Education 4.0: Are Students Aware And Ready For It?

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ABSTRACT

The aim of this study is to investigate the awareness and readiness of UKM health science programs students on education 4.0. Methods: This was a descriptive cross-sectional survey involving a convenient sample of 265 health science programs students in UKM. A google form questionnaire was constructed including the demographic profiles of the subjects and 10 closed ended questions to assess the awareness and readiness of education 4.0 respectively. Ethics approval was obtained from UKM Research Ethics Committee. The sample comprised of 68.3% females and 31.7% males with an age group ranging from 18-24 years old. Majority were Malay and Chinese students of 45.7% each. Faculty of Health Science has the largest sample size with 52.1%, followed by Faculty of Pharmacy (28.3%) and about 19.6% from the Faculty of Dentistry. Data analysis revealed over 75% of the subjects were aware while more than 65% were ready for education 4.0. Almost two thirds of the students were aware and ready for education 4.0.
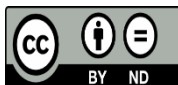
1. INTRODUCTION

According to Oxford Dictionary, education is defined as the process of receiving or giving systematic instruction, especially at a school or university and an enlightening experience. The origin is 16th century: from Latin education, from the verb educare. It cannot be denied that education is a very crucial aspect in our life. A normally grown adult usually has three educators in their life, parents, teachers and lecturers. Education provides us socialization. If children need to learn the norms, values, and skills they need to function in society, then education is a primary vehicle for such learning. These norms and values include respect for authority, patriotism, punctuality, individualism, and competition. It is indisputable that people must subscribe to a common set of beliefs and values. Education provides chances to integrate their social skills. We believe that education can give innovation to students. It provides the basics for any great scientist and artists to discover their creativity and contribute their great ideas to the construction of the world we are seeing today.

According to LeapFrog, education has revolutionized three times: Education 1.0: Memorisation, Education

2.0: Internet-based learning, Education 3.0: Empowerment to produce knowledge. Education 1.0 and 2.0 is exactly the backbone of the Education 3.0 and 4.0. Education 4.0 applicators are able to think critically and systematically by using past and current information obtained from the internet, thus creating innovative ideas [1].

The new vision of learning promotes learners to learn not only skills and knowledge that are needed but also to identify the source to learn these skills and knowledge. There are nine trends related to Education 4.0. First, learning can take place anytime, anywhere. E-Learning tools offer great opportunities for remote, self-coordinated learning. Flipped classroom approach also plays a huge role as it allows interactive learning to be done in class, while the theoretical parts to be learned beyond the class. Second, learning will be personalized to individual students. They will be introduced to harder tasks only after a certain mastery level is achieved. More practices will be provided if the instructors see a need in it. Third, students have a choice in determining how they want to learn. Although the learning outcomes of a course are preset by the institutions/bodies in charge of the curriculum, students are still free to choose the learning tools or techniques that they prefer. Fourth, students will be exposed to more modular and project-based learning. Students are required to apply their knowledge and skills in completing a couple of short-term projects.

Fifth, students will be exposed to more learning through practical applications such as internships, mentoring projects and collaborative projects. These provides more room for acquiring skills that involve human knowledge and face-to-face interaction. Sixth, students will be exposed to data interpretation in which they are required to apply their theoretical knowledge to numbers and use their reasoning skills to make inferences based on logic and trends from given sets of data. Seventh, students will be evaluated not examined. They will be assessed differently and the conventional platforms to assess students may become irrelevant or insufficient. Eighth, students' opinions will be considered in designing and updating the curriculum. Their inputs help the curriculum designers maintain curriculum contemporariness, up-to-date and usefulness. Ninth, students will become more independent in their own learning, thus forcing teachers to assume a new role as facilitators who will guide the students through their learning process. The nine trends of Education 4.0 shift the major learning responsibilities from the instructors to the learners [2].

In Malaysia, the new era of Education 4.0 will be the next hot seats as Malaysia will be exposed to this matter. Therefore, it is crucial for Malaysia have a preparation plan to deal with the expected situation towards Education 4.0. In the Education 4.0 framework, challenges of the fourth Industrial Revolution (IR4.0) are addressed in relation to the Malaysia Education Blueprint for Higher Education 2015-2025 [3]. Students equipped with ICT and collaborative skills and interested in lifelong learning can compete better in society. They also need to have critical and creative thinking and communicative skills.

Changes will take place in the teaching method and the setting of the learning process for secondary education in the next 5 to 7 years. Similar transformation has already taken place in the tertiary education setting in Malaysia. Layout of the classroom has gradually changed from neat rows and chairs to flexible seating arrangement enabling for both individual and collaborative workspaces. Student assignments are no longer in the form of constructed or selected responses only. Alternative assessments have been introduced to accommodate multiple learning styles. Portfolio, project papers, demonstration of skills and rating scales are among the alternative assessments being practiced nowadays. Apart from changes in the classroom layout and the types of assessment, the tertiary education has started using Massive Open Online Courses (MOOCs) and other online learning platforms in the teaching and learning. Most of the MOOCs offered by prestigious academic institutions in Malaysia are free. Students can choose any courses that they are interested in. Many courses are self-paced, enabling the students to learn the courses anytime, anywhere convenient to them using

devices of their choice. The use of virtual reality (VR) and augmented reality (AR) in teaching and learning seems rather new to many instructors in the tertiary education. The emergence of user-friendly VR and AR apps has helped instructors to integrate virtual and augmented reality in their teaching and learning [4].

