

Synchronous Online Discussion Forum for Postgraduate Study: A Case Study in Malaysia

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Abstract

Industrial Revolution 4.0 (IR4.0) has given a new impetus to educational transformation through a myriad of technological innovations in all aspects such as content, structure and overall management of education. Today the burgeoning of machine learning via flexible learning environments have witnessed synchronous online forums as a means to replace traditional face-to-face classroom interactions. This paper investigates the synchronous forum for postgraduate study in an open university in Malaysia. A total of 103 respondents responded to the questionnaire whilst 10 students were interviewed. Findings revealed that though a majority of the students held favorably views regarding synchronous online forum and their e-tutors, their participation was low due to time constraints, no reward for participation, lack of preparation and personal factors. There was also no significant difference in students' views with regards to gender but significant differences were recorded for age, and ethnicity. A positive and significant correlation was found between synchronous forums and e-tutors. The mismatch of the quantitative and qualitative findings of this study imply that though e-learning is viewed as the way forward, institutions of higher learning need to address the many challenges faced by students so they are capable of functioning in tomorrow's competitive arena of IR 4.0.

Keywords: *synchronous learning, live forums, online learning, postgraduate study.*

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I. INTRODUCTION

The current Industrial Revolution Wave 4.0 (IR4.0) is so strong that it has impacted all aspects of our life including education at all levels. Educationists today, are constantly challenged by the fast-paced technological era of the 21st century associated with IR4.0. Both Education 4.0 and the current wave of Education 5.0 is witnessing the inclusion of technologies that are evolving at such an exponential speed that they are often referred to as the disruptive technologies. Teaching and learning in Education 4.0 and Education 5.0 is no longer restricted to the four walls of the classroom. Dunwill [1] predicted that the future classrooms will witness changes in classroom layouts where virtual and augmented reality will completely

change the educational landscape offering flexible learning opportunities to accommodate varied and multiple learning styles with MOOC and a myriad of online learning options. Today's digital consumer looks for more interactive and personalized learning through SMAC (Social, Mobile, Analytics and Cloud) technologies.

Henceforth, the emergence of online learning is viewed as the 'major inflection point' in higher education. As such, institutions of higher learning (IHL) are challenged to provide self-paced personalized learning through innovations such as e-learning platforms using live forums, mobile computing, cloud and social networks. More importantly, e-learning platforms also provide learners to design their own learning pathways through designing learning ecosystems to meet their desired goals through various Internet of Things (IoT), cyber physical systems

that allow students to cooperate with other students in real time. The rising level of complexity offered through emerging innovative technologies have pushed educational institutions all around the globe including Malaysia to provide flexible e-learning environments for all students especially working adults pursuing their postgraduate degrees.

Among the numerous new pedagogical approaches, synchronous online discussion forums have surfaced in numerous institutions of higher learning in Malaysia as a means to replace traditional face-to-face classroom interactions. Such online learning environments are often viewed as new pedagogical approach to help address the increased number of postgraduate students who are busy working adults facing time constraints and limited funding. Therefore the main aim of this study was to investigate postgraduate students' views on synchronous online forums and their e-tutors in an open university in Malaysia.

II. LITERATURE REVIEW

Today online learning has revolutionized into many forms of applications intended for learning as well as teaching at different educational levels. In this case, learning can be synchronous or asynchronous or both altogether in online learning forms, which are done through implementation of technological advances like Internet. It offers the option for 24x7 interaction among the students. However, in case of asynchronous online learning, it enables the students to opt for courses that is based on their schedule as teaching and learning does not occur at the same time. On the other hand, synchronous online learning occurs when students and instructors are engaged in real time and allows students to obtain immediate feedback.

According to Kearsley [2], one of the applications of Computer Mediated Communication (CMC) is the provision of e-learning platform are discussion forums that provide a platform for learners to extend classroom discussion. Some notable advancement of its benefit has been observed as it provides improved cognitive and exploratory learning, improved critical thinking skills among learners and superior learning empowerment [3]. Besides that, Khlaif, Nadiruzzaman, & Kwon [4] further reiterated that studies have shown that online discussion forums correlated with increased student satisfaction with course experience and more meaningful and interactive learning experiences.

