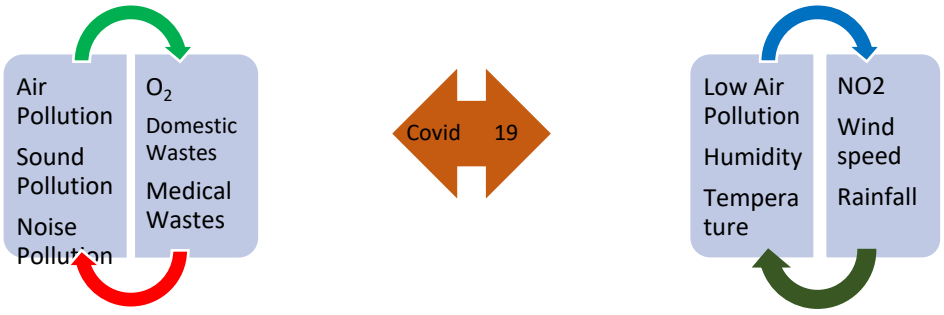

Fig. 1. COVID 19 and Environment.

Based on figure 1, many studies about the impacts of Corona virus on environment and in specific about air pollution have been highlighted. Air pollutants, such as nitrogen dioxide (NO_2) and carbon dioxide (CO_2) emissions declined substantially as anticipated due to the stop in industrial and vehicle operations worldwide [12]. Due to the drop in fossil fuel consumption, air pollution has dropped drastically in several countries, such as China, Italy, the USA, and India [13]. NO_2 levels in major Indian cities such as Ahmedabad, Mumbai, and Pune decreased between 40% and 50% at the time of lockdown [14]. In Europe, CO_2 levels are expected to drop by 390 million tonnes due to lockdown [13]. In the USA, carbon emissions also dropped around 40% during lockdown due to lower traffic [12]. Moreover, [15] reported that carbon monoxide (CO), NO_2, and 'particulate matter with a diameter smaller or equal to 10μm'(PM_{10}) decreased significantly during the global shutdown, while ozone (O_3) increased due to reduction in NO_2, NO_2 and black carbon (BC) has been reduced by 50% during the lockdown period, while PM_{10} was reduced to some

extent. In the context of Malaysia, [16] found that the MCO had a substantial impact on the reduction of $PM_{2.5}$. [17] found that the lockdown resulted in a 30% drop in air pollution while mobility was restrained by approximately 90%. Fig. 2 summarizes the indirect impacts of COVID-19 on air pollution due to lockdowns.

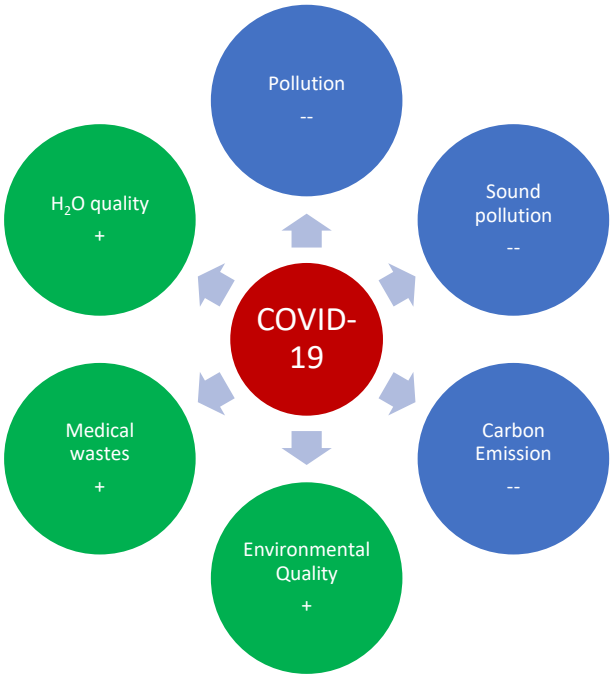

Fig. 2. Impacts of COVID-19 on environmental.

5. Religions and environmental sustainability

Almost all religions focus on the issue of the protecting of the universe, in different forms and with varying degrees of transparency. Religious have different perspective towards environmental sustainability, The Baha'i writings are instilled with a great respect for nature and the interrelation of all things, seeing especially in nature a reflection of the divine and an example of the oneness of humanity. "Let us look … at the beauty in diversity, the beauty of harmony, and learn a lesson from the vegetable creation. It is just the diversity and variety that constitutes its charm; each flower, each tree, each fruit, besides being beautiful, brings out by contrast the qualities of the others, and shows to advantage the special loveliness of each and all." ('Abdu'l-Bahá, *Paris Talks*). For Buddha's lessons, expresses the values of preservation and liability for the future. It is said that the morality of our actions in the present will shape our character for the future, an idea close of sustainable development. "As a bee – without harming the blossom, its color, its fragrance – takes its nectar and flies away: so should the sage go through a village."(Dhammapada IV, Pupphavagga: Blossoms, 49). There are around hundred verses in the bible that talk about safeguard of the environment. Christians therefore have environmental accountability and urge behavioral change for the good of the future. "Do not pollute the land where you are. Bloodshed pollutes the land, and atonement cannot be made for the land on which blood has been shed, except by the blood of the one who shed it." (Verse 35:33). To Confucians, everyday life was the arena of religion Some beliefs followed in Confucianism humanitarianism are linked in nature protection and ecology. "… sustainable harmonious relationship between the human species and nature is not merely an abstract ideal, but a concrete guide for practical living." (International Confucian Ecological Alliance, 2015). Hinduism is a religion profoundly embedded in nature. "According to the different modes of material nature — the mode of goodness, the mode of passion and the mode of darkness — there are different living creatures, who are known as demigods, human beings and hellish living

entities. O King, even a particular mode of nature, being mixed with the other two, is divided into three, and thus each kind of living creature is influenced by the other modes and acquires its habits also." (Bhagavata Purana 2.10.41). Hundreds of Qur'an verses support the protection of the environment. Many some Islamic organizations promote the relation between Islam and sustainability. Islam prohibits the excessive consumption of resources the planet provides to the humanity (Qur'an 7:31, 6:141, 17:26-27, 40:34).