Aims & Objectives
1.   To assess the Education 4.0 awareness of students in Universiti Kebangsaan Malaysia (UKM), Kuala Lumpur Campus.
2.   to assess the readiness of Education 4.0 among the students.

2. Material and Methods

2.1 Selection and Description of Participants
Participants were conveniently selected from undergraduate students from various health sciences programs including Faculty of Dentistry, Faculty of Pharmacy and Faculty of Health Sciences at UKM Kuala Lumpur (UKMKL) campus. Inclusion criteria were adults from the age 19 to 24 years old, UKM health science campus students and be able to access *Google Forms*. Exclusion criteria was applied to the students who were absent on the day of conducting research. The participants were recruited via convenience sampling as this is the most time-efficient and effective method to obtain an appropriate sample relevant to the research question.

2.2 Technical Information
This study was carried out as a descriptive and exploratory research, using a cross-sectional approach. The study examined the awareness and readiness of UKM undergraduate health science students regarding Education 4.0. A cross-sectional design was selected as it was identified as the most appropriate method to answer research questions.

The questionnaire was conducted online using Google Forms. It was in a plain-language (English) statement with 20 closed ended questions. Demographic information such as age, gender, ethnic, respective faculties and year of study were also included in the survey. Pretesting of the questionnaire was conducted beforehand to evaluate and improve upon the study where any problems were identified and rectified accordingly. The questions created were designed according to the key features of Education 4.0 such as easy access, self-coordinated, personalized, interactive and problem-based learning were asked to assess their awareness and readiness. Students in UKMKL were approached by the researchers during free time in the library, cafe and bus stops to complete the questionnaire. Link and QR code were provided for the subjects to access the questionnaire. The questionnaires were filled up by participants anonymously and voluntarily. Pertaining to ethical consideration, participants' consent was obtained at the first page of questionnaires before they proceeded to fill up the questionnaire.

2.3 Ethical
The Universiti Kebangsaan Malaysia (UKM) Institutional Review Board for Research and Ethics has approved this study (UKM PPI/111/8/JEP-2019-707).

2.4 Statistical Analysis
Data collected from the questionnaires were analyzed using Statistical Package for the Social Science (SPSS) software version 22.0 (IBM Corporation, Armonk, NY, USA). First, descriptive analysis was performed for demographic data to have a general view of the sample's gender, age, faculty and year of study. However, our study data analysis was to compare between faculty and year of study regarding their awareness and readiness towards Education 4.0.

3. Results

3.1 Demographic background

A total of 265 questionnaires were distributed and completed. Data detailing on the demographic profile of the subjects was presented in Table 1. Majority of the subjects were from the Faculty of Health Science (52.1%), followed by Pharmacy students (28.3%) and Dentistry students (19.6%). Higher number of female participants (68.3%) reflected the real population ratio of students in UKM Kuala Lumpur campus.

About 174 participants (65%) were in the age group of 21 to 23 years old while only 35 participants (13.4%) were in the age group of 24 years old and above. This was because most students had already graduated at the age of 24 years old. Both Chinese and Malay were the largest ethnic groups in this study, consisting of over 121 participants (45.7%) each. Only 7 participants (2.6%) were from the other races such as Bajau, Dusun, Melanau and Siamese which reflected the real ethnic population ratio in UKMKL campus. Year 4 students had the largest year group of a total of 93 participants (35.1%) while only 25 Year 5 students (9.4%) participated in the survey. This was due to the fact that Dentistry was the only course in UKMKL campus that required a five years curriculum duration.

Table 1 Demographic Data

		Respondence	Percentage (%)
Gender	Male	84	31.7
	Female	181	68.3
Age	18-20	58	21.9
	21-23	173	65.3
	24 and above	34	12.8
Ethnic	Malay	121	45.7
	Chinese	121	45.7
	Indian	16	6
	Others	7	2.6
Year of study	One	42	15.8
	Two	46	17.4
	Three	59	22.3
	Four	93	35.1
	Five	25	9.4
Faculty	Dentistry	53	19.6
	Health Science	138	52.1
	Pharmacy	75	28.3

3.2 Awareness of Education 4.0

In the presence of advanced technology, we need a revolution in education – not just to meet the needs of industry, but also to ensure the best experience for students through Education 4.0. Students would have greater flexibility in choosing their mode of engagement through this revolution. Hence, awareness of Education 4.0 among students in UKM was important.