More importantly, the nature of anonymity on this platform may also allow introvert and shy students who otherwise prefer to participate in online education

compared to face-to-face (F2F) discussions. At last, up gradation of technology might enable the instructors, students, and administrators of the colleges and universities for data collection, as well as collection of feedback. It also involves evaluation with respect to their online experiences [5]. Evidence of the advancement of this field could be observed from study conducted by the Pew Research Center (2010-11) stated that 89% of 4 years courses offered courses that were completely online, or hybrid/blended online, or other forms of distance/non-face-to-face instruction [6].

Effective online synchronous learning require effective online sync e-tutors to help learners navigate effectively via synchronous discussion forums. Coppola et al. [7] postulated that tutors' roles have transformed in the cognitive, affective and managerial aspects in this field. They stressed that the affective role played by the tutor and their fellow students needed a change due to the loss of the face-to-face presence in the traditional classrooms. This limitation required the exploration of new modes of communication during interaction with learners such as the virtual classroom in addition to the asynchronous discussion forums to ensure better two-way communication when communicating ideas during discussions. This dynamic change required instructors to emphasize and highlight on the cognitive role noticing that online learning required deeper cognitive complexity in the learning materials since it lacked the non-verbal language present in traditional classroom teaching. Lastly, the managerial role played by the instructor also witnessed a change through differences in the course management due to the loss of the conventional classroom style expressiveness and spontaneous question and answer sessions. Knowing the possible challenges, e-tutors needed to change their roles in several aspects to ensure successful teaching and learning process on this platform.

Bailey and Card [8] put forward the following eight pedagogical practices for effective online practice: fostering relationships, engagement, timeliness, communication, organization, technology, flexibility and high expectations. They further highlighted that successful teaching and learning experience on discussion platforms require effective communication in order to establish a good student-instructor relationship. Besides that, e-tutors must play an active role in being attentive, responsive, and timely in responding to students as well as providing sufficient feedback on completed tasks and assignments on their online learning platform. An effective online e-tutor must be flexible to cope and adapt with the current

technologies especially on this platform, engaging and responding with prompt feedback to their learners in a timely manner.

Sull [9] highlighted that e-tutors are bound to expect a number of formidable challenges on online forum discussions that can pose as negative setbacks to interactive discussion forums. There can be a tendency for some learners to dominate the forum whilst some may get involved in online conflict discussion which can sometimes lead to personal attacks and bullying. Other challenges pointed out by Sull [9] include students who often digress and go off-track discussion topics whilst some students fail to contribute to discussions. There are also cases where students plagiarize other students' postings or offer weak and non-substantive posts / responses such as 'I agree' and 'that's interesting'.

These challenges can be overcome by effective monitoring by e-tutors. It is hence pertinent that e-tutors begin their online courses by first laying down effective ground rules. Sull [9] recommended that learners should be made aware of the importance of a healthy debate and discussion to ensure emotions are kept in check where they need to understand and value opposing views. E-tutors can highlight such matters through a general email/announcement to the class and ensuring a strong presence of e-tutors. Kehrward [10] in proposing his theoretical model, postulated three indicators of social presence, namely expression of emotion, open communication and group cohesion. E-tutors and learners need to develop social bonds through this platform, which will enable students to feel comfortable in communicating and exchanging information on this online environment. With this, the students are able to showcase their abilities and pursuits of opportunities to maintain an ongoing participation.

Finally, Sun & Chen [6] revealed that effective online instruction depends on the following three aspects. Firstly, well-designed course content that effectively motivates meaningful interaction between the instructor and learners with well-prepared and fully-supported instructors. Second, is the creation of a sense of online learning community and thirdly IHLs need to keep abreast with the rapid advancement of technology. Thus effective online forum discussions can only be productive if e-tutors are in sync with today's techno-savvy learning environments.

III. THE STUDY

This case study was aimed to investigate synchronous online forum for postgraduate study in an open university

located in the Klang Valley, Malaysia. In this study, the synchronous online forum in the selected Open University has been implemented for the past three years. The synchronous online interactive discussion forum allows both learners and e-tutors to interact in real time. The interaction is however a non F2F engagement through an e-learning platform which enables both parties to be in the same online 'space' typing out messages/ comments / feedback that appear in a single thread (linear order). Moreover this Open University offers a 3-Stage Guide for all e-tutors.

- Stage 1, is the Setting Up or the Pre-Synchronous E-Learning Stage. At this stage, e-tutors are advised to introduce themselves and encourage learners to introduce themselves. E-tutors are also required to lay down the basic ground rules / netiquette for the synchronous online forum. They are also required to inform learners on the set time and semester schedule for the upcoming Live Forums.