"Devote thyself single-mindedly to the Faith, and thus follow the nature designed by Allah, the nature according to which He has fashioned mankind. There is no altering the creation of Allah." (Qur'an 30:30). "Do not strut arrogantly on the earth. You will never split the earth apart nor will you ever rival the mountains' stature" (Qur'an 17: 37). "It is Allah who made for you the earth a place of settlement and the sky a ceiling and formed you and perfected your forms and provided you with good things. That is Allah, your Lord; then blessed is Allah, Lord of the worlds." (Qur'an, 40:64).

Jewish they have a belief in environmental sustainability "And God said: 'Behold, I have given you every herb yielding seed, which is upon the face of all the earth, and every tree, in which is the fruit of a tree yielding seed--to you it shall be for food." (Gen 1:29), "The Earth is the Lord's and the fullness thereof" (Psalm 24), "[…] the Earth is Mine, you are My tenants" (Leviticus 25:23).

In conclusion, all religious principles, practices, and morals offer an efficient and thorough explanation to the existing environmental disputes faced by humans. Religious has a rich tradition of emphasizing the significance of environmental protection, sustainability, and conservation of natural resources.

6. Conclusion

Long-term consequences on population health are likely and pose significant challenges to national and international responses to COVID-19. Future research should include the effect of lockdown on air quality, effect of reckless mask dumping. Moreover, future research may explore the cause behind the low reduction of air quality in form of PM_{10} during lockdown compared to NO_2 and BC and might consider the overall pollution during lockdown. Special care must be given to the environment because it is the place where we live and thrive, though different religions hands be worked together and human on earth can pass the time he faced.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Blockchain for Sustainable Supply Chain: Applications and Challenges

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Abstract— Sustainable supply chain can be achieved by being aware of the ecosystem's environment. Nowadays, all types of supply chains between the producer and the consumer have become complex and long. This supply chain is lacking transparency regarding the journey of the products which can result in the increase of contaminated foods. Also, there is a chance of data manipulation as the records about the foods' movement are usually digitally centralized or even paper-based. Blockchain technology can help to build secured, traceable and transparence transactions of services. With the blockchain ledger it is possible to quickly verify the location, history, and status of a particular food product and everyone can access the data. This paper is reviewing different attempts to use blockchain to manage supply chains. Then it highlights some security issues facing blockchain in recent years to have more understanding of these issues and how to address them.

Keywords: *Blockchain technology, supply chain, blockchain challenges, distributed ledger, smart contracts.*

1. Introduction

The concept of blockchain technology was first introduced some years back in the area of cryptocurrency. Due to its great success in this area, it was later introduced in various other sectors. It has been used in sectors such as banking, global finance, enterprise services and now more focus is being given to blockchain technology in the supply chain sector. Blockchain is a distributed ledger technology whereby it uses an innovative technological approach to realizing decentralized trustless systems. The blockchain ensures the security and privacy of data by indexing the identity and locations in a decentralized approach [1][2]. Blockchain is a distributed ledger that is programmed to record online transactions in a secure way that cannot be manipulated. All transactions/information are chunked into blocks and linked so that each block is linked to the previous and next blocks. Each record in this ledger is protected by cryptographic rules, making it more reliable and tamper-proof. All the records of the transactions are checked with the approval of the system's participants [3]. When adopted, blockchain cannot be reversed or refused because the agreement is carried out with the mutual consent of all parties [4]. In the blockchain, each transaction has a digital signature from participants to ensure its security and authenticity. It focuses on storing information safely and efficiently in a distributed environment so that it cannot be tampered with or compromised.

Blockchain offers numerous security characteristics that include fault tolerance, full traceability, and auditability where the block is characterized by cryptographic schemes and secure timestamp, integrity, and authorization with the use of hash function and digital signature algorithm to validate signatures. Blockchain is also transparent where the transactions are appended into blocks and replicated publicly. Even though the distributed ledger is publicly accessible, the keys relative to the parties are anonymous, thus protecting privacy.

There are three types of blockchain, public, private, and consortium which define the membership control of the consensus in a blockchain. Consensus is achieved by using the prior agreement mechanisms. The ledgers are visible to anyone of all these types. However, in consortiums, the ledger can be restricted to a selected group. In public blockchains, anyone can verify and add transaction blocks while in private and consortium blockchains, only specific people or groups of the organization (such as banks) are allowed. This has to be considered when evaluating the consensus algorithms in the blockchain design based on the membership control that fits the nature

of the business application [5][6]. A good consensus algorithm means efficiency, safety, and convenience [7]. Several consensus algorithms that have been employed in blockchains are Proof-of-Work (PoW), Proof-of-Stake (PoS), Delegated Proof-of-Stake (DPoS), Practical Byzantine Fault Tolerance (PBFT), and RAFT [8]. These algorithms' employability might vary in terms of the byzantine fault tolerance, crash fault tolerance, speed of its verification, throughput of the transactions, and scalability.

One of the primary benefits of using blockchain is the ability to generate smart contracts such as Ethereum that currently uses Proof-of-Work (PoW) consensus protocol, NXT Proof-of-Stake (PoS), and Hyperledger Fabric Practical Byzantine Fault Tolerance (PBFT)[9]. According to [10], a smart contract converts a contract to computer codes, which are then stored and repeated on the computer system and monitored by the network of computers that operate the blockchain. A smart contract is a trusted application in automating the agreement execution, workflow and triggering the next action based on the policies and requirements specified in the contract and as agreed upon by the parties. The transactions are carried out in compliance with the terms of the contract [10] without any intermediary's involvement. As a result, transaction time and costs can be minimized because of smart contracts' ability to conduct themselves. Smart contracts not only describe the rules and penalties surrounding a contractual arrangement in the same way as conventional contracts do, but they also automatically impose those requirements. Smart contracts are self-verifying and self-executing agreements that can simplify the contract lifecycle to enhance enforcement, reduce risk, and increase business efficiencies [11]. Smart contracts have the benefit of efficiency and accuracy as they are digital and automated; security, trust, and transparency of the encrypted records of the transactions. There have been many applications of smart contracts across the industries which include supply chain areas to streamline and automate processes to identify any discrepancies, reconcile documents and transactions and resolve disputes based on the agreed-upon smart contract.

In this paper, a review of blockchain applications is presented in section 2. Section 3 presents the adoption of blockchain in supply chain sectors, and a discussion about the challenges faced in adopting blockchain is in section 4. Furthermore, some of the security issues are mentioned in section 5.