Figure 1 showed that the majority of the participants (>82%) undisputedly agreed that they are aware of Education 4.0 based on all the questions More than 90% of the students agreed of being aware that learning can take place anytime anywhere (Q1), e-learning tools will offer great opportunities for remote, self-coordinated learning (Q2), students will be exposed to more structured and problem-based learning through Education 4.0 (Q5) and more hands-on learning through practical applications (Q6), more critical skills on data interpretation (Q7) and be more independent in their own learning (Q10). 12.8% of the students were unsure that interactive learning would be personalized to individual students (Q3). 89.8% of all participants

agreed that they would have a choice in determining how they want to learn (Q4). 13.2% and 4.2% of participants were not sure and disagreed respectively that Education 4.0 would emphasize on evaluation rather than examination (Q8). These were the highest percentages among any other questions. 85% of all participants agreed and were aware that their opinion will be considered in designing and updating the curriculum (Q9).
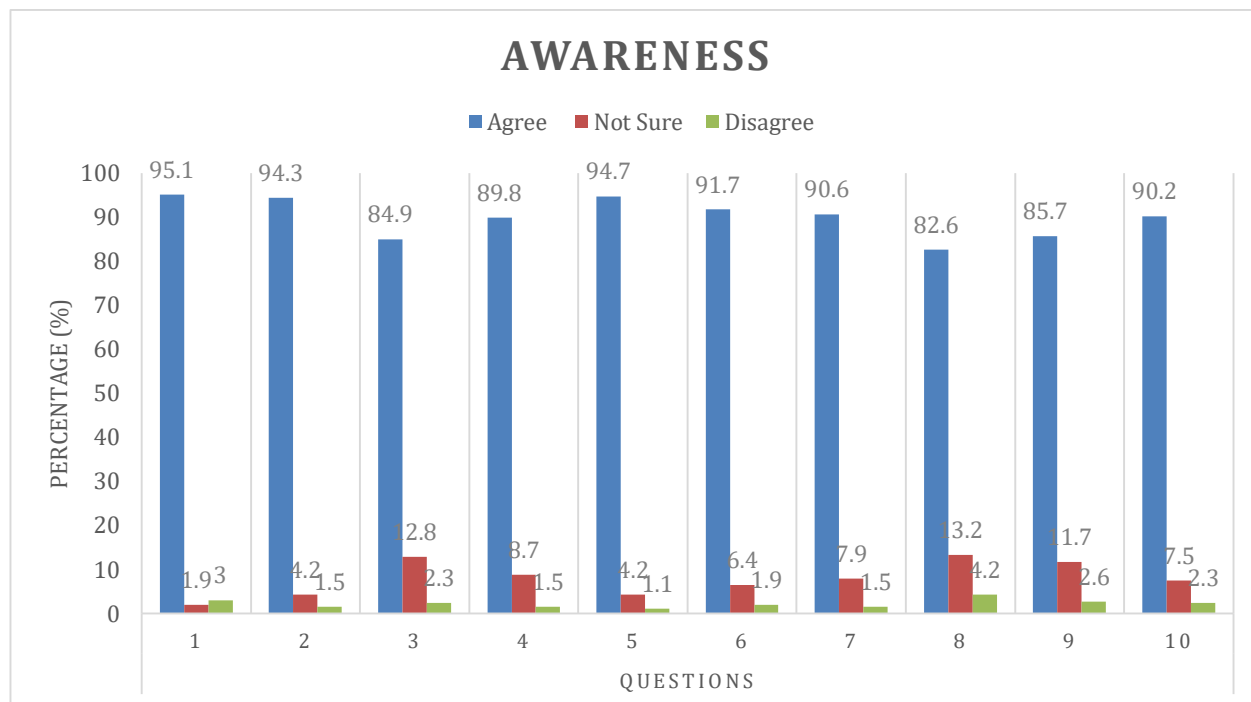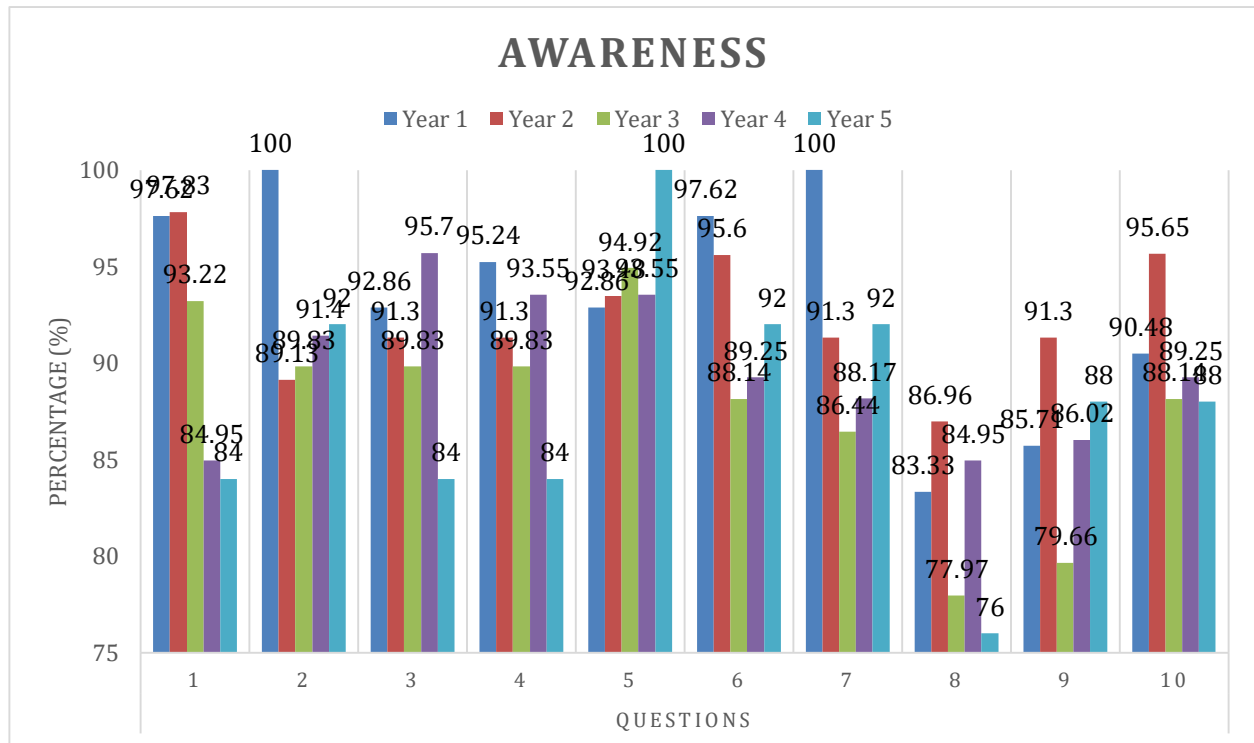