- Stage 2, is the Synchronous Socialization Stage where e-tutors have to begin their sessions on time and once the session is activated, e-tutors can post discussions questions into the Live Forum and encourage learners to participate. E-tutors are also encouraged to engage in knowledge construction by responding constructively to comments and asking probing questions to instill critical and creative thinking.

- Stage 3 is the Closure Stage where e-tutors sum up or conclude the discussion by posting a summary in the forum and clarify any misconception of the concepts discussed. They are also required to motivate and show appreciation to learners for their active participation and collaboration.

Besides the above, e-tutors are also provided with a guide on their roles and responsibilities. E-tutors at this university are also provided with numerous support systems such as the Tutor & Delivery Unit (TDU) that provides support online to all tutors and facilitators and it is also a platform where e-tutors can not only pose their queries but also share effective e-tutoring tips with other tutors and obtain links to useful resources.

The sample population involved in this study comprised 103 postgraduate respondents who were pursuing their Master's degree. Data were collected through a mixed-method approach employing the use of a online survey questionnaire and semi structured interviews with 10 volunteer postgraduate students. A case study was used as it enables researchers to investigate the contemporary phenomenon of synchronous online forum discussion within its real-life content.

The survey questionnaire comprised of four main

sections. Section A explored respondents' demographic profile whilst Section B examined respondents' perceptions of synchronous online forums. Their responses were recorded based on a five-point Likert scale (1-5) where a score of 1 indicated strong disagreement whilst a score of 5 meant a strong agreement to the item posed. Section C investigated respondents' views on ten items on the role of e-tutors and an open ended question for respondents to provide any form of comment / feedback on their e-tutor. Finally, Section D comprised of five open-ended questions on synchronous online forum. The survey questionnaire was validated by a panel of two experts, one from a public university and another from a private university located in the Klang Valley. A pilot test was conducted involving 42 Master's degree students from another institution of higher learning to establish the reliability of the instrument. The Cronbach Alpha mean score of 0.923 indicated that it was a reliable instrument. The quantitative data were analyzed using descriptive and inferential statistics via SPSS version 32.

On the other hand, qualitative data obtained from interviews were transcribed and thematically analyzed. To ensure rigor in qualitative analysis, the qualitative data were validated through member-checking and the inter-rater reliability procedure showed an 82.3 percent level of agreement between two independent researchers. Both procedures ensured a valid and reliable process of data collection and data analysis were conducted.

IV. RESULTS AND DISCUSSION FINDINGS

The following section reports the findings obtained from the questionnaire and semi-structured interviews. The demographic profile of the respondents indicated that a total of 103 respondents responded to the online survey questionnaire, comprising 80 (77.6%) female and 23 (22.4%) male postgraduate students. A large majority (95%) of them are currently pursuing their Master of Education whilst the remaining were either doing a Master of Counselling or ICT. Given below, first are the quantitative findings followed by the qualitative findings obtained from semi-structured interviews and structured questions posed in Section D of the Questionnaire.

A. Quantitative Findings- Postgraduate Students Views on Synchronous Forum Discussions and Role of e-Tutors

The main objective of this study was to investigate PG students' perspectives on synchronous forum discussions. From the findings in Table 1 it can be seen that PG students generally held rather positive perceptions on live discussion

forums. They also agreed that live forums provide flexible and independent learning ($M=3.62$), as it provides students the opportunities to interact for peer learning ($M=3.56$, $SD=1.082$) and more importantly allows them to get immediate response for their learning concerns ($M=3.61$, $SD=1.246$). Besides that live forum also complements F2F teaching sessions, encourages responsible active learning and helps develops students' communication skills.

Table I: Perceptions on Synchronous Forum Discussions

No.	Item	Mean	SD
	Live Discussion Forums		
1	complement F2F teaching sessions	3.48	1.092
2	encourage responsible active learning	3.47	0.978
3	improve communication skills	3.45	0.109
4	allow me to get immediate response to my learning concerns	3.61	1.246
5	enhance my learning process	3.46	1.055
6	offer deeper perspectives on topics for knowledge construction	3.36	0.092
7	help develop critical thinking skills	3.41	1.080
8	provide flexible and independent learning	3.62	0.104
9	provide opportunities for students to interact for peer learning	3.56	1.082
	Overall	3.489	1.093