2. Blockchain Technology Applications

The blockchain technological concept became highly known after the first cryptocurrency, Bitcoin was introduced by Satoshi Nakamoto [12]. Nakamoto defined Bitcoin as a peer-to-peer version of electronic cash that allows online transactions to be sent directly without going through a centralized financial institution. The wide popularity of Bitcoin encouraged others to introduce their digital coins. But the concept of blockchain holds huge potential for large-scale improvements in different fields [13].

In blockchain, transactions are conducted in a multi-distributed form which can be used to transform and classify details. This is one of the applications of blockchain technology, in which all documents are stored securely and made available worldwide, with the ability to be verified at any time [14]. The variety of blockchain publications enriches various industries, including healthcare, banking, energy, media, and telecommunications. For example, the healthcare sector can use the features of blockchain to optimise data protection and authentication schemes for electronic health records.
The potential of blockchain technology to monitor transactions on distributed ledgers opens up new avenues for governments to increase accountability, prevent fraud, and foster confidence in the public-private sector. Some of the potential benefits such as trust and transparency can be especially beneficial for developing countries since they are more vulnerable to corruption, fraud, and lack of trust than developed countries [15]. Society can reduce the number of officials who execute regulations and provide administrative services and those officials who control this process (decreasing corruption, decreasing cost of public administration, increasing quality of administrative services). Another specific feature of the blockchain is an immutable repository. Therefore, the main idea is to use it as a general repository for any kind of public information which conventionally is managed by governments in the form of public registries, and administrative services around such registries, i.e. business registries, notaries, real estate and cadastral, public finances, trademarks and patents, and many others; which

makes an exhaustive list difficult. In general, we can say that the ledger can secure and timestamp any kind of facts [16].
Smart property refers to managing the responsibility of property or resources through the use of blockchain and smart contracts. The property can be tangible, such as an automobile, a home, or a cell phone or it can be non-physical, such as an organization's offers. Blockchain can envision placing proof of the existence of any authoritative archive, health records, and steadfastness instalments in the music industry, public accountants, private shares, and marriage licenses. The ambiguity or security goal can be achieved by keeping the unique mark of the computerized resource rather than the computerized resource itself.

3. Blockchain for Sustainable Supply Chain

Integrating IoT with blockchain enables the benefits of both technologies to form the decentralized model of blockchain that can handle processing of billions of transactions in between IoT devices. This can significantly reduce the costs associated with installing and maintaining large centralized data centers, distributing computation and storage of the devices that form the IoT networks [17].

As a result of its capability of ensuring public accessibility of data streams and data immutability, Blockchain can increase the transparency, efficiency, and reliability of the supply chains, and optimize the inbound processes. Many researchers are working on blockchain in logistics and supply chain activities as well. Radio-frequency identification (RFID), barcode, telematics, sensors-enabled technologies, Internet-of-things (IoT) and many other technologies are used for tracking products through the supply chain. [13]

Supply chains consist of a series of organisations and activities that products move through on their journey from the suppliers to the customers. The main goal for the organisations is to actively and collaboratively manage the operations in the supply chain to achieve a sustainable competitive advantage and maximize customer value [13]. Figure (1) presents the blockchain for Halal food supply chain.

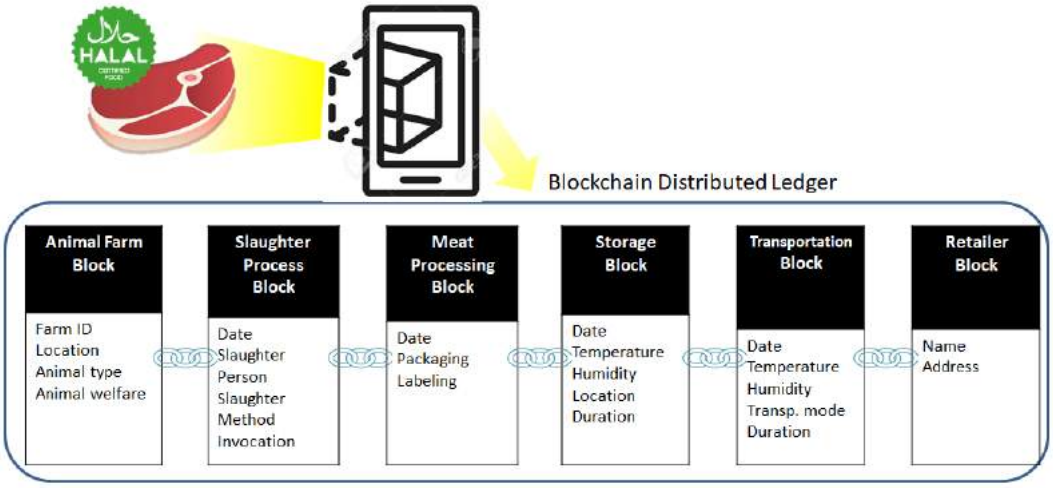

Fig1. Blockchain for Halal food supply chain

The studies about applications of blockchain in supply chain management are focusing on different aspects: First, tracing of assets as well as automation of supply chain operations, supply chain finance can be supported occasionally. Second, blockchain can reorganize supply chains for more collaborative ecosystems, such as: the security of additive manufacturing, agricultural supply chain, purchasing and supply management, common-pool resource management, and supply chain performance measurements [18]. Third, blockchain is subject to technical

limitations which are related to supply chain nature like: typically low data quality in supply chain settings and the governance model of data ownership [19].

A supply chain frequently crosses business functions and national borders, and it has a large network of trading partners. These interactions make the supply chain more vulnerable and can contribute to its disruption. Nowadays, supply chains are having three challenges: Data visibility, process optimization, and demand management. Many efforts were made to overcome them but the inefficiencies remain. An example of that is the administrative costs which are twice the cost of physically shipping the container [20].
Blockchain can play an important role in the area of supply chain by preventing security breaches and improving supply chain communication. Blockchain also provides automatic traceability, as append-only distributed databases of transaction information can be exchanged through the entire Peer-to-Peer network, and those historical records remain with permanent footprints in perpetuity. Besides that, a blockchain made up of nodes and arcs may be embedded in a traditional supply chain structure made up of nodes and arcs, allowing it to capture both operational and network risks associated with the supply chain [11].
Kehoe [21] summarized the main weaknesses of current supply chains and identified the four key solutions which can be provided by blockchain technology as shown in figure 2.