Figure 1 Awareness of Education 4.0 among health science students in UKM

Based on Figure 2, more than 80% of all participants agreed that they were aware of the importance of Education 4.0 towards the community and university. 95% of the students from all faculties were aware that learning can take place anytime anywhere (Q1). Pharmacy students recorded the highest percentage (96%) among all faculties agreeing that e-learning tools will offer great opportunities for remote, self-coordinated learning (Q2). Only 82.61% of health science students were aware that interactive learning will be personalized to individual students (Q3). This was the lowest value recorded compared to faculty of dentistry and pharmacy respectively. Average of 90% of all faculties' students agreed that they will have a choice in determining how they want to learn (Q4). All dentistry students agreed and were aware that they will be exposed to more structured and problem-based learning through Education 4.0 (Q5). Average of 91% of participants from all faculties were aware that students will be exposed to more hands-on learning through practical applications respectively (Q6). A high majority of participants (90%) agreed and were aware that the students will be exposed to more critical skills on data interpretation (Q7). 78.67% of pharmacy students, which was the lowest among faculties, agreed and were aware that Education 4.0 will emphasize on evaluation rather than examination (Q8). Average of 85% of all students agreed and were aware that their opinion will be considered in designing and updating the curriculum (Q9). Pharmacy students scored the highest (93.33%) among all faculties being aware that they will be more independent in their own learning (Q10).