Scale: 1= Strongly Disagree, 3= Almost Agree, 5= Strongly Agree

Likewise, PG students' held similar positive ($M=3.76$, $SD=0.906$) perceptions towards their e-tutors. Findings exhibited in Table 2 demonstrate that respondents agreed that their e-tutors were knowledgeable in their respective subject areas and they did pose questions and helpful resources in the forums. Students also acknowledged that e-tutors guided students in assignments and quizzes, provided appropriate feedback and communicated course information clearly. Meanwhile, item on e-tutor active participation, received the lowest mean score ($M = 3.612$, $SD = 0.920$) perhaps reflecting that some e-tutors may not have logged in or posted a minimum of three postings per week. Nonetheless, the general levels of agreement of all items disclose the fact that e-tutors were performing well in their role as e-learning facilitators.

TABLE II: Respondents' Views of e-tutors

No.	Item	Mean	SD
1	e-tutor actively participated in the forum (login/posted at least 3 times per week)	3.612	0.920
2	e-tutor responded and gave feedback immediately (within 48 hours)	3.631	0.874
3	e-tutor posted questions and helpful resources in the forum	3.864	0.817

4	e-tutor is knowledgeable in the subject	4.165	0.793
5	Information about the courses was communicated clearly	3.738	0.970
6	e-tutor facilitated engaging discussions in the forum/live forum	3.680	0.921
7	e-tutor guided students in assignment, quizzes, etc.	3.786	0.893
8	e-tutor guided students on where to find resources	3.621	1.001
9	e-tutor provided appropriate feedback to all discussions	3.748	0.936
10	e-tutor presented the subject matter illustratively, providing examples, etc.	3.729	0.931
	Overall	3.757	0.906

Scale: 1= Strongly Disagree, 3= Almost Agree, 5= Strongly Agree

B. Postgraduate Students' Views based on Gender

With respect to respondents' views on live forums based on gender, the findings (Table 3) revealed that though the males ($M=3.79$) held slightly more positive views compared to the females ($M=3.40$), the difference in the feedback between male and female respondents [$t(101) = 1.866$, $p = 0.087$] was not statistically significant.

Table III: Respondents' Perceptions of Synchronous Forum based on Gender

Gender	Mean	SD	T	P
Male (n=23)	3.792	0.780	1.866	0.087
Female (n=80)	3.401	0.913		

Significance ** $p < 0.05$

Likewise similar findings were also recorded with regards to their views on e-tutors. Findings in Table 4, exhibit that the male respondents held slightly more positive views ($M=4.02$, $SD=0.652$) compared to their female ($M=4.02$, $SD=0.652$) counterparts. The difference in their perception was however also not significant [$t(101) = 1.999$, $p = 0.027$].

Table IV: Respondents' Views of e-tutors based on gender

Gender	Mean	SD	T	P
Male (n= 23)	4.021	0.652	1.999	0.027
Female (n=80)	3.681	0.738		

C. Postgraduate Students' Views based on Age

The findings displayed in Table 5, reveal that there was a statistically significant difference in the mean scores on live forums between the three groups of respondents (19-25 years old, 26-35 years old and above 35 years old) at the $p < 0.05$ level as determined by one-way ANOVA ($F(2, 100) = 10.614$, $p = 0.000$). Further analysis shows that there was a significant difference in mean between respondents aged 19-25 years old with respondents aged 26-35 years old ($p = 0.00$). Besides, the difference in the

mean scores between respondents aged 26-35 years old with respondents aged above 35 years old was also significant ($p = 0.07$).

Table V: Perceptions on Synchronous Forum based on Age

Age	Mean	SD	F	P
19-25 years old (n=37)	3.859	0.732		
26-35 years old (n=35)	2.987	0.899	10.614	0.000
Above 35 years old (n=31)	3.613	0.833		

Significance ** $p < 0.05$

Likewise, findings in Table 6 show that there was also a significant difference in the mean scores on the perceptions of online e-tutor between the three groups of respondents (19-25 years old, 26-35 years old and above 35 years old) at the $p < 0.05$ level as determined by one-way ANOVA ($F(2, 100) = 3.707$, $p = 0.028$). Further analysis through Turkey Post Hoc test shows that there is a significant difference in the mean scores between respondents aged 19-25 years old and respondents aged 26-35 years old.