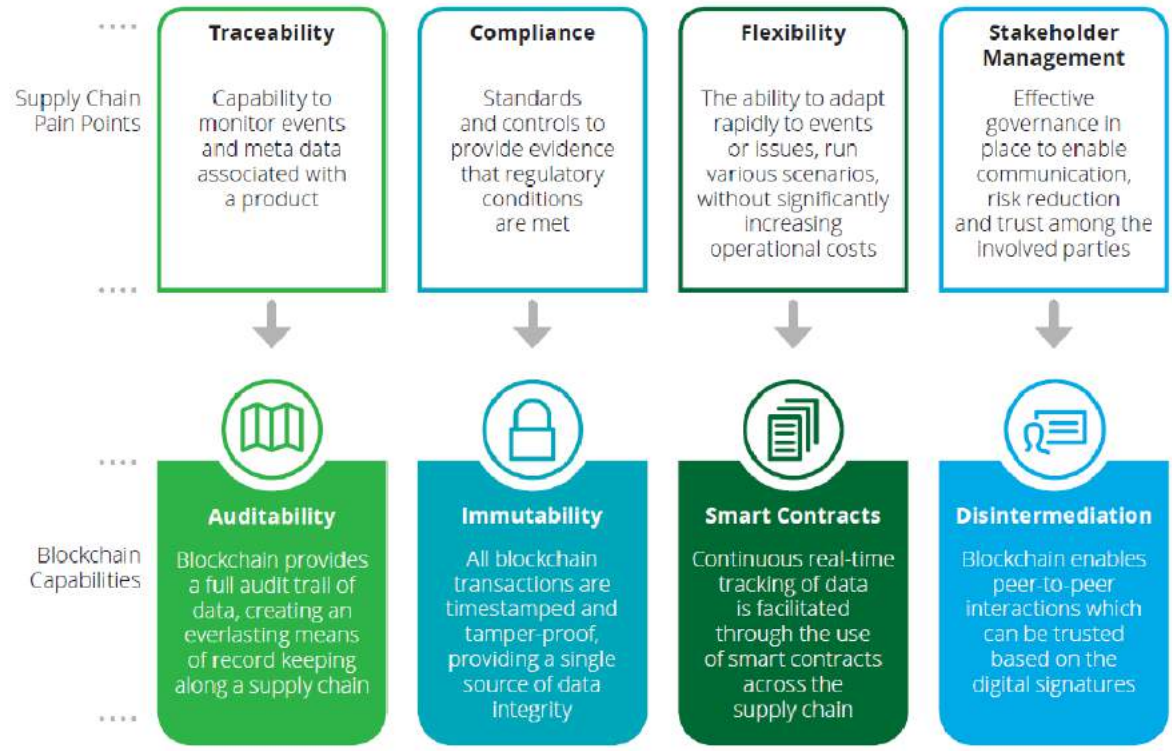

Fig 2. The four pain points in current supply chain and the blockchain possible solutions [21]

4. Blockchain Challenges in Supply Chain

With the amount of benefits and successes blockchain has achieved in various sectors, there are many shortcomings and vulnerabilities which are mainly due to its revolutionary concept and its complexity. Interoperability, scalability, and government regulatory concerns appear to be the most critical of these challenges. Since each node in a blockchain must process and verify each transaction, the blockchain needs a high-bandwidth internet connection, and massive processing power. If the blockchain is forced to centralize its verification process as a result of this obstacle, it will lose its original intent [11].

Furthermore, considering the various systems that blockchain technology can employ, determining the best combinations of platforms that are interoperable and compatible with one another will be difficult. Because blockchain is based on a distributed ledger that can escape government intervention, the government could put more pressure on blockchain users through various regulations and legal restrictions, reducing the utility of blockchain in terms of maintaining the integrity and privacy of transactions and asset transfers. Ironically, increased privacy makes it more difficult for law enforcement officials to determine who owns a digital wallet, making it more vulnerable to scammers attempting to steal digital currencies recorded on the blockchain [22].

Some of the major problems facing blockchain are summarized by [23]. Firstly, there is a lack of terminology clarification and perceived immaturity of the technology. There appears to be a lack of understanding among businesses, consumers and authorities about how the technology operates, the potential use cases for blockchain and the likely short and medium-term market development potential [24]. Secondly, there is insufficient data on the benefits to different kinds of businesses and the broader economic effects. Thirdly, the uncertainty of the regulatory environment, the multiple non-interoperable applications, as well as the fragmentation that occurs makes businesses avoid the adaptation of the technology[25]. Fourthly, technology has an energy-intensive nature. Also, the current supply chain models lack trust and certification for the products' path and the lack of trust regarding the compliance of the product with respect to origin, quality and specifications [11]. Typically, there are numerous supply chain members each with their own information systems, but communication between these systems is limited at best. [13] The interconnected structure of the supply chain makes it difficult to introduce a centralized system in control of a third party, since a high level of trust is required. The limited amount of trust concludes in separate systems that restrain the possibility to accomplish traceability throughout the full supply chain. [26].

5. Security Challenges of Blockchain

Numerous security experts believe that the blockchain system's intrinsic cryptographic existence is adequate to withstand persistent hacking and security threats. The adoption of blockchain technology in various sectors can help in improving the availability of unencrypted data as blockchain adopts a decentralized architecture, immutable reliable trust with verifiable transmission backtracks, secured transactions with cryptographic encryption, and keys as the unique identifiers. However, despite the many advantages that blockchains offer, blockchains are also vulnerable to attacks and require different types of consensus mechanisms and models to validate the transactions of the blockchain network. This mainly depends on the consensus algorithm such as Proof-of-Work (PoW), Proof-of-Stake (PoS), Delegated Proof-of-Stake (DPoS), Practical Byzantine Fault Tolerance (PBFT), and RAFT and their relative considerations as they have their characteristics. These consensus algorithms were analyzed in terms of their limitations, especially in the hashing power concentration where they are prone to attacks [27][6].