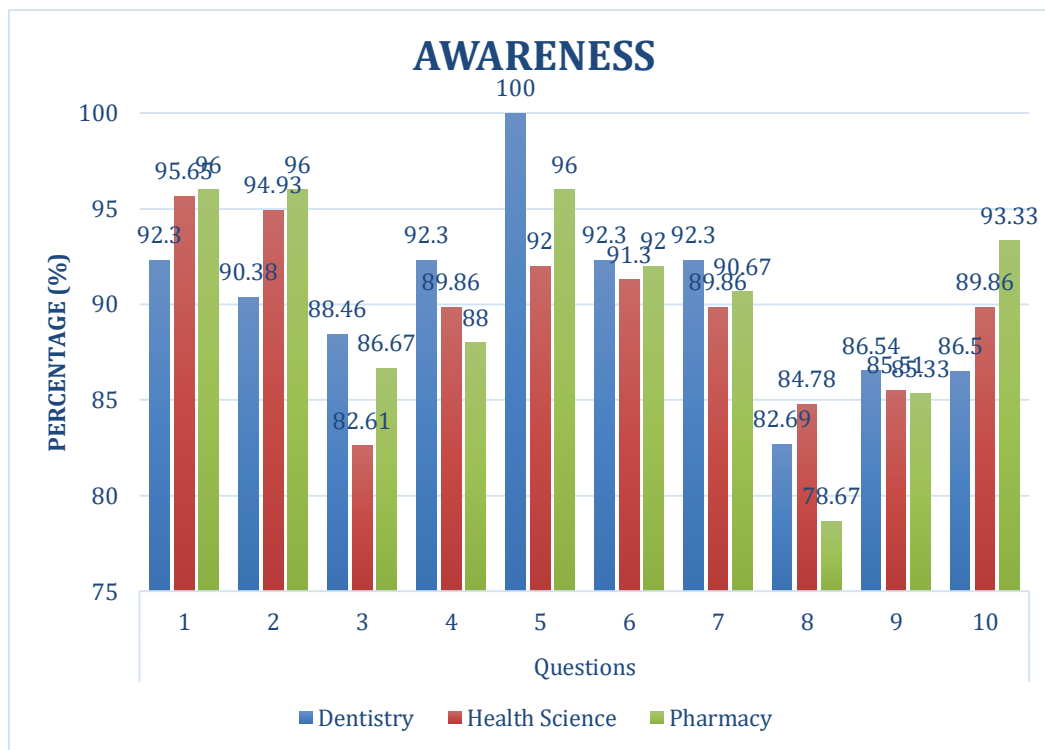
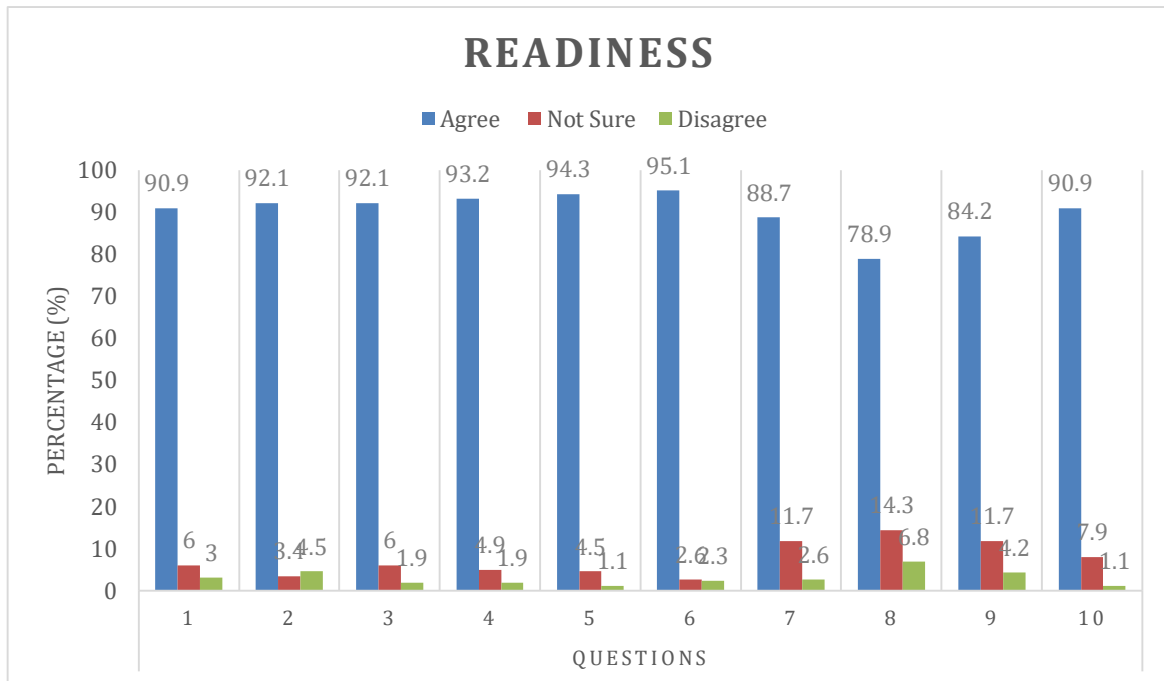**Figure 2** Awareness of Education 4.0 among health faculty in UKM

Figure 3 showed Year 2 students (97.83%) having the highest awareness among all the others year that learning can take place anytime anywhere with Education 4.0 (Q1). All Year 1 students (100%) agreed and were aware that e-learning tools will offer great opportunities for remote, self-coordinated learning (Q2). Only 80.65% in Year 4, which is the lowest among different years of students agreed that they were aware that interactive learning will be personalized to individual students (Q3). 95% of Year 1 students agreed that they will have a choice in determining how they want to learn (Q4). All Year 5 students (100%) agreed and were aware that they will be exposed to more structured and problem-based learning through Education 4.0 (Q5). 88.14% of Year 3 students agreed and were aware that students will be exposed to more hands-on learning through practical application (Q6). 86.44% of them agreed and were aware that they will be exposed to more critical skills on data interpretation (Q7). 77.97% and 79% of all year 3 students agreed and were aware that students will be evaluated not examined (Q8) and0 their opinion will be considered in designing and updating the curriculum (Q9) respectively, which were the lowest group compare to student from different years. 95 % of Year 2 students, which is highest among all faculties, agreed and were aware that they are more independent in their own learning (Q10).