Table VI: Respondents' Views of e-tutors based on age

Age	Mean	SD	F	P
19-25 years old (n=37)	3.905	0.606		
26-35 years old (n=35)	3.491	0.827	3.707	0.028
Above 35 years old (n=31)	3.881	0.68		

D. Postgraduate Students' Views based on Ethnicity

This study also examined respondents' perceptions based on ethnicity. Results in Table 7 reveal that there was a statistically significant difference in the mean scores on live forums between the four groups of respondents (Malay, Chinese, Indian and Others) at the $p < 0.05$ level as determined by one-way ANOVA ($F(3, 99) = 6.157$, $p = 0.001$).

Table VII: Respondents' Perceptions of Synchronous Forum based on Ethnicity

Ethnicity	Mean	SD	F	P
Malay (n=46)	3.773	0.767		
Chinese (n=32)	3.226	0.833	6.157	0.001
Indian (n=20)	3.056	0.974		
Others (n=5)	4.289	0.873		

Significance ** $p < 0.05$

Further analysis using Turkey Post Hoc test shows that there was significant difference in the mean scores between Malay respondents and Chinese respondents ($p = 0.27$) as well as between Malay respondents and Indian respondents ($p = 0.10$). Furthermore, the results also show that there was a significant difference in the mean scores between Indian and respondents from other ethnic groups ($p = 0.20$) and also between Chinese respondents compared to respondents from other ethnic groups ($p = 0.46$).

Table VIII: Respondents' Views of e-tutors based on ethnicity

Ethnicity	Mean	SD	F	P
Malay (n=46)	3.883	0.662		
Chinese (n=32)	3.638	0.748	2.222	0.090
Indian (n=20)	3.535	0.841		
Others (n=5)	4.260	0.358		

Significance ** $p < 0.05$

On the other hand, findings on respondents' perceptions on e-tutors is shown in Table 8 indicated that there was no statistically significant difference in the mean scores on live forums between the four groups of respondents (Malay, Chinese, Indian and Others) at the $p < 0.05$ level as determined by one-way ANOVA ($F(3, 99) = 2.222, p = 0.090$).

E. Correlation between Synchronous Forums and e-Tutors

The final quantitative analysis investigated the correlation between respondents' perceptions between synchronous discussion forums and e-Tutors. Results exhibited in Table 9 from the Spearman rho correlation test reveal that the correlation between Live Forums and e-tutor is positive and significant. Based on the findings it can be concluded that Live Forums and e-tutor have a high correlation (0.730).

Table IX: Correlation between Synchronous Forums and e-tutors

		Overall B	Overall C
Live Forums	Spearman's rho Correlation	1	.730**
	Sig. (2-tailed)		.000
	N	103	103
e-tutor	Spearman's rho Correlation	.730**	1
	Sig. (2-tailed)	.000	
	N	103	103

** Correlation is significant at the 0.01 level (2-tailed)

F. Qualitative findings – Respondents' Views on Synchronous Online Discussion Forums

The positive perceptions portrayed in Section A of the questionnaire however revealed a rather mixed response from findings obtained from qualitative research instruments. This data were obtained from both interviews and open ended questions on Synchronous Forums posed in Section D of the questionnaire. Findings exhibited that approximately 52% responded positively whilst the remaining 48% did not find synchronous forums helpful. The qualitative findings were thematically analyzed and given below is some of the feedback obtained.

The positive themes that emerged from both sets of data further reiterated that live discussion forums enhance student learning, provide flexible learning environments

and enhances not only students' communication skills but also the student-tutor interaction. This was well articulated by Student G, who said that "live discussion forums are very helpful to me because I can get additional information on the contents of the lesson, as well as assignments. Furthermore, the F2F sessions are not enough to cover all these discussions."

This positivity was also expressed by Student H, a retired practitioner currently doing his MEd. He said that "I look forward to my live discussion forums because it provides me the platforms to not only discuss stuff I get from class, books and the Internet but I can also throw my ideas to spark in-depth conversations with my experienced e-tutor. This has really helped me better understand the field of education."

On the other hand, students' who held a negative view highlighted that synchronous forums did not only provide sufficient in-depth information, left them confused, did not contribute to impactful learning and hence a majority felt that F2F student-tutor interactions were more useful. Time constraint was another major reason why live forums were not useful as a majority had various work and family commitments. Yet a few others felt that the learning platform was not user friendly as they were not techno savvy and felt that the learning tools provided required further enhancement.