Among blockchain technology's problems are reversible transactions, verification speed, access restriction, cryptanalysis, anonymity, data mining, and modeling security [28]. Blockchain ensures security by doing a huge amount of repetition as the data have to be tampered proof. Nevertheless, it is possible that some of the nodes may act maliciously or can be compromised through the smart contract that runs on blockchain. Thus, it is important to ensure that any security vulnerabilities from other smart contracts do not get inherited when they are called [29].

Some of the blockchain security attacks are the Blockchain denial-of-service (BDoS) [30], endpoint security attacks, code vulnerabilities, malware mining, Sybil attacks [31], eclipse attacks [32], and routing attacks [29]. Other types of blockchain attacks are double-spending, privacy leakage, private key security, mining, and balanced attack [5]. Many approaches which include new consensus algorithms were made to deal with different aspects of security, privacy, and trust in the blockchain [33][34][35][36] in addition to other types of limitations such as the need for a trusted third party to act as a manager, the inability to reveal the identity of the signer in the event of a dispute, unresolved issue of the issuance and revocation of attribute certificate in a distributed environment, or the risk of data being deceived by a malicious user [28][35][36].

6. Conclusion

Blockchain offers numerous security characteristics that can increase the efficiency, and reliability of the supply chains, and optimize the inbound processes. It is also transparent and fault tolerant, in addition to its auditability, integrity, authorization, and privacy aspects. Blockchain also provides automatic traceability, as append-only distributed databases of transaction information can be exchanged through the entire network, and those records remain with permanent footprints. These characteristics are important in the supply chain area as it is difficult to centralize a system within the supply chain interconnected structure without a high level of trust within all the separate systems. This might restrain the possibility of full supply chain traceability. With the use of smart contracts that run on blockchain in the area of the supply chain, it is possible to quickly verify the location, history, and status processes that are accessible by anyone. Smart contracts automate the execution of agreements and other processes that can simplify the contract lifecycle to enhance enforcement, reduce risk, and increase business efficiencies. Blockchain can play an important role in the area of the supply chain as it helps in preventing security breaches and improving supply chain communication.

7. Acknowledgement

This research is supported by the Ministry of Higher Education (MoHE) of Malaysia through Fundamental Research Grant Scheme (FRGS/1/2020/ICT11/UUM/02/1).

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

A Review on Quality Assurance Framework for Science and Technology Higher Education to Build Digital Society

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Abstract— Quality assurance is a universal approach that possesses quality as a benchmark standard in higher education institutions. This is to ensure equal knowledge, learning, practice, and implementation with an uncompromised standard to students and stakeholders. Many countries have been working on standardizing the quality assurance framework in higher education. For example, European Union has designed its unique framework following ISO Integrated Management System by adding the administrative departments, units, services, and processes. However, some elements have been identified in designing and standardizing the framework in terms of international standards. These are the key structures for quality assurance, design, approval, and modification of programs, academic program quality review, course quality review, assessment and grading, faculty, students, teaching and learning resources, public information - academic programs, academic information management, cyclical external quality assurance, and information systems should be implemented to integrate the quality assurance. This is to increase and maintain the quality assurance system's quality, success rate, efficiency, and acceptability. Therefore, the proposed strategic framework should be able to make one platform of strategic management, process management, and monitoring-measuring systems for international, national, and regional external factors that are liase into the system.

Keywords: *Quality Assurance; HQA framework; e-learning; Higher education.*

1. Introduction

Higher education is a continual and transformative process of various ideal areas where teaching, learning, and research are very important factors that mostly interconnected each other. These factors are can be implied for teachers, students and the educational institutes. Mostly the highly demanded areas are concerned according to the social benefits. The higher educational institutes can be established according to the location, easy access to the students and the community. The programs should be useful and designed course materials are industry and social standard. Students can pick their areas according to the background, discipline and the mode of study. Professional body should internationally recognize the curriculums or standard abide by course selection, structure, theory and practical facilities at the state of art laboratories, and the high quality and globally connected teaching staffs. High quality, equitable and global learning experiences can help the students widen their career paths and the graduates to contribute globally interconnected societies by their direct participation to the industry, and research and the developments. Therefore, a complete higher education quality assurance framework is the key criterion for any country and the institutions. Thus, this article presents the various higher education quality assurance framework that are internationally accepted. The main contribution of this article is to present a new higher education quality assurance (HEQA) framework that can be adapted to universities or education institutes. The following sections are designed as: section 2 presents the current higher education quality assurance (HEQA) frameworks that the designed standard for several countries, i.e., Japan, Australia, and United Kingdom, section 3 discusses the proposed higher education quality assurance (HEQA) framework

2. Existing HEQA framework

HEQA frameworks are designed with several regulations for the education institutes through applying several Standards and operating procedures. The intention here is to respect the independence and autonomy of the institutes or universities and thus assume that universities that are once approved would be ready to assure their quality autonomously. The education standard and the operating procedures are very significant attachments to the HEQA in guaranteeing appropriate levels of quality in all universities. Therefore, several factors and regulations are considered in opening a new university. The concerns regulation factors are listed as below [1-3]:

- Qualifications for admission, duration of the study, and organization
- Minimum standards for human and material
- Resources (faculty, facilities, and equipment). Faculty members such as lecturers,
- professors must meet the minimum qualification for teaching and research. The laboratories should be well equipped, merit-based financial assistance and scholarship assistance for the bright student, and the university/education institutions should ensure highly organized library facilities. Norm for educational activities
- The number of offered courses for diploma, pre-university courses, under graduation, and post graduations and the required number of courses with credits for graduation.
- Leadership training and assessment system.

The above factors are abiding by the following Japanese HEQA framework (Figure 1) [4-5].