Figure 3 Awareness of Education 4.0 among year of study in UKM
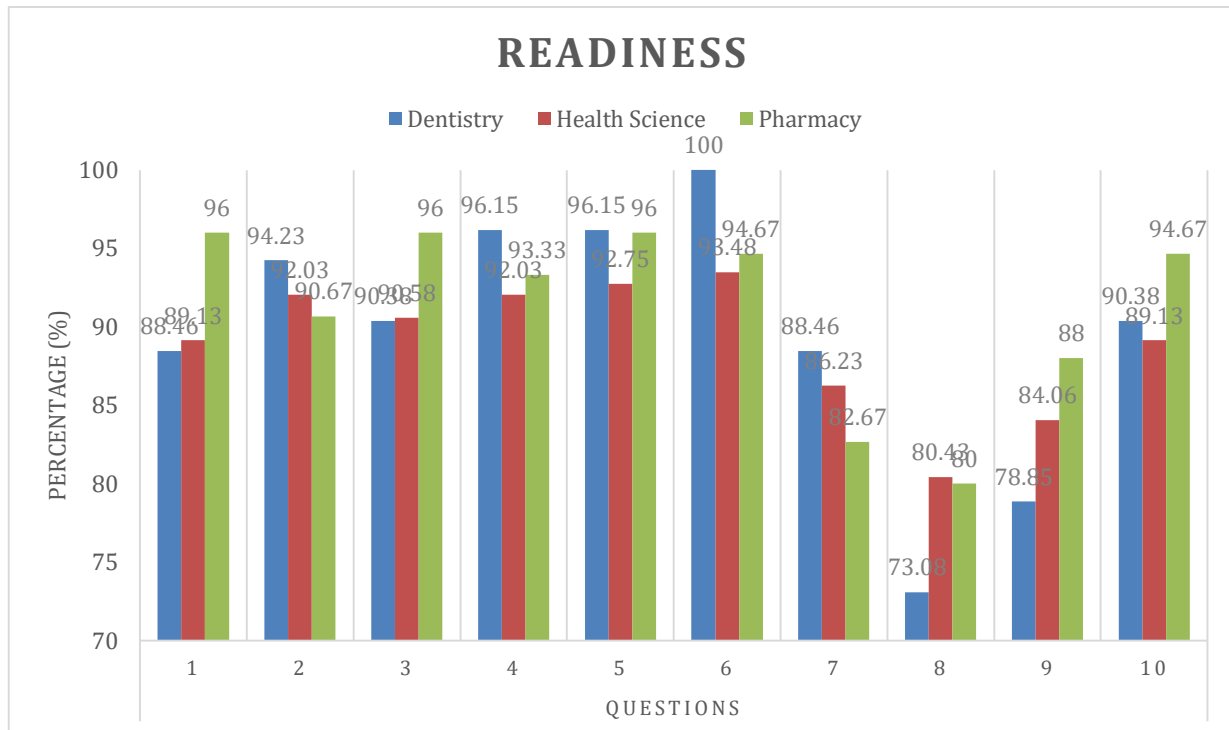
3.3 Readiness of Education 4.0

Majority of the participants (>78%) undisputedly agreed that they were ready for Education 4.0 based on the questions that we had made. More than 90% of all participants agreed that they were ready to learn anytime anywhere (Q1), e-learning tools will offer great opportunities for remote, self-coordinated learning (Q2), interactive learning would be personalized to individual students (Q3), choosing how they want to learn (Q4), be exposed to more structured and problem-based learning through Education 4.0 (Q5) and more hands-on learning through practical application (Q6) and be more independent in their own learning (Q10). (Q6) recorded the highest percentage (95.1%) among them. 85.7% and 84.2 % of all participants agreed that they were ready to be exposed to more critical skills on data interpretation (Q7), that their opinion will be considered in designing and updating the curriculum (Q9) respectively. 78.9% of all participants, which was the lowest, agreed that they were ready to be evaluated not examined (Q8) while 14.3% of participants were unsure contributing to the highest percentage of 'unsure' among any other questions (Figure 4).

READINESS

Agree ■ Not Sure ■ Disagree ■

Figure 4 Readiness of Education 4.0 among health science students in UKM

The majority of the participants were ready to take learning anytime and anywhere (Q1), especially students from the Faculty of Pharmacy where 96% of them agreed to learn anytime and anywhere as shown in Figure 5. Besides that, it could be seen that high numbers of students from each faculty were ready to use e-learning tools for remote, self-coordinated learning (Q2). 96% of students from Faculty of Pharmacy which has the highest number among the others were ready to decide on their own ways of learning (Q3) while 90.38% of students from Faculty of Dentistry and 90.58% of students from Faculty of Health Science were ready to decide their own ways of learning. Moreover, an average of 93.84% of students from all three faculties were ready to decide their own pace of mastering skills in their studies (Q4). Furthermore, it was noticed that 96.15% of dentistry students, 92.75% of health science students and 96% of pharmacy students were ready to expose to more structured and problem-based learning (Q5). All dental students who participated in this study were ready to apply more hands-on learning practically (Q6) whereas only 93.48% and 94.67% of students from Faculty of Health Science and Faculty of Pharmacy were ready to do so. Mean percentage of 85.79% of students involved were ready to be exposed to critical skills on data interpretation (Q7). Readiness to be evaluated continuously throughout their study with no examination (Q8) among dentistry, health science and pharmacy students were 73.08%, 80.43% and 80% respectively. Mean percentage of students involved who were ready to voice out their opinion regarding the current curriculum (Q9) was 83.64% while the mean percentage of students who were ready to be more independent in their own learning (Q10) was 91.39 (Figure 5).