This negative perception was succinctly presented in the interview session by Student F: Well in my opinion, I do not think discussion forums have much to offer, I feel it lacks the depth of discussion that we can get in the F2F classroom . . . I do not think it has achieved its objective because a majority of students do not turn up for the live forums and if they do they just ask their question and once they have their answer they leave. Furthermore if the tutor or another student like me poses a question or challenges their view, they get intimidated and they leave the forum, so where is the intellectual discussion we are looking for? In my opinion, I am able to share more with my lecturer and peers during the face-to-face classroom interaction."

Student J highlighted that there were close to 90 online students in his group of synchronous forum but only 'three to five get online for the forums.' When probed further as to why students 'stay away' from live forums, the following five main themes emerged: 1) time constraints, (2) lack of preparation, (3) no reward system for participation, (4) Internet connection problems and (5) personal issues (e.g. not techno savvy, lack confidence). Even though most tutors held their synchronous forums after office hours, a majority still cited time constraint as the main reason.

Student D felt that, “discussion forums are good as they blend technology and learning but if I have not read the topic I cannot go in because I feel I cannot contribute and this lack of preparation is why many of us do not join the forum... besides that I think most Malaysian students are shy and want to ‘jaga muka’ (save face) as they will feel stupid if they cannot answer questions posed or discussed in the forum.” Student H, a male teacher from Johor further added that “some students have low confidence and some have poor English proficiency, so they do not want to join the discussion.”

Student B a female lecturer from a private university highlighted that “some of my course mates, especially the school teachers are not techno savvy and they are shy to ask for help. You will not believe me some do not even know the existence of the live forum as they did not attend the training the university offers...so they cannot join the forum. In my opinion, the e-tutors even though some are retired seniors, are good. It is the students who are not ready or ill-equipped with IT skills. In my opinion, since no marks are awarded for participation, the exam orientated society of Malaysian students will not bother to join. I think it is sad that our Malaysian students and even our postgraduate adult students are not ready for such e-learning endeavors.” The above discussion reveal that though online learning is the way forward a majority of the postgraduate students in this study have not been able to effectively embrace the true benefits of flexible online learning endeavors.

V. DISCUSSION OF THE FINDINGS

The findings of this study revealed a mixed response from this group of Malaysian postgraduate students’ on synchronous online discussion forums. Though students held a positive view on the many benefits, yet a majority failed to actively participate to reap the full benefits of synchronous online discussion forums. Respondents cited time constraints, lack of rewards for participation and personal factors such as lack of preparation and confidence as the main deterrents. A majority also claimed a preference for the tradition Face-to-Face instructor-student classroom interaction to learner-to-learner interaction of synchronous forums. This finding is congruent with Kyei-Blankson, Ntuli and Donnelly [11] study and they emphasized the need to investigate why student-instructor presence plays a more important role than learner-learner interaction for online learning. Jaggers and Du Xi [12] indicated that both types of interpersonal interaction within a course online does positively and significantly relate to student grades learning gains. They also validated that a negative perception towards online learning often stems from

learners from disadvantaged backgrounds and students with lower levels of preparation.

Findings in this study also revealed no significant difference in student perceptions to live forums and e-tutors with regards to gender but significant differences were recorded with regards to age and ethnicity. A study conducted by Adams, et al. [13] among Malaysian tertiary students in a public university, however, indicated a significant difference. Females in their study used more technological tools and were more active on social networks whilst males preferred mobile technologies and asked more questions on online learning platforms. They also noted a significant difference based on age with students aged 30 and above displaying more learner autonomy and self-directed learning compared to the younger learners. Likewise, a significant difference was also witnessed in terms of ethnicity with international students been more active on online learning platforms compared to Malaysian students.

VI. CONCLUSION & RECOMMENDATIONS

At this juncture it is pertinent to stress that the findings of this study are not conclusive and cannot be generalized on the total population of Malaysian postgraduate students because it involved only a small sample size of only 103 working adult postgraduate students. Therefore, future studies should involve a larger sample size involving both private, public and international students.

Finally, there is no denying that online learning has transformed the teaching and learning endeavors of today and the impact of both IR4.0 and Education 5.0 may witness even more disruptive technologies on future machine learning in higher education. The empirical findings of this study have notable implications for online course delivery for all stakeholders in education at all levels. In line with proliferating technological advances, the Malaysian Education Blueprint 2015-2025 (Higher Education) has stressed the need for 70% of all programs to have blended online courses, so that higher education can further notarize burgeoning flexible learning environments to remain relevant and resilient in today’s keen competitive changing times.

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