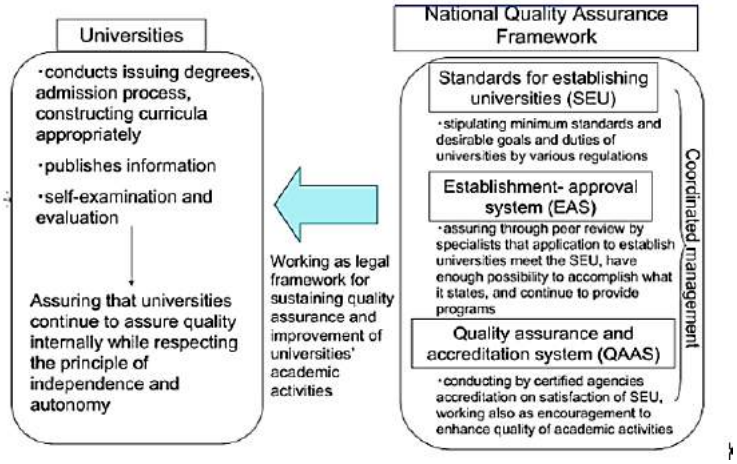


Fig.1. Japanese HEQA Framework [4-5]

In Australia, the HEQA framework has been structured to support the student experience as progresses of the student to achieve the degree and qualification. It is also viewed that the HEQA framework is designed with the many core characteristics of higher education to make it more useful and practical to the system to student as well as community. The Standards are regularly monitored to ensure the quality of the higher education activities

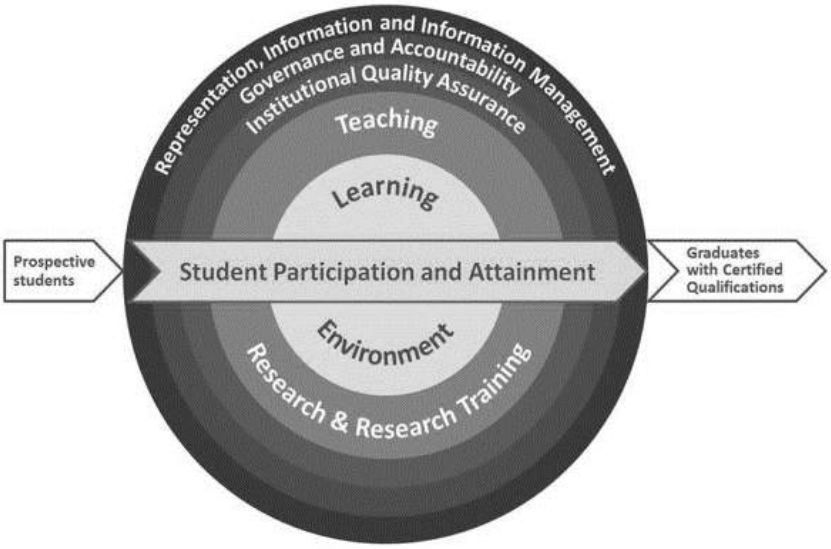
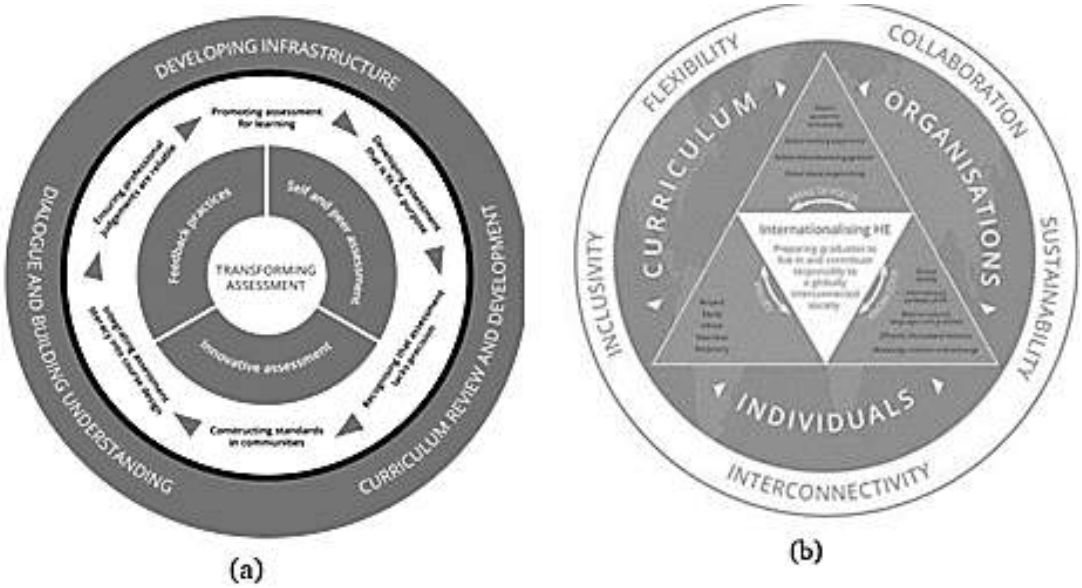


Fig.2. Australian HEQA framework [5]

Higher education academy in United Kingdom maintains several standards to their universities and institutions. The UK HEQA framework for transforming assessment is presented in Figure 2a, internationalizing higher education framework presented in 2(b), and the learning framework in (c) [6].



(c)

Fig. 3. UK academy Higher Education Framework: transforming assessment (a), internationalizing higher education framework (b), flexible learning framework (c) [6]

Authors have presented the existing governance encounters at the university level facing the successions of global standpoints. The authors also have discussed the comparisons concerning different continent universities [7]. UK education providers have designed and delivered degree apprenticeships which is a very addition to UK higher education [8]. Hence, UK originates the frameworks to meet the selection criteria for Sustainable Development and Global Citizenship. According to the case study of United Kingdom higher education, a policy framework generates that relates the sustainable development comprising the critical policy analysis. This is to identify, differentiate and categorize stakeholder interactions [9-10]. However, the entire framework is still facing various administration and adoption challenges at the university level of Japan, Australia, and the UK. Thus, the developing country perspective is more challenging in higher education administration, learning, laboratories, and overall QA. Therefore, a standard HEQA framework for universities needs to design focusing the developing and developed countries.

3. Conclusion

This article aims to advance the new insights into the higher education quality assurance framework that processes in universities relating to sustainable learning, teaching, and development through maintaining proper educational QA. This paper also discusses the critical points of the UK, Australia, and Japanizes higher education framework. The new HEQA framework advances the existing frameworks identifying the key elements and factors related to the QA in higher education systems. The proposed HEQA effectively integrates ICT learning of sustainable learning, teaching, research, and development frameworks in any developing countries sustainable higher education. The total layout of the proposed HEQA framework needs to elaborate which is a future work of this study.

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Proceedings of International Conference on Engineering Professional Ethics and Education 2021 (ICEPEE'21)
22 – 23 June 2021, Kuala Lumpur, Malaysia.