Figure 5 Readiness of Education 4.0 among health faculty in UKM

From the data collected in Figure 6, among all students involved, readiness of year 2 students to take learning anytime and anywhere (Q1) was the highest among all years of study which was 97.83%. All year 1 students involved in this study were ready to use e-learning tools for remote, self-coordinated learning (Q2). Besides, 89.1% of year 2 students had recorded the highest percentage among all who were ready to decide on their own ways of learning (Q3). Furthermore, readiness of year 1 students was noticed highest among to decide on their own pace of mastering skills in their study (Q4), to be evaluated continuously throughout their study with no examination (Q8) and be more independent in their own learning (Q10) where respective percentage were recorded at 95.24%, 88.1% and 92.86%. Moreover, readiness to be exposed to more structured and problem-based learning (Q5) was the highest among year 4 students involved in the study which recorded 97.85%. On the other hand, the percentage of year 5 students in readiness to apply more hands-on learning practically (Q6) and be exposed to critical skills on data interpretation (Q7) was the highest among other years of study which was 100% and 92% respectively. Lastly, mean percentage of 91.04% from year 1 to year 5 students involved in this study were ready to voice out their opinion regarding the current curriculum (Q9).
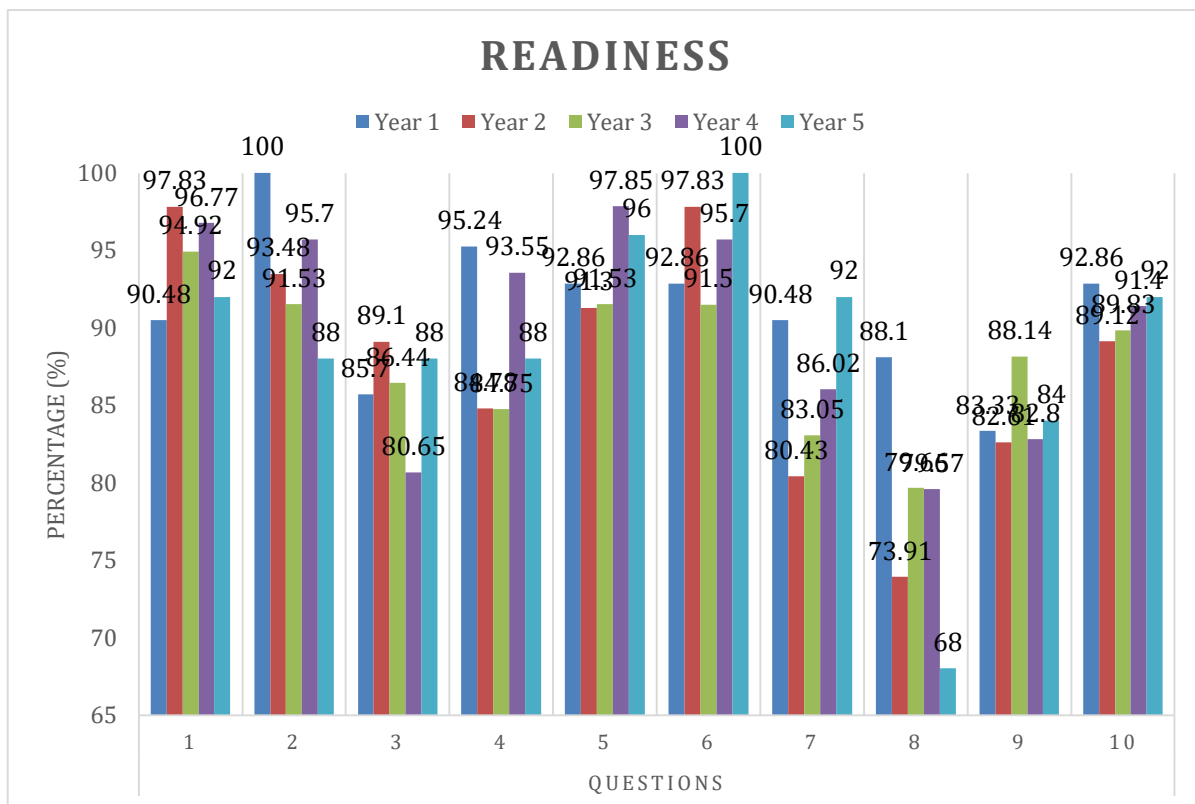
Figure 6 Readiness of Education 4.0 among year of study in UKM

4. Discussion

Majority of the participants in this study were females. Since the proportions of male students were small in our study, it was not appropriate to determine the outcomes based on gender. This was due to the fact that the intake of UKM students was dominated by females. Age and ethnicity were not appropriate as the comparable criteria due to big differences in proportion size within those demographic profiles. For instance, the number of participants of age group 21-23 and Malay ethnicity were too large to be compared in their respective demographic profile.