Mechatronics Engineering Curriculum in the New Perspective

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Abstract— Mechatronics Engineering nowadays is no longer restricted to the simple combination of the traditional disciplines like mechanical, electrical and computer engineering. Emerging technologies like micro-actuators, distributed sensory systems, medical robotics in healthcare, soft actuators and robotics are a few to name that need a wide range of knowledge for their design and realization. To add to that, the demand of Industrial Revolution 4.0 (IR 4.0) also requires future graduates to have adequate digital and data literacy, while the elements of sustainability and ethics also need to be upheld to produce well-balanced engineers with good work ethics. For this, understanding in complex decision algorithms, advanced control systems and artificial intelligence are gradually becoming essential and therefore need to be integrated in mechatronics engineering curriculum. That being said, it is a big challenge to develop an effective mechatronics curriculum to produce graduates who will be able to support modern mechatronics systems that involve so many foundations, as well as to include sustainability and ethics elements in related subjects. This paper presents a Mechatronics Engineering curriculum that has been recently revised in the International Islamic University Malaysia to accommodate most of the fundamentals in its core while grouping the elective courses in three streams to be opted by the students; namely Artificial Intelligence, Robotics and Automation and Instrumentation and Control. It is expected that the graduates of this program will be able to support specialized areas of mechatronics as well as will be able to switch to other areas with minimum training to cater with the needs of IR 4.0.

Keywords: *Mechatronics Engineering, Curriculum, digital and data literacy.*

1. Introduction

Mechatronics Engineering is an interdisciplinary academic programme that has been existing for almost five decades in many universities in different countries of the world, specifically in Asia and Europe. This discipline requires knowledge of Mechanical, Electrical, Electronic, Information Technology, Instrumentation and Control, Robotics engineering and so on [1-2]. With the passage of time, it has become such that this discipline now integrates most of the interdisciplinary engineering fields and has been playing a vital role in developing modern smart products and systems [3]. And with the evolving technologies within the fourth industrial revolution, Mechatronics Engineering curriculum needs to be further updated to equip the students with the tools of trade for current and the future [4-5]. The revision is also timely as the International Islamic University Malaysia (IIUM) has just recently introduced the *Sejahtera* Academic Framework (SAF), which demonstrates that the university envisions preparing the present students to face the future that may have so many disruptions and that the university emphasizes the need of humanising education that will nurture holistic, well-balanced and *sejahtera* human beings instead of merely employable graduates [6].

2. Revised Mechatronics Curriculum at IIUM

The Mechatronics Engineering curriculum of IIUM underwent its latest review in 2020. After running the programme for more than 25 years it was felt that the field and scope of such a discipline had expanded significantly and had become difficult to be accommodated just with a list of courses from the constituent disciplines without highlighting clear goals of the programme [7-8]. The hype cycle of emerging technologies

shown in Fig.1 highlights the trend of technological advancements by the next 5 to 10 years and beyond [8]. Technologies related to Mechatronics Engineering discipline have been extracted from Fig.1 and are presented in Table 1. It is evident from Table 1 that robotics, control, and artificial intelligence will be the core elements of many of these products and technologies.

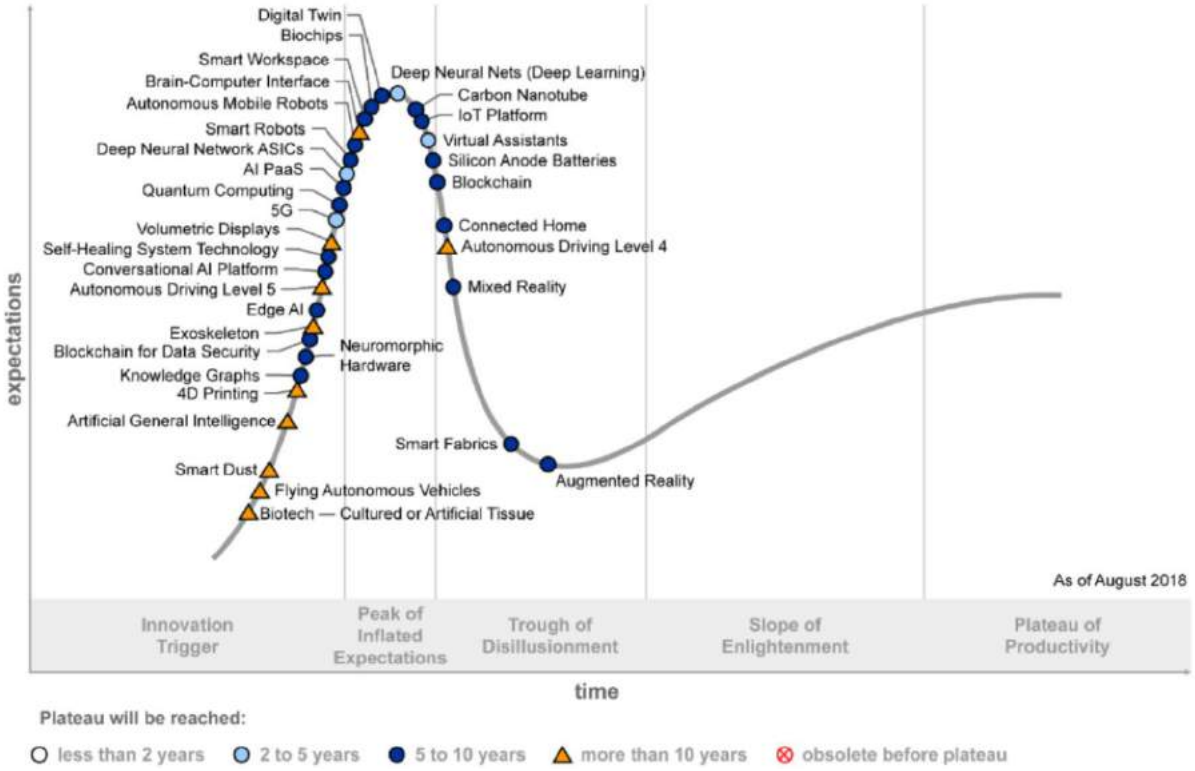

Fig. 1: Hype Cycle for Emerging Technologies, 2018 [9]

Table 1: Emerging Technologies related to mechatronics engineering discipline

Autonomous mobile robots
Smart robots
Deep Neural network and deep learning
IoT Platform
Exoskeleton
Flying Autonomous Vehicle
Autonomous Driving
4D Printing Platform
Digital Twin

To have a better structure of the revised mechatronics engineering curriculum that would be able to provide sufficient scope of theoretical knowledge and skills of applying theory and software in realizing mechatronics products an analysis based on the future trend of technologies was conducted. The analysis is presented in Table 2. Input from the alumni and industries was also considered in responding to the questions set in column 1 of this table. Expectations of graduate competencies from the industries are summarized in Table 3.

Table 2: Analysis on programme relevancy for the next 5-10 years

What are the future trends and demands in areas related to the programme?	**Innovators** of smart, affordable, and sustainable products that involve knowledge of • Sensors and instrumentation • Actuators and dynamic systems • Robotics and autonomous systems • precision control • AI based decision • IOT and • IR4.0 **Self-learner** with ethical practices and Islamic values **Technopreneur** in the area of robotics, automation and AI
What changes need to be made to meet the future challenges?	• Core courses need to be aligned to understand and solve complex problems of the future that need robotics, AI, sensor fusion, IOT and IR4.0 • Sufficient software practice and software-hardware interfacing need to be enhanced • Students' hands on skill must be improved to the level of self-engaging in product development • Self-learning needs to be inculcated in the core curriculum • Entrepreneurship must be incorporated to the level that the graduates will be able to create job
Will the programme be still relevant to meet the needs of society and industries 5-10 years from now?	• Yes • New products and services will involve more and more smart products like new kinds of robots and autonomous systems. The revised Mechatronics engineering curriculum aligned in line with the elements listed in row 1 and 2 of this table will be able to meet the needs of the industries and society.

Table 3: Expectations of graduate competencies from the industries

Technical Skills	Soft skills and Managerial Skills
1. Very good in theories in the field of study 2. Multitasking and quick problem solver with minimum cost. 3. Expertise (hands-on) in robotics, embedded systems, and control systems. 4. Hands-on experience in designing machines or robots simple as well as complex. 5. Strong programming skills especially C++/Python. 6. Experience with ROS 7. Hands on skills	1. Integrity 2. Decision making skills 3. Engineering management skills 4. Competence and multitasking 5. Good attitude 6. Passionate in any job given 7. Have a pilot view on the interest area and seeing the milestone of it ahead

To cope up with the trend of technological advancements and to fulfill the expectations of the industries, in the new curriculum three specialization streams have been introduced where each stream consists of four courses in the respective specialization area. Graduates who will take courses from a particular stream will require minimum training either to work in the industries or to become technopreneur. Specialization streams and the list of courses under each stream are presented in Table 4.

Table 4: Specialization stream in the revised mechatronics curriculum at IIUM

No	Robotics and Automation	Control and Instrumentation	Artificial Intelligence
1	Autonomous Robotic Systems	Electronic Instrumentation and Design	Natural Language Processing
2	Underwater and Aerial Robots	Biomedical instrumentation	Machine Learning
3	Manufacturing Mechatronics	Modern Control Design	Deep Learning
4	Smart Infrastructure	System Modelling and Identification	Machine Vision

To fulfill the requirements of integration of interdisciplinary courses, in most of the Mechatronics Engineering curriculum, fundamental engineering discipline courses such as Electrical and Electronics Circuits, Engineering Mechanics, Thermal Sciences and Fluid Mechanics are taught within the first four to five semesters of the programme. Then, the integrated courses like Control System, Robotics and Industrial Automation are taught during the last three semesters. Such practice helps the students to understand the concept of Mechatronics Engineering, however, fails to show the students any pathway to real-life integrated smart products. It is also observed that not all graduates of Mechatronics Engineering will be able to master all the components of Mechatronics. As such, it would be wise to introduce core courses in the early stage of the curriculum that are highly involved in some specialization areas. For example, in the case of Robotics, Dynamics and Mechanism are

heavily involved. Similarly, Statistics and Computational Intelligence are highly involved in Artificial Intelligence. Table 5 shows the list of courses that show pathways for choosing specialization.

Table 5: Core courses to show pathway of specialization.

Core courses to support the specialisation streams Robotics and Automation, Control and Instrumentation and Artificial Intelligence		
Machine design and Theory of Machines	Instrumentation and Measurement	Statistics and Numerical Analysis
Fundamentals of Robotics	Two control courses	Computational Intelligence

In the revised Mechatronics Engineering curriculum, emphasis has also been put on equipping students with entrepreneurial skills. Three courses namely Engineering Design, Integrated Design Project and Entrepreneurship have been designed in such a way that a group of four to five students will work for three consecutive semesters on building a prototype of a product starting from market survey until the scheme of commercialization. In line with the newly introduced *Sejahtera* Academic Framework in IIUM, the element of Islamic ethics has been incorporated into selected courses, including Robotics and Computational Intelligence to inculcate responsible use and design of the technology in this field in the perspective of Islam. A designated course on Sustainability Development to be taken before Engineering Design is also introduced as a university required course to discuss related issues, policies and practices for holistic product and service development considering multiple stakeholders.

3. Conclusion

The revised Mechatronics Engineering curriculum at IIUM has been designed to equip all graduates with core competencies that would lead to smart product design and development capabilities. Specializations in three crucial fields - Robotics and Automation, Control and Instrumentation, and Artificial Intelligence have been introduced to help students cope with the advanced technologies of the future. Integration of software and hardware at course level along with three dynamically designed courses in consecutive semesters to expose students to entrepreneurial skills have also been incorporated. Islamic ethics and values have been integrated inside courses like AI and robotics for practicing Mechatronics Engineering in a better way.

ACKNOWLEDGEMENT

The authors would like to acknowledge the contributions of all the lecturers of the Mechatronics Engineering Programme in this noble endeavor. Special thanks are due to the Kulliyyah of Engineering (KOE) for taking the initiative of revising the curriculum as well as guiding towards the direction in line with the universities vision and mission. We are also indebted to the academic staff of the electrical engineering and mechanical engineering departments and the department of science in the Kulliyyah of Engineering who were directly or indirectly involved in designing the revised curriculum.

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