The outcomes of the findings showed that students at UKM were highly aware and ready for Education 4.0. Similar studies conducted by different researchers have shown similar results. This finding was consistent with previous studies involving student's feedback regarding Education 4.0. Other study reported that 82.6% of students claimed that they felt very comfortable while 17.4% claimed that they felt comfortable in flip learning approach [5]. This finding suggested that students enjoyed the teaching approach advocated in Education 4.0.

Our choice of questions was designed according to the nine trends related to Education 4.0 [2]. First, learning could be conducted anytime anywhere. According to Internet Survey, it was found that 89.4% of internet users in Malaysia used smartphones as a medium to access the internet [6]. This explained the high percentage (>88%) of students were aware and ready to learn no matter when and where they were as the time and physical boundaries of the traditional classroom no longer existed. Secondly, e-learning tools offer great opportunities for remote, self-paced learning due to the huge role of flipped classroom which allows interactive learning to be done in class while theoretical parts to be learned outside of classroom. In an e-learning environment, students need access to technological tools, software and the internet, which enables them to be interested in engaging in the blended learning model of instruction. This view was supported by

other study who revealed that the barriers impinging on the implementation of blended learning in developing countries were internet connectivity, computer and software equipment [7].

Next, learning will be personalized to individual students. Web can be globally distributed and has a highly personalized media for delivery information. Personalized learning could be introduced where tasks of different difficulties level will be assigned according to their mastery level [8]. Our study reported that year 2 students had the highest percentage of readiness (89.1%) towards personalized interactive learning while year 4 students ranked the lowest percentage (80.65%). The low rating on self-directed learning could be due to the reason that students, in the context of a Malaysian higher education institute, were not comfortable with e-learning, and preferred traditional learning [9]. This may explain the current situation whereby year 4 students have a busier schedule than year 2 students and they were more familiar with the traditional way of learning.

Furthermore, Education 4.0 enabled students to have a choice in determining how they want to learn. Despite the preset learning outcomes of a course by the institutions in charge of the curriculum, students were given the freedom to select the learning tools or techniques that they prefer. According to a study, individual learners could control their pace of learning, information flow, selection of learning activities, and time management [10]. This was supported by another study mentioning that the current studies support and encourage students to have control over the whole learning process [11]. In our study, it could be noticed that students from Faculty of Dentistry were most aware and ready of determining the way they learn. This might be due to various ways of learning imposed in the curriculum of the Faculty of Dentistry to expose students with current knowledge through workshops, lectures, simulation learning, etc. A study found that students were more likely to have a better experience with different types of online learning activities [12]. This finding also supported by other study [13].

Besides, Education 4.0 would expose students to more project-based learning. Students were required to complete short term projects based on their current knowledge and skills. Through the projects, they were able to practice their organizational, collaborative as well as time management skills which are useful in their future careers. Students from the Faculty of Dentistry recorded the highest percentage of over 96% agreeing to more exposure towards project-based learning through e-learning. This was because dentistry students were often required to present their case study of their own patients throughout their curriculum.

Moreover, students would be exposed to more hands-on learning through internships, mentoring projects and collaborative projects. Education 4.0 has made more room for acquiring skills that involve human knowledge and face-to-face interaction. From our study, Dentistry students had the highest awareness and readiness to be exposed to more hands-on learning through practical applications. A study reported that hands-on learning was more superior to conventional classroom learning when it comes to long term memory performance [14]. Therefore, it supported our results whereby dentistry students were required to undergo three years of clinical practice throughout their curriculum.

Apart from that, students will be exposed to more critical skills on data interpretation which their theoretical knowledge and reasoning skills were needed to make inferences from given sets of data from our data, dentistry students showed the highest percentage of awareness of learning critical skills on data interpretation. However, they were the least ready to be exposed to skill for data interpretation as dentistry students found it unsuitable to their curriculum.

Furthermore, students will be evaluated, not examined so that they can assess differently. Students' factual

knowledge can be assessed during the learning process, while the application of the knowledge can be tested when they are working on their projects in the field. Our study showed dentistry students were the least ready that they would be evaluated, not examined as they were used to the examination system that had high weightage on theory tests.

On the other hand, students' opinions will be considered in designing and updating the curriculum. Curriculum designers can make sure that the current curriculum system is up-to-date. A study found that vast majority considered assessment feedback a valued part of their learning when done effectively [15]. Majority of students from all faculties were aware that their opinions were needed in designing curriculum.

Last but not least, students will be more independent in their own learning, thus forcing teachers to assume a new role as facilitators who will guide the students through their learning process. Our study showed that the majority of students from different faculties had high awareness and readiness to be independent in their own learning as they need to be on their own in their future practice without lecturer's supervision. According to a study, receiver of e-learning was ready to commit towards e-learning, willing to allocate time to upgrade professional knowledge through e-learning and believe e-learning is an efficient medium of information dissemination and advanced mode of teaching and learning [16].

5. Conclusion
Almost two thirds of the students were aware and ready for Education 4.0. Faculty of Dentistry has the greatest awareness while Faculty of Pharmacy has the greatest readiness towards Education 4.0. The high outcomes of awareness and readiness among students highlighted and described their learning preference brought by Education 4.0.